

**Travis Air Force Base  
Environmental Restoration Program  
Restoration Program Manager's  
Meeting Minutes  
18 January 2018, 0930 Hours**

Mr. Lonnie Duke of the Air Force Civil Engineer Center (AFCEC) Restoration Installation Support Section (ISS) conducted the Restoration Program Manager's (RPM) meeting on 18 January 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
Angel Santiago Jr.	AFCEC/CZOW
Haekyung Kim (via telephone)	AFCEC/CZRW
Merrie Schilter-Lowe	Travis AFB/PAO
Adriana Constantinescu (via telephone)	RWQCB
Ben Fries (via telephone)	DTSC
Monika O'Sullivan	AFCEC/CZOW
Nadia Hollan Burke	USEPA
Indira Balkissoon (via telephone)	Techlaw, Inc
Jeff Gamlin (via telephone)	CH2M
Mike Wray	CH2M

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 (November 2017)
Attachment 4	CGWTP Monthly Data Sheet (November 2017)
Attachment 5	LF007C GWTP Monthly Data Sheet (November 2017)
Attachment 6	ST018 Monthly Data Sheet (November 2017)
Attachment 7	SBBGWTP Monthly Data Sheet (December 2017)
Attachment 8	CGWTP Monthly Data Sheet (December 2017)
Attachment 9	LF007C GWTP Monthly Data Sheet (December 2017)

Attachment 10	ST018 Monthly Data Sheet (December 2017)
Attachment 11	Travis AFB KC-46 Hangar Plan (Figure)
Attachment 12	Presentation: Program Update (January 2018)

## **1. ADMINISTRATIVE**

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

The 15 November 2017 RPM meeting minutes were approved and finalized as written.

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

Action items from November 2017 were reviewed.

Action item 1 is ongoing: Ms. O'Sullivan to provide updates on perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA). 15 January 2018 update: The SI Report review has been delayed due to closure of the Ventura office for fires and mudslides. Additional sampling is being considered based on results of the follow-up sampling conducted in October 2017.

Action item 2: The Air Force will determine if site boundaries can be changed. 17 January 2018 Update: Mr. Duke has confirmed that it is permissible to change site boundaries; applicable to November discussions related to Sites SS035 and SS014.

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

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

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

The next RPM meeting will be a meeting to be held on Wednesday 21 February 2018, at 0930 hours.

Lonnie is scheduled to be in Alabama during the scheduled RPM teleconference in September 2018. This meeting date (09-19-2018) may need to be re-scheduled.

## **Travis AFB Master Document Schedule**

- Community Relations Plan (CRP): No change was made to the schedule. Comments have been received from AFCEC Public Affairs. A draft final version will be submitted next; the web pages will not require review since they can be changed on the fly as needed. A schedule update is expected at the next RPM meeting.
- Amendment to the WABOU Soil ROD for Travis AFB ERP Sites DP039, SD043, and SS046: The submittal of draft to agencies date was changed to 30 November 2017 to reflect actual submittal date; the remainder of the schedule was changed accordingly. Mr. Wray noted that the timing on this document is crucial.
- Amendment to the NEWIOU Soil ROD for the Travis AFB ERP Sites SS016 and SD033: The submittal date of the pre-draft version was changed to 25 January 2018 to reflect actual submittal date. The remainder of the schedule was changed accordingly.
- Site SD031 Soil Remedial Investigation/Feasibility Study: This is a new document.
- Potrero Hills Annex (FS, PP, and ROD): No change was made to the schedule. Mr. Anderson said the contractor provided a summary of findings.
- Data Gap Investigation Results Technical Memorandum for Soil Sites SD033, SD043, and SS046: No change was made to the schedule.
- Data Gap Investigation Results Technical Memorandum for Soil Site SS016: Draft to Agencies date changed to 30 November 2017 to reflect the actual submittal date.
- Site SD043 Excavation Work Plan: This is a new document. This is a WABOU site, and the schedule will be developed as the WABOU ROD Amendment is finalized.
- Site SS046 Excavation Work Plan: This is a new document. This is a WABOU site, and the schedule will be developed as the WABOU ROD Amendment is finalized.
- Quarterly Newsletters (January 2018): No change to the schedule.
- 2016 Annual GRISR: The Response to Comments date has been changed to 21 December 2017; the remainder of the schedule was changed accordingly. Mr. Anderson expressed appreciation for finalizing this document in 2017. Mr. Duke requested the GIS files from CH2M.
- Site TS060 Removal Action Completion Report: The Draft to Agencies date was changed to 11 December 2018 to account for actual submittal date. The rest of the schedule was changed accordingly. Mr. Fries and Ms. Constantinescu both noted that they would not have comments on this document and will send an email confirmation for the record.
- Site SS035 Site Closure Report: The Draft to Agencies date was changed to 21 December 2017 to reflect actual submittal date; the rest of the schedule was changed accordingly.
- Site DP039 Monitoring Well Installation Report, Addendum to the Site DP039 Remedial Action Construction Completion Report: This is a new document.

- Sites LF006, SS030, and SD031 Aquifer Test Activities Technical Memorandum This is a new document.
- Site FT005 Extraction System Optimization Report: This is a new document.
- Emulsified Vegetable Oil Sites FT004, SS015, SD031, and SD036 Optimization Injections Report. This is a new document.
- POCO Evaluation/Closure Report for DERA-funded Oil/Water Separators OW040, OW047, OW048, OW049, OW052, OW050, OW052, OW055, OW056, and OW057. Draft to Agencies Due date was changed to 19 December 2017 to reflect actual submittal date; the rest of the dates were changed accordingly. The Water Board indicated an extension of the review time will be needed.
- Area of Concern TA500 Data Gap Investigation and Closure Report: This is a new document
- The following documents were moved to History:
  - Work Plan for the Fourth Five-year Review

## 2. CURRENT PROJECTS

### Treatment Plant Operation and Maintenance Update

#### **South Base Boundary Groundwater Treatment Plant, November 2017 (see Attachment 3)**

The South Base Boundary Groundwater Treatment Plant (SBBGWTP) performed at 99.9% uptime, and 6.3 million gallons of groundwater were extracted and treated in November 2017. All treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 129.6 gallons per minute (gpm). Electrical power usage was 16,712 kWh, and approximately 13,167 pounds of CO<sub>2</sub> were created (based on DOE calculation). Approximately 2.08 pounds of volatile organic compounds (VOCs) were removed in November. The total mass of VOCs removed since startup of the system is 494.7 pounds.

Optimization Activities for SBBGWTP: In October 2017, five (5) new extraction wells were installed to optimize removal of residual 1,2-DCA at Site FT005. This resulted in an increase in flow rate to approximately 185 gallons per minute.

#### **Central Groundwater Treatment Plant, November 2017 (see Attachment 4)**

The Central Groundwater Treatment Plant (CGWTP) performed at 90.4% uptime with approximately 1,260,656 gallons of groundwater extracted and treated in November

2017. All treated water was discharged to the storm sewer system which discharges to Union Creek. The average flow rate for the CGWTP was 29.3 gpm. Electrical power usage was 2,371 kWh for all equipment connected to the Central Plant, and approximately 2,643 pounds of CO<sub>2</sub> were generated. Approximately 2.13 pounds of VOCs were removed from groundwater by the treatment plant in November. The total mass of VOCs removed since the startup of the system is 11,477 pounds.

Optimization Activities for CGWTP: No optimization activities are reported for the month of November 2017.

### **LF007C Groundwater Treatment Plant, November 2017 (see Attachment 5)**

The Subarea LF007C Groundwater Treatment Plant (LF007C GWTP) performed at 66.6% uptime with approximately 139,990 gallons of groundwater extracted and treated in November 2017. All treated water was discharged to the Duck Pond for beneficial reuse. The average flow rate was 4.3 gpm. This plant operates on solar power only. Approximately  $1.45 \times 10^{-3}$  pound of VOCs was removed from groundwater by the treatment plant in November. The total mass of VOCs removed since the startup of the system is 174.38 pounds.

Optimization Activities for LF007C GWTP: No optimization activities are reported for the month of November 2017.

Note: In November 2017, the LF007C GWTP system was shut down for approximately 11 days because the treatment pad sump flooded with rainwater. On 20 November, the rainwater was pumped out of the pad and sump, and the system was restarted without issue. Mr. Santiago and Mr. Duke noted that this facility is open to the atmosphere and rain water must be pumped out by hand. This is done as part of the post-rain event inspections.

### **ST018 Groundwater (MTBE) Treatment Plant, November 2017 (see Attachment 6)**

Site ST018 (MTBE) Treatment Plant (ST018 GWTP) performed at 100% uptime with approximately 83,880 gallons of groundwater extracted and treated in November 2017. All treated water was discharged to the Fairfield – Suisun Sewer District. The average flow rate for the ST018 GWTP was 2.2 gpm. Electrical power usage for the month was 47 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 35 pounds. Approximately 0.07 pounds of BTEX, VOCs, and TPH was removed in November by the treatment plant, and approximately 0.01 pounds of MTBE was removed from groundwater. The total BTEX, MTBE and TPH mass removed since the startup of the system is 42.8 pounds, and the total MTBE mass removed since startup of the system is 10.6 pounds.

Note: Electrical power use at the ST018 GWTP is only for the alarm system and a pump that pushes water through the GAC vessels for treatment. The four groundwater extraction pumps in the system are all solar powered.

Optimization Activities for ST018 GWTP: Beginning in October 2017, three of the four extraction wells (EW2014x18, EW2016x18, and EW2333x18) began operating in a two-week “pulse-mode” (two weeks off, two weeks on, two weeks off, and so forth). Performance is being tracked month to month.

### **South Base Boundary Groundwater Treatment Plant, December 2017 (see Attachment 7)**

The South Base Boundary Groundwater Treatment Plant (SBBGWTP) performed at 99.5% uptime, and 6.3 million gallons of groundwater were extracted and treated in December 2017. All treated water was discharged to Union Creek. The average flow rate for the SBBGWTP was 156.5 gallons per minute (gpm). Electrical power usage was 18,537 kWh, and approximately 14,517 pounds of CO<sub>2</sub> were created (based on DOE calculation). Approximately 1.34 pounds of volatile organic compounds (VOCs) were removed in December. The total mass of VOCs removed since startup of the system is 496.0 pounds.

Optimization Activities for SBBGWTP: No optimization activities are reported for the month of December 2017.

Note: A new general fuels permit went into effect on 1 January 2018. The Air Force is exempt from having to obtain this permit, but will operate according to its substantive requirements. Future sampling will follow the schedule prescribed in this permit. This will affect all GWTPs except for ST018.

### **Central Groundwater Treatment Plant, December 2017 (see Attachment 8)**

The Central Groundwater Treatment Plant (CGWTP) performed at 100% uptime with approximately 1,263,052 gallons of groundwater extracted and treated in December 2017. All treated water was discharged to the storm sewer system which discharges to Union Creek. The average flow rate for the CGWTP was 30.1 gpm. Electrical power usage was 2,340 kWh for all equipment connected to the Central Plant, and approximately 2,620 pounds of CO<sub>2</sub> were generated. Approximately 2.26 pounds of VOCs were removed from groundwater by the treatment plant in December. The total mass of VOCs removed since the startup of the system is 11,479 pounds.

Optimization Activities for CGWTP: No optimization activities are reported for the month of December 2017.

### **LF007C Groundwater Treatment Plant, December 2017 (see Attachment 9)**

The Subarea LF007C Groundwater Treatment Plant (LF007C GWTP) performed at 100% uptime with approximately 169,360 gallons of groundwater extracted and treated in December 2017. All treated water was discharged to the Duck Pond for beneficial reuse. The average flow rate was 4.0 gpm. This plant operates on solar power only. Approximately  $1.70 \times 10^{-3}$  pound of VOCs was removed from groundwater by the treatment plant in December. The total mass of VOCs removed since the startup of the system is 174.38 pounds.

Optimization Activities for LF007C GWTP: No optimization activities are reported for the month of December 2017.

Note: Additional sampling will be conducted, and samples will be analyzed with and without silica gel cleanup, to aid in determining if the source of TPH detected in Fall 2017 samples is from a biogenic source.

### **ST018 Groundwater (MTBE) Treatment Plant, December 2017 (see Attachment 10)**

Site ST018 (MTBE) Treatment Plant (ST018 GWTP) performed at 100% uptime with approximately 89,960 gallons of groundwater extracted and treated in December 2017. All treated water was discharged to the Fairfield – Suisun Sewer District. The average flow rate for the ST018 GWTP was 1.7 gpm. Electrical power usage for the month was 50 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 37 pounds. Approximately 0.04 pound of BTEX, VOCs, and TPH was removed in December by the treatment plant, and approximately 0.01 pound of MTBE was removed from groundwater. The total BTEX, MTBE and TPH mass removed since the startup of the system is 42.8 pounds, and the total MTBE mass removed since startup of the system is 10.6 pounds.

Note: Electrical power use at the ST018 GWTP is only for the alarm system and a pump that pushes water through the GAC vessels for treatment. The four groundwater extraction pumps in the system are all solar powered.

Optimization Activities for ST018 GWTP: Two of the four extraction wells (EW2014x18 and EW2016x18) continued to operate in a two-week “pulse-mode” (two weeks off, two weeks on, two weeks off, and so forth) through December. The third well was non-operational due to a pump fault resulting from excess sediment dug up by a burrowing animal. Samples have been collected after specified intervals and will be evaluated in January to determine the effectiveness of the pulsed mode operation on MTBE capture.

### **3. Presentations:**

#### **A) Land Use Control Inspection Update (No Attachments)**

Mr. Anderson provided an overview of the two-day land use control (LUC) inspection that occurred the previous week. Highlights of the discussion include:

Overall it was a very positive experience; access was given to parts of the Base that are normally inaccessible or restricted.

The new hangar planned for Site SS016 was discussed.

This visit was conducted earlier in the year than normal so that the Five Year Review contractor and the Base planner could attend.

Several people attended: Joachim Eberharter from TetraTech, the contractor responsible for the Five Year Review; Ms. Burke from EPA; Mr. Fries from DTSC; Mr. Santiago (Travis ERP); and the Base Community Planner; among others.

Mr. Anderson is transitioning his knowledge of the Base, the LUCIP, and the review checklists to Seth Merdler, Civil Engineering personnel, starting now, to assure consistency at the time of his and Mr. Duke's eventual retirement. His hope is that these inspections will be conducted by Base personnel in the near future.

The next ERP contract, regardless of contract mechanism, will include requirements for annotated checklists and will support the management of the existing controls.

#### **B) KC-46 Hangar Planned for Site SS016 (See Attachment 11)**

Mr. Duke and Mr. Anderson discussed the KC-46 hangar planned for an area within Site SS016. Please refer to Attachment 11 for details. Highlights of the discussion include the following:

This may be the largest hangar in the Air Force and will include three bays.

The hangar is upgradient of the groundwater plume at this site,

The existing bioreactor is in front of and between two of the bay entrances – meaning these doors will not open onto the bioreactor. The hangar was designed to avoid any aircraft contact with the bioreactor.

Curbing will be placed around the bioreactor to prevent any traffic from traversing the bioreactor, and will also prevent inflow of runoff.



Passive venting is planned for office spaces that will be occupied 8 hours per day, 5 days per week, but not the hangar itself. This is because air flow in the main hangar is sufficient when the doors are open to the atmosphere, and also because a passive venting system throughout the main hangar would compromise the integrity of the flooring needed to support the weight of the aircraft.

The hangars are not expected to be occupied with workers 8 hours per day, 5 days per week; but there is a requirement for an air exchange system for use of the hangar when the main doors are closed.

The Site SS016 soil area to the west of the planned hangar needs to be excavated prior to construction in order to prevent delay of awarding the MILCON contract for the hangar construction.

It has been recommended that an industrial hygienist be present during construction activities.

It has been specified that the area overlying the bioreactor cannot be used as a construction staging or laydown area.

This will be a major construction effort and a high visibility project for the Air Force.

Demolition of existing buildings is expected to commence in 2019. The asbestos inspections are occurring now.

Ms. Burke requested that she be kept up to date on the status of the related NEWIOU Soil ROD Amendment excavation at Site SS016 for congressional briefings.

### **C) Program Update: Activities Completed, In Progress, and Upcoming (see Attachment 12)**

Mr. Wray reported on the status of fieldwork and documents which are completed, in progress, and upcoming. Please refer to Attachment 12 for the full briefing.

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

No new action items were identified.

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

Mr. Wray announced that CH2M is now officially Jacobs; however, there will be no changes to the existing contract, and the change will not impact the work being conducted.

Mr. Anderson noted that a No Further Action Proposed Plan and Record of Decision are needed, per AFLOA, in order to close out Site TS060. Mr. Anderson will prepare these documents, using the Guardian format for the Proposed Plan, and will utilize the Viewpoint section in The Guardian to explain the need for the NFA Proposed Plan to the public. He will emphasize to the public that the remedial activities have already been conducted, that no additional remedial activities are necessary to make the site acceptable for closure, and that the NFA Proposed Plan is one of the required steps in the CERCLA process. A notification of public comment period and public meeting, as well as a mail-back comment card, will be included in that issue of The Guardian. This will fulfill the public noticing and fact sheet requirements. Mr. Anderson noted that the public meeting will coincide with the April 2018 RAB meeting. Ms. Burke will look into acceptable transcript options that fulfill CERCLA public meeting requirements for NFA sites.

## 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

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

The RPM Teleconference is scheduled for 9:30 AM PST on 17 January 2018. **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. 2017 ANNUAL LAND USE CONTROL INSPECTION
- B. IMPACT OF HANGAR CONSTRUCTION ON SITE SS016
- C. SITE TS060 NFA PROPOSED PLAN/ROD PATH FORWARD
- D. 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.

**(2018)**  
**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>
—	01-17-18	—
02-21-18	—	—
—	03-21-18	—
04-19-18 (Thursday 2:00 PM)	—	04-19-18
—	05-16-18	—
06-20-18	—	—
—	07-18-18	—
08-15-18	—	—
—	09-19-18	—
10-18-18 (Thursday 2:00 PM)	—	10-18-18 <sup>2</sup>
—	11-21-18	—
—	—	—

<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 date in lieu of RAB meeting.

## Travis AFB Master Meeting and Document Schedule

PRIMARY DOCUMENTS				
Life Cycle	Community Relations Plan Travis AFB, Glenn Anderson CH2M, Jill Dunphy	Amendment to the WABOU Soil ROD for the Travis AFB ERP Sites DP039, SD043, and SS046 Travis AFB, Glenn Anderson CH2M, Latonya Coleman	Amendment to the NEWIOU Soil ROD for the Travis AFB ERP Sites SS016 and SD033 Travis AFB, Glenn Anderson CH2M, Latonya Coleman	Site SD031 Remedial Investigation/Feasibility Study Travis AFB, Glenn Anderson CH2M, Nikki Carlton
<b>Scoping Meeting</b>	NA	NA	NA	NA
Predraft to AF/Service Center	08-23-16	10-09-17	01-25-18	02-28-18
AF/Service Center Comments Due	09-07-16	11-08-17	02-26-18	03-30-18
Draft to Agencies	09-28-16	11-30-17	03-14-18	04-13-18
Draft to RAB	09-28-16	11-30-17	03-14-18	04-13-18
Agency Comments Due	10-28-16 (11-28-16)	01-31-18	05-14-18	06-12-18
<b>Response to Comments Meeting</b>	<b>TBD</b>	<b>02-21-18</b>	<b>05-16-18</b>	<b>06-20-18</b>
Agency Concurrence with Remedy	NA	NA	NA	NA
Public Comment Period	NA	NA	NA	NA
<b>Public Meeting</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>
Response to Comments Due	TBD	03-07-18	05-30-18	07-06-18
Draft Final Due	TBD	03-07-18	05-30-18	07-06-18
Final Due	TBD	04-06-18	06-29-18	08-06-18

## 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

SECONDARY DOCUMENTS				
Life Cycle	Data Gap Investigation Results Technical Memorandum for Soil Sites SD033, SD043, and SS046 Travis AFB, Glenn Anderson CH2M, Leslie Royer	Data Gap Investigation Results Technical Memorandum for Soil Site SS016 Travis AFB, Glenn Anderson CH2M, Doug Berwick CAPE, Meg Greenwald	Site SD043 Excavation Work Plan Travis AFB, Glenn Anderson CH2M, Levi Pratt	Site SS046 Excavation Work Plan Travis AFB, Glenn Anderson CH2M, Doug Berwick CAPE, Meg Greenwald
<b>Scoping Meeting</b>	NA	NA	NA	NA
Predraft to AF/Service Center	07-26-17	10-04-17	TBD	TBD
AF/Service Center Comments Due	08-09-17	10-18-17	TBD	TBD
Draft to Agencies	09-19-17	11-30-17	TBD	TBD
Draft to RAB	09-19-17	11-30-17	TBD	TBD
Agency Comments Due	10-19-17 (11-20-17)	01-02-18	TBD	TBD
<b>Response to Comments Meeting</b>	<b>(11-15-17) 01-17-18</b>	<b>01-17-18</b>	<b>TBD</b>	<b>TBD</b>
Response to Comments Due	(12-05-17) 02-01-18	02-02-18	TBD	TBD
Draft Final Due	NA	NA	NA	NA
Final Due	(12-05-17) 02-01-18	02-02-18	TBD	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	Quarterly Newsletters (January 2018) Travis, Glenn Anderson	2016 Annual GRISR Travis AFB, Glenn Anderson CH2M, Leslie Royer	Site TS060 Removal Action Completion Report Travis AFB, Glenn Anderson CH2M, Doug Berwick CAPE, Meg Greenwald
<b>Scoping Meeting</b>	NA	NA	NA
Predraft to AF/Service Center	NA	04-21-17	11-08-17
AF/Service Center Comments Due	NA	05-22-17	11-22-17
Draft to Agencies	01-04-18	06-07-17	12-11-17
Draft to RAB	NA	06-07-17	12-11-17
Agency Comments Due	01-18-18	08-10-17 (08-24-17)	01-15-18
<b>Response to Comments Meeting</b>	<b>TBD</b>	<b>08-16-17 (09-20-17)</b>	<b>01-17-18</b>
Response to Comments Due	01-19-18	09-01-17 (12-21-17)	02-06-18
Draft Final Due	NA	NA	NA
Final Due	01-19-18	09-01-17 (12-21-17)	02-06-18
Public Comment Period	NA	NA	NA
<b>Public Meeting</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>



## Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS		
Life Cycle	Site SS035 Site Closure Report Travis AFB, Glenn Anderson CH2M, Leslie Royer	Site DP039 Monitoring Well Installation Report, Addendum to the Site DP039 Remedial Action Construction Completion Report Travis AFB, Glenn Anderson CH2M, Levi Pratt
<b>Scoping Meeting</b>	NA	NA
Predraft to AF/Service Center	11-07-17	02-07-18
AF/Service Center Comments Due	11-21-17	02-22-18
Draft to Agencies	12-21-17	03-16-18
Draft to RAB	12-21-17	03-16-18
Agency Comments Due	01-25-18	04-16-18
<b>Response to Comments Meeting</b>	02-21-18	04-19-18
Response to Comments Due	03-14-18	05-04-18
Draft Final Due	NA	NA
Final Due	03-14-18	05-04-18
Public Comment Period	NA	NA
<b>Public Meeting</b>	NA	NA

## Travis AFB Master Meeting and Document Schedule

INFORMATIONAL DOCUMENTS			
Life Cycle	Sites LF006, SS030 and SD031 Aquifer Test Activities Technical Memorandum Travis AFB, Glenn Anderson CH2M, Renee Caird	Site FT005 Extraction System Optimization Report Travis AFB, Glenn Anderson CH2M, Levi Pratt	Emulsified Vegetable Oil Sites FT004, SS015, SD031, and SD036 Optimization Injections Report Travis AFB, Glenn Anderson CH2M, Levi Pratt
<b>Scoping Meeting</b>	NA	NA	NA
Predraft to AF/Service Center	02-14-18	02-27-18	03-08-18
AF/Service Center Comments Due	03-01-18	03-13-18	03-22-18
Draft to Agencies	03-21-18	03-29-18	04-05-18
Draft to RAB	03-21-18	03-29-18	04-05-18
Agency Comments Due	04-20-18	04-30-18	05-07-18
<b>Response to Comments Meeting</b>	05-16-18	05-16-18	05-16-18
Response to Comments Due	05-30-18	06-01-18	06-05-18
Draft Final Due	NA	NA	NA
Final Due	05-30-18	06-01-18	06-05-18
Public Comment Period	NA	NA	NA
<b>Public Meeting</b>	NA	NA	NA

## Travis AFB Master Meeting and Document Schedule

INFORMATIONAL POCO DOCUMENTS		
Life Cycle	POCO Evaluation/Closure Report for DERA-funded Oil/Water Separators OW040, OW047, OW048, OW049, OW050, OW052, OW055, OW056, and OW057 Travis AFB, Glenn Anderson CH2M, Doug Berwick	Area of Concern TA500 Data Gap Investigation and Closure Report Travis AFB, Glenn Anderson CH2M, Renee Caird
<b>Scoping Meeting</b>	NA	NA
Predraft to AF/Service Center	02-01-17	12-21-17
AF/Service Center Comments Due	02-15-17	01-08-18
Draft to Agencies	12-19-17	01-23-18
Draft to RAB	12-19-17	01-23-18
Agency Comments Due	01-30-18	02-23-18
<b>Response to Comments Meeting</b>	02-21-18	03-09-18
Response to Comments Due	03-07-18	03-27-18
Draft Final Due	NA	NA
Final Due	03-07-18	03-27-18
Public Comment Period	NA	NA
<b>Public Meeting</b>	NA	NA

## Travis AFB Master Meeting and Document Schedule

HISTORY	
Life Cycle	Work Plan for the Fourth Five-year Review Travis AFB, Glenn Anderson Tetrattech, Joachim Eberharter
<b>Scoping Meeting</b>	<b>06-02-17</b>
Predraft to AF/Service Center	08-01-17
AF/Service Center Comments Due	08-15-17
Draft to Agencies	08-23-17
Draft to RAB	08-23-17
Agency Comments Due	09-28-17
<b>Response to Comments Meeting</b>	<b>10-18-17</b>
Agency Concurrence with Remedy	NA
Public Comment Period	NA
<b>Public Meeting</b>	<b>NA</b>
Response to Comments Due	10-18-17
Draft Final Due	10-18-17
Final Due	11-03-17

# South Base Boundary Groundwater Treatment Plant Monthly Data Sheet

Report Number: 205

Reporting Period: 1 November 2017 – 5 December 2017

Date Submitted: 12 December 2017

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 November 2017 reporting period.

Table 1 – Operations Summary – November 2017				
Initial Data Collection:		11/1/2017 12:40	Final Data Collection:	12/5/2017 12:00
Operating Time:		Percent Uptime:		Electrical Power Usage:
SBBGWTP:	814 hours	SBBGWTP:	99.9%	SBBGWTP: 16,712 kWh (13,167 lbs CO <sub>2</sub> generated <sup>a</sup> )
Gallons Treated: <b>6.3 million gallons</b>		Gallons Treated Since July 1998: <b>1,003 million gallons</b>		
Volume Discharged to Union Creek: <b>6.3 million gallons</b>		Gallons Treated From Other Sources: <b>0 gallons</b>		
VOC Mass Removed: <b>2.08 lbs<sup>b</sup></b>		VOC Mass Removed Since July 1998: <b>494.7 lbs</b>		
Rolling 12-Month Cost per Pound of Mass Removed: \$11,307 <sup>c</sup>				
Monthly Cost per Pound of Mass Removed: \$2,159 <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 800 pounds of GHG from GAC change out services averaged to a per month basis.				
<sup>b</sup> Calculated using November 2017 EPA Method SW8260C analytical results.				
<sup>c</sup> Costs include operations and maintenance, 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> – November 2017							
FT005 <sup>b</sup>				SS029		SS030	
EW01x05	Offline	EW743x05	Offline	EW01x29	1.1	EW01x30	8.2
EW02x05	Offline	EW744x05	3.1	EW02x29	4.6	EW02x30	4.8
EW03x05	Offline	EW745x05	11.9	EW03x29	2.3	EW03x30	4.6
EW731x05	5.7	EW746x05	Offline	EW04x29	6.6	EW04x30	21.0
EW732x05	Offline	EW2291x05	Offline <sup>c</sup>	EW05x29	4.1	EW05x30	17.6
EW733x05	Offline	EW2782x05	4.0	EW06x29	5.9	EW2174x30	7.0
EW734x05	4.7	EW2783x05	7.7	EW07x29	9.3	EW711x30	6.9
EW735x05	11.7	EW2784x05	11.3				
EW736x05	Offline	EW2785x05	5.2				
EW737x05	Offline	EW2786x05	11.5				
EW742x05	Offline						
FT005 Total: 76.8				SS029 Total: 33.9		SS030 Total: 70.1	
SBBGWTP Average Monthly Flow <sup>d</sup> : 129.6 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> These extraction wells are offline due to pump or other malfunction.							
<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	20 November 2017	13:00	20 November 2017	14:00	Replaced bag filters.
-- = Time not recorded <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 1 November 2017. Sample results are presented in Table 4. The total VOC concentration (39.47 µg/L) in the influent sample has decreased from the October 2017 sample results (49.71 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 36.8 µg/L. Several VOCs were detected in the midpoint sampling location, including TCE, cis-1,2-DCE, and chloroform. No VOCs were detected at the effluent sampling location. A carbon change out on the lead GAC vessel is being coordinated.

On 1 November, a system effluent sample was collected and analyzed for metals in accordance with the General Fuels NPDES Permit (Water Board, 2012). The metal detections were compared to background concentrations in the *Travis AFB West/Annexes/Basewide Operable Unit Remedial Investigation* (CH2M HILL, 1997) as well as the trigger values as defined in the General Fuels NPDES permit (Water Board, 2012). Sample results are presented in Table 5. Selenium was detected at a concentration (10.7 µg/L) exceeding the trigger value of 5 µg/L, but the detection is in line with the historical background concentrations as shown in Table 5. No other detections exceeded their respective trigger values. A trigger study for selenium will not be conducted at the SBBGWTP because this detection was below historical background levels. Hexavalent chromium and cyanide were not included in the metals analysis in November 2017; therefore, they will be collected in December 2017 and reported in the December 2017 Monthly Data Sheet.

In addition, on 2 November, a system effluent sample was collected for a bioassay test in accordance with the General Fuels NPDES Permit (Water Board, 2012). One hundred percent of the fish survived the 96-hour test; no statistically significant toxicity was observed.

In November 2017, troubleshooting was performed on several extraction wells. The following list presents the maintenance activities and status of several extraction wells:

- EW02x29 – Replaced a cracked fitting. Well is currently operating.
- EW02x30 – Replaced motor starter and fuse. Well is currently operating.
- EW05x30 – Motor starter malfunction. Starter was cleaned and lubricated. Well is currently operating.
- EW731x05 – Pressure transducer will need to be replaced. Well is currently operating.
- EW2291x05 – Low flow alarm. Additional troubleshooting will be conducted in December.

Figure 1 presents a plot of influent concentrations and average flow at the SBBGWTP over the past twelve (12) months. An overall increase in the VOC influent concentration has been observed in the past 12 months along with an increasing flow rate trend.

In October 2017, the FT005 extraction wells were off line for site construction; five (5) additional extraction wells were installed. In November, the wells were tied into the existing conveyance line. The FT005 extraction wells were restarted on 16 November 2017.

On 20 November, the SBBGWTP was shut down for approximately 1 hour to conduct routine maintenance on the system.

## Optimization Activities

Based on two aquifer tests conducted in June 2017, five (5) new extraction wells (EW2782x05, EW2783x05, EW2784x05, EW2785x05, and EW2786x05) were installed to help extract and treat residual 1,2-DCA at Site FT005. On 16 November 2017, the Site FT005 extraction system was brought back on line without issue, and operated for the remainder of the reporting period. The addition of these five (5) new extraction wells, along with operation of six (6) existing wells (EW731x05, EW734x05, EW735x05, EW744x05, EW745x05, and

EW2291x05) has resulted in an increased flow rate of approximately 70 gpm, for an estimated total flow at the SBBGWTP of approximately 185 gpm. The December 2017 Monthly Data Sheet will present a full month of operation with the new Site FT005 extraction wells.

## 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 November 2017, the SBBGWTP produced approximately 13,167 pounds of GHG, which includes approximately 800 pounds of GHG generated from GAC change out services averaged to a per month basis.



TABLE 4

Summary of Groundwater Analytical Data For November 2017 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	1 November 2017 (µg/L)		
				Influent	Midpoint	Effluent
Halogenated Volatile Organics						
Acetone	NA	1.0	0	ND	ND	ND
Bromodichloromethane	NA	0.15	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND
Chloroform	5.0	0.15	0	ND	0.28 J	ND
Chloromethane	NA	0.15	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	ND	ND	ND
1,1-Dichloroethene	5.0	0.15	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	2.67	1.83	ND
trans-1,2-Dichloroethene	5.0	0.15	0	ND	ND	ND
Methylene Chloride	5.0	0.15	0	ND	ND	ND
Tetrachloroethene	5.0	0.15	0	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.15	0	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.15	0	ND	ND	ND
Trichloroethene	5.0	0.15	0	36.8	5.64	ND
Vinyl Chloride	0.5	0.15	0	ND	ND	ND
Non-Halogenated Volatile Organics						
Benzene	1.0	0.15	0	ND	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND	ND
Toluene	5.0	0.15	0	ND	ND	ND
Xylenes	5.0	0.15 – 0.30	0	ND	ND	ND
Other						
Total Petroleum Hydrocarbons – Gasoline	50	35	0	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	24	0	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil	50 (trigger)	24	0	NM	NM	ND

\* In accordance with Appendix B of the Travis AFB South Base Boundary Groundwater Treatment Plant Operations and Maintenance Manual (CH2M HILL, 2004).

## 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

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

µg/L = micrograms per liter

TABLE 5

Summary of Groundwater Analytical Data For November 2017 – South Base Boundary Groundwater Treatment Plant

Constituent	Background Level <sup>a</sup> (µg/L)	Trigger Value <sup>b</sup> (µg/L)	Detection Limit (µg/L)	1 November 2017 (µg/L)
				Effluent
Dissolved Metals				
Antimony	76	6	0.031	0.0696 J
Arsenic	92.4	10	0.030	0.806
Beryllium	3.18	4	0.025	ND
Cadmium	8.63	1.1	0.030	ND
Chromium	2,820	NA	0.10	3.11
Copper	148	5.9	0.50	2.61
Lead	111	3.2	0.041	0.105 J
Nickel	734	30	0.025	3.10
Selenium	100	5	0.069	10.7
Silver	10.8	2.2	0.025	ND
Thallium	1.85	1.7	0.025	ND
Zinc	323	86	2.5	12.0
Mercury	0.96	0.025	0.045	ND

<sup>a</sup> In accordance with Appendix H1 of the *Travis AFB West/Annexes/Basewide Operable Unit, Remedial Investigation* (CH2M HILL, 1997).

<sup>b</sup> In accordance with the General Fuels NPDES permit (Water Board, 2012).

Notes:

Concentrations in **gray** exceeded the trigger value

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

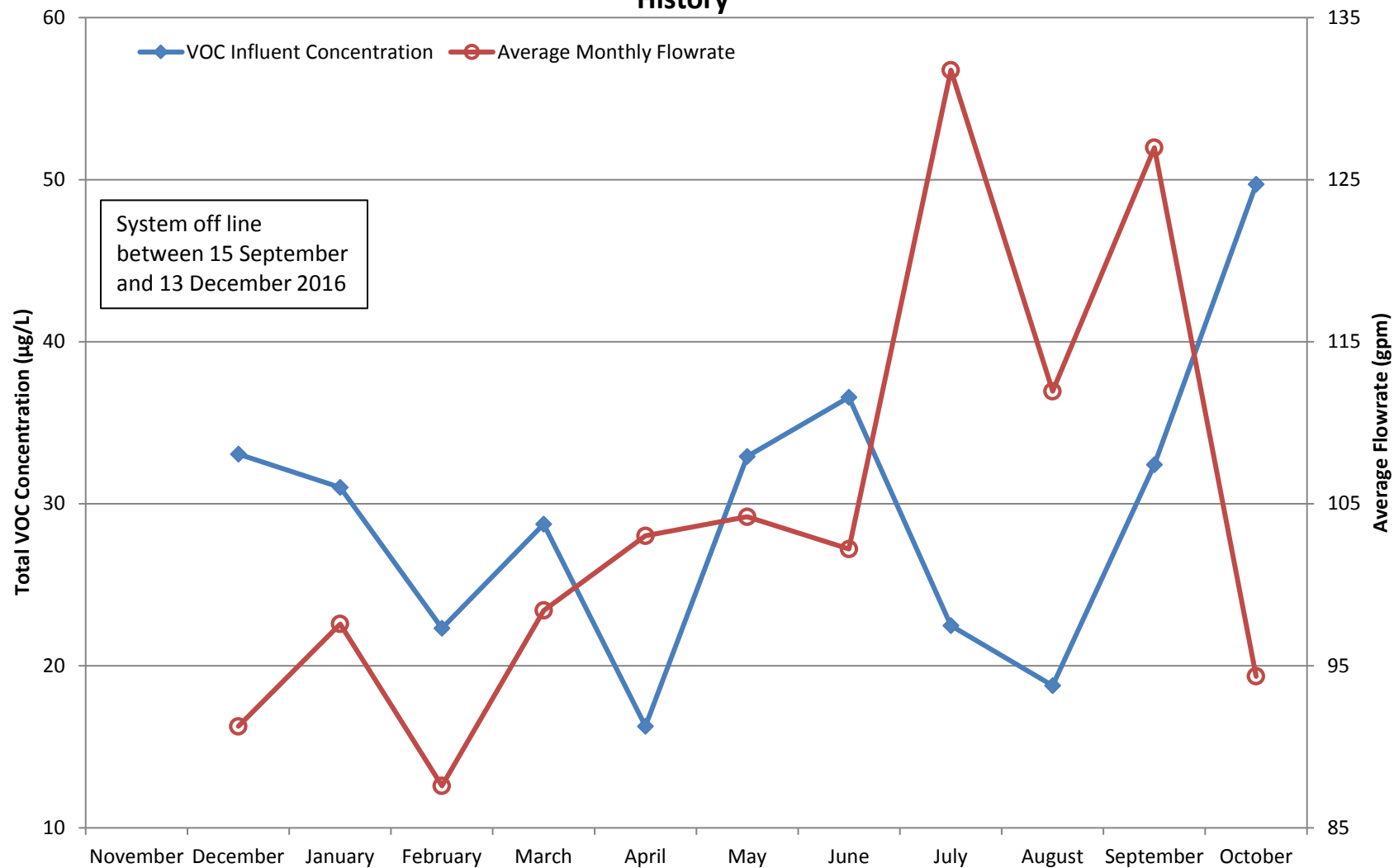
NA = not applicable

ND = not detected

NM = not measured

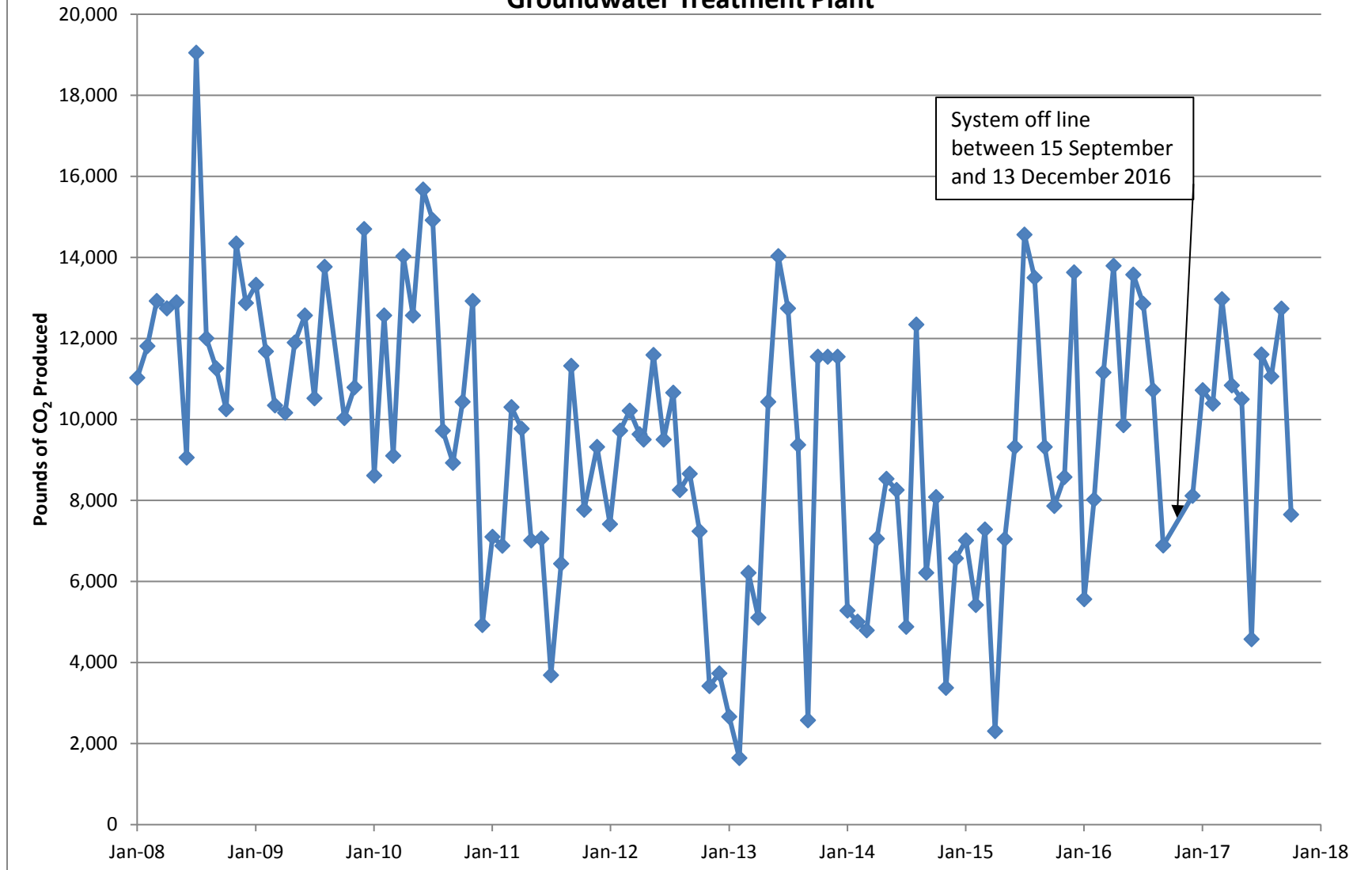
µg/L = micrograms per liter

**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: 220

Reporting Period: 2 November 2017 – 5 December 2017

Date Submitted: 12 December 2017

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 November 2017 reporting period.

Table 1 – Operations Summary – November 2017				
Initial Data Collection:		11/2/2017 11:00	Final Data Collection:	12/5/2017 12:00
Operating Time:		Percent Uptime:	Electrical Power Usage:	
CGWTP:	717 hours	CGWTP:	90.4%	CGWTP: 2,371 kWh (2,643 lbs CO <sub>2</sub> generated <sup>a</sup> )
Gallons Treated (discharge to storm sewer):		Gallons Treated Since January 1996: <b>548.0 million gallons</b>		
<b>1,260,656 gallons</b>				
VOC Mass Removed from groundwater:		VOC Mass Removed Since January 1996:		
<b>2.13 lbs<sup>b</sup></b>		<b>2,791 lbs from groundwater</b>		
		<b>8,686 lbs from vapor</b>		
Rolling 12-Month Cost per Pound of Mass Removed: \$2,224 <sup>c</sup>				
Monthly Cost per Pound of Mass Removed: \$860 <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 November 2017 EPA Method SW8260C analytical results.				
<sup>c</sup> Costs include operations and maintenance, 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> – November 2017	
Location	Average Flow Rate Groundwater (gpm)
EW001x16	13.2
EW002x16	11.1
EW003x16	0.3
EW605x16	6.1
EW610x16	2.6
CGWTP	29.3
<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	1 December 2017	09:40	4 December 2017	14:00	Replaced the starter and overload on the influent transfer pump. Installed a new variable frequency drive (VFD) for the pump motor.
-- = 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 6 – Summary of DP039 Bioreactor “Pulsed Mode” Operations</b>		
<b>Location</b>	<b>Pulse-on Date</b>	<b>Pulse-off Date</b>
MW750x39	29 November 2016	13 December 2016
	27 December 2016	10 January 2017
	7 February 2017	7 March 2017
	5 April 2017	7 August 2017
	7 September 2017	2 October 2017
	6 November 2017	27 November 2017
MW = Monitoring Well		

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the CGWTP on 1 November 2017. Sample results are presented in Table 5. The total VOC concentration (202.53 µg/L) in the November 2017 influent sample has slightly decreased from the October 2017 sample (204.37 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 157 µg/L. Cis-1,2-DCE (16.5 µg/L) and vinyl chloride (0.22 J µg/L) were detected in the sample collected after the first carbon vessel, and vinyl chloride (0.21 J µg/L) was detected in the sample collected after the second carbon vessel. No VOC constituents were detected 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 November 2017. A carbon change out on the lead GAC vessel is being coordinated.

On 1 November, a system effluent sample was collected and analyzed for metals, in accordance with the General Fuels NDPS Permit (Water Board, 2012). The metal detections were compared to background concentrations in the *Travis AFB West/Annexes/Basewide Operable Unit Remedial Investigation* (CH2M HILL, 1997) as well as the trigger values as defined in the General Fuels NPDES permit (Water Board, 2012). Sample results are presented in Table 6. All metal concentrations were less than Travis AFB historical background levels and

trigger values. Hexavalent chromium and cyanide were not included in the metals analysis in November 2017; therefore, they will be collected in December 2017 and reported in the December 2017 Monthly Data Sheet.

In addition to metals analyses, the system effluent sample collected on 2 November was also subjected to a bioassay test in accordance with the General Fuels NPDES Permit (Water Board, 2012). One hundred percent of the fish survived the 96-hour test; hence, no statistically significant toxicity was observed.

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 an overall decreasing trend for the flow rate through the treatment plant.

Between 1 and 4 December, the CGWTP was shut down to perform maintenance on the influent transfer pump. After the starter and overload were replaced, the new VFD was installed and programmed. On 4 December, the system was restarted without issue.

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 brought back on line on 6 November and was taken off line on 27 November.

## Optimization Activities

No optimization activities occurred at the CGWTP in November 2017.

## 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 2,643 pounds of GHG during November 2017, which is an increase from the October 2017 amount of 2,191 pounds.

TABLE 5

Summary of Groundwater Analytical Data for November 2017 – Central Groundwater Treatment Plant

				1 November 2017 (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	1.0	0	ND	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND	ND
Chloroform	5.0	0.15	0	ND	ND	ND	ND
Chloromethane	NA	0.15	0	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	39.6	16.5	ND	ND
1,2-Dichlorobenzene	5.0	0.15	0	0.62	ND	ND	ND
1,3-Dichlorobenzene	5.0	0.15	0	0.92	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.15	0	0.47 J	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	ND	ND	ND	ND
1,1-Dichloroethene	5.0	0.15	0	0.57	ND	ND	ND
Methylene Chloride	5.0	0.15	0	ND	ND	ND	ND
Methyl tert-Butyl Ether	1.0	0.15	0	ND	ND	ND	ND
Tetrachloroethene	5.0	0.15	0	0.55	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.15	0	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.15	0	ND	ND	ND	ND
trans-1,2-Dichloroethene	5.0	0.15	0	2.49	ND	ND	ND
Trichloroethene	5.0	0.15 – 1.5	0	157	ND	ND	ND
Vinyl Chloride	0.5	0.15	0	0.31 J	0.22 J	0.21 J	ND
Non-Halogenated Volatile Organics							
Benzene	1.0	0.15	0	ND	ND	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND	ND	ND
Toluene	5.0	0.15	0	ND	ND	ND	ND
Total Xylenes	5.0	0.15 – 0.30	0	ND	ND	ND	ND
Other							
Total Petroleum Hydrocarbons – Gasoline	50	35	0	NM	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	24	0	NM	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil	50 (trigger)	24	0	NM	NM	NM	ND

\* In accordance with Appendix G of the Travis AFB Central Groundwater Treatment Plant Operations and Maintenance Manual (URS Group, Inc., 2002).

Notes:

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

NA = not applicable

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

ND = not detected

NM = not measured

µg/L = micrograms per liter

mg/L = milligrams per liter



TABLE 6

Summary of Groundwater Analytical Data for November 2017 – Central Groundwater Treatment Plant

Summary of Groundwater Analytical Data for November 2017				1 November 2017
Constituent	Background Level <sup>a</sup> (µg/L)	Trigger Value <sup>b</sup> (µg/L)	Detection Limit (µg/L)	(µg/L)
				System Effluent
Metals				
Antimony	76	6	0.031	0.135 J
Arsenic	92.4	10	0.030	0.690
Beryllium	3.18	4	0.025	ND
Cadmium	8.63	1.1	0.030	ND
Chromium	2,820	NA	0.10	0.299 J
Copper	148	5.9	0.50	3.06
Lead	111	3.2	0.041	0.0585 J
Nickel	734	30	0.025	1.71
Selenium	100	5	0.069	1.78
Silver	10.8	2.2	0.025	ND
Thallium	1.85	1.7	0.025	ND
Zinc	323	86	2.5	ND
Mercury	0.96	0.025	0.045	ND

<sup>a</sup> In accordance with Appendix H1 of the Travis AFB West/Annexes/Basewide Operable Unit, Remedial Investigation (CH2M HILL, 1997).

<sup>b</sup> In accordance with the General Fuels NPDES permit (Water Board, 2012).

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

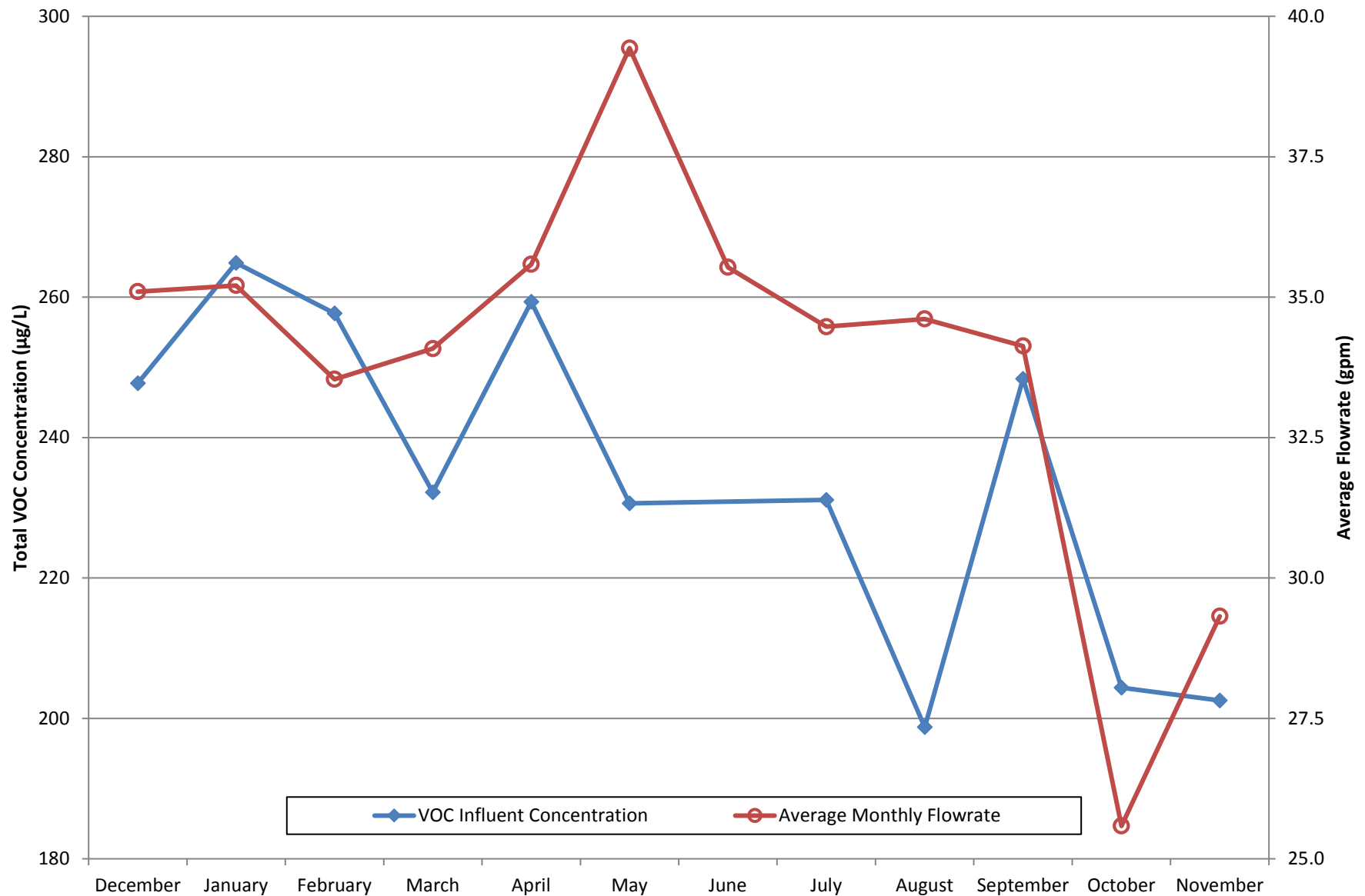
ND = not detected

NM = not measured

µg/L = micrograms per liter

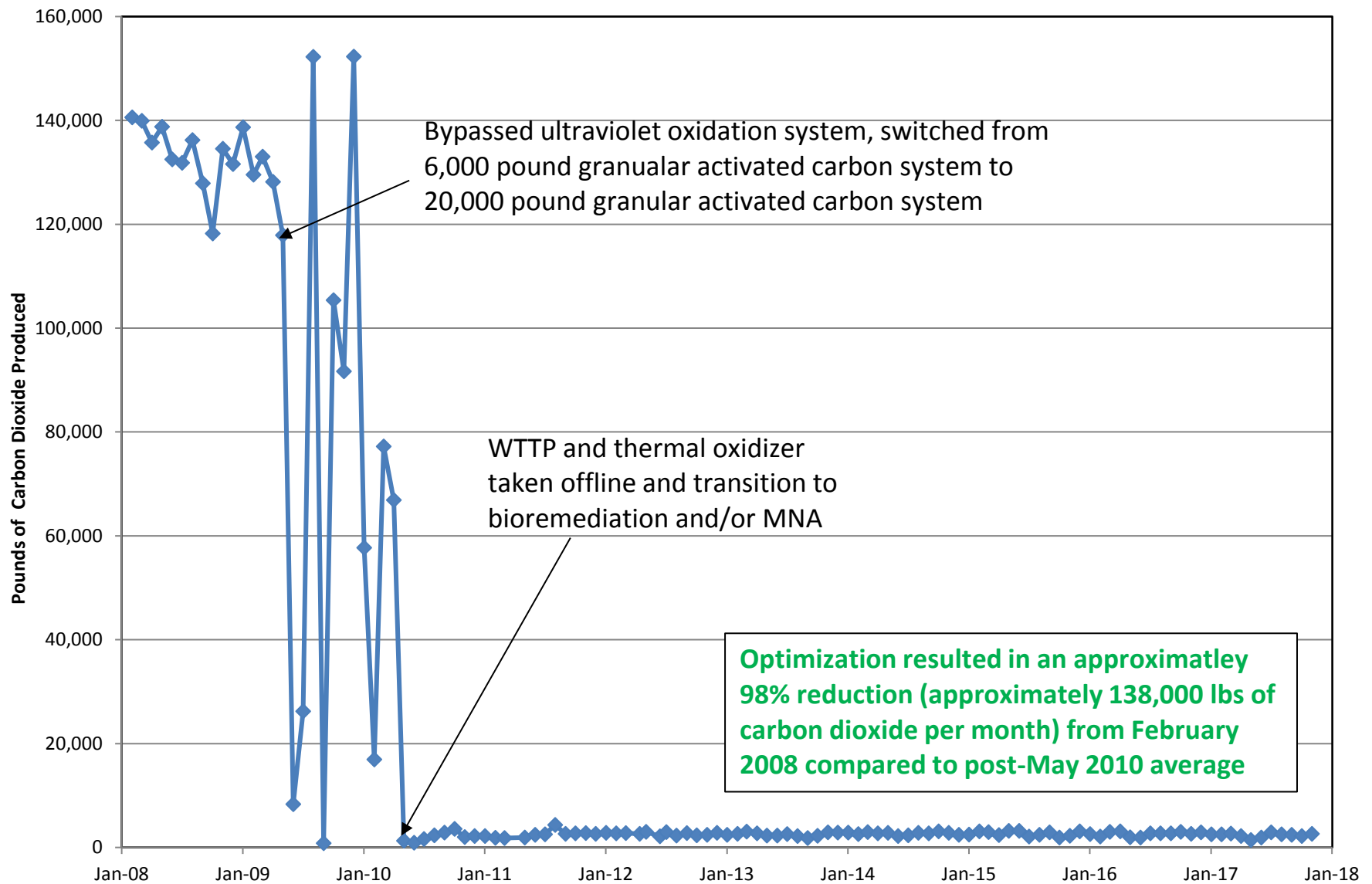
**Figure 1**

**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**



# Subarea LF007C Groundwater Treatment Plant

## Monthly Data Sheet

Report Number: 164

Reporting Period: 1 November 2017 – 5 December 2017

Date Submitted: 12 December 2017

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 November 2017 reporting period:

Table 1 – Operations Summary – November 2017				
Initial Data Collection:		11/1/2017 11:30	Final Data Collection:	12/5/2017 8:45
Operating Time:		Percent Uptime:		Electrical Power Usage <sup>a</sup> :
LF007C GWTP:	541 hours	LF007C GWTP	66.6%	LF007C GWTP: 0 kWh
Gallons Treated: <b>139,990 gallons</b>		Gallons Treated Since March 2000: <b>86.7 million gallons</b>		
Volume Discharged to Duck Pond: <b>139,990 gallons</b>		VOC Mass Removed Since March 2000: <b>174.38 pounds (Groundwater)</b>		
VOC Mass Removed: <b>1.45 x 10<sup>-3</sup> pounds<sup>b</sup></b>				
Rolling 12-Month Cost per Pound of Mass Removed: <b>Not Measured<sup>c</sup></b>				
Monthly Cost per Pound of Mass Removed: <b>Not Measured<sup>c</sup></b>				
<sup>a</sup> The LF007C GWTP operates on solar power only.				
<sup>b</sup> VOCs from November 2017 influent sample detected by EPA Method SW8260C.				
<sup>c</sup> Value not calculated since measurement does not accurately represent the cost effectiveness of the system.				

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

Table 2 – LF007C GWTP Average and Total Flow Rates – November 2017		
Location	Average Flow Rate (gpm) <sup>a</sup>	Total Gallons Processed (gallons)
EW614x07	3.9	128,230
EW615x07	0.3	11,160
LF007C GWTP	4.3	139,990
<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<sup>a</sup></b>		<b>Cause</b>
	<b>Date</b>	<b>Time</b>	<b>Date</b>	<b>Time</b>	
LF007C GWTP	9 November 2017	01:00	20 November 2017	10:00	Treatment pad flooded with rainwater.
-- = Time not recorded <sup>a</sup> Shutdown and restart times estimated based on field notes LF007C GWTP = Subarea LF007C Groundwater Treatment Plant TPH – total petroleum hydrocarbons					

## Summary of O&M Activities

Between August and November 2017, TPH-D and/or TPH-MO were detected at concentrations exceeding the effluent limitations or trigger values. The confirmation sampling results in September suggested that the TPH detections are not related to fuels contamination. The cause of the TPH-D and TPH-MO detections was investigated during basewide sampling in November 2017. These results will be evaluated in December 2017.

Monthly groundwater samples were collected at the LF007C GWTP on 1 November 2017. Sample results are presented in Table 4. TCE (1.24 µg/L) was detected at the influent sample location. Cis-1,2-DCE (0.16 J µg/L) was detected at the midpoint sampling location. No VOC contaminants were detected at the effluent sampling location. However, the effluent sample identified TPH-D at a concentration (111 µg/L) in excess of the effluent limitation of 50 µg/L, the TPH-MO concentration (69.1 J µg/L) exceeded its trigger value of 50 µg/L.

On 1 November, a system effluent sample was collected and analyzed for metals in accordance with General Fuels NPDES Permit (Water Board, 2012). The metal detections were compared to background concentrations in the *Travis AFB Remedial Investigation Report, East Industrial Operable Unit* (Weston, 1995) as well as the trigger values as defined in the General Fuels NPDES permit (Water Board, 2012). Sample results are presented in Table 5. Copper was detected at a concentration (7.64 µg/L) in excess of the trigger value of 5.9 µg/L. This detection, however, is well within the historical background concentration range of 3.81 µg/L to 148 µg/L. A trigger study will not be conducted because background concentrations of copper are in excess of the detected historical range at Travis AFB. Hexavalent chromium and cyanide were not included in the metals analysis in November 2017; therefore, they will be collected in December 2017 and reported in the December 2017 Monthly Data Sheet.

In addition on 2 November, a system effluent sample was collected for a bioassay test. One hundred percent of the fish survived the 96-hour test; no statistically significant toxicity was observed.

In November 2017, the LF007C GWTP system was shut down for approximately 11 days because the treatment pad sump flooded with rainwater. On 20 November, the rainwater was pumped out of the pad and sump, and the system was restarted without issue.

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

## Optimization Activities

No optimization activities occurred at the LF007C GWTP in November 2017.

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## 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 now a solar-only operated treatment system and no longer 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 November 2017 – Subarea LF007C Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	1 November 2017 (µg/L)		
				Influent	After Carbon 1	Effluent
Halogenated Volatile Organics						
Acetone	NA	0.50	0	ND	ND	ND
Bromodichloromethane	5.0	0.15	0	ND	ND	ND
Bromoform	5.0	0.15	0	ND	ND	ND
2-Butanone	5.0	2.0	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND
Chloroform	5.0	0.15	0	ND	ND	ND
Dibromochloromethane	5.0	0.15	0	ND	ND	ND
1,3-Dichlorobenzene	5.0	0.15	0	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.15	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	ND	ND	ND
1,1-Dichloroethene	5.0	0.15	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	ND	0.16 J	ND
trans-1,2-Dichloroethene	5.0	0.15	0	ND	ND	ND
Methylene Chloride	5.0	0.15	0	ND	ND	ND
Tetrachloroethene	5.0	0.15	0	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.15	0	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.15	0	ND	ND	ND
Trichloroethene	5.0	0.15	0	1.24	ND	ND
Vinyl Chloride	0.5	0.15	0	ND	ND	ND
Non-Halogenated Volatile Organics						
Benzene	1.0	0.15	0	ND	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND	ND
Toluene	5.0	0.15	0	ND	ND	ND
Xylenes	5.0	0.15 – 0.30	0	ND	ND	ND
Other						
Total Petroleum Hydrocarbons – Gasoline	50	35	0	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	24	1	NM	NM	111
Total Petroleum Hydrocarbons – Motor Oil	50	24	1	NM	NM	69.1 J

\* In accordance with Appendix G of the *Travis AFB North Groundwater Treatment Plant Operations and Maintenance Manual*, Sites FT004, SD031, and LF007 Area C (URS Group, Inc., 2005).

## 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 Groundwater Analytical Data For November 2017 – Subarea LF007C Groundwater Treatment Plant

				1 November 2017 (µg/L)
Constituent	Background Level <sup>a</sup> (µg/L)	Trigger Value <sup>b</sup> (µg/L)	Detection Limit (µg/L)	Effluent
Dissolved Metals				
Antimony	24.1 – 76	6	0.031	0.0707 J
Arsenic	0.984 – 92.4	10	0.030	0.977
Beryllium	0.51 – 3.18	4	0.025	ND
Cadmium	1.72 – 5.42	1.1	0.030	ND
Chromium	5.24 – 2,820	NA	0.10	1.46
Copper	3.81 – 148	5.9	0.50	7.64
Lead	1.1 – 59.5	3.2	0.041	0.438 J
Nickel	9.86 – 734	30	0.025	3.35
Selenium	0.843 – 100	5.0	0.069	3.24
Silver	4.92 – 10.8	2.2	0.025	ND
Thallium	0.874 – 1.85	1.7	0.025	ND
Zinc	4.02 – 323	86	2.5	11.7
Mercury	0.033 – 0.96	0.025	0.045	ND

<sup>a</sup> In accordance with Table 4.2-7 in the *Travis AFB Remedial Investigation Report, East Industrial Operable Unit* (Weston, 1995).

<sup>b</sup> In accordance with the General Fuels NPDES permit (Water Board, 2012).

Notes:

Concentrations in **gray** exceeded the trigger value

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

ND = not detected

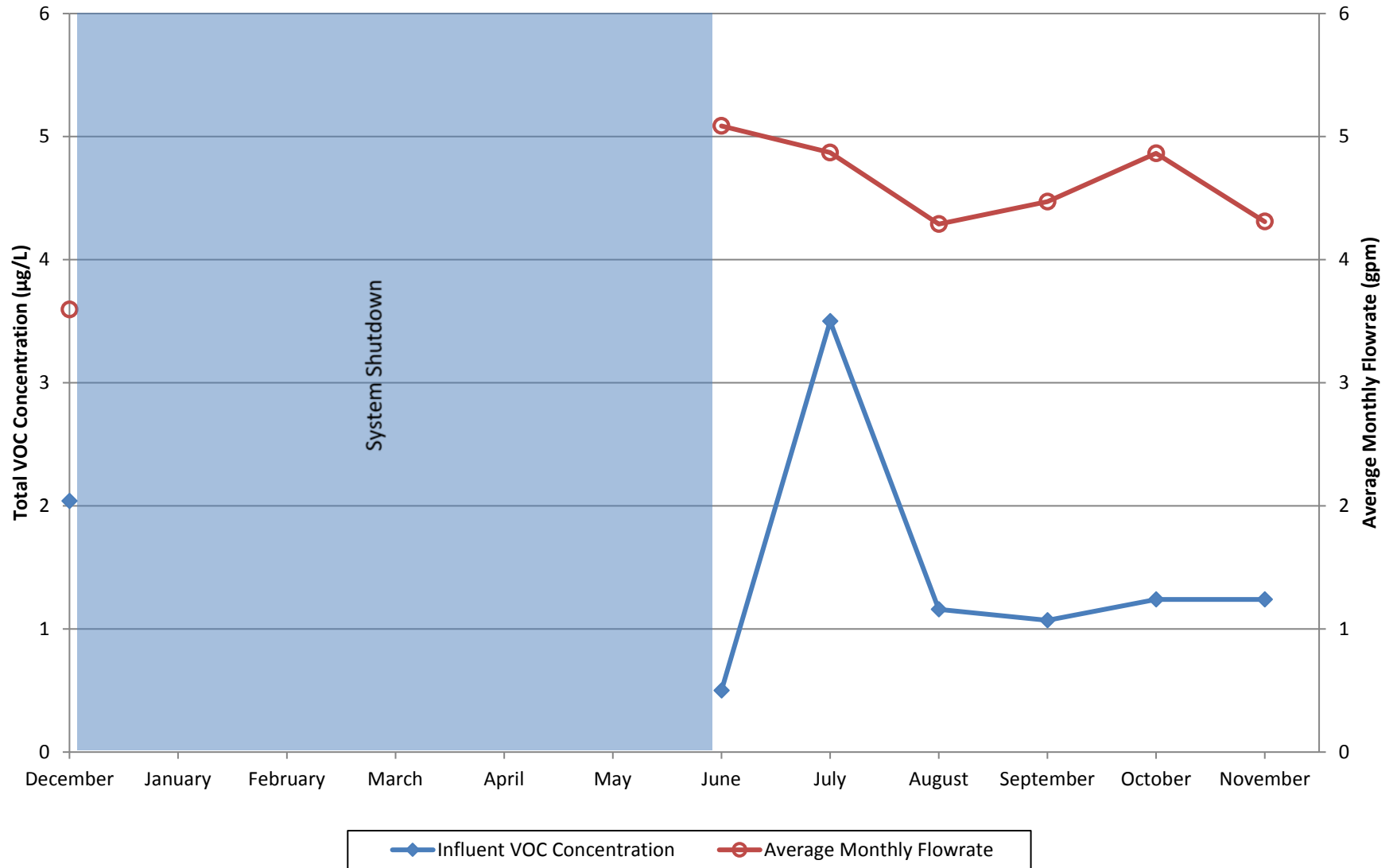
NM = not measured

µg/L = micrograms per liter

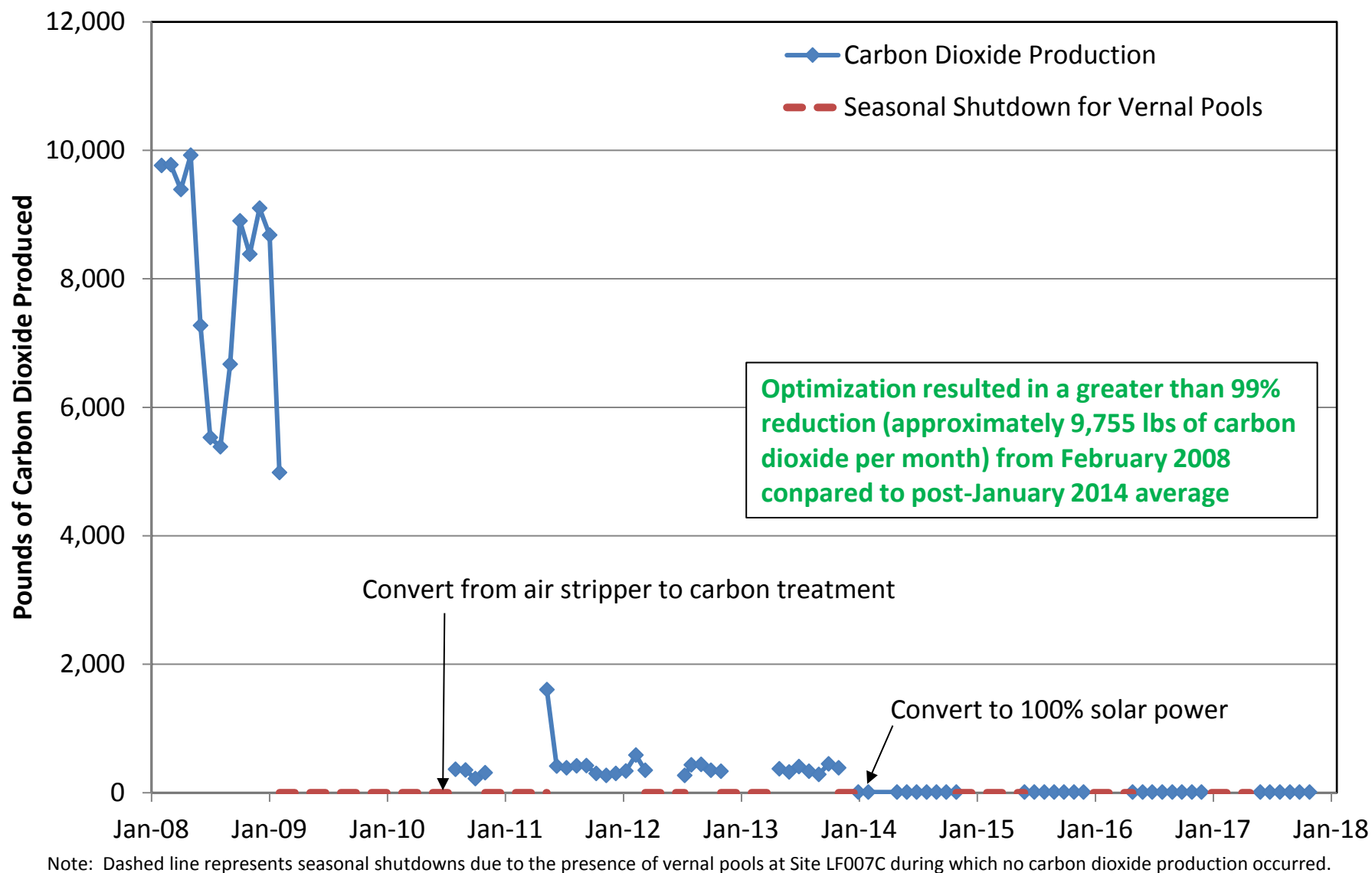


**Figure 1**

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



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



# Site ST018 Groundwater Treatment Plant

## Monthly Data Sheet

Report Number: 081

Reporting Period: 1 November 2017 – 27 November 2017

Date Submitted: 12 December 2017

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

### System Metrics

Table 1 presents operation data from the November 2017 reporting period.

Table 1 – Operations Summary – November 2017			
Initial Data Collection: 11/1/2017 10:00		Final Data Collection: 11/27/2017 9:15	
Operating Time:		Percent Uptime:	
ST018GWTP: 623 hours		ST018GWTP: 100%	
		Electrical Power Usage: ST018GWTP: 47 kWh (35 lbs CO <sub>2</sub> generated <sup>a</sup> )	
Gallons Treated: 83,880 gallons		Gallons Treated Since March 2011: 13.8 million gallons	
Volume Discharged to Sanitary Sewer: 83,880 gallons		Final Totalizer Reading: 13,868,799 gallons	
Cumulative Volume Discharged to Sanitary Sewer since 1 November 2014: 7,372,625 gallons			
MTBE, BTEX, VOC, TPH Mass Removed: 0.07 lbs <sup>b</sup>		MTBE, BTEX, VOC, TPH Mass Removed Since March 2011: 42.8 lbs	
MTBE (Only) Removed: 0.01 lbs <sup>b</sup>		MTBE (Only) Mass Removed Since March 2011: 10.6 lbs	
Rolling 12-Month Cost per Total Pounds of Mass Removed: \$17,093 <sup>bc</sup>			
Monthly Cost per Pound of Mass Removed: \$14,359 <sup>bc</sup>			
<sup>a</sup> SiteWise™ estimate that 1 kilowatt hour generated produces 0.74 pounds of GHG.			
<sup>b</sup> Calculated using November 2017 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 – November 2017</b>		
<b>Location</b>	<b>Average Flow Rate Groundwater (gpm)<sup>a</sup></b>	<b>Hours of Operation</b>
EW2014x18	0.9	313
EW2016x18	0.8	313
EW2019x18	0.8	623
EW2333x18	1.0	313
Site ST018 GWTP	2.2	623
<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.	--		--	None.
-- = Time not recorded <sup>a</sup> Shutdown and restart times estimated based on field notes ST018GWTP = Site ST018 Groundwater Treatment Plant					

Table 4 presents a Site ST018 pulsing dates.

<b>Table 6 – Summary of Site ST018 “Pulsed Mode” Operations</b>	
<b>Pulse-on Date (All Extraction Wells Operational)</b>	<b>Pulse-off Date (EW2019x18 Operational Only)</b>
	4 October 2017
16 October 2017	31 October 2017
14 November 2017	27 November 2017

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the ST018GWTP on 1 November 2017. During the sampling, EW2019x18 was the only operational extraction well. Results are presented in Table 5. The complete

November 2017 laboratory data report is available upon request. The influent concentration for MTBE during the November 2017 sampling event was 6.88 µg/L, which is an increase from the October 2017 sample result of 0.80 µg/L. TPH-d, TPH-mo, and 1,2-DCA were also detected in the influent sample. MTBE was detected in the system effluent sampling location at a concentration less than the effluent limitation.

Beginning in October 2017, three of the four extraction wells (EW2014x18, EW2016x18, and EW2333x18) began operating in a two-week “pulse-mode” (two weeks off, two weeks on, two weeks off, and so forth). In the first half of November, the ST018GWTP operated in pulsed-off mode, with only the furthest downgradient extraction well EW2019x18 operating continuously.

On 14 November, wells EW2014x18, EW2016x18, and EW2333x18 were restarted in the pulsed-on mode. Approximately 4 hours after the extraction wells were restarted, groundwater treatment samples were collected and analyzed for VOCs at the ST018GWTP. Results are presented in Table 6. The influent concentration for MTBE was went up to 23.2 µg/L. Benzene and 1,2-DCA were also detected in the influent sample.

All concentrations of TPH are well below the Fairfield-Suisun Sewer District effluent limitation of 50,000 µg/L for TPH-g and TPH-d, or 100,000 µg/L for TPH-mo. Additionally, 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 influent and effluent contaminant concentrations to maintain compliance with the Fairfield-Suisun Sewer District discharge permit.

Figure 1 presents plots of the average flow rate and influent total contaminant (MTBE, TPH-g, TPH-d, TPH-mo, BTEX, and VOCs) and 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 following the wet rainy 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 because of the “pulse-mode” operations. The total influent concentrations have generally been fluctuating over the past 12 months with an overall flat trend. Similarly, the influent MTBE concentration has also fluctuated over the past 12 months with an overall flat trend.

## Optimization Activities

Optimization activities this month at the ST018GWTP include experimenting with operating the system in a pulsed mode. As discussed above, the three of the four extraction wells are operating in a two-week “pulse-mode” operation. We will track the performance of operating in pulsed mode, as compared against month-over-month results from 2016, and from 2017 as we transition into 2018.

## 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 35 pounds of GHG during November 2017 and treated 83,880 gallons of water, which was a decrease from October 2017 (60 pounds, treating 146,380 gallons). The amount of GHG produced is directly attributed to the amount of water treated through the system because the only line-power electrical use is for a transfer pump through the GAC system.

TABLE 5

Summary Of Groundwater Analytical Data for November 2017– Site ST018 Groundwater Treatment Plant

Summary of Groundwater Monitoring Data for November 2017 - Oroville Groundwater Treatment Plant					
Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	1 November 2017** (µg/L)	
				Influent	System Effluent
<b>Fuel Related Constituents</b>					
Methyl tert-Butyl Ether	6,400	0.15	0	<b>6.88</b>	<b>1.99</b>
Benzene	25,000 <sup>a</sup>	0.15	0	ND	ND
Ethylbenzene	25,000 <sup>a</sup>	0.15	0	ND	ND
Toluene	25,000 <sup>a</sup>	0.15	0	ND	ND
Total Xylenes	25,000 <sup>a</sup>	0.15 – 0.30	0	ND	ND
Total Petroleum Hydrocarbons – Gasoline	50,000 <sup>b</sup>	35	0	ND	ND
Total Petroleum Hydrocarbons – Diesel	50,000 <sup>b</sup>	24	0	<b>68.1 J</b>	ND
Total Petroleum Hydrocarbons – Motor Oil	100,000	24	0	<b>30.8 J</b>	ND
<b>Other</b>					
Acetone	NA	1.0	0	<b>2.30 J</b>	ND
1,2-Dichloroethane	20	0.15	0	<b>0.20 J</b>	ND

\* In accordance with the Fairfield-Suisun Sewer District Effluent Limitations

\*\* During the sampling event, only EW2019x18 was operational

Laboratory data available on request.

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

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

µg/L = micrograms per liter

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

NA = not applicable

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

ND = not detected above method detection limit

TABLE 6

Summary Of Groundwater Analytical Data for November 2017– Site ST018 Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	14 November 2017** (µg/L)	
				Influent	System Effluent
Fuel Related Constituents					
Methyl tert-Butyl Ether	6,400	0.15	0	23.2	2.34
Benzene	25,000 <sup>a</sup>	0.15	0	0.15 J	ND
Ethylbenzene	25,000 <sup>a</sup>	0.15	0	ND	ND
Toluene	25,000 <sup>a</sup>	0.15	0	ND	ND
Total Xylenes	25,000 <sup>a</sup>	0.15 – 0.30	0	ND	ND
Other					
Acetone	NA	1.0	0	ND	ND
1,2-Dichloroethane	20	0.15	0	0.41 J	ND

\* In accordance with the Fairfield-Suisun Sewer District Effluent Limitations

\*\* During the sampling event, all four (4) extraction wells were operational  
Laboratory data available on request.

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

µg/L = micrograms per liter

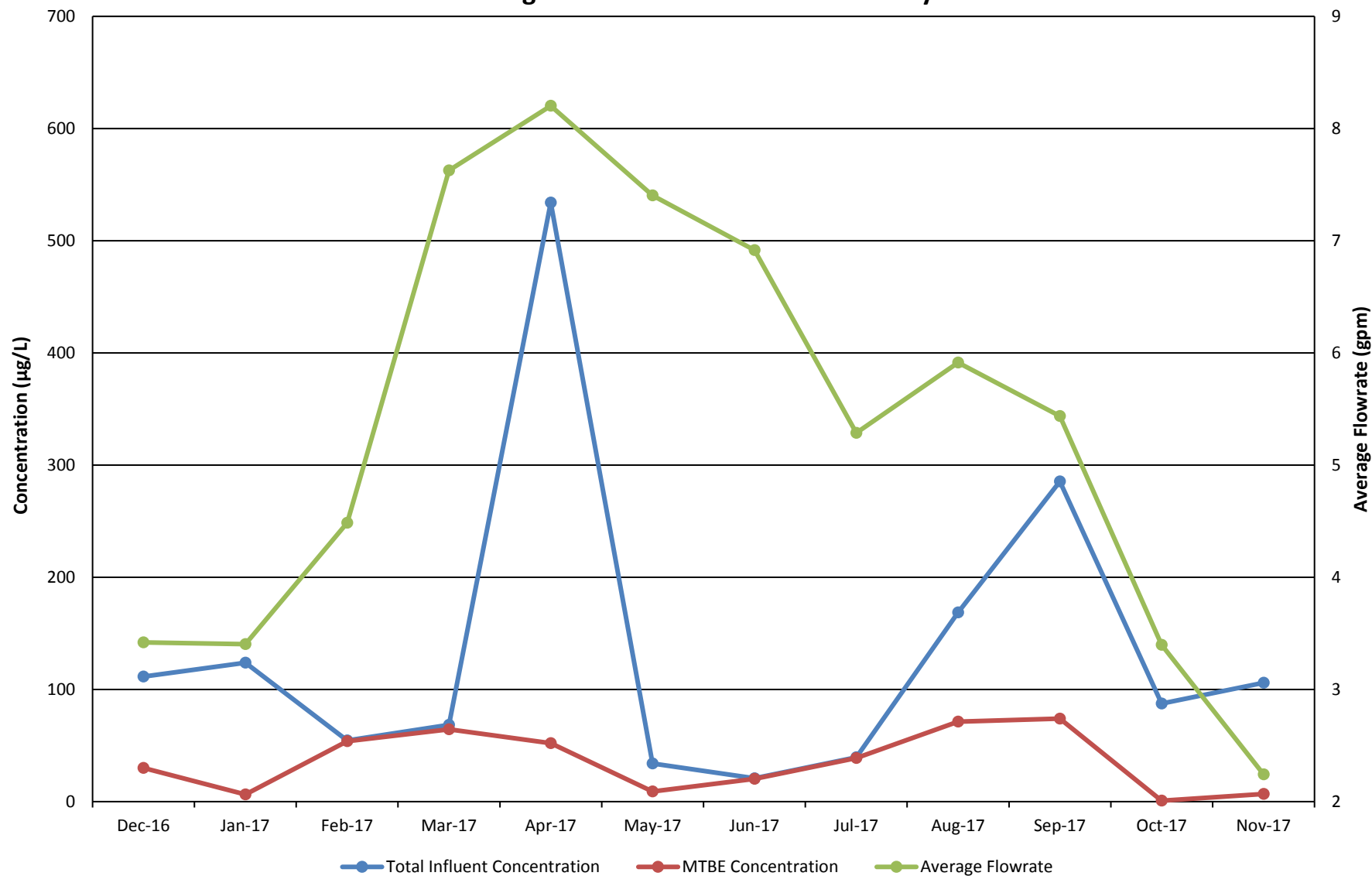
J = analyte concentration is considered an estimated value due to a detected concentration value between the reporting limit and method detection limit for the contaminant

NA = not applicable

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

ND = not detected above method detection limit

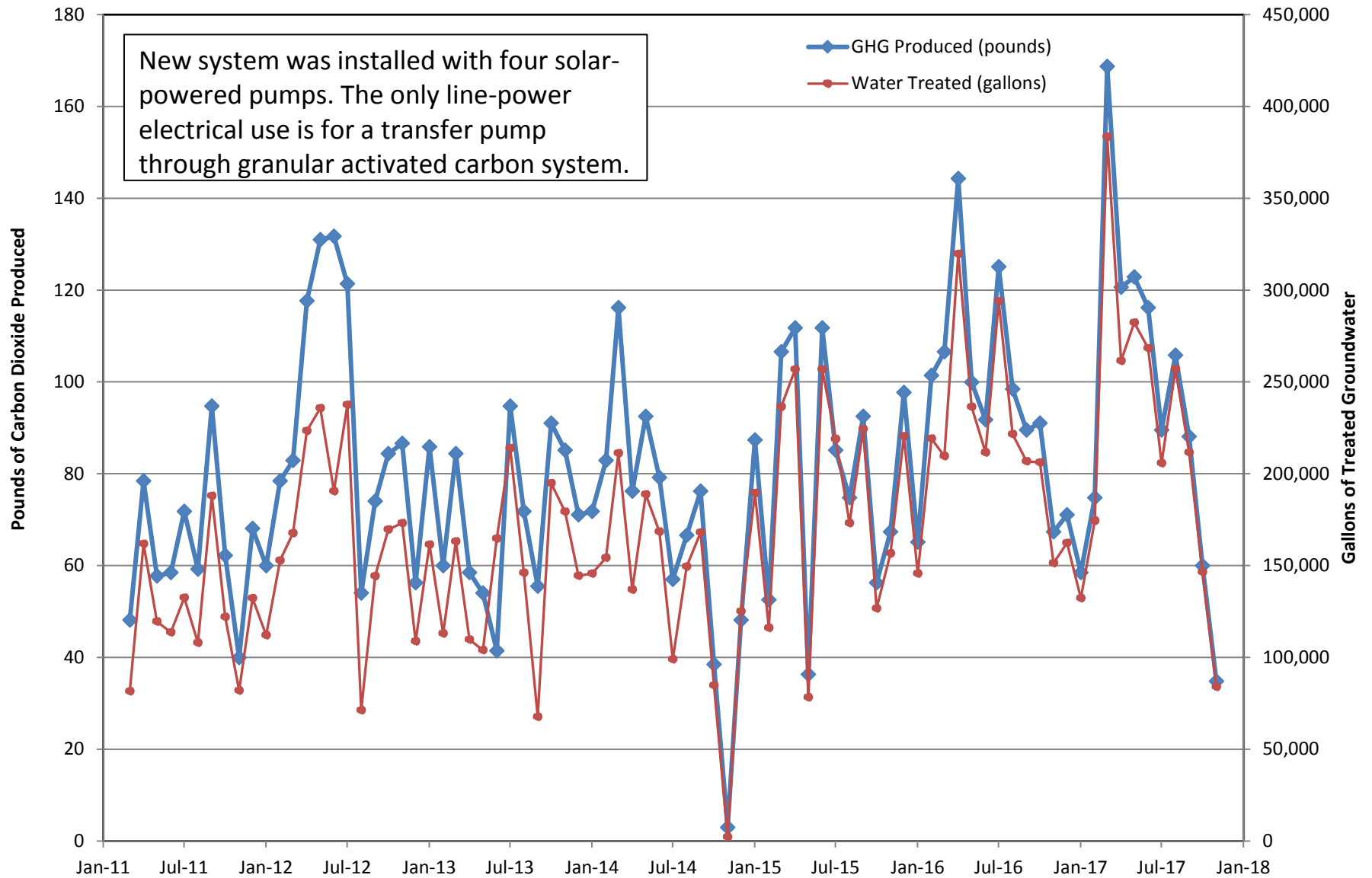
**Figure 1**  
**ST018GWTP Total VOC and MTBE Influent Concentrations**  
**and Average Flowrate Twelve Month History**





## Figure 2

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



# South Base Boundary Groundwater Treatment Plant Monthly Data Sheet

Report Number: 206

Reporting Period: 5 December 2017 – 2 January 2018

Date Submitted: 12 January 2018

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 December 2017 reporting period.

Table 1 – Operations Summary – December 2017				
Initial Data Collection:		12/5/2017 12:00	Final Data Collection:	1/2/2018 15:00
Operating Time:		Percent Uptime:		Electrical Power Usage:
SBBGWTP:	675 hours	SBBGWTP:	99.5%	SBBGWTP: 18,537 kWh (14,517 lbs CO <sub>2</sub> generated <sup>a</sup> )
Gallons Treated: 6.3 million gallons		Gallons Treated Since July 1998: 1,010 million gallons		
Volume Discharged to Union Creek: 6.3 million gallons		Gallons Treated From Other Sources: 0 gallons		
VOC Mass Removed: 1.34 lbs <sup>b</sup>		VOC Mass Removed Since July 1998: 496.0 lbs		
Rolling 12-Month Cost per Pound of Mass Removed: \$9,280 <sup>c</sup>				
Monthly Cost per Pound of Mass Removed: \$5,670 <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 800 pounds of GHG from GAC change out services averaged to a per month basis.				
<sup>b</sup> Calculated using December 2017 EPA Method SW8260C analytical results.				
<sup>c</sup> Costs include operations and maintenance, 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> – December 2017							
FT005 <sup>b</sup>				SS029		SS030	
EW01x05	Offline	EW743x05	Offline	EW01x29	1.0	EW01x30	5.7
EW02x05	Offline	EW744x05	3.1	EW02x29	4.4	EW02x30	6.0
EW03x05	Offline	EW745x05	11.6	EW03x29	2.7	EW03x30	1.3
EW731x05	5.5	EW746x05	Offline	EW04x29	6.2	EW04x30	21.9
EW732x05	Offline	EW2291x05	2.7	EW05x29	3.9	EW05x30	17.3
EW733x05	Offline	EW2782x05	4.1	EW06x29	3.6	EW2174x30	7.4
EW734x05	3.3	EW2783x05	7.2	EW07x29	8.5	EW711x30	6.7
EW735x05	11.2	EW2784x05	10.2				
EW736x05	Offline	EW2785x05	3.7				
EW737x05	Offline	EW2786x05	8.9				
EW742x05	Offline						
FT005 Total: 71.5				SS029 Total: 30.3		SS030 Total: 66.3	
SBBGWTP Average Monthly Flow <sup>c</sup> : 156.5 gpm							
<sup>a</sup> Flow rates presented are instantaneous measurements taken at the end of the reporting period.							
<sup>b</sup> Most extraction wells at FT005 were taken offline in accordance with the 2008 Annual Remedial Process Optimization Report for the Central Groundwater Treatment Plant, North Groundwater Treatment Plant, and South Base Boundary Groundwater Treatment Plant.							
<sup>c</sup> 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	11 December 2017	11:30	11 December 2017	12:00	Replaced bag filters.
SBBGWTP	20 December 2017	09:00	20 December 2017	11:30	Backwashed GAC vessels.
SBBGWTP	27 December 2017	10:00	27 December 2017	10:20	Replaced bag filters.
-- = Time not recorded <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 5 December 2017. Sample results are presented in Table 4. The total VOC concentration (25.40 µg/L) in the influent sample has decreased from the November 2017 sample results (39.47 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 23.1 µg/L. Several VOCs were detected in the midpoint sampling location, including TCE, cis-1,2-DCE, 1,2-DCA, and chloroform. No VOCs were detected at the effluent sampling location. A carbon change out on the lead GAC vessel is being coordinated.

On 5 December, a system effluent sample was collected and analyzed for hexavalent chromium and cyanide, in accordance with the General Fuels NPDES Permit (Water Board, 2012). Hexavalent chromium was not detected. Cyanide was detected at a low concentration of 2.1 J µg/L.

A new General Fuels Permit (Water Board, 2018) took effect on January 1, 2018. Monthly sampling events at each Travis AFB treatment plant going forward will be based on the sampling schedule presented in this new General Fuels Permit.

Figure 1 presents a plot of influent concentrations and average flow at the SBBGWTP over the past twelve (12) months. An overall increase in the VOC influent concentration has been observed in the past 12 months along with an overall increasing flow rate trend.

In December 2017, the SBBGWTP was shut down several times for an approximate total of 3.3 hours to conduct routine maintenance on the system.

## Optimization Activities

No optimization activities occurred at the SBBGWTP in December 2017.

## 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 December 2017, the SBBGWTP produced approximately 14,517 pounds of GHG, which includes approximately 800 pounds of GHG generated from GAC change out services averaged to a per month basis.

TABLE 4

Summary of Groundwater Analytical Data for December 2017 – South Base Boundary Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	5 December 2017 (µg/L)		
				Influent	Midpoint	Effluent
Halogenated Volatile Organics						
Acetone	NA	1.0	0	ND	ND	ND
Bromodichloromethane	NA	0.15	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND
Chloroform	5.0	0.15	0	0.16 J	0.21 J	ND
Chloromethane	NA	0.15	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	0.58	0.38 J	ND
1,1-Dichloroethene	5.0	0.15	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	1.56	2.29	ND
trans-1,2-Dichloroethene	5.0	0.15	0	ND	ND	ND
Methylene Chloride	5.0	0.15	0	ND	ND	ND
Tetrachloroethene	5.0	0.15	0	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.15	0	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.15	0	ND	ND	ND
Trichloroethene	5.0	0.15	0	23.1	6.41	ND
Vinyl Chloride	0.5	0.15	0	ND	ND	ND
Non-Halogenated Volatile Organics						
Benzene	1.0	0.15	0	ND	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND	ND
Toluene	5.0	0.15	0	ND	ND	ND
Xylenes	5.0	0.15 – 0.30	0	ND	ND	ND
Other						
Total Petroleum Hydrocarbons – Gasoline	50	35	0	ND	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	24	0	ND	NM	ND
Total Petroleum Hydrocarbons – Motor Oil	50 (trigger)	24	0	ND	NM	ND

\* In accordance with Appendix B of the Travis AFB South Base Boundary Groundwater Treatment Plant Operations and Maintenance Manual (CH2M HILL, 2004).

## 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

mg/L = milligrams per liter

NA = not applicable

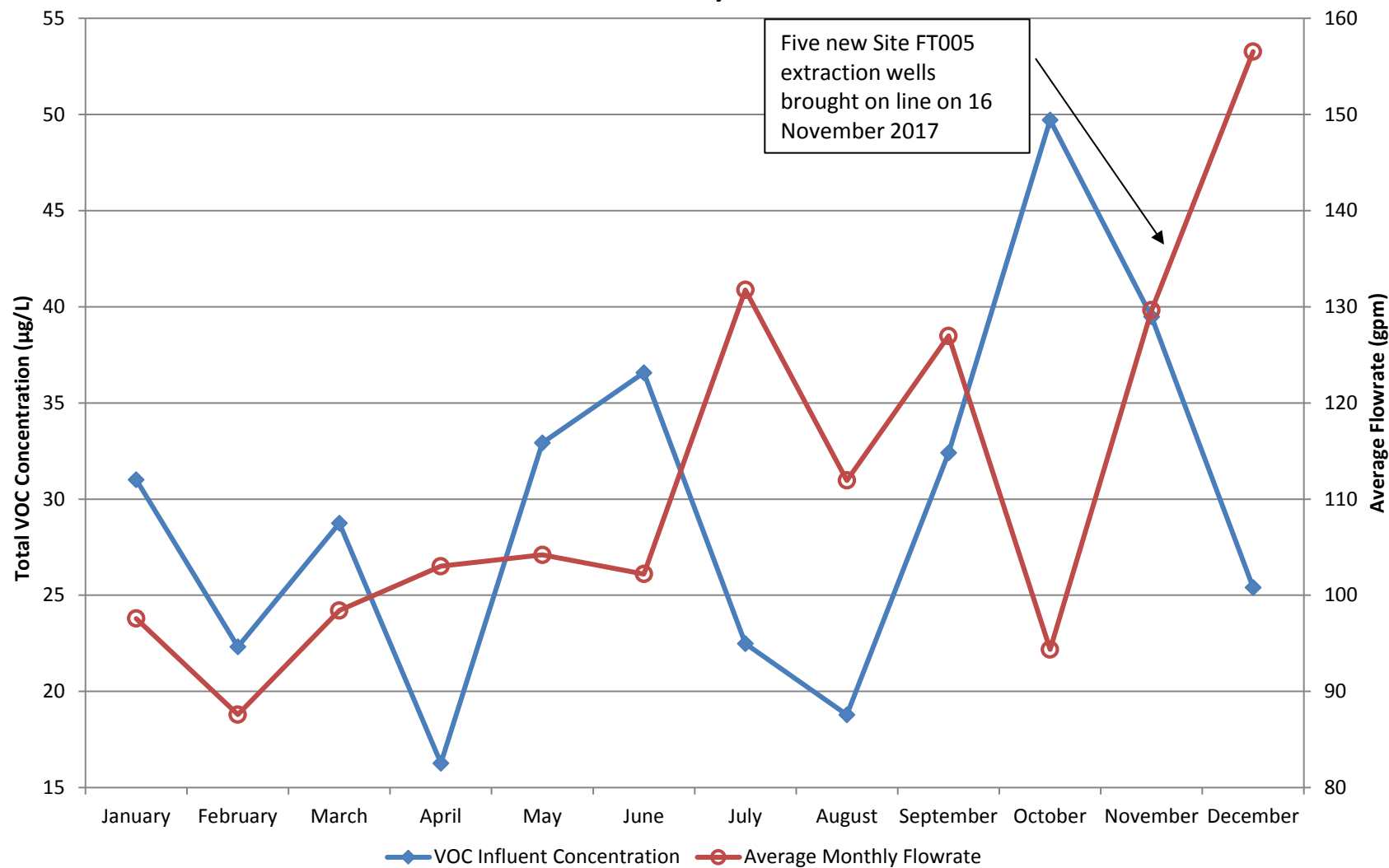
N/C = number of samples out of compliance with discharge limits

ND = not detected

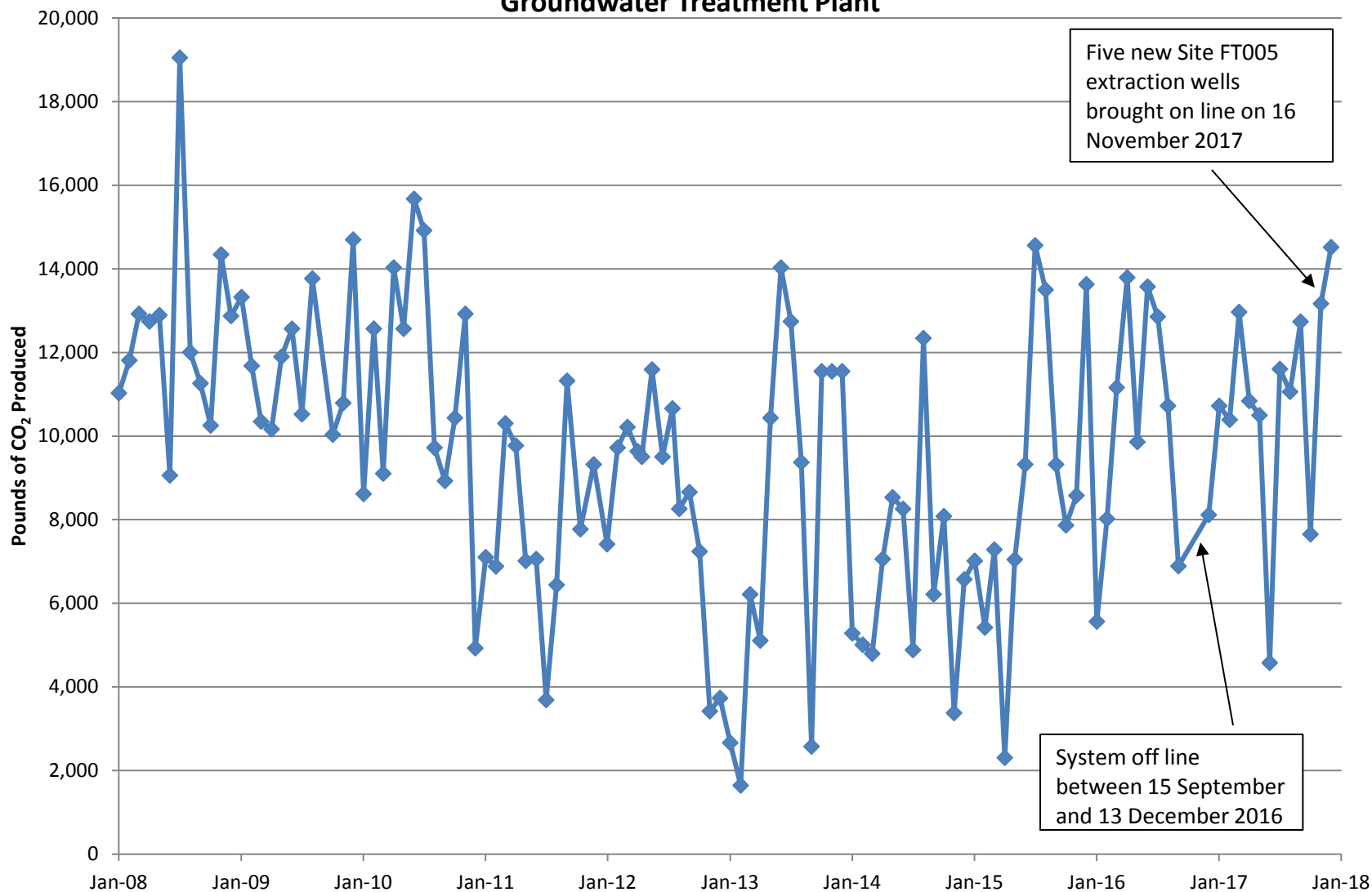
NM = not measured

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: 221

Reporting Period: 5 December 2017 – 3 January 2018

Date Submitted: 12 January 2018

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 December 2017 reporting period.

Table 1 – Operations Summary – December 2017				
Initial Data Collection:		12/5/2017 12:00	Final Data Collection:	1/3/2018 14:50
Operating Time:		Percent Uptime:	Electrical Power Usage:	
CGWTP:	699 hours	CGWTP:	100%	CGWTP: 2,340 kWh (2,620 lbs CO <sub>2</sub> generated <sup>a</sup> )
Gallons Treated (discharge to storm sewer):		Gallons Treated Since January 1996: <b>549.2 million gallons</b>		
<b>1,263,052 gallons</b>				
VOC Mass Removed from groundwater:		VOC Mass Removed Since January 1996:		
<b>2.26 lbs<sup>b</sup></b>		<b>2,793 lbs from groundwater</b>		
		<b>8,686 lbs from vapor</b>		
Rolling 12-Month Cost per Pound of Mass Removed: \$2,173 <sup>c</sup>				
Monthly Cost per Pound of Mass Removed: \$1,470 <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 December 2017 EPA Method SW8260C analytical results.				
<sup>c</sup> Costs include operations and maintenance, 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> – December 2017	
Location	Average Flow Rate Groundwater (gpm)
EW001x16	13.5
EW002x16	11.1
EW003x16	0.2
EW605x16	6.3
EW610x16	2.6
CGWTP	30.1
<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	None.	--		--	None.
-- = 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	27 December 2016	10 January 2017
	7 February 2017	7 March 2017
	5 April 2017	7 August 2017
	7 September 2017	2 October 2017
	6 November 2017	27 November 2017
	26 December 2017	
MW = Monitoring Well		

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the CGWTP on 5 December 2017. Sample results are presented in Table 5. The total VOC concentration (214.34 µg/L) in the December 2017 influent sample has increased from the November 2017 sample (202.53 µg/L). TCE was the primary VOC detected in the influent sample at a concentration of 168 µg/L. Cis-1,2-DCE (19.3 µg/L) and vinyl chloride (0.21 J µg/L) were detected in the sample collected after the first carbon vessel, and vinyl chloride (0.20 J µg/L) was detected in the sample collected after the second carbon vessel. No VOC constituents were detected 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 December 2017. A carbon change out on the lead GAC vessel is being coordinated.

On 5 December, a system effluent sample was collected and analyzed for hexavalent chromium and cyanide, in accordance with the General Fuels NPDES Permit (Water Board, 2012). Hexavalent chromium was not detected. Cyanide was detected at a concentration of 3.5 J µg/L.

A new General Fuels Permit (Water Board, 2018) took effect on January 1, 2018. Monthly sampling events at each Travis AFB treatment plant going forward will be based on the sampling schedule presented in this new General Fuels Permit.

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 an overall decreasing trend for the flow rate through the treatment plant.

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 brought back on line on 26 December.

## Optimization Activities

No optimization activities occurred at the CGWTP in December 2017.

## 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 2,620 pounds of GHG during December 2017, which is a slight decrease from the November 2017 amount of 2,643 pounds.

TABLE 5

Summary of Groundwater Analytical Data for December 2017 – Central Groundwater Treatment Plant

				5 December 2017 (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	1.0	0	ND	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND	ND
Chloroform	5.0	0.15	0	ND	ND	ND	ND
Chloromethane	NA	0.15	0	ND	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	40.9	19.3	ND	ND
1,2-Dichlorobenzene	5.0	0.15	0	0.44 J	ND	ND	ND
1,3-Dichlorobenzene	5.0	0.15	0	0.70	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.15	0	0.34 J	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	ND	ND	ND	ND
1,1-Dichloroethene	5.0	0.15	0	0.55	ND	ND	ND
Methylene Chloride	5.0	0.15	0	ND	ND	ND	ND
Methyl tert-Butyl Ether	1.0	0.15	0	ND	ND	ND	ND
Tetrachloroethene	5.0	0.15	0	0.56	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.15	0	ND	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.15	0	ND	ND	ND	ND
trans-1,2-Dichloroethene	5.0	0.15	0	2.58	ND	ND	ND
Trichloroethene	5.0	0.15 – 1.5	0	168	ND	ND	ND
Vinyl Chloride	0.5	0.15	0	0.27 J	0.21 J	0.20 J	ND
Non-Halogenated Volatile Organics							
Benzene	1.0	0.15	0	ND	ND	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND	ND	ND
Toluene	5.0	0.15	0	ND	ND	ND	ND
Total Xylenes	5.0	0.15 – 0.30	0	ND	ND	ND	ND
Other							
Total Petroleum Hydrocarbons – Gasoline	50	35	0	47.9 J	NM	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	24	0	48.8 J	NM	NM	ND
Total Petroleum Hydrocarbons – Motor Oil	50 (trigger)	24	0	ND	NM	NM	ND

\* In accordance with Appendix G of the Travis AFB Central Groundwater Treatment Plant Operations and Maintenance Manual (URS Group, Inc., 2002).

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

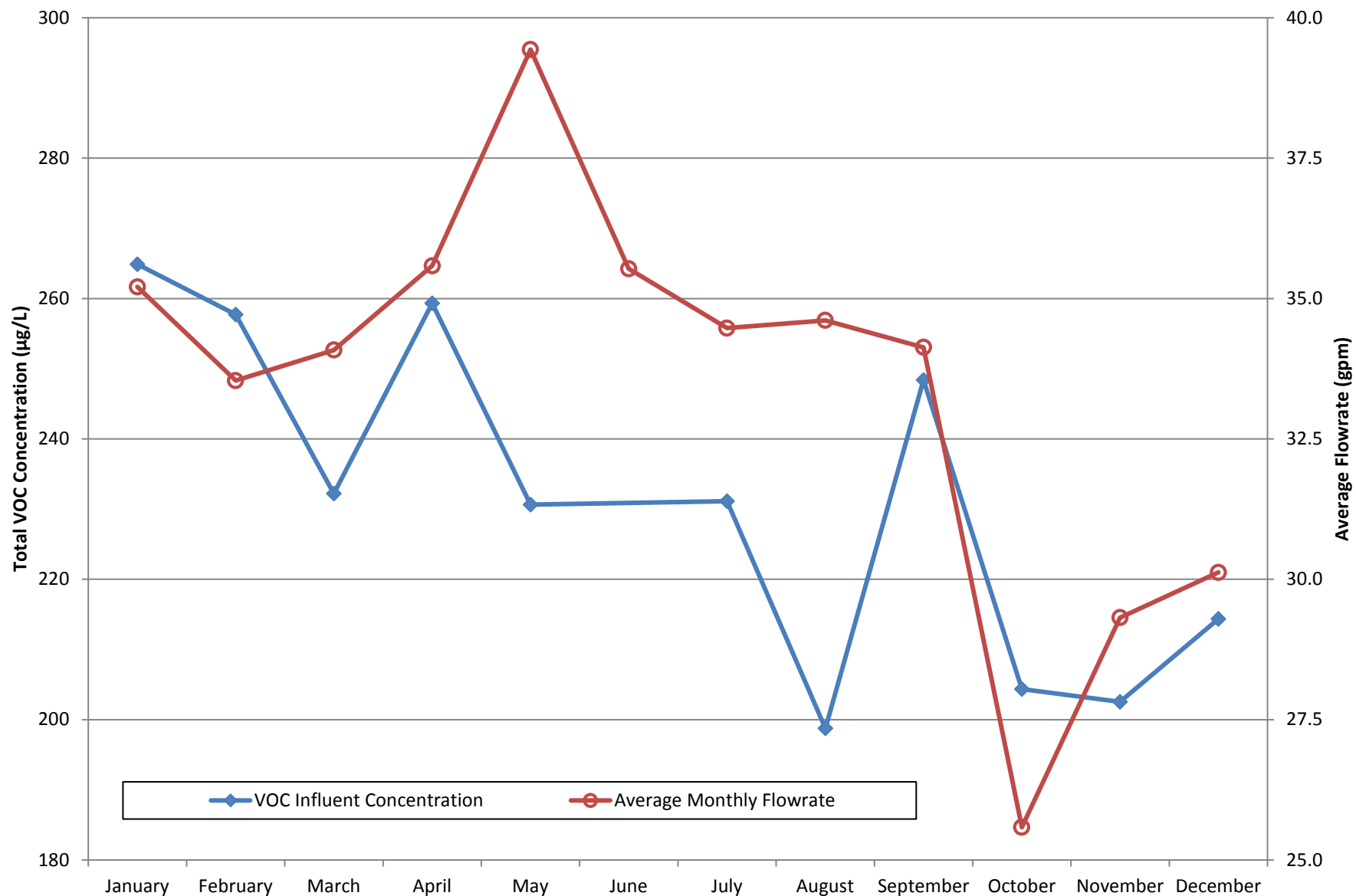
ND = not detected

NM = not measured

µg/L = micrograms per liter

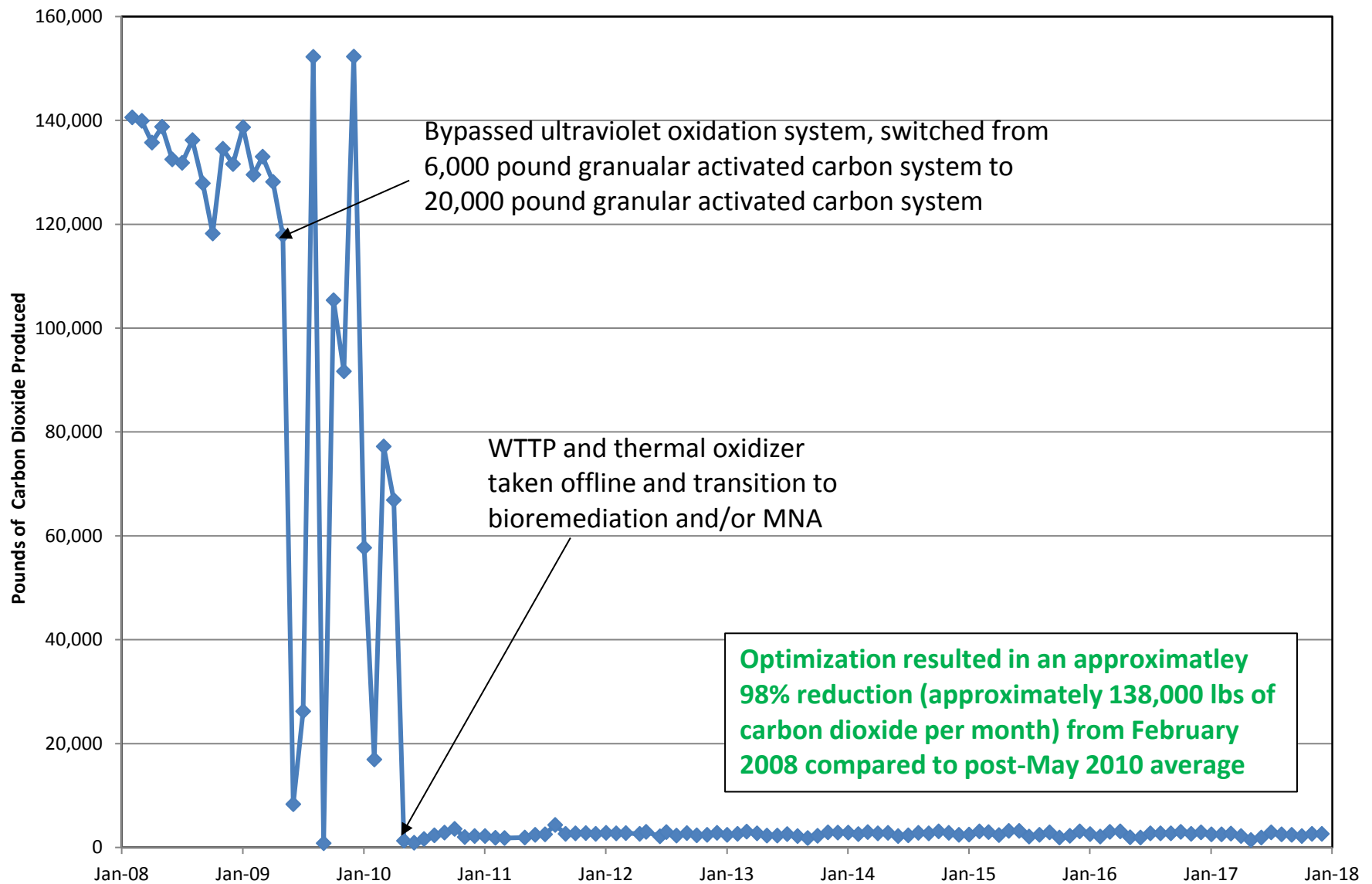
mg/L = milligrams per liter

**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**



# Subarea LF007C Groundwater Treatment Plant

## Monthly Data Sheet

Report Number: 165

Reporting Period: 5 December 2017 – 3 January 2018

Date Submitted: 12 January 2018

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 December 2017 reporting period:

Table 1 – Operations Summary – December 2017			
Initial Data Collection:		12/5/2017 8:45	Final Data Collection: 1/3/2018 13:00
Operating Time:		Percent Uptime:	Electrical Power Usage <sup>a</sup> :
LF007C GWTP:	700 hours	LF007C GWTP	100% LF007C GWTP: 0 kWh
Gallons Treated: 169,360 gallons		Gallons Treated Since March 2000: 86.9 million gallons	
Volume Discharged to Duck Pond: 169,360 gallons			
VOC Mass Removed: 1.70 x 10 <sup>-3</sup> pounds <sup>b</sup>		VOC Mass Removed Since March 2000: 174.38 pounds (Groundwater)	
Rolling 12-Month Cost per Pound of Mass Removed: Not Measured <sup>c</sup>			
Monthly Cost per Pound of Mass Removed: Not Measured <sup>c</sup>			
<sup>a</sup> The LF007C GWTP operates on solar power only.			
<sup>b</sup> VOCs from December 2017 influent sample detected by EPA Method SW8260C.			
<sup>c</sup> Value not calculated since measurement does not accurately represent the cost effectiveness of the system.			

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

Table 2 – LF007C GWTP Average and Total Flow Rates – December 2017		
Location	Average Flow Rate (gpm) <sup>a</sup>	Total Gallons Processed (gallons)
EW614x07	3.7	155,470
EW615x07	0.3	13,890
LF007C GWTP	4.0	170,360
<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<sup>a</sup></b>		<b>Cause</b>
	<b>Date</b>	<b>Time</b>	<b>Date</b>	<b>Time</b>	
LF007C GWTP	None.	--		--	None.
-- = Time not recorded <sup>a</sup> Shutdown and restart times estimated based on field notes LF007C GWTP = Subarea LF007C Groundwater Treatment Plant					

## Summary of O&M Activities

Between August and December 2017, TPH-d and/or TPH-mo were detected at concentrations exceeding the effluent limitations or trigger values. Confirmation sampling results in September suggested that the TPH detections are not related to fuels contamination. The cause of the TPH-D and TPH-MO detections was investigated during basewide sampling in October 2017. During that sampling event, both Subarea LF007C extraction wells (EW614x07 and EW615x07) and background well MW210x06 were sampled and analyzed for TPH as gasoline (MW210x06 only), diesel, and motor oil (TPH-G, TPH-D, and TPH-MO), VOCs, and semi-volatile VOCs. The samples collected for TPH-D and TPH-MO were not analyzed by the lab with silica gel cleanup (SGC), as requested. Therefore, additional samples from EW614x07, EW615x07, and MW210x06 will be collected in January 2018 so they can be analyzed for TPH with and without SGC. These sample results will be presented in the January 2018 Monthly Data Sheet

Monthly groundwater samples were collected at the LF007C GWTP on 5 December 2017. Sample results are presented in Table 4. TCE (1.20 µg/L) was detected at the influent sample location. No VOC contaminants were detected at the midpoint and effluent sampling locations. However, the effluent sample identified TPH-D at a concentration (95 J µg/L) in excess of the effluent limitation of 50 µg/L.

On 5 December, a system effluent sample was collected and analyzed for hexavalent chromium and cyanide, in accordance with the General Fuels NPDES Permit (Water Board, 2012). Hexavalent chromium was not detected. Cyanide was detected at a concentration of 3.1 J µg/L.

A new General Fuels Permit (Water Board, 2018) took effect on January 1, 2018. Monthly sampling events at each Travis AFB treatment plant going forward will be based on the sampling schedule presented in this new General Fuels Permit.

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

## Optimization Activities

No optimization activities occurred at the LF007C GWTP in December 2017.

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## 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 now a solar-only operated treatment system and no longer 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 December 2017 – Subarea LF007C Groundwater Treatment Plant

Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	5 December 2017 (µg/L)		
				Influent	After Carbon 1	Effluent
Halogenated Volatile Organics						
Acetone	NA	0.50	0	ND	ND	ND
Bromodichloromethane	5.0	0.15	0	ND	ND	ND
Bromoform	5.0	0.15	0	ND	ND	ND
2-Butanone	5.0	2.0	0	ND	ND	ND
Carbon Tetrachloride	0.5	0.15	0	ND	ND	ND
Chloroform	5.0	0.15	0	ND	ND	ND
Dibromochloromethane	5.0	0.15	0	ND	ND	ND
1,3-Dichlorobenzene	5.0	0.15	0	ND	ND	ND
1,4-Dichlorobenzene	5.0	0.15	0	ND	ND	ND
1,1-Dichloroethane	5.0	0.15	0	ND	ND	ND
1,2-Dichloroethane	0.5	0.15	0	ND	ND	ND
1,1-Dichloroethene	5.0	0.15	0	ND	ND	ND
cis-1,2-Dichloroethene	5.0	0.15	0	ND	ND	ND
trans-1,2-Dichloroethene	5.0	0.15	0	ND	ND	ND
Methylene Chloride	5.0	0.15	0	ND	ND	ND
Tetrachloroethene	5.0	0.15	0	ND	ND	ND
1,1,1-Trichloroethane	5.0	0.15	0	ND	ND	ND
1,1,2-Trichloroethane	5.0	0.15	0	ND	ND	ND
Trichloroethene	5.0	0.15	0	1.20	ND	ND
Vinyl Chloride	0.5	0.15	0	ND	ND	ND
Non-Halogenated Volatile Organics						
Benzene	1.0	0.15	0	ND	ND	ND
Ethylbenzene	5.0	0.15	0	ND	ND	ND
Toluene	5.0	0.15	0	ND	ND	ND
Xylenes	5.0	0.15 – 0.30	0	ND	ND	ND
Other						
Total Petroleum Hydrocarbons – Gasoline	50	35	0	ND	NM	ND
Total Petroleum Hydrocarbons – Diesel	50	24	1	107	NM	95 J
Total Petroleum Hydrocarbons – Motor Oil	50	24	0	64.8	NM	46.1 J

\* In accordance with Appendix G of the *Travis AFB North Groundwater Treatment Plant Operations and Maintenance Manual*, Sites FT004, SD031, and LF007 Area C (URS Group, Inc., 2005).

## 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

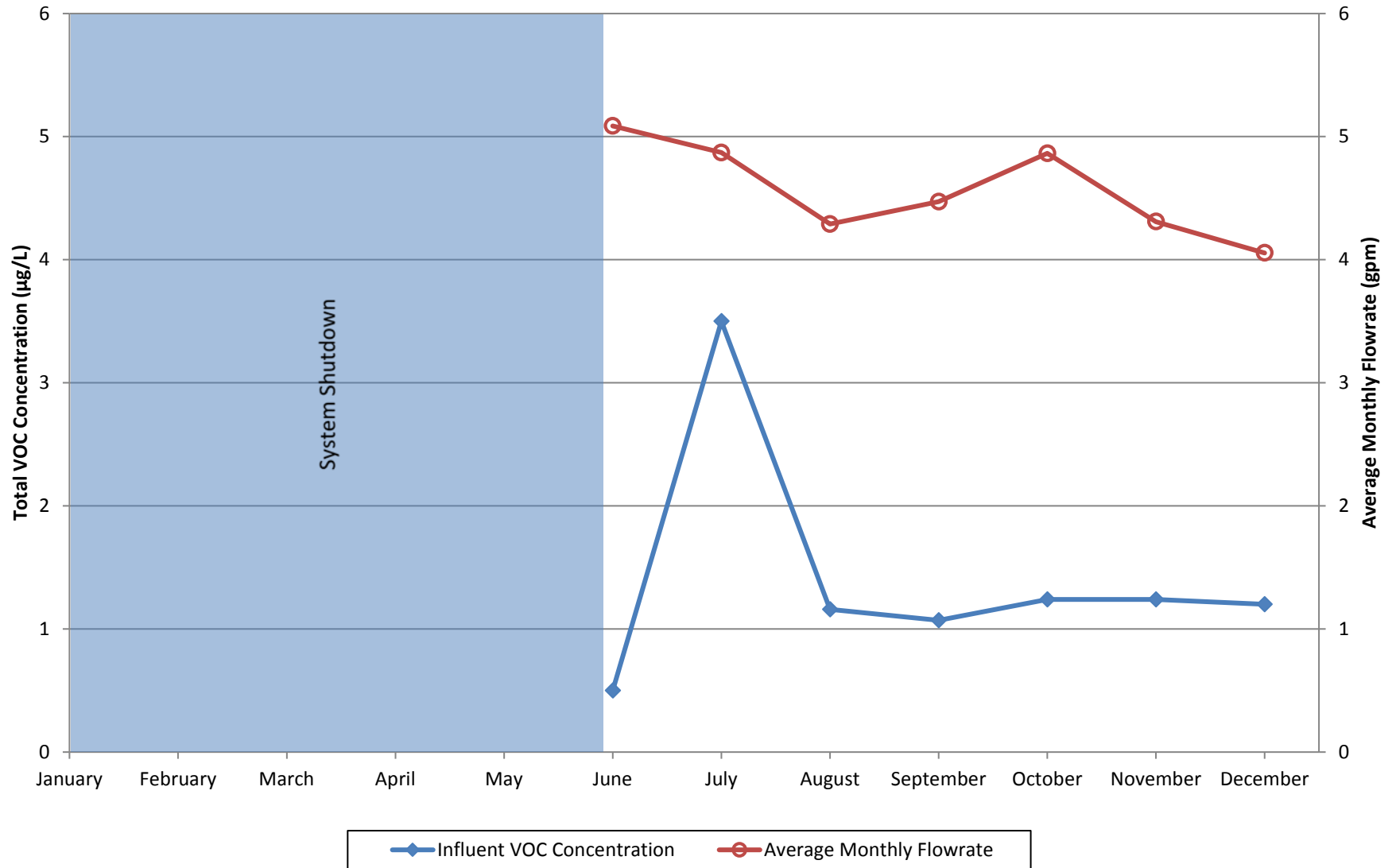
ND = not detected

NM = not measured

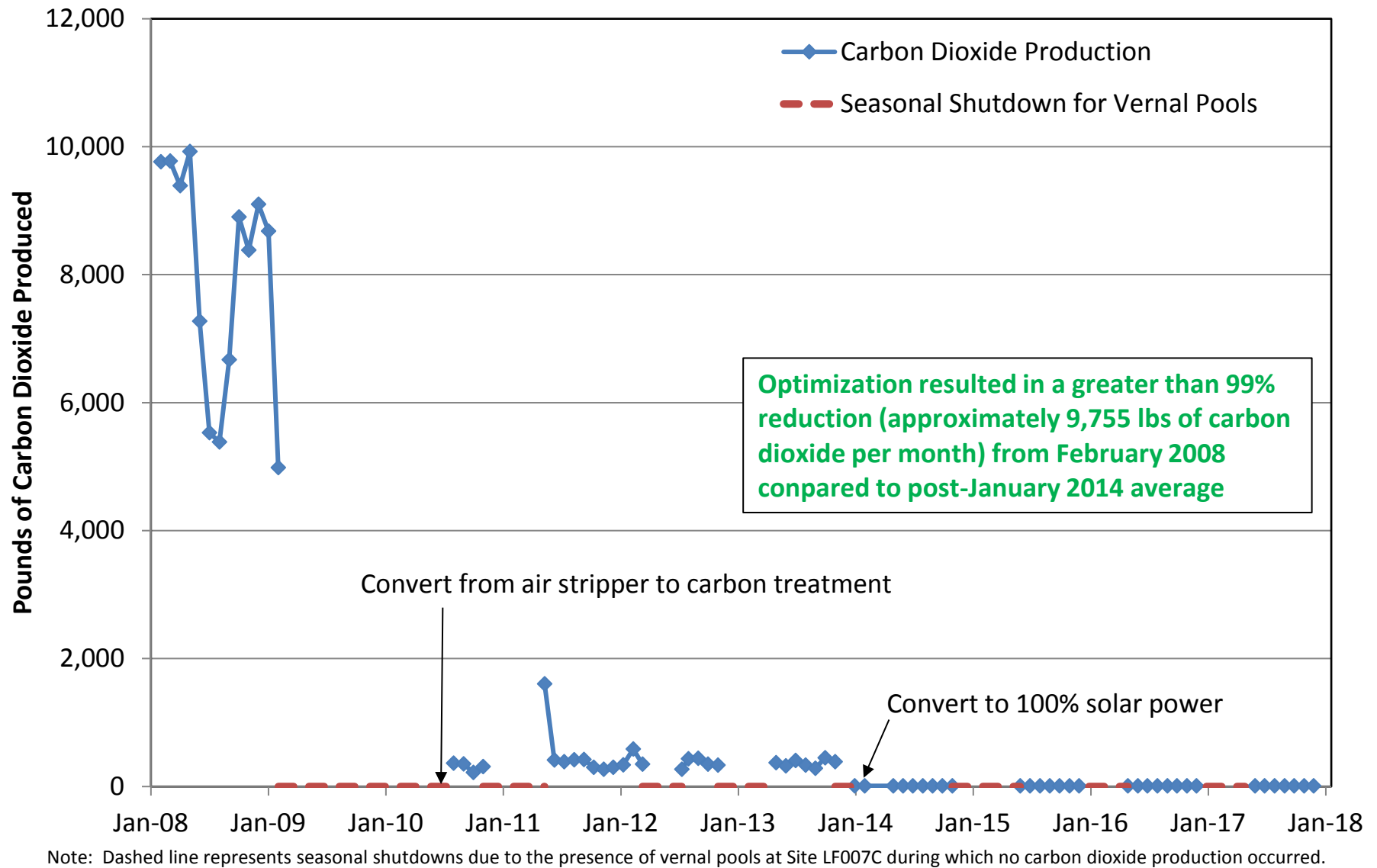
µg/L = micrograms per liter

**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**



# Site ST018 Groundwater Treatment Plant

## Monthly Data Sheet

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Report Number: 082

Reporting Period: 27 November 2017 – 2 January 2018

Date Submitted: 12 January 2018

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

### System Metrics

Table 1 presents operation data from the December 2017 reporting period.

Table 1 – Operations Summary – December 2017			
<b>Initial Data Collection:</b>	11/27/2017 9:15	<b>Final Data Collection:</b>	1/2/2018 13:00
Operating Time:		Percent Uptime:	Electrical Power Usage:
<b>ST018GWTP:</b> 868 hours		<b>ST018GWTP:</b> 100%	<b>ST018GWTP:</b> 50 kWh (37 lbs CO <sub>2</sub> generated <sup>a</sup> )
Gallons Treated: <b>89,960 gallons</b>		Gallons Treated Since March 2011: <b>14.0 million gallons</b>	
Volume Discharged to Sanitary Sewer: <b>89,960 gallons</b>		Final Totalizer Reading: <b>13,958,759 gallons</b>	
Cumulative Volume Discharged to Sanitary Sewer since 1 November 2014: <b>7,462,585 gallons</b>			
MTBE, BTEX, VOC, TPH Mass Removed: <b>0.04 lbs<sup>b</sup></b>		MTBE, BTEX, VOC, TPH Mass Removed Since March 2011: <b>42.8 lbs</b>	
MTBE (Only) Removed: <b>0.01 lbs<sup>b</sup></b>		MTBE (Only) Mass Removed Since March 2011: <b>10.6 lbs</b>	
Rolling 12-Month Cost per Total Pounds of Mass Removed: \$16,234 <sup>bc</sup>			
Monthly Cost per Pound of Mass Removed: \$55,896 <sup>bc</sup>			
<sup>a</sup> SiteWise™ estimate that 1 kilowatt hour generated produces 0.74 pounds of GHG.			
<sup>b</sup> Calculated using December 2017 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 – December 2017</b>		
<b>Location</b>	<b>Average Flow Rate Groundwater (gpm)<sup>a</sup></b>	<b>Hours of Operation</b>
EW2014x18	1.1	364
EW2016x18	1.0	364
EW2019x18	0.8	878
EW2333x18	0.0	0
Site ST018 GWTP	1.7	878
<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.	--		--	None.
-- = Time not recorded <sup>a</sup> Shutdown and restart times estimated based on field notes ST018GWTP = Site ST018 Groundwater Treatment Plant					

Table 4 presents the Site ST018 pulsing dates.

<b>Table 4 – Summary of Site ST018 “Pulsed Mode” Operations</b>	
<b>Pulse-on Date (All Extraction Wells Operational)</b>	<b>Pulse-off Date (EW2019x18 Operational Only)</b>
	4 October 2017
16 October 2017	31 October 2017
14 November 2017	27 November 2017
11 December 2017	26 December 2017

## Summary of O&M Activities

Monthly groundwater treatment samples were collected at the ST018GWTP on 5 December 2017. During the sampling, EW2019x18 was the only operational extraction well due to pulsed operation of the system. Results are presented in Table 5. The complete December 2017 laboratory data report is available upon request. The influent concentration for MTBE during the November 2017 sampling event was 1.16 µg/L, which is a decrease from the November 2017 sample result of 6.88 µg/L. TPH-d and TPH-mo were also detected in the influent sample. MTBE and TPH-d were detected in the system effluent sampling location at concentrations less than the effluent limitations.

All concentrations of TPH are well below the Fairfield-Suisun Sewer District effluent limitation of 50,000 µg/L for TPH-g and TPH-d, or 100,000 µg/L for TPH-mo. Additionally, 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 influent and effluent contaminant concentrations to maintain compliance with the Fairfield-Suisun Sewer District discharge permit.

In December 2017, three of the four extraction wells (EW2014x18, EW2016x18, and EW2333x18) continued to operate in a two-week “pulse-mode” (two weeks off, two weeks on, two weeks off, and so forth). As shown in Table 4, all the extraction wells were on line on 11 December, and the three extraction wells were taken off line on 26 December. When the ST018GWTP operates in pulsed-off mode, only the furthest downgradient extraction well EW2019x18 operates continuously.

In December 2017, EW2333x18 was not operational because of a pump fault. Inside the extraction well vault, an excess amount of soil and gravel were observed, which may be caused by a burrowing animal. The excess soil and gravel covered the vault flood float switch and the pump electrical box, which caused the pump malfunction. The vault will be cleared of excess soil and the pump will be brought back on line (as scheduled) in January 2018.

Figure 1 presents plots of the average flow rate and influent total contaminant (MTBE, TPH-g, TPH-d, TPH-mo, BTEX, and VOCs) and 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 following the wet rainy 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 because of the “pulse-mode” operations. The MTBE concentration and total influent concentrations have generally been fluctuating over the past 12 months with an overall slightly decreasing trend.

## Optimization Activities

Optimization activities this month at the ST018GWTP include experimenting with operating the system in a pulsed mode. As discussed above, the three of the four extraction wells are operating in a two-week “pulse-mode” operation. Travis AFB will continue to track the performance of operating in pulsed mode, as compared against month-over-month results from 2016, and from 2017 as we transition into 2018. Through December 2017, upon turning the three (3) pulsed extraction wells back on line, influent samples have been collected to see if captured MTBE concentrations have increased. These samples have been collected 1 hour, 5 hours, and approximately 24 hours after turning the pulse wells back on. An additional sample will be collected approximately 48 hours after bringing all wells back on line in January 2018. All four (4) of these samples will be evaluated in January 2018 to determine how effective a pulsed mode operation is for MTBE capture at the Site ST018 GWTP.

## 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 37 pounds of GHG during December 2017 and treated 89,960 gallons of water, which was a slight increase from November 2017 (35 pounds, treating 83,880 gallons). The amount of GHG produced is directly attributed to the amount of water treated through the system because the only line-power electrical use is for a transfer pump through the GAC system.

TABLE 5

Summary of Groundwater Analytical Data for December 2017– Site ST018 Groundwater Treatment Plant

Summary of Groundwater Monitoring Data for December 2017 - Site 01016 Groundwater Monitoring Point					
Constituent	Instantaneous Maximum* (µg/L)	Detection Limit (µg/L)	N/C	5 December 2017** (µg/L)	
				Influent	System Effluent
<b>Fuel Related Constituents</b>					
Methyl tert-Butyl Ether	6,400	0.15	0	<b>1.16</b>	<b>1.54</b>
Benzene	25,000 <sup>a</sup>	0.15	0	ND	ND
Ethylbenzene	25,000 <sup>a</sup>	0.15	0	ND	ND
Toluene	25,000 <sup>a</sup>	0.15	0	ND	ND
Total Xylenes	25,000 <sup>a</sup>	0.15 – 0.30	0	ND	ND
Total Petroleum Hydrocarbons – Gasoline	50,000 <sup>b</sup>	35	0	ND	ND
Total Petroleum Hydrocarbons – Diesel	50,000 <sup>b</sup>	24	0	<b>48.2 J</b>	<b>25.9 J</b>
Total Petroleum Hydrocarbons – Motor Oil	100,000	24	0	<b>25.2 J</b>	ND
<b>Other</b>					
Acetone	NA	1.0	0	ND	ND
1,2-Dichloroethane	20	0.15	0	ND	ND

\* In accordance with the Fairfield-Suisun Sewer District Effluent Limitations

\*\* During the sampling event, only EW2019x18 was operational

Laboratory data available on request.

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

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

µg/L = micrograms per liter

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

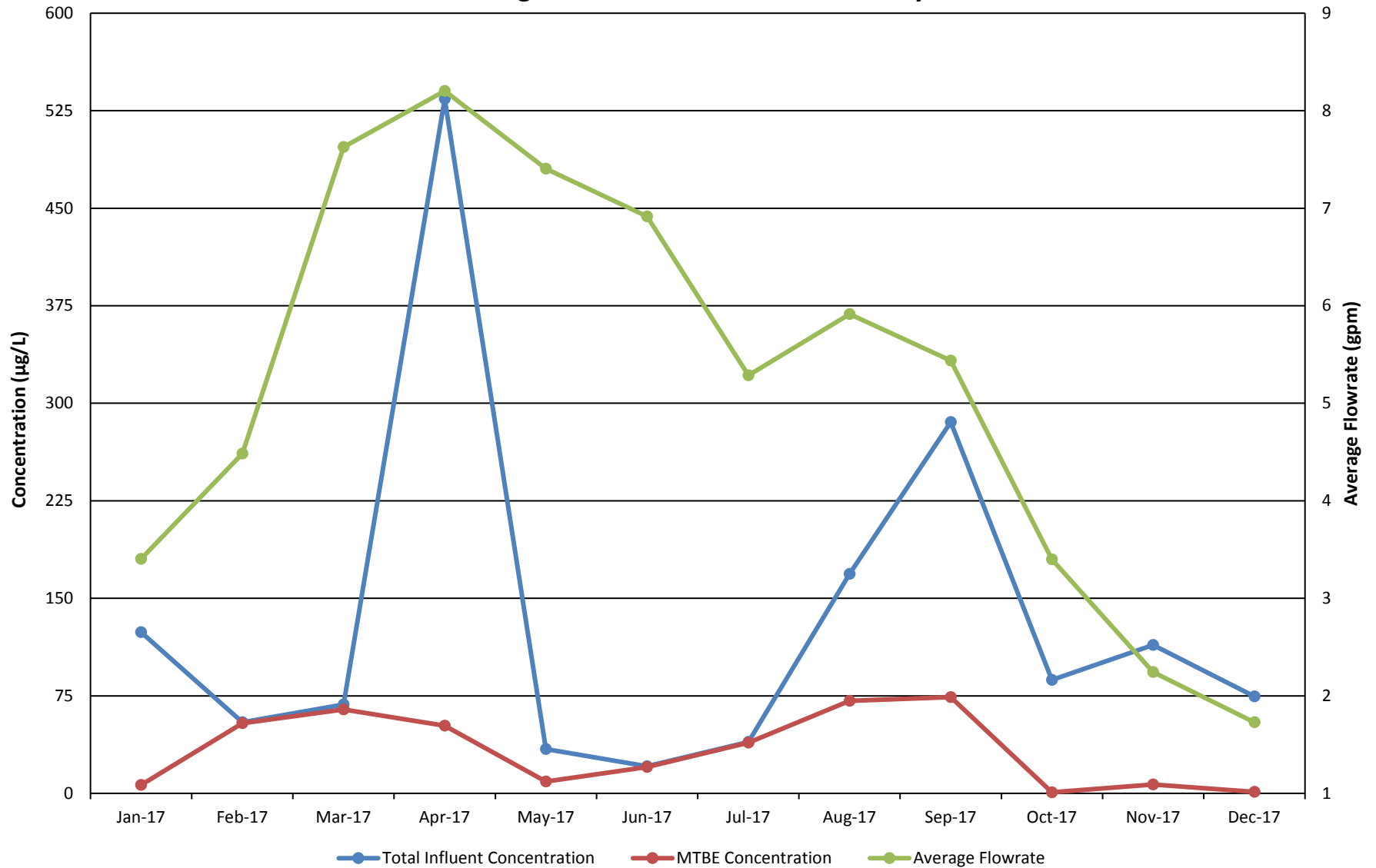
NA = not applicable

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

ND = not detected above method detection limit

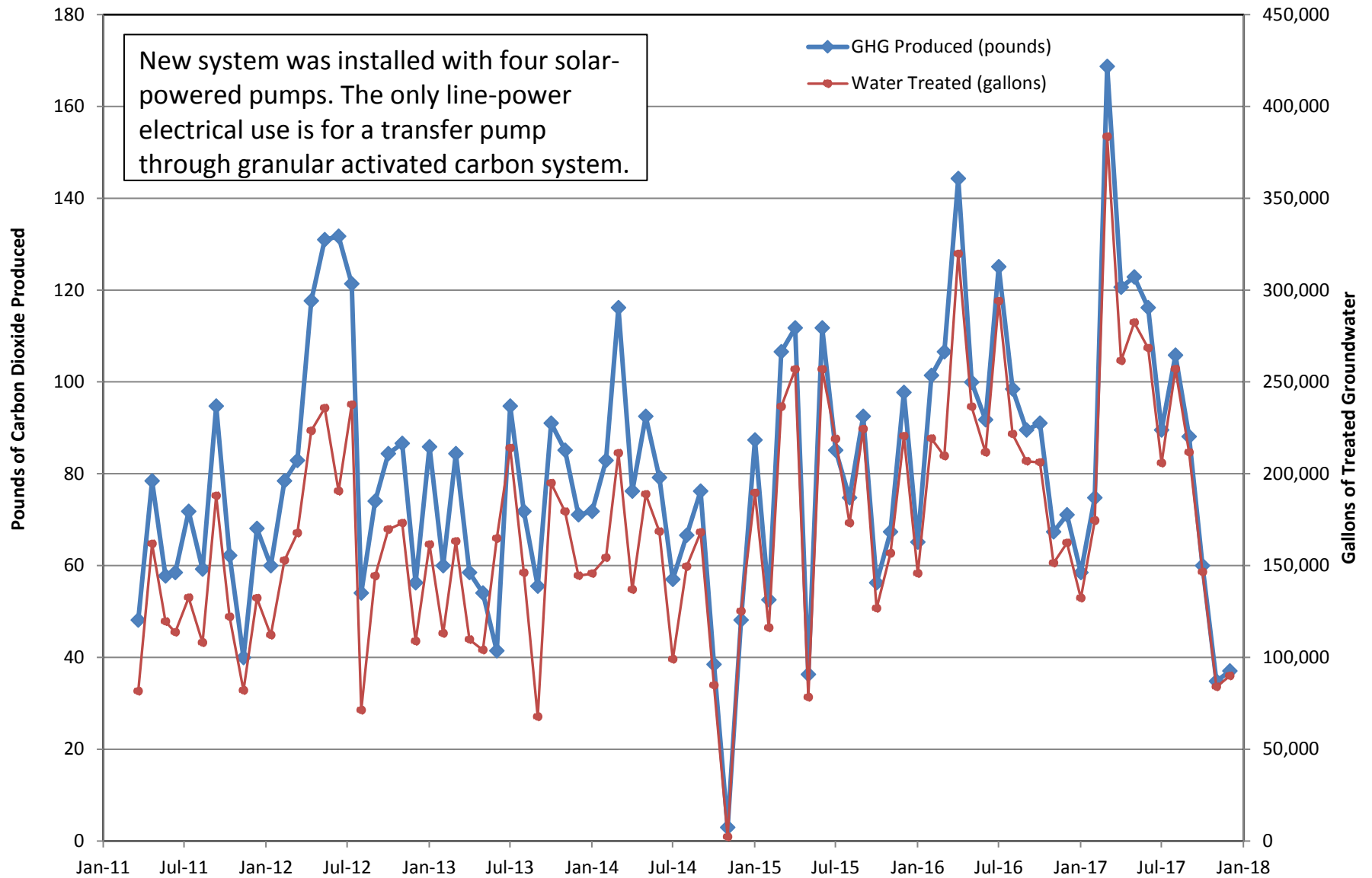


**Figure 1**  
**ST018GWTP Total VOC and MTBE Influent Concentrations**  
**and Average Flowrate Twelve Month History**

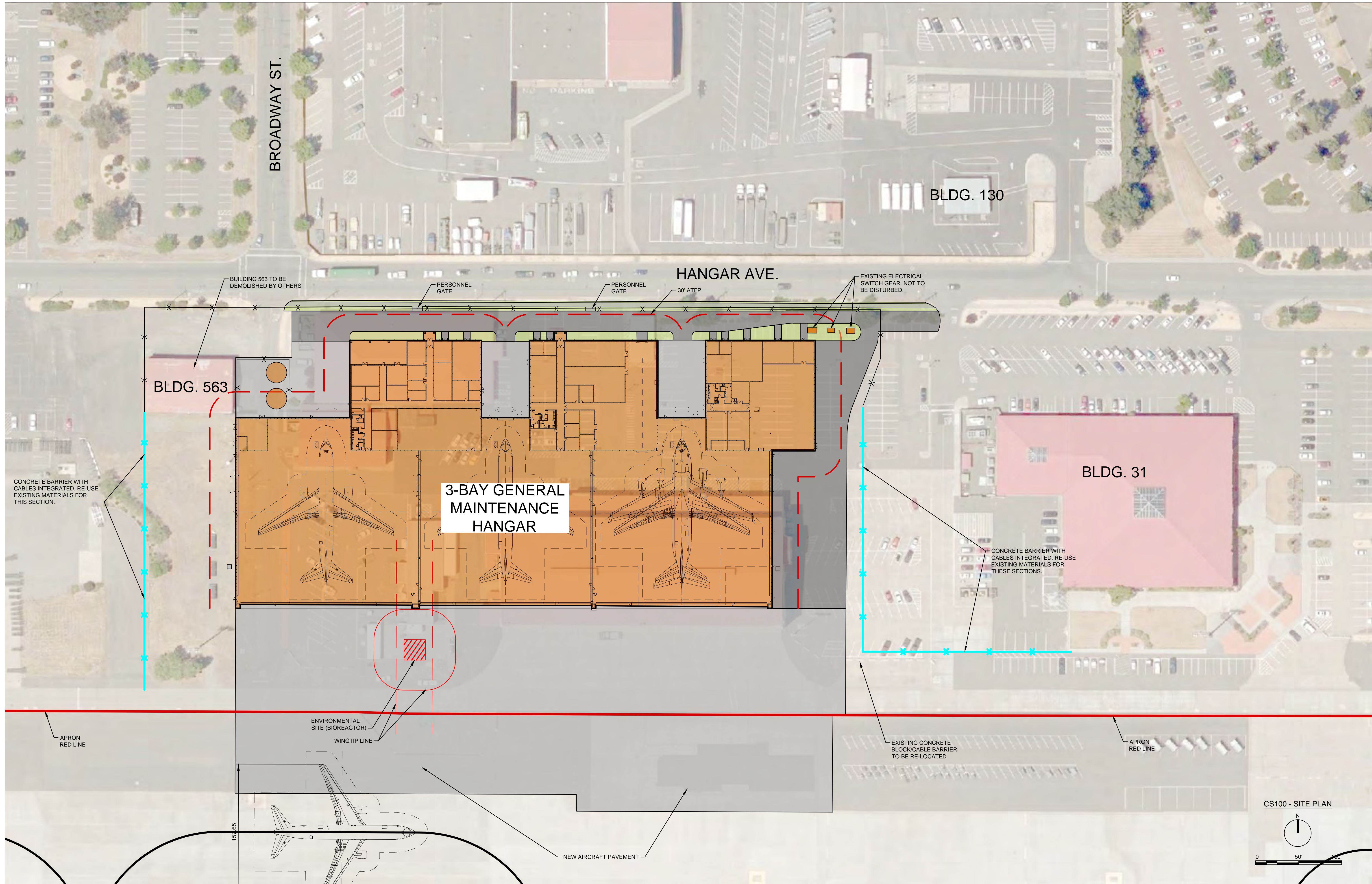


## Figure 2

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









# Travis AFB Restoration Program

## Program Update

*RPM Meeting*  
*January 17, 2018*

# 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**



# 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***

# Documents In-Progress

## CERCLA

- Community Relations Plan
- Data Gap Investigation Results, Technical Memorandum for Soil, Sites SD033, SD043, SS046
- ***Data Gap Investigation Results, Technical Memorandum for Site SS016***
- ***Amendment to the Soil ROD for WABOU sites DP039, SD043, and SS046***
- ***TS060 Removal Action Completion Report***
- ***SS035 Site Closure Report***

## POCO

- POCO Evaluation/Closure Report for DERA-funded Oil/Water Separators OW040, OW047, OW048, OW049, OW050, OW052, OW055, OW056, and OW057

# Field Work In-Progress

CERCLA

- None

POCO

- None

# Documents Planned

## CERCLA

- DP039 RACCR Addendum for newly installed downgradient monitoring wells Mar
- Amendment to the Soil ROD for NEWIOU Sites SS016 and SD033 Mar
- ***FT005 Extraction System Optimization Report*** ***Mar***
- SD031 RI/FS Apr
- ***EVO Sites FT004, SS015, SD031, & SD036 Optimization Injections Report*** ***Apr***
- ***SD043 Excavation Work Plan*** ***TBD***
- ***SS046 Excavation Work Plan*** ***TBD***
- ***LF006, SS030, SD031 Aquifer Test Activities Tech Memo*** ***TBD***

## POCO

- ***AOC TA500 Data Gaps Investigation and Closure Report*** ***Jan***

# Field Work Planned

## CERCLA

- ***Q1 2018 GRIP Sampling*** ***Feb***
- ***Q2 2018 GRIP Sampling*** ***Apr***
- SD034 Install bollards around SBGR ***May***
- ***SD034 Repair collar around EW2450x34*** ***Summer***
- ***SD037 EVO injection*** ***Summer***
- ***SD043 Soil excavation*** ***Summer***
- ***SS046 Soil excavation*** ***Summer***
- ***SS016 Soil excavation*** ***Summer***
- ***SS015 Soil sampling*** ***Summer***

## POCO

- None

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



# Petroleum Technology Demonstration Projects (1)

- SS014: Recycled Drywall 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 9 months**
    - **TPH-G: 99% reduction in source area (1,900 to 15 J  $\mu\text{g/L}$ ), 34% for remaining 6 site wells (was 18% after 3 months)**
    - **TPH-D: 98% reduction in source area (5,500 to 130 J  $\mu\text{g/L}$ ), 61% for remaining 6 site wells (was 33% after 3 months)**
    - **Benzene: 98% reduction (22 to 0.24 J  $\mu\text{g/L}$ ), 61% for remaining 6 site wells (was 49% after 3 months)**
- SD034: Washboard SBGR
  - Evaluate the effectiveness of an oxygen-enhanced aerobic SBGR on reducing TPH as diesel (TPH-D) in groundwater
  - Installed six (6) SBGR trenches in November 2016
  - **Below SBGR trench (MW811x34/PZSSAx34) through first 9 months**
    - **TPH-DRO baseline 9,600 ug/L reduced to 160 ug/L (98% reduction)**
    - **TPH-MRO baseline 2,300 ug/L reduced to 210 ug/L (91% reduction)**
  - **Plume hot spot monitoring well (MW02x34) through first 9 months**
    - **TPH-DRO baseline 8,300 ug/L reduced to 1,100 ug/L (87% reduction)**
    - **TPH-MRO baseline 1,500 ug/L reduced to 420 ug/L (72% reduction)**

\* SBGR = Subgrade Biogeochemical Reactor

**Updates in Green Font**

## CVOC Technology Demonstration Projects (2)

- Multisite Bioaugmentation: EVO and KB-1 Plus
  - 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 reduction at ST027B bioaugmentation area and low/fluctuating reductions at EVO only area**
    - **TCE fluctuations at SD036 bioaugmentation area (but 62% DCE decrease) and 99% decrease at EVO only area**
- 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
  - Installation completed May 2016
  - Slightly elevated TOC and reduced COC concentrations in the north, **TOC increase has not yet been observed in the central test area yet (distance may be too far for TOC dispersal using EVO)**
  - Optimized the GETs in southern portion of site in 2017, which may help accelerate TOC dispersal to support this TD

**Updates in Green Font**

# CVOC Technology Demonstration Projects (3)

- 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**)
    - **Concentrations rebounded in 4Q17, but 2017 reinjection should support further reductions**

**Updates in Green Font**

# CVOC Technology Demonstration Projects (4)

- SD031: EVO distribution via Gravel Chimneys
  - 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:
    - Reducing conditions have initiated as expected throughout the TD area and are supporting anaerobic degradation
    - TOC concentrations are increasing at several wells
    - Recirculation through chimneys has been successful relative to our design assumptions
    - 1,1-DCE (primary COC) concentrations have reduced by **96% (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 **93% (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 area), conducted reinjection of EVO in 2017
    - **Too early to evaluate effect of reinjection on cross-gradient area**

**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>19</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