

## Air Force Civil Engineer Center



### Performance-Based Remediation (PBR) at the Former Galena Forward Operating Location (FOL), Alaska

Restoration Advisory Board (RAB) Meeting  
25 October 2017

*Battle Ready ... Built Right!*

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## Former Galena FOL Performance Based Contract



- Parsons - Prime Contractor
- Partnering Team – CH2M and Ahtna Engineering Services
- Remediation of 32 sites contaminated primarily with fuels and solvents
- To date, five sites have achieved Cleanup Complete
- Installation of remediation systems from 2015 to 2018
- Operation through Summer 2020



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## 2017 Field Activities



- **2017 Field Work (June through September)**

- **Subsurface Aeration (Horizontal Well) Air Sparging**

- Million Gallon Hill/Missile Storage (Sites CG001/CG002)
    - POL Tank Farm Area/GAVTC Building (Site ST005/CB001)

- **Soil Vapor Extraction**

- Former South Apron Maintenance Area (Site SS015)

- **Sulfate-Enhanced Bioremediation Injections**

- Former Bldg 1812 Hazardous Waste Satellite Accumulation (Site CSS002)
    - Former Birchwood Hangar and Truck Fillstands (Sites SS014/SS017)
    - Former JP-4 Fuel Stands at ADOT Maintenance Bldg (Site ST009)

- **Excavations**

- Old Abandoned Pipeline (Site CPL006) Area 3
    - Former Birchwood Hangar (Site SS014)
    - Former Truck Fillstands (Site SS017)

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## 2017 Field Activities (continued)



- **2017 Field Work (June through September)**

- **Site CS001 (Tank 27 Biocell) – DDT Contaminated Soil**

- Investigation to evaluate concentrations of contaminants in soil and water in the biocell, and to evaluate tank integrity

- **Other Field Work**

- System modifications (e.g., expand SVE systems)
    - Install new groundwater monitoring wells
    - Annual groundwater monitoring

- **Galena Landfarm**

- Landfarm tilling operations



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## 2017 Remediation System Locations



- Legend**
- Excavation
  - SVE System Installation
  - Horizontal Air Sparge Systems Installation
  - Sulfate-Enhanced Bioremediation Injections

Figure 1  
Installation of 2017 Remediation Systems  
at the Former Galena FOL  
Former Galena Forward Operating Location, Alaska  
PARSONS

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## Horizontal Air Sparge Systems



Injects air below the fuel-contaminated soil to remove volatiles (e.g., benzene) and stimulate aerobic biodegradation of petroleum hydrocarbons



Drilling and well  
screen installation  
at Site ST005

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# Horizontal Air Sparge Systems



Drilling and monitoring at Site CG001

Blower enclosure installation

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# Horizontal Air Sparge System at CG001/CG002



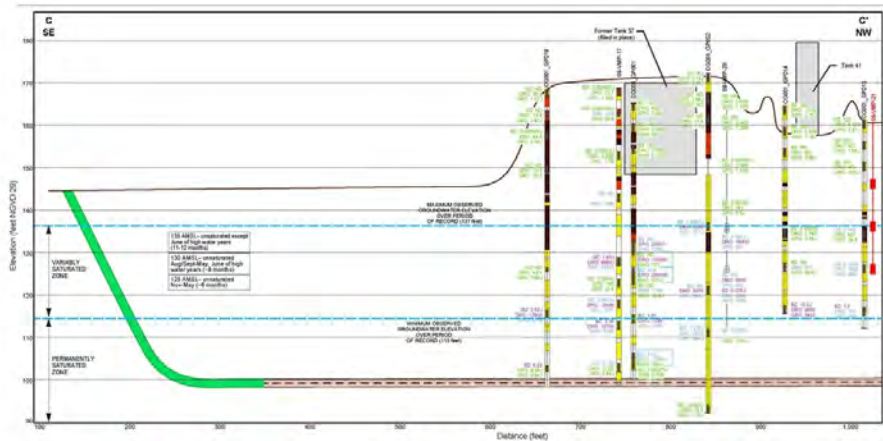
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## Horizontal Air Sparge System at CG001/CG002



Horizontal wells were installed 45 to 75 feet beneath Million Gallon Hill so that injected air passes upwards through the contaminated soil.



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## Horizontal Air Sparge System at ST005/CB001



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## Horizontal Well System Operation



- Air sparging will startup in November 2017 and operate during the winter time (November – April) when groundwater levels are lower
- Systems may operate for 10 years or more, depending on annual groundwater monitoring results meeting cleanup objectives

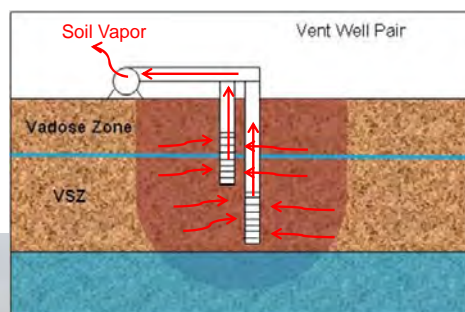
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## Soil Vapor Extraction (SVE) System



- SVE removes volatile contaminants in unsaturated soil
- System installed at Site SS015 will remove TCE from soil



Note: VSZ = variably saturated zone



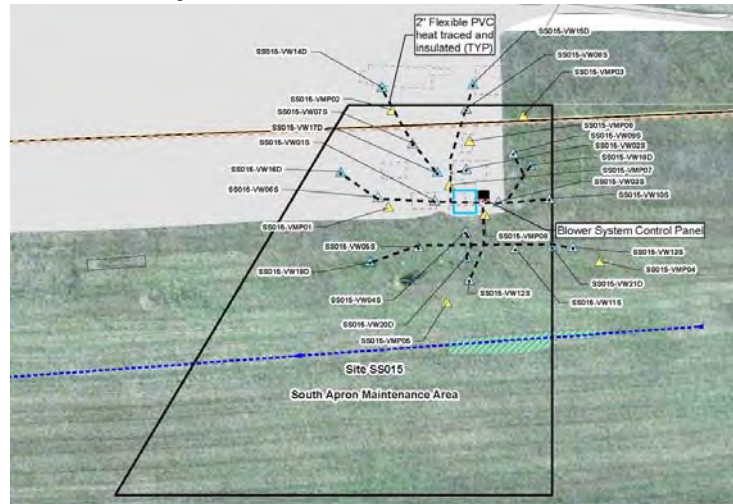
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## SS015 – South Maintenance Apron Area SVE Layout



Installed 13 shallow and 8 deep vent wells in 2017  
System will be plumbed and started in 2018



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## Sulfate Enhanced Bioremediation for Petroleum Hydrocarbons



- Inject sulfate (gypsum) to biodegrade petroleum hydrocarbons by sulfate reduction
- Direct injection of a gypsum slurry through direct-push drill rods
- Injected a total of **196,000 lbs** of gypsum at three sites
- Boreholes are grouted up with bentonite after injection



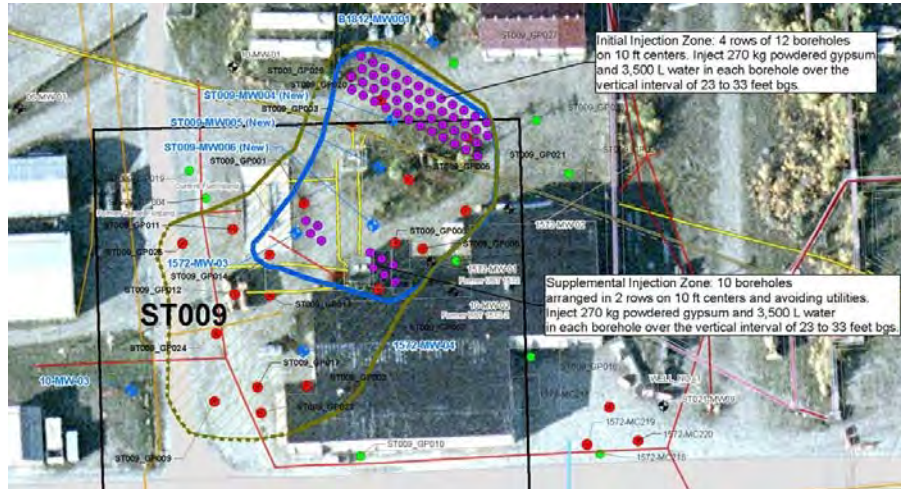
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## ST009 – Injection Point Layout



Total of 58 injection points at 23-33 feet



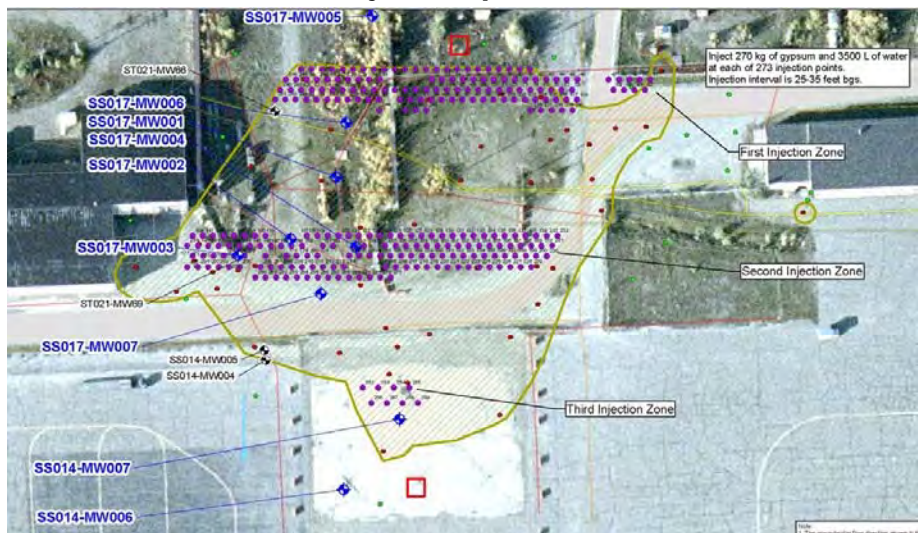
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## SS014/SS017 – Injection Point Layout



Total of 273 injection points at 25-35 feet



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## CSS002 (B1812) – Injection Point Layout



Total of 10 injection points at 27-37 feet



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## 2017 Excavations



- CPL006 Area 3 – Excavated approximately 132 cubic yards (cy) of petroleum contaminated soil and transported to landfarm
- CPL006 Area 4 – excavated approximately 12 cy of petroleum contaminated soil from pipeline test pit and transported to landfarm
- SS017 - Excavated approximately 70 cubic yards of petroleum contaminated soil and transported to landfarm
- SS014 – Excavated approximately 26 cubic yards of PCB and petroleum contaminated soil and staged in supersacks for pending characterization and disposal



Excavation at Site SS014

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# Galena PBR Schedule



## Planned 2018 Remediation Systems (April through October)

### Bioventing System Installation

- Former Fire Protection Training Area (Site FT001)

### Soil Vapor Extraction System Installation

- Complete Former South Apron Maintenance Area (Site SS015)
- Trichloroethene (TCE) Area (Site SS006/SS019)
- Former Fuel Storage Tank Area (Site ST005 Area C)

### Enhanced Anaerobic Bioremediation Injections

- Former South Apron Maintenance Area (Site SS015)
- Trichloroethene (TCE) Area (Site SS006)

### Excavations

- Former Waste Accumulation Area South of Bldg 1499 (Site SS018)
- Disposal Site West of Dike (Site DP023)
- CPL006 Area 2



# 2018 Field Work Locations



**Legend**

ADOT Runway Control Areas

- Apron (TRPS)
- OFA
- CPZ
- Safety Area
- Runway Centerline

Remediation Sites

- Building

Proposed 2018 Remediation Sites  
 October 2017 Presentation for  
 Former Galena PBR Remediation Contract Award  
**PARSONS**



## Galena PBR Schedule (cont'd)



- Operation and maintenance of remediation systems
- Annual groundwater monitoring
- Landfarm reconstruction and operation
- 2019 to 2020 – Operate and monitor remedies



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## Communications



- Semi-annual RAB Meetings (April/October)
- Air Force maintains Administrative Record for Final Documents at:

<http://afcec.publicadmin-record.us.af.mil/>



Excavation at Site SS017



Excavation at Site CPL006 Area 3

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## Questions?



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**Attachment 3**  
**Former Galena FOL Newsletter**

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# THE FORMER GALENA FOL ENVIRONMENTAL UPDATE



Published to keep the Galena, Alaska community informed of the Air Force's cleanup progress | Oct 2017

## Galena Performance Based Remediation Contract Nearing Halfway Mark

In March 2014, the Air Force awarded a Performance Based Remediation, or PBR, contract for the former Galena Forward Operating Location, or FOL, to Parsons Government Services. Parsons along with CH2M are responsible for implementing cleanup remedies at 32 sites through September 2020.

Three and a half years into the contract and the PBR team has made great progress towards cleaning up the sites. The overall approach for site cleanup is to focus on the most contaminated soil, which is a continuing source of contamination to groundwater. Once the source is reduced, remediation of soil and groundwater will occur naturally over time. Cleanup can take as little as a few years or up to several decades. Contamination at Galena is mainly from old spills or leaks of fuel from pipelines and storage tanks or spills of cleaning solvents and degreasers.

The PBR contractor has implemented several remedial systems such as bioventing, soil vapor extraction and air sparging which typically operates over the winter when groundwater is at its lowest. This ensures that the greatest area of soil is treated to remove contamination. Air sparging, or injecting air below the water table, is also a key component in cleaning up groundwater.

A few sites have also included excavation of contaminated soil with treatment at the landfarm or off-site disposal. The addition of treatment amendments to groundwater (gypsum for petroleum contamination and emulsified vegetable oil for chlorinated solvents) for larger sites will accelerate cleanup.

Parsons and CH2M have already closed several sites and the last few systems are scheduled to be installed next summer. Alaska Department of Environmental Conservation, Alaska Department of Transportation & Public Facilities, and others, are working closely with the Air Force and PBR contractor to meet the aggressive cleanup schedule.

### Galena PBR by the Numbers

#### 32 sites in the PBR contract

ACTIONS COMPLETED	REMAINING ACTIONS
5 sites closed	3 SVE systems
20 remediation systems installed	3 Excavations
2000 cubic yards of contaminated soil removed	1 Biovent system
196,000 pounds of treatment amendments injected	1 Site with treatment amendment injections

## Horizontal Well Air Sparging System Installed

Air Force contractors installed remediation systems at the two largest petroleum contaminated sites this summer and will begin operating this winter, 2017-18. These systems use horizontal wells that were installed just below the groundwater surface over a large area. Air will be injected into the wells to accelerate bioremediation of petroleum contamination in the soil and groundwater. The Air Force selected horizontal wells over vertical wells in order to cover a larger area of contamination.



AF contractors conduct horizontal well drilling at the former Galena FOL. Photo Courtesy: AF Contractor

# Overview of Site Remedies

## Triangle Area Sites



**Legend: Soil Contamination above Cleanup Level and Type of Cleanup**

- **Bioventing.** Soil was excavated from some of these sites and treatment amendments have been added to groundwater to enhance bioremediation.
- **Horizontal Air Sparging.** A small area of ST005 also will have an SVE system.
- **Soil Vapor Extraction (SVE).** Soil was excavated from some of these sites and treatment amendments have been added to groundwater to enhance bioremediation.
- **Vertical Air Sparging and Soil Vapor Extraction (SVE).** CST011 did not need an SVE system.
- **Excavation**

**Legend: Groundwater Contamination above Cleanup Level**

- Trichloroethene
- Diesel
- Benzene
- Structure
- Airfield or Road



## Overview of Site Remedies (cont'd)

### Eastern Portion of Airport



## Defining Former Galena FOL Cleanup

### Soil Vapor Extraction

Soil Vapor Extraction removes volatile fuels such as gasoline or solvents from the ground by creating a vacuum that draws soil vapors into the wells. The low level volatiles are discharged to the air. Emissions are treated if needed prior to discharge.

### Injecting Treatment Amendments

At several Galena sites, amendments will be injected into the ground to enhance or accelerate biological activity or transforms fuel and chlorinated solvent contamination to a less hazardous end-product in groundwater. The amendments are pumped into the ground through a temporary borehole. When done, the borehole is grouted up. Injection locations are typically 20 feet apart to ensure that the amendments cover the entire area.

### Bioventing/Air Sparging

Bioventing and Air Sparging are types of subsurface aeration systems. Air is injected into the ground either into soil (bioventing) or groundwater (sparging) to add oxygen. Naturally occurring microbes in the ground need the oxygen to degrade petroleum hydrocarbons. Fuels are broken down over time.

### Land Use Controls

Land use controls are placed on areas where contamination may present a risk to people. For excavation and construction work this generally involves working with Alaska Department of Environmental Conservation on preparing a work plan to ensure that any contaminated soil or groundwater is handled properly. The installation of drinking water wells is prohibited in areas with groundwater contamination. New buildings must be constructed in areas where vapor intrusion is not a concern or can be mitigated. For a map of the current land use controls at the former Galena FOL, refer to the Galena LUC Map at: [http://dec.alaska.gov/spar/csp/galena\\_land\\_use\\_control.htm](http://dec.alaska.gov/spar/csp/galena_land_use_control.htm) Instructions on how to use the LUC map are provided on the website.

## Air Force Administrative Record, or AR, Website

Remedial Action Work Plans and Cleanup Plans can be found online at: <http://www.afcec.af.mil/Home/BRAC/Galena.aspx> or directly at: <http://afcec.publicadmin-record.us.af.mil/Search.aspx>

To search for Galena documents, select BRAC at the top of the page and then select Galena from the Installation List. There are several different search fields that can be used to find documents. One method is to use the "Subject or Title" field and type in the site ID or type of report. You can also add dates for "Documents After" and/or "Documents Before". If you know the AR number for a document, you can enter that number into the "Full Metadata Search" field for easy access.

In addition to the AR website, the Air Force has placed a DVD of the entire AR in a binder behind the librarian's desk at the library: **The Charles Evans Community Library (Inside Galena High School) Antoski Street, Galena, AK 99741 (907) 656-1205**

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## Feedback, comments, and more information

- I would like more information about the environmental cleanup of the former Galena FOL.
- I would like more information about the Restoration Advisory Board for the former Galena FOL.

*Please let us know how we are doing. Your comments and opinions are welcomed and assist the Air Force in providing the most accurate and up-to-date information regarding the cleanup for the former Galena FOL. Fill out this form and send it to the address listed below or email information to [afcec.pa@us.af.mil](mailto:afcec.pa@us.af.mil).*

Name (Mr./Mrs./Ms.) \_\_\_\_\_

Organization \_\_\_\_\_

Street Address \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_ Phone \_\_\_\_\_

Additional Comments \_\_\_\_\_

\_\_\_\_\_

Detach and mail this section in a stamped envelope to: AFCEC/Public Affairs, 2261 Hughes Ave., JBSA Lackland, TX 78236-9853

**Attachment 4**

**Galena PBR Open Sites**

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**Former Galena Forward Operating Location  
Performance-based Contract - Open Sites**

Site ID	Previous Site ID	Site Name	Primary Contamination	Impacted Media	Remedy	Status
CB001	--	Galena Aviation Vocation Technical Center	Petroleum	Soil and Groundwater	Horizontal Well Air Sparging	System installed in 2017 and startup underway (combined with ST005)
CG001	--	Million Gallon Hill	Petroleum	Soil and Groundwater	Horizontal and Vertical Well Air Sparging	Systems installed in 2017 and startup underway (combined with CG002)
CG002	--	Missile Storage Area	Petroleum	Soil and Groundwater	Horizontal Well Air Sparging	System installed in 2017 and startup underway (combined with CG001)
CPL006	OAP	Old Abandoned Pipeline	Petroleum	Soil and Groundwater	Bioventing and Excavation	System installed in 2016 and operating; excavations completed in 2017
CSS002	B1812	Building 1812 Former Hazardous Waste Satellite Accumulation Point	Petroleum	Soil and Groundwater	Excavation, Bioventing and Injecting Treatment Amendments	Excavation completed in 2015; system installed in 2016 and operating; sulfate injections to enhance bioremediation completed in 2017
CST011	UST1428	Combat Alert Cell USTs	Petroleum	Soil and Groundwater	Vertical Well Air Sparging	System installed in 2016 and operating
CST014	UST1859	Dining Facility UST	Petroleum	Soil and Groundwater	Vertical Air Sparging with Soil Vapor Extraction (SVE)	Systems installed in 2016 and operating
DP023	DSWD	Former Disposal Site West of Dike	Polychlorinated Biphenyls (PCBs) and Petroleum	Soil	Excavation	Removal action completed in 2016 (partially complete); additional action planned for 2018
FT001	--	Fire Protection Training Area	Petroleum and Solvents	Soil and Groundwater	Bioventing	System installation planned for 2018; perfluorinated compounds (PFCs) are being addressed under a separate project
OW024	OWS1833	MWR Storage OWS	Solvents	Soil	SVE	System installed in 2015 and operating
SS005	--	Wilderness Hall (Bldg 1872)	Petroleum	Soil and Groundwater	Vertical Air Sparging with SVE	Systems installed in 2016 and operating
SS006	--	TCE Area (Bldg 1845)	Solvents (small area of petroleum)	Soil and Groundwater	SVE and Injecting Treatment Amendments	SVE and treatment amendment injections to enhance bioremediation planned for 2018
SS014	--	Birchwood Hangar	Petroleum	Soil and Groundwater	Bioventing, Excavation, and Injecting	System installed in 2016 and operating; sulfate injections to enhance bioremediation

Site ID	Previous Site ID	Site Name	Primary Contamination	Impacted Media	Remedy	Status
					Treatment Amendments	completed in 2017; small area excavated in 2017
SS015	--	South Apron Maintenance Area	Solvents (small area of petroleum)	Soil and Groundwater	SVE and Injecting Treatment Amendments	SVE and treatment amendment injections to enhance bioremediation planned for 2018
SS016	--	Building 2541 – Former POL Fuel Lab	Petroleum	Soil and Groundwater	Bioventing	System installed in 2016 and operating
SS017	--	Former Truck Fillstands	Petroleum	Soil and Groundwater	Bioventing, Excavation, and Injecting Treatment Amendments	System installed in 2016 and operating; sulfate injections to enhance bioremediation completed in 2017; small area excavated in 2017
SS018	AOC023	Waste Accumulation Area - South of Bldg 1499	Petroleum and Solvents	Soil and Groundwater	Excavation	Excavation planned for 2018
SS019	--	Building 1700 – Refueler Maintenance Shop	Petroleum and Solvents	Soil and Groundwater	SVE followed by Bioventing	SVE system installed in 2015 and operating
SS022	B400	Building 400 Former CAA- Air Force Weather Station	Solvents (small area of petroleum)	Soil and Groundwater	SVE	System installed in 2015 and operating; expansion planned for 2018
SS025	--	West Perimeter Road TCE Spill	Solvents	Soil	SVE	System installed in 2015 and operating; expansion planned for 2018
ST005	--	POL Tank Farm	Petroleum	Soil and Groundwater	Horizontal Well Air Sparging and SVE	Air sparge system installed in 2017 and startup underway; SVE for one additional area planned for 2018
ST009	--	West Unit JP-4 Fuel Stands	Petroleum	Soil and Groundwater	SVE followed by Bioventing and Injecting Treatment Amendments	SVE system installed in 2016 and operating; sulfate injections to enhance bioremediation completed in 2017
ST010	--	Southeast Runway Fuel Spill	Petroleum	Soil and Groundwater	Bioventing	System installed in 2016 and operating
ST020	--	Building 1837 – Former UST	Petroleum	Soil	SVE	System installed in 2016 and operating
TU001	--	Power Plant Tank 49	Petroleum and Metals	Soil and Groundwater	Vertical Well Air Sparging with SVE and Excavation	Systems installed in 2016 and operating; excavation of blast grit media completed in 2016