

# Norwalk Tank Farm Update

Presented to the Norwalk Tank Farm  
Restoration Advisory Board

On behalf of KMEP

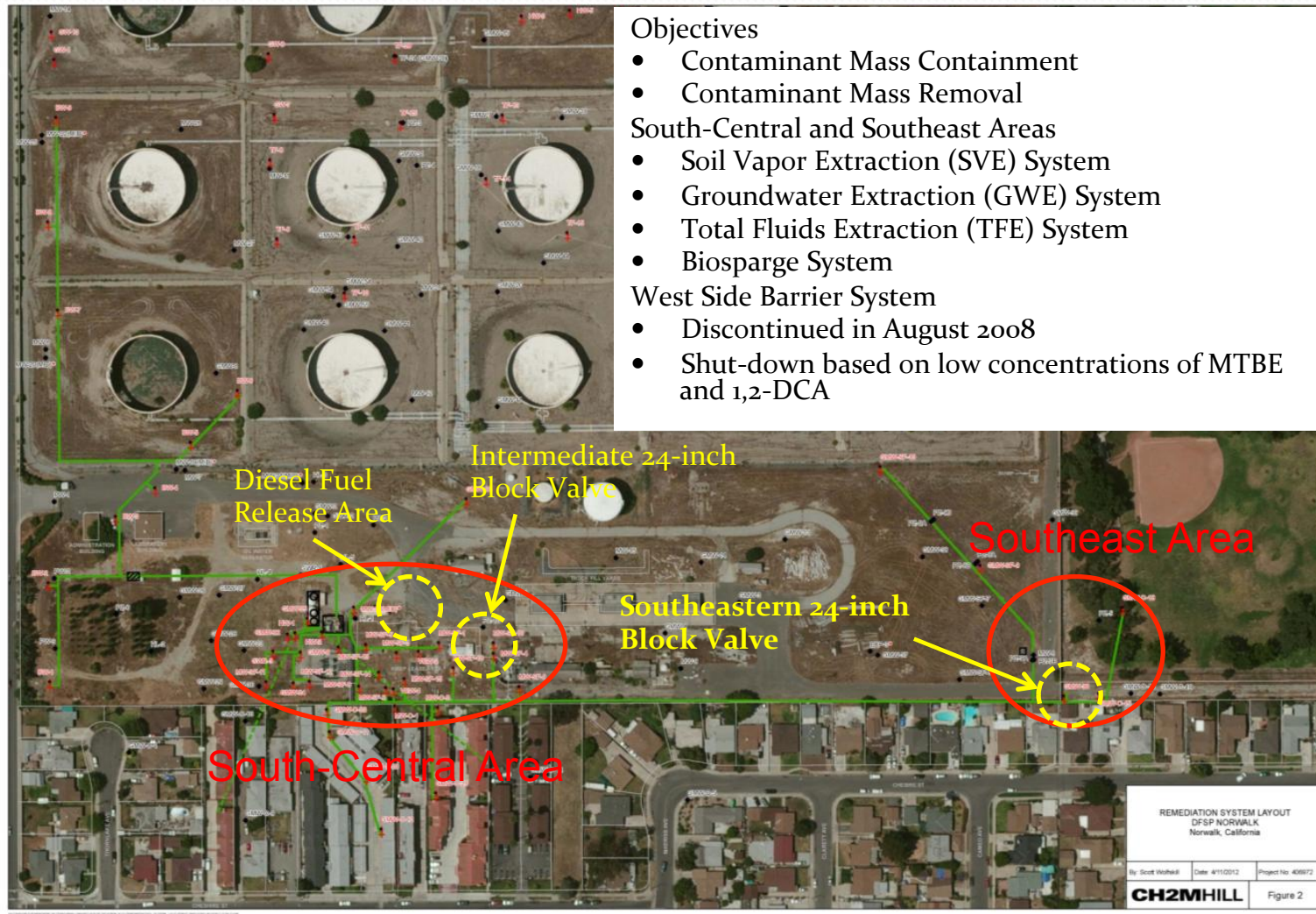
February 25, 2016



# Presentation Overview

- KMEP Update
  - Remediation Operations Update
  - Annual Soil Vapor Sampling Results
  - Biosparge Pilot Testing Update
  - Planned Activities

# SFPP Remediation Areas



## Objectives

- Contaminant Mass Containment
- Contaminant Mass Removal

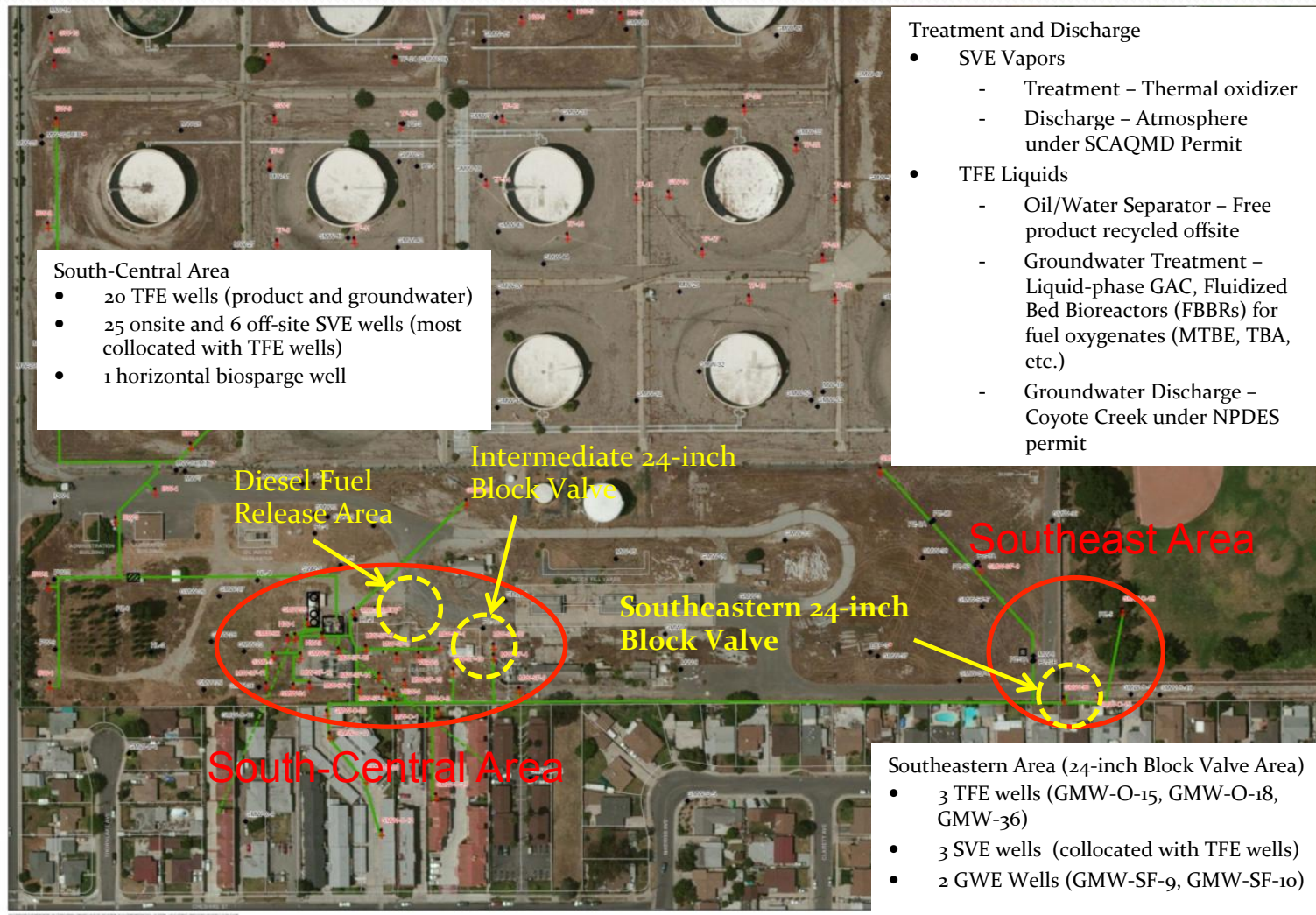
## South-Central and Southeast Areas

- Soil Vapor Extraction (SVE) System
- Groundwater Extraction (GWE) System
- Total Fluids Extraction (TFE) System
- Biosparge System

## West Side Barrier System

- Discontinued in August 2008
- Shut-down based on low concentrations of MTBE and 1,2-DCA

# SFPP Remediation Systems





# Remediation Systems

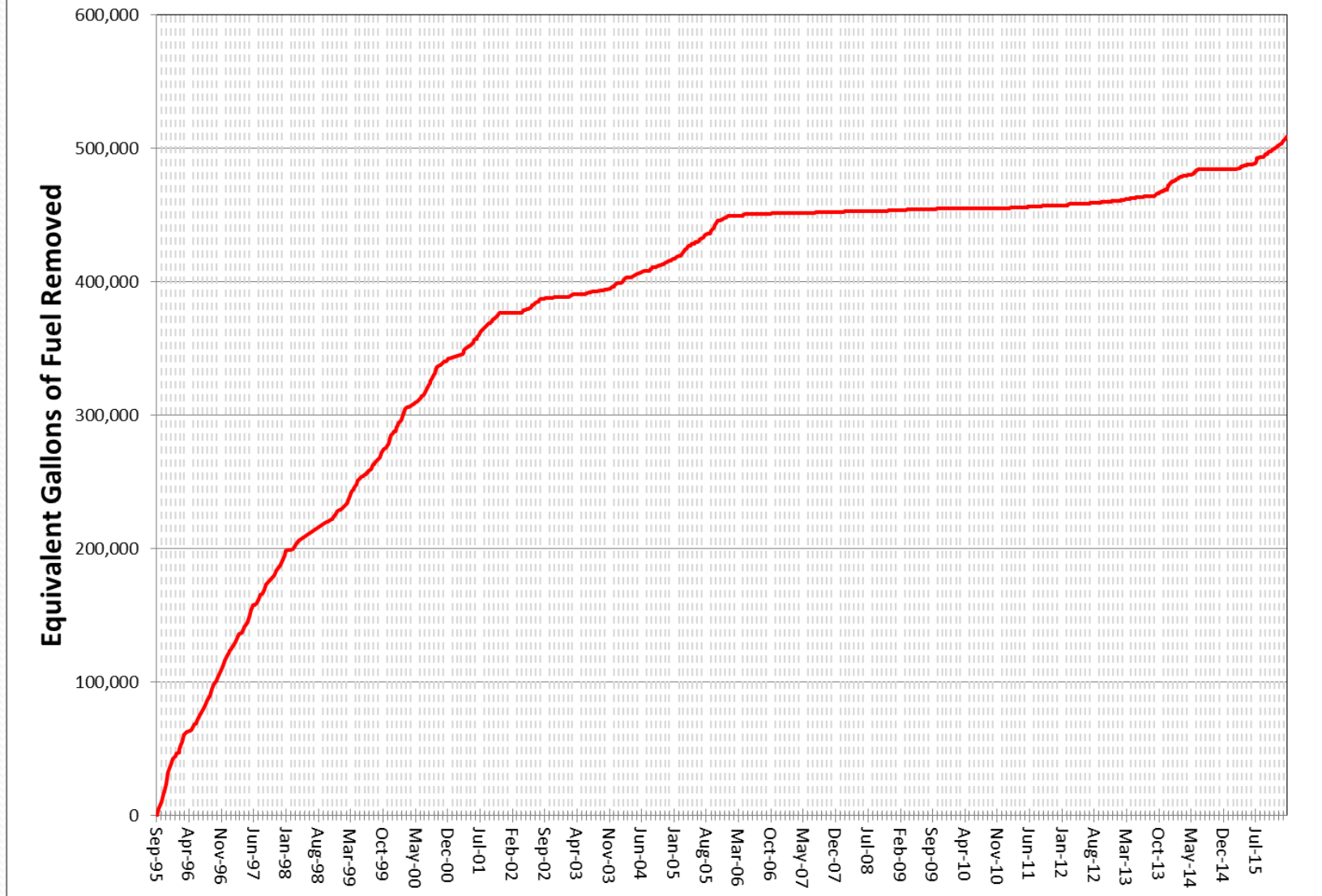
- Operations & Maintenance Activities
  - Weekly inspection and maintenance of SVE, TFE, and TBA treatment systems
  - Weekly data collection
    - Vapor flow rate, vacuum, groundwater extraction rates, hours of operations, and other system parameters
  - Monthly pump inspections
  - Measurement of individual well vapor concentrations
  - Collection and analysis of system influent and effluent vapor and groundwater samples
  - Hand bailing product from select remediation wells

# SVE System Operations Summary

- Equivalent Fuel Treated - SVE
  - Based on weekly monitoring of influent vapor concentration, vapor extraction flow rate, and hours of operation.
  - Pounds / 6.6 lbs/gal = gallons
- 3<sup>rd</sup> Quarter 2015– 7,780 gallons (51,350 pounds)
- 4<sup>th</sup> Quarter 2015– 14,599 gallons (96,351 pounds)
- Since 1995 – Approx. 510,700 gallons (3.37 million pounds)

# SVE System Operations Summary

Cumulative Fuel Removed by Vapor Extraction To Date





# TFE/GWE System Operations Summary

- Groundwater Extracted
  - 3<sup>rd</sup> Quarter 2015
    - South-Central and Southeast Areas -1,397,963 gallons
    - West Side Barrier – none (shutdown in third quarter 2008)
  - 4<sup>th</sup> Quarter 2015
    - South-Central and Southeast Areas – 1,482,816 gallons
    - West Side Barrier – none (shutdown in third quarter 2008)
  - Since 1995
    - South-Central and Southeast Areas– 69.3 million gallons
    - West Side Barrier – 26.9 million gallons



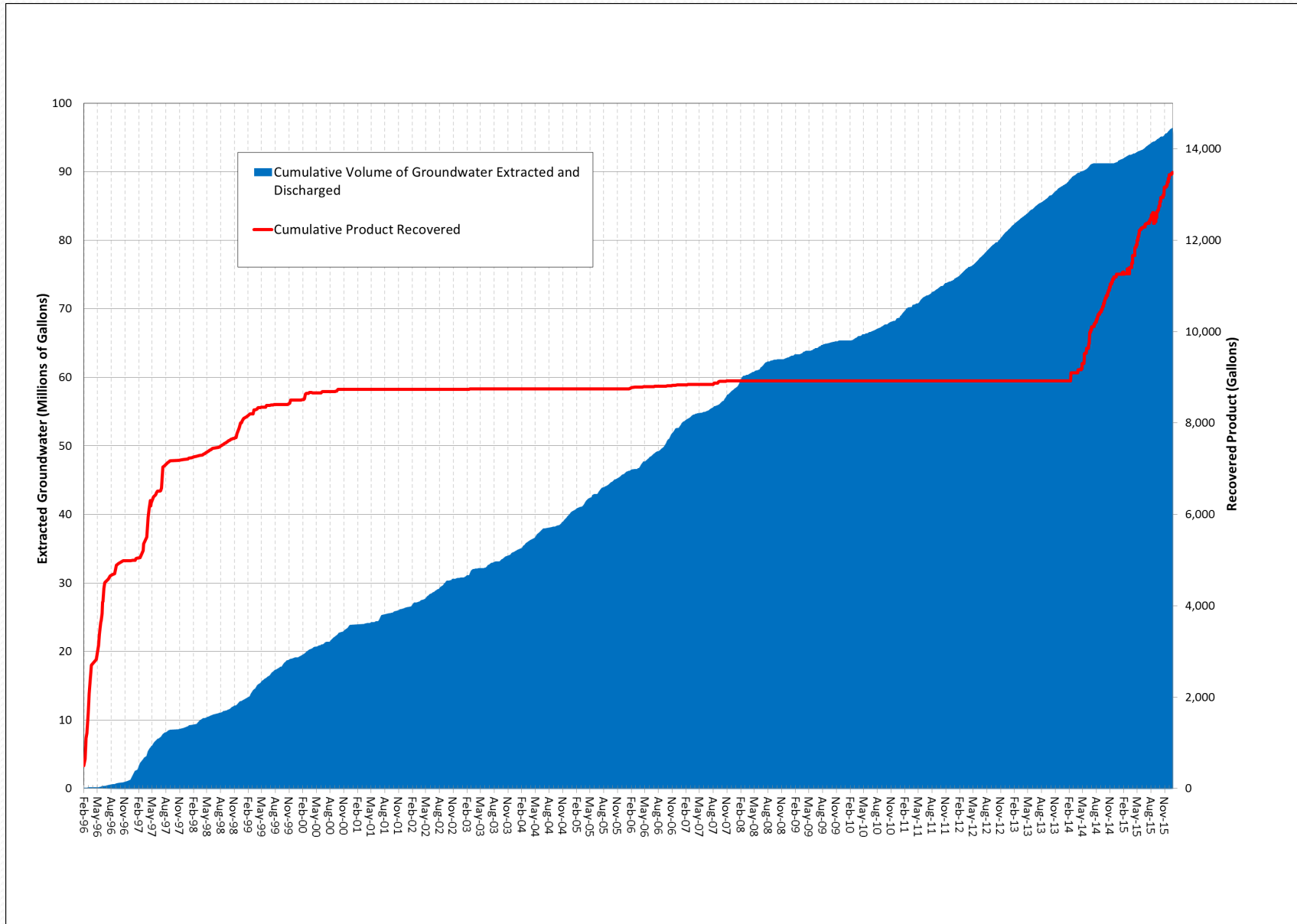
# TFE/GWE System Operations Summary

- Equivalent Fuel Treated – TFE/GWE
  - Based on monthly monitoring of influent TPH concentration and volume of extracted groundwater.
  - Pounds / 6.6 lbs/gal = gallons
  - 3<sup>rd</sup> Quarter 2015– 196 gallons (1,296 pounds)
  - 4<sup>th</sup> Quarter 2015– 244 gallons (1,612 pounds)
    - Higher mass removal during 2015 a result of increased TPH concentration in groundwater influent; higher TPH concentration a result of free product emulsified in groundwater influent

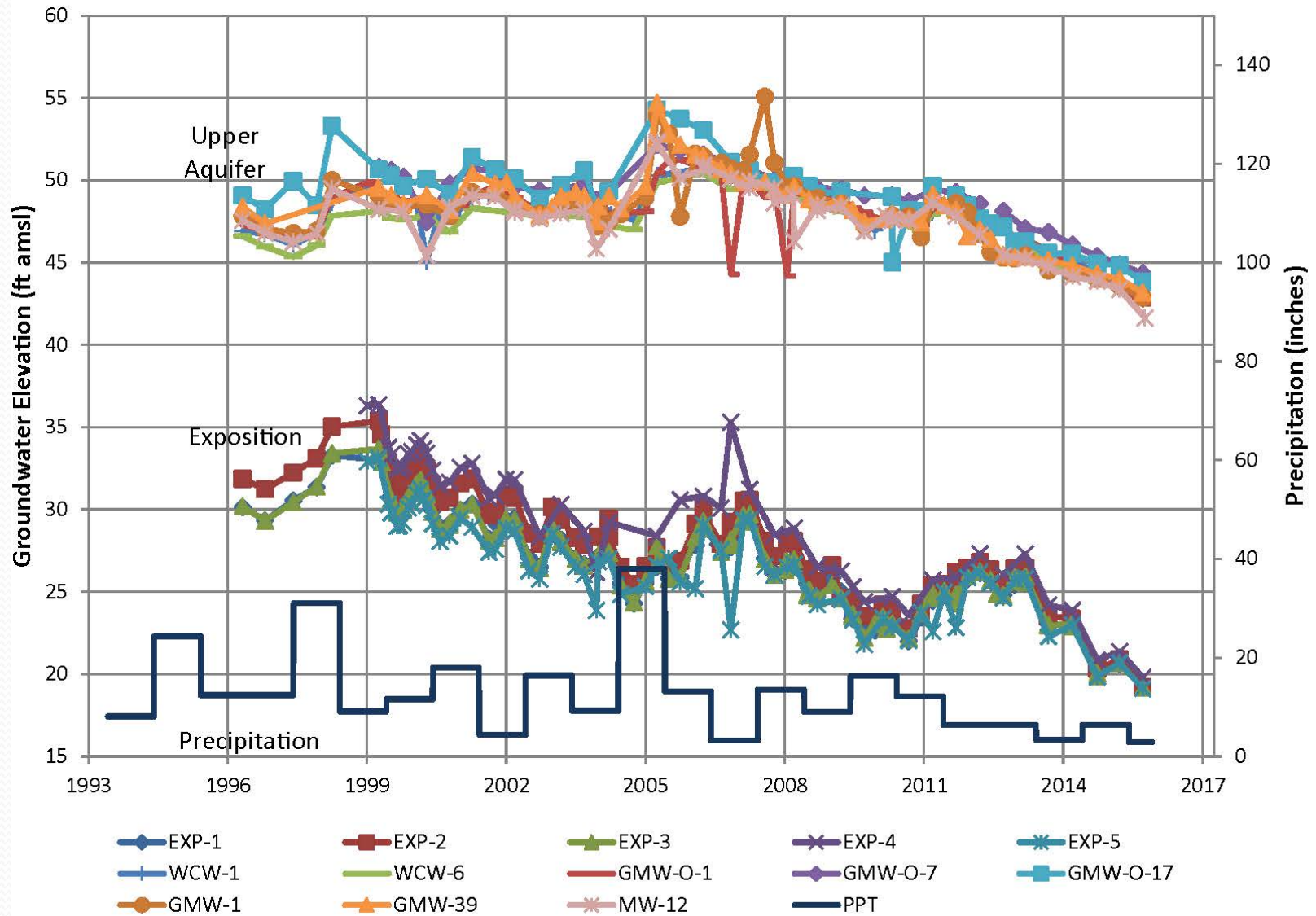
# TFE System Operations Summary

- Free Product Extracted
  - 3<sup>rd</sup> Quarter 2015
    - Approximately 682 gallons of free product observed to accumulate in the product holding tank
    - Recovered 98 gallons of free product using hand bailing
  - 4<sup>th</sup> Quarter 2015
    - Approximately 772 gallons of free product observed to accumulate in the product holding tank
    - Recovered 35 gallons of free product using hand bailing
  - Since 1995 – 13,892 gallons

# TFE System Operations Summary



# Historical Groundwater Elevations



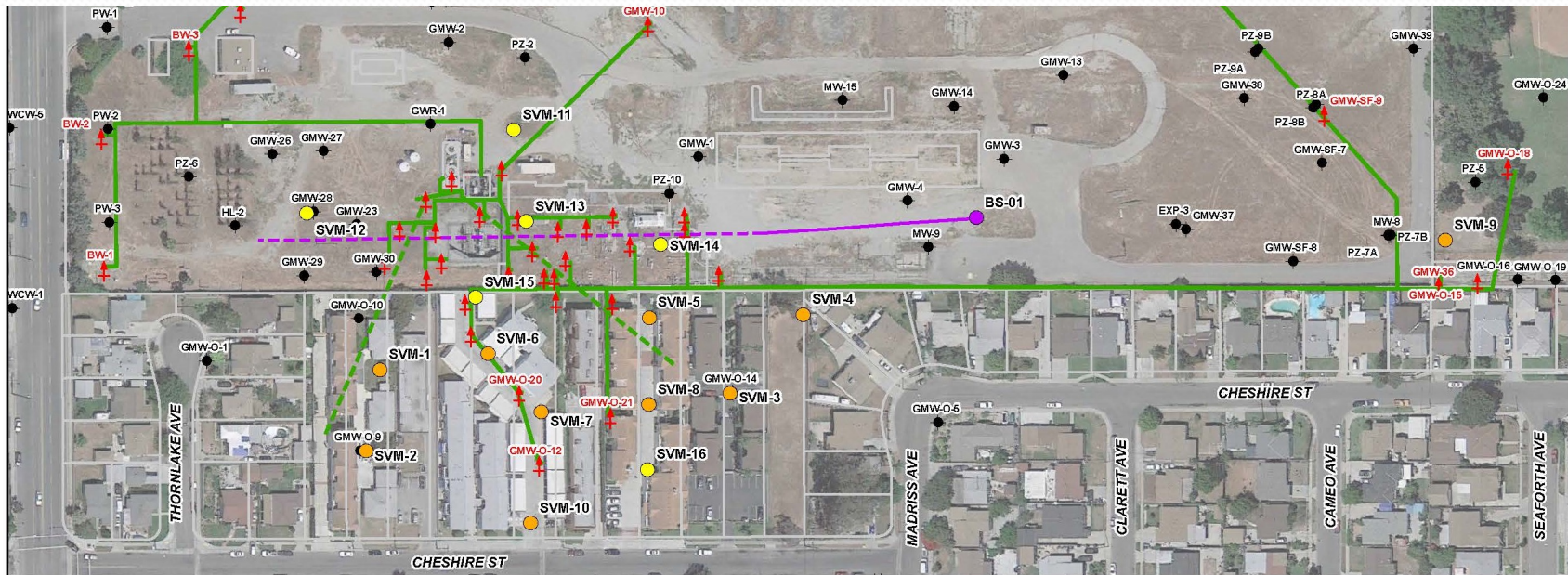
# Confirmation of Pipeline Integrity

- Because of the apparent increase in product thickness beneath the south-central area, SFPP implemented the following activities to confirm that a new fuel release had not occurred:
  - Pressure testing of active pipelines
    - **All pipelines passed the pressure tests (i.e., no pressure drop) and were put back online.**
  - Forensics analysis of product samples (GMW-23, GMW-29, and GMW-30)
    - **No fuel oxygenates (e.g., MTBE) present**
    - **Leaded gasoline was present (age of release 1960 to 1986)**
    - **Gasoline “weathered” or aged and not indicative of a new release**
- To take advantage of the historically low water levels and recent increases in product thicknesses, SFPP continues to hand bail wells that are not equipped for TFE

# Remediation System Operations Summary

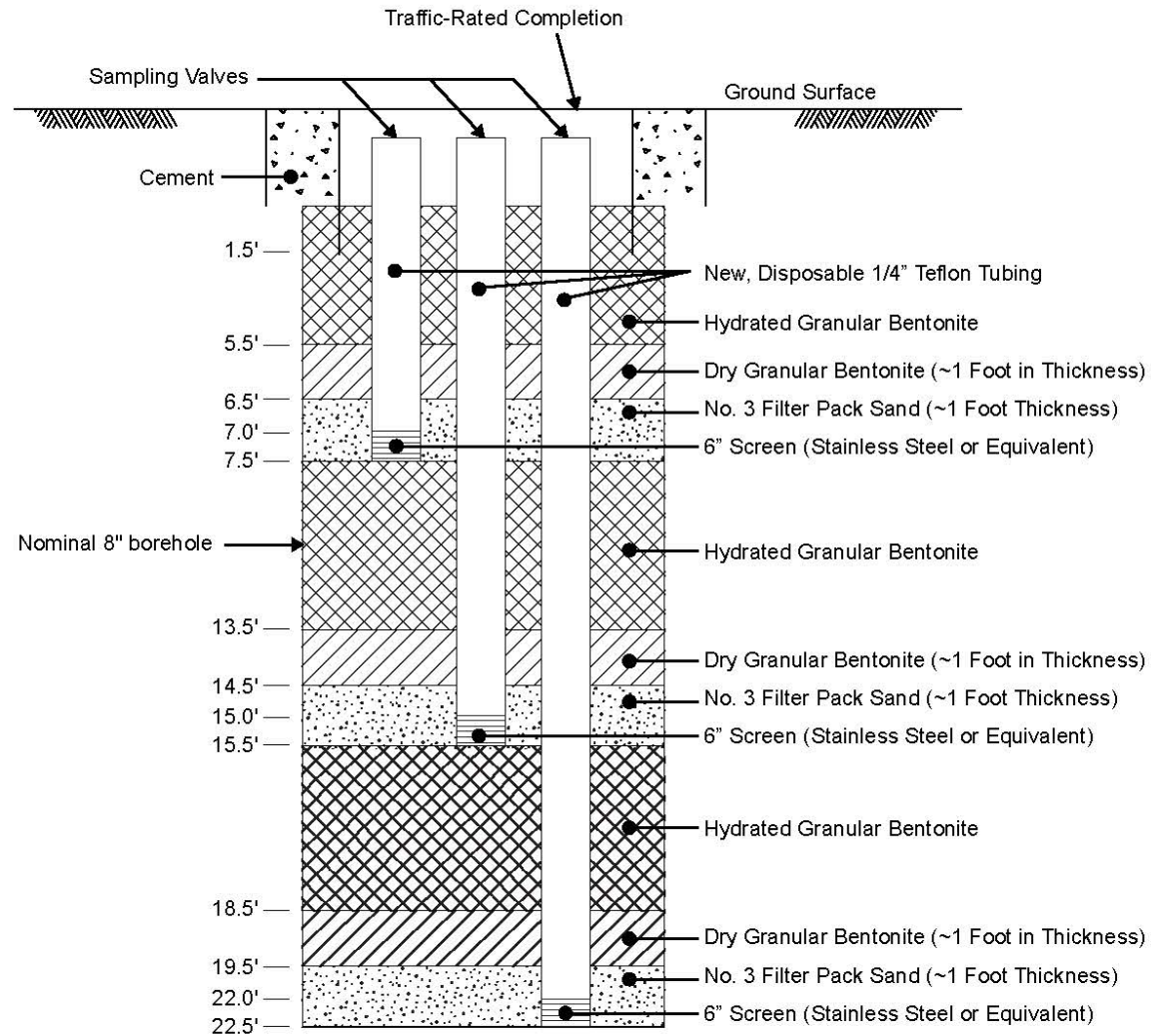
- SVE System
  - 3<sup>rd</sup> Quarter 2015
    - Operated 66% of time (reduced uptime as a result of system troubleshooting and annual soil vapor monitoring)
  - 4<sup>th</sup> Quarter 2015
    - Operated 77% of time (97% excluding planned shutdowns)
- TFE/GWE System
  - 3<sup>rd</sup> Quarter 2015
    - Operated 98% of time
  - 4<sup>th</sup> Quarter 2015
    - Operated 73% of time (94% excluding planned shutdowns)

# Annual Soil Vapor Monitoring



- 10 nested soil vapor monitoring probes (9 in southern offsite and 1 in southeastern area) installed in 2012; probes screened at ~ 5 and 15 feet bgs
- 6 triple nested soil vapor monitoring probes installed in south-central area in 2014; probes screened at ~ 7, 15, and 22 feet bgs
- Sampled probes in September 2015 for VOCs, TPH, and fixed gases analysis using mobile lab and fixed lab

# Soil Vapor Probe Construction



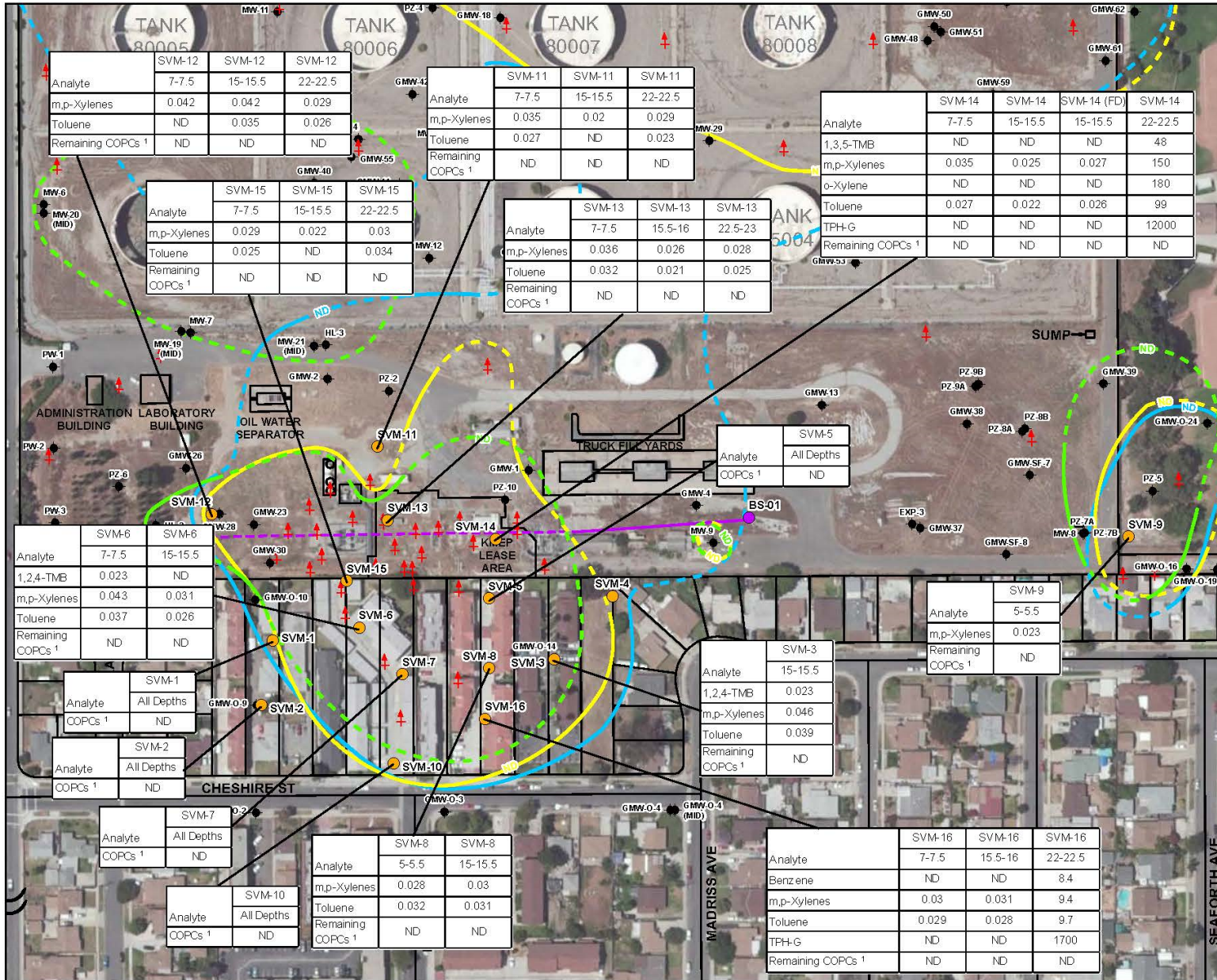
Not to Scale



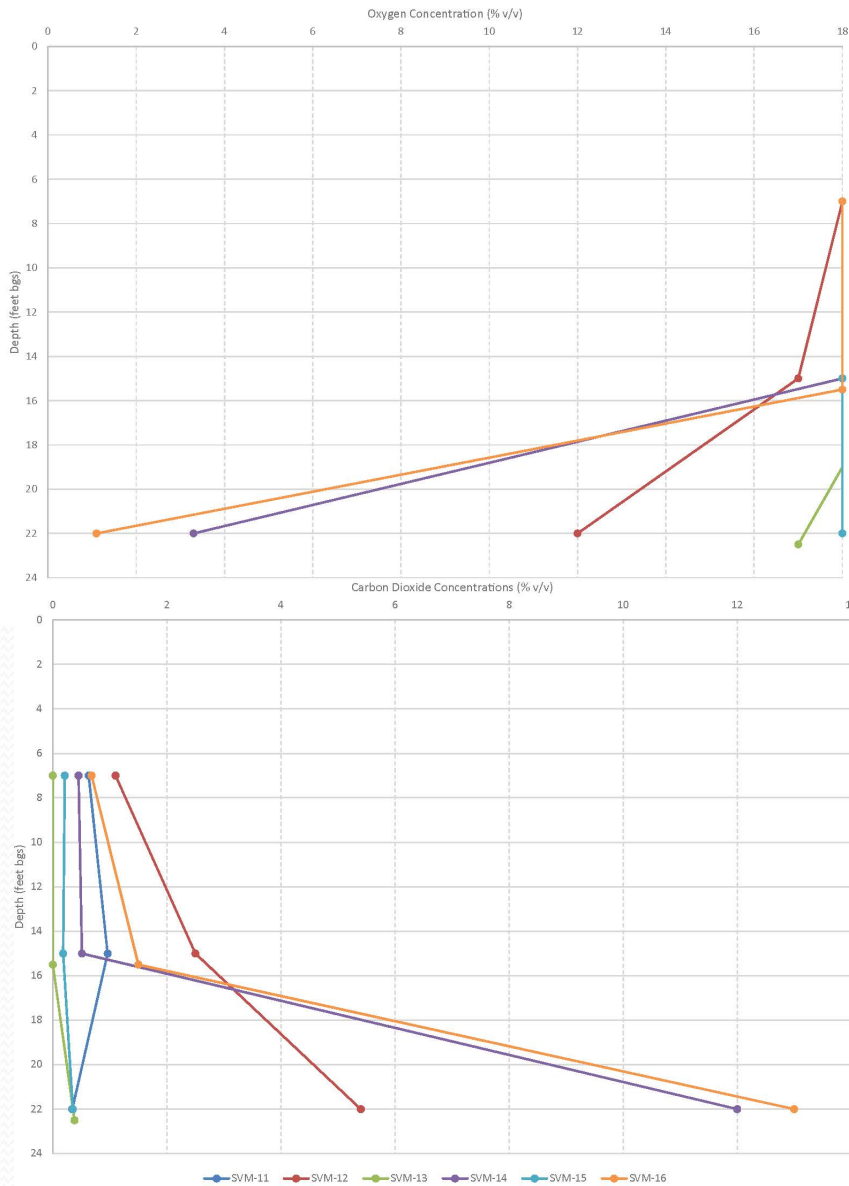
# Annual Soil Vapor Monitoring

- Mobile lab
  - Similar to 2014 soil vapor results.
  - Detections of COPCs in deeper probes (22-foot depth) of SVM-14 and SVM-16 at concentrations greater than human health screening levels
  - Detected COPCs shallower than 22 feet were generally low, near the laboratory RL, and below human health screening levels
- Fixed lab
  - Sampled 4 probes (SVM-1, SVM-5, SVM-7 and SVM-14) at deepest screen intervals (ranging from 13 to 22 feet bgs)
  - Detections of COPCs in SVM-1, SVM-5, and SVM-7, but below analytical reporting limits (J-qualified), and all detections were below the human health screening levels
  - In SVM-14 (22-foot depth), several COPCs detected above human health screening levels at concentrations consistent with the mobile lab

# Annual Soil Vapor Monitoring



# Fixed Gas Profiles

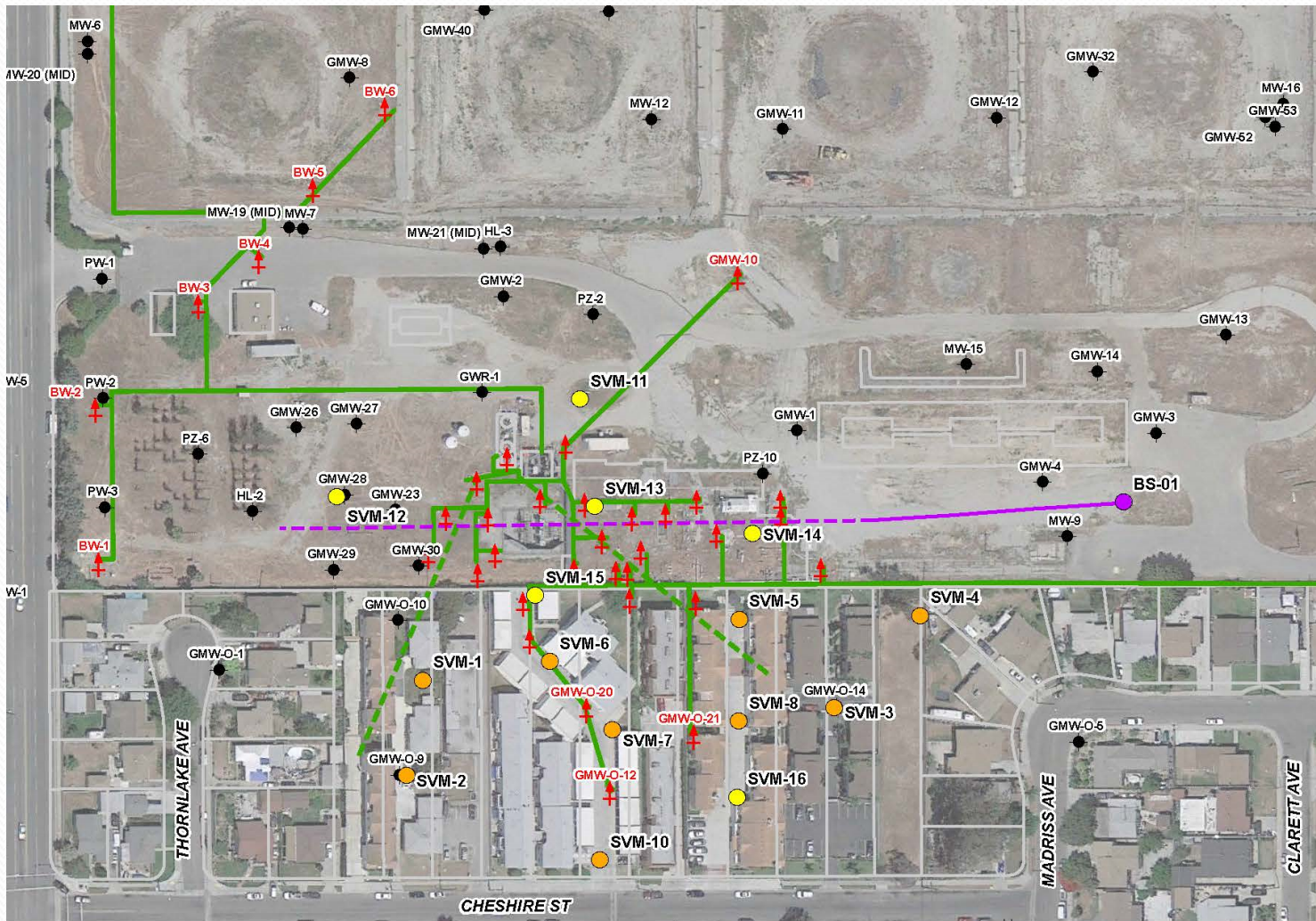


- Profiles demonstrate that shallow soil media (<15 feet bgs) is predominantly aerobic and favorable for natural attenuation of hydrocarbons. Lower oxygen concentrations at greater depths indicate that deeper soil media is approaching anaerobic conditions.

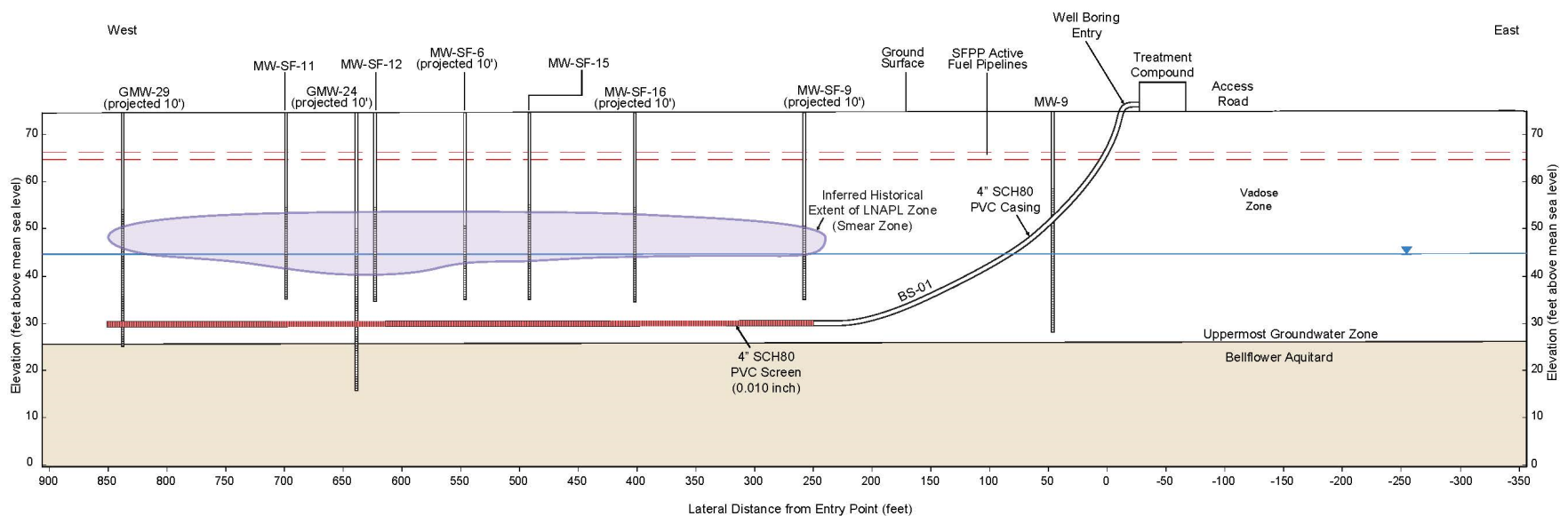
# Pilot Biosparge System

- Construction and Pilot Test Work Plan
  - Work Plan – November 18, 2013
  - Response to Comments – February 14, 2014
  - Approved by RWQCB – February 26, 2014
- Implementation
  - Horizontal well construction – Completed in August 2014
  - 6 triple nested soil vapor probes – Completed in September 2014
  - Electrical connections completed in December 2015
  - Commence pilot testing in January 2016

# Biosparge Well and Soil Vapor Probe Layout

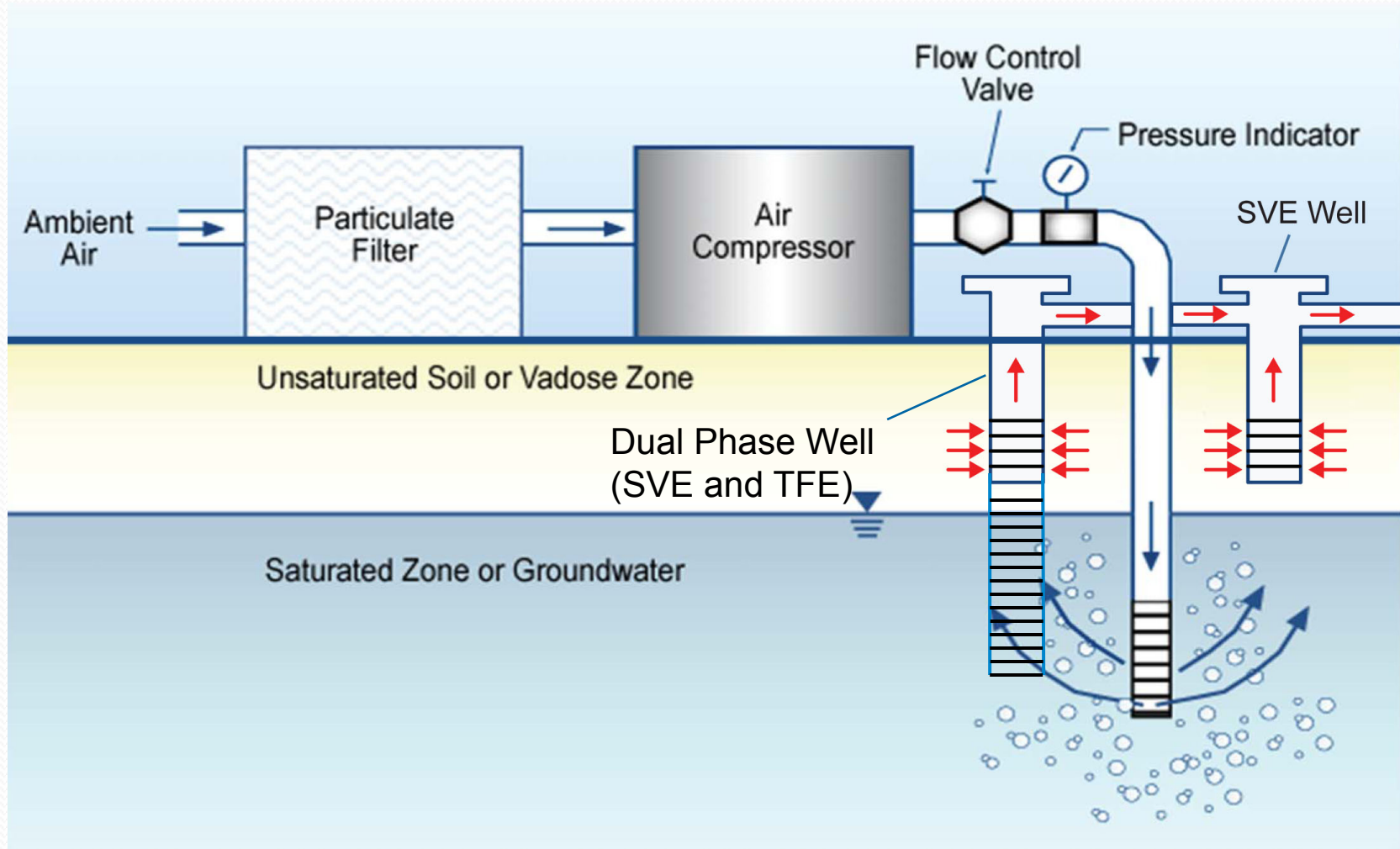


# Horizontal Well Construction



- Well Casing and Screen
  - SCH 80 PVC 4-inch diameter well
  - Open slot design (no sand pack required); slot width 0.010 inches, 11 slots per foot, 1.2 inches length; 0.28 to 0.30 % open area
  - Screen depth of 45 feet bgs
  - 250 feet of riser casing; 600 feet of screen

# Biosparge Process Flow



# Biosparge Compressor System



- 8 ft by 20 ft system enclosure
- Insulated for noise reduction



# Biosparge Compressor System



Air Compressor



Manifold



Digital Display



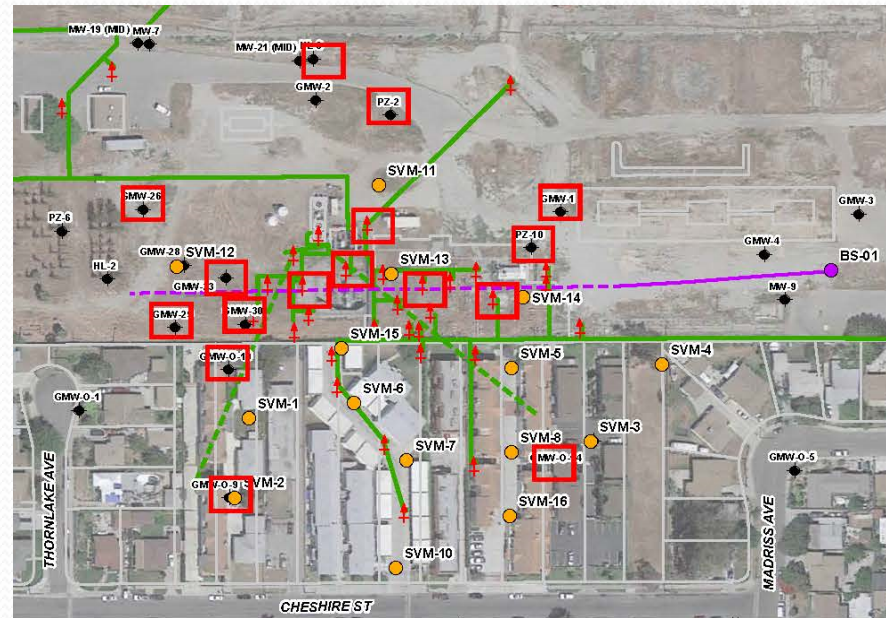
Compressed Air Tank

Kaiser 200 HP Rotary Screw Air Compressor  
(max rate of 494 scfm at 125 psi)

# Pilot Testing Program

- Baseline Testing (complete)
  - Soil vapor and groundwater samples collected prior to start-up to establish baseline data
- Ramp-Up Period (complete)
  - Initiated start up in January 2016; increased air flow slowly and in stages
  - Monitored soil vapor probes weekly using PID
  - Installed In-Situ Trolls to continuously record water levels, pH, and DO
  - Collected and analyzed soil vapor samples on January 27, 28, and 29 using mobile lab
- Short Term Tracer Test (complete)
  - 2 day test for zone of influence evaluation
  - Operate system at 0.8 cfm/ft (max flow rate)
  - Observe lateral and vertical zone of influence
    - Changes in water levels, groundwater DO and detection of SF6 tracer
- Long Term Test (ongoing)
  - Operate system up to 1 year and monitor soil vapor and groundwater conditions on monthly basis for first 6 months then quarterly thereafter

# Tracer Study



- Inject SF6 gas in biosparge well for 8 to 12 hours
- Sample groundwater from select wells following day for SF6 analysis
- Collect dissolved oxygen and other field parameters during sampling
- Observe wells for “bubbling”

# Preliminary Results

- Groundwater
  - Bubbling observed in several wells
  - Fluctuations in water levels and decline in product thickness in some wells
  - SF6 data are pending
- Soil Vapor
  - Mobile lab and field PID readings indicate modest increase in vapor phase VOCs (as expected). SVE will continue to operate during biosparge operation.
  - Results will be presented to RWQCB and RAB as part of monthly reporting requirement

# Safety Measures and Offsite Monitoring and Response

- SVE Interlock
  - Biosparging will only occur if the SVE system is online
  - Interlock installed so that biosparge system shuts off if SVE system goes down
- Soil Vapor Monitoring
  - Collection of field PID measurements of offsite probes on weekly basis for initial month of operation
  - Sampling of offsite soil vapor probes monthly to assess potential offgassing
  - Initial “wave” of higher VOCs in some probes expected but should subside with continued biosparge and SVE operations
- Immediate response to odor complaints
  - Field team will respond to residents immediately and collect indoor air samples if odors are reported

# Planned Remediation Activities

- Continue SVE and TFE in south-central and southeastern areas
- Continue as-need hand bailing product from wells without TFE capabilities
- Install new oil water separator and remediation pad for GWTS – 2<sup>nd</sup> Quarter 2016
- Install new SVE system – 4<sup>th</sup> Quarter 2016
- Continue operation of biosparge well and monthly groundwater and soil vapor monitoring



Questions?