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WILLIAMS AIR FORCE BASE

Site LF004 Landfill Remedial Action

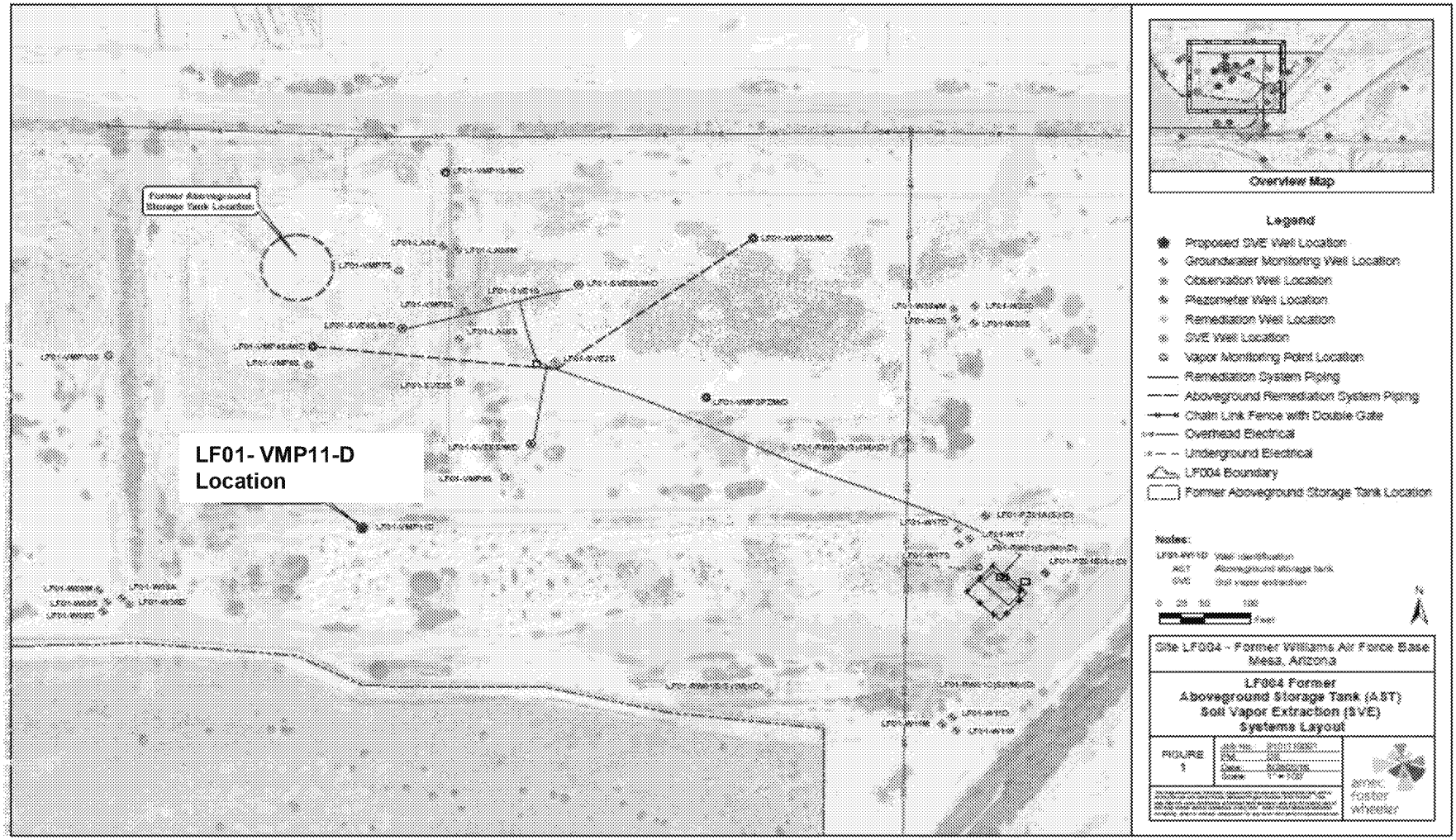
BCT Conference Call
20 October 2016

Site LF004
Former AST SVE System Update

Operations Summary through 7 Oct 2016

- Analytical data (Sep 2016) indicates TCE and PCE concentration remained below soil vapor goals (SVSLs) in all SVE wells and VMPs except SVE6-D (2.7 mg/m^3 vs 2 mg/m^3)
- SVE system shutdown in May 2016. SVE6-D connected to IWAS system. SVE6-D will be reconnected to SVE system in Oct 2016
- Installed vapor monitoring probe (VMP11-D) south of SVE6-D in Aug 2016. Analytical data (Sep 2016) indicates TCE concentration is greater than soil vapor goals (SVSLs) in VMP11-D (13 mg/m^3 vs 2 mg/m^3)
- A groundwater sample collected approximately 5 ft. below the air water interface during drilling of VMP11-D indicated TCE concentrations of 0.24 µg/l in groundwater.
- VMP11-D will be connected to SVE system in Oct 2016

Site LF004
Former AST SVE System Update



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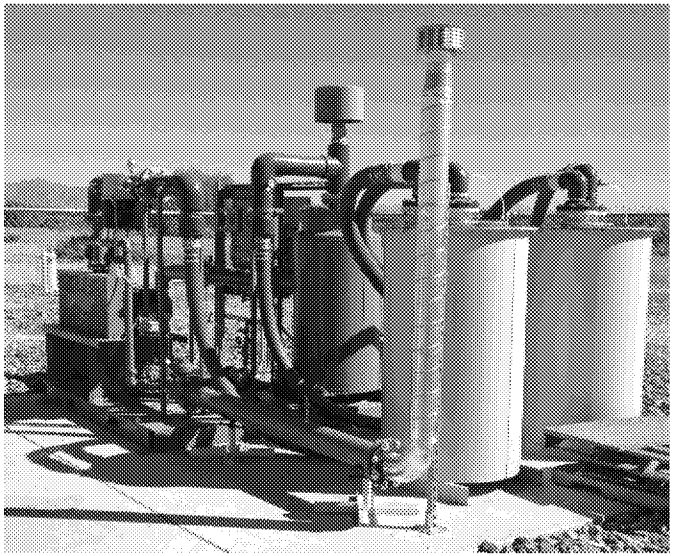
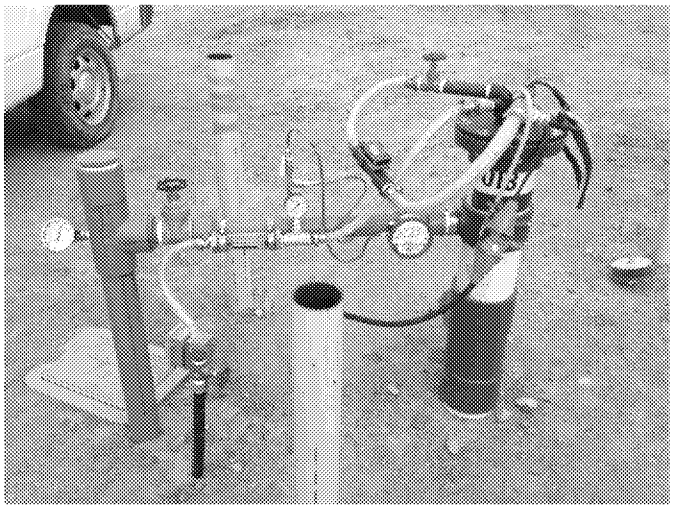
Site LF004
LF01-W17 Area IWAS System Update

Operations Summary through 7 Oct 2016

- Began operation 29 Aug 2014 (approximately 22 months of operation)
- Average 99% operational uptime for reporting period
- TCE and PCE concentrations in extracted vapor are 710 and 110 micrograms per cubic meter ($\mu g/m^3$), respectively (Sep 2016); extracted vapor concentrations remain low.
- SVE 6D connected to IWAS system in May 2016
- Estimated 10.2 pounds of TCE and PCE removed by vapor extraction; 0.8 pounds since 2 Sep 2016
- Oxidant injection at LF01-W30M completed in Aug 2016. Oxidant screening indicates residual oxidant concentrations of approximately 30 mg/L.
- All remediation wells operating





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Site LF004
Southeast Landfill SVE System Update

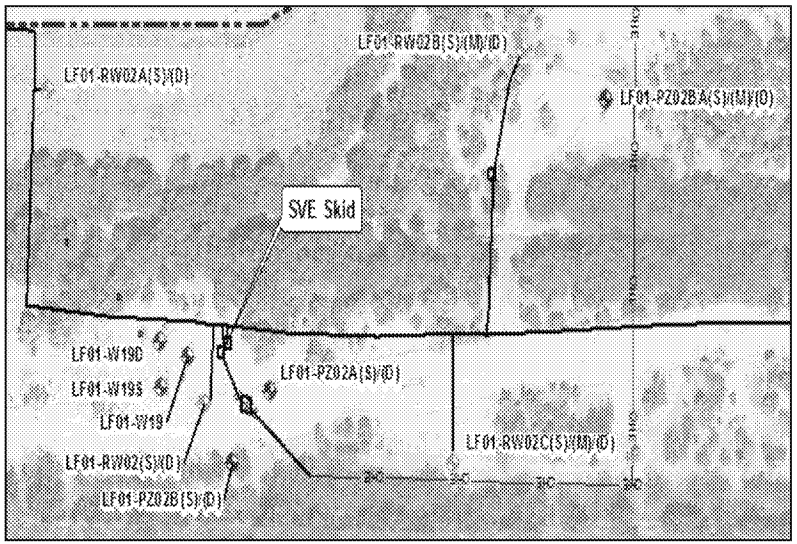
Operations Summary through 7 Oct 2016

- System shut down June 2016 based on concentrations below soil vapor goals (SVSLs)
- Analytical data (Sep 2016) indicates TCE and PCE concentration remained below SVSLs in all SVE wells and VMPs
- 36.9 pounds of PCE and TCE removed by SVE during entire operational period

Site LF004
Southern Area Oxidant Injection

Activity Summary through 7 Oct 2016

- **Began operation 15 Sep 2014 (approximately 22 months of operation)**
- **Field screening of residual oxidant ongoing**
- **Last injection completed week of 27 Feb 2016 at LA06-S and W19-S**
- **Oxidant concentrations continue to range from 1 to 125 mg/L in LF01-W19 area and 1 to 200 mg/L in LF01-W17 area**



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LF004 Remediation System Recent and Upcoming Activities

- Operation of IWAS and Southern Area remediation wells will continue
- Focused extraction at SVE6-D and VMP11-D (AST) by SVE system
- Continue quarterly soil vapor sampling
- 2016 landfill inspection conducted on Sep 26, 2016 in coordination with ADEQ
- Next groundwater semi-annual sampling event in Nov 2016
- Posting of analytical data to Sharepoint will continue as results are available
- LF004 Operating Properly and Successfully report under AF review. Anticipated submittal is Nov 2016.

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Five-Year Review

BCT Conference Call

20 October 2016

Battle Ready…Built Right!

Five-Year Review Path Forward

- Draft submitted for regulatory review on Aug 8, 2016
- Received regulatory comments on Oct 4, 2016
- Air Force response to comments and Final Five-Year Review Report in progress

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Site ST012

Former Liquid Fuel Storage Area

BCT Conference Call

20 October 2016

Site ST012 Outline

- Summary of Activities Since September BCT Call
- SVE System Performance Update
- LNAPL/Groundwater Monitoring Update
  - LNAPL Gauging/Removal
  - Perimeter Samples
  - Sampling to Support Additional Characterization Decisions
- Field Variance Memorandum Status
  - FVM4 - Additional Characterization Status
  - FVM5 - Containment Status
- Path Forward

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Site ST012 Activities Since September

- Continued LNAPL screening in accessible SEE wells and newly installed EBR wells
- Completed a round of perimeter well sampling and collected select additional samples from SEE/Phase 1 wells (preliminary September and available October results presented on later slides)
- Continued SVE operation

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Soil Vapor Extraction System Update

ST012 SVE System Update

- **Jan – Mar 2016**
  - 86.0% operational uptime
  - 20 wells (9 deep wells) closed throughout period
  - 12 wells opened during the period
  - Total petroleum hydrocarbon (TPH) removed – 98,600 pounds or 15,000 gallons

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ST012 SVE System Update

- **Apr – Jun 2016**
  - 92.4% operational uptime
  - 7 deep wells reconnected in May after SEE operation ceased
  - 11 wells remained closed throughout period
  - 21 wells (includes 7 deep wells) remained open throughout period
  - Catalyst was removed from the oxidizer to increase capacity
  - TPH removed – 54,100 pounds or 8,240 gallons (based on lab data)
  - TPH removed in weekly reports is based on weekly PID readings
- **Post Jun 2016**
  - Flame oxidizer brought online to increase treatment capacity (Aug)
  - Southern CZ wells screened with PID and two CZ wells (CZ-6 and CZ-19) were connected to SVE (Sep) and later closed (Oct)

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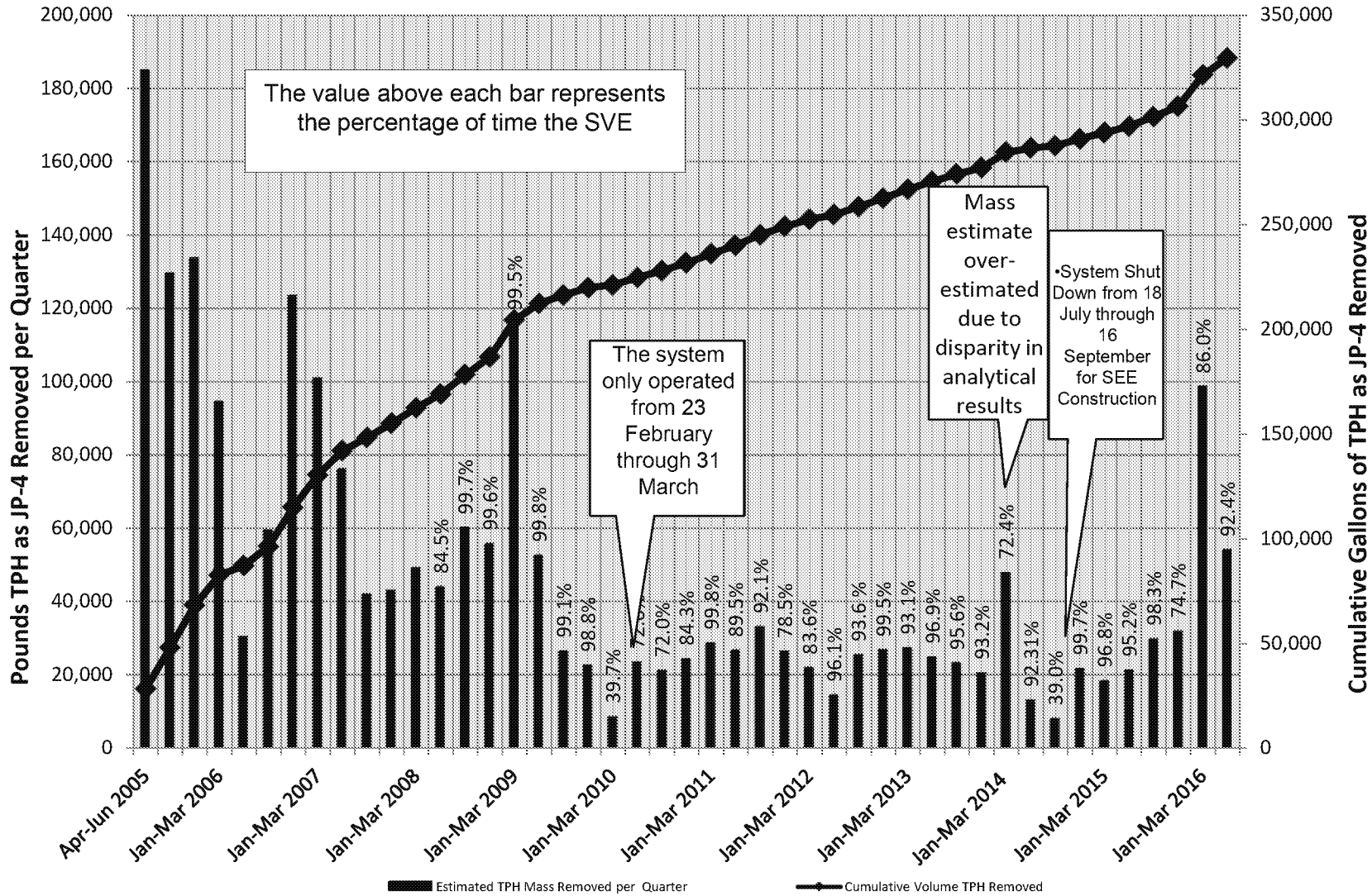
Site ST012 SVE System Performance

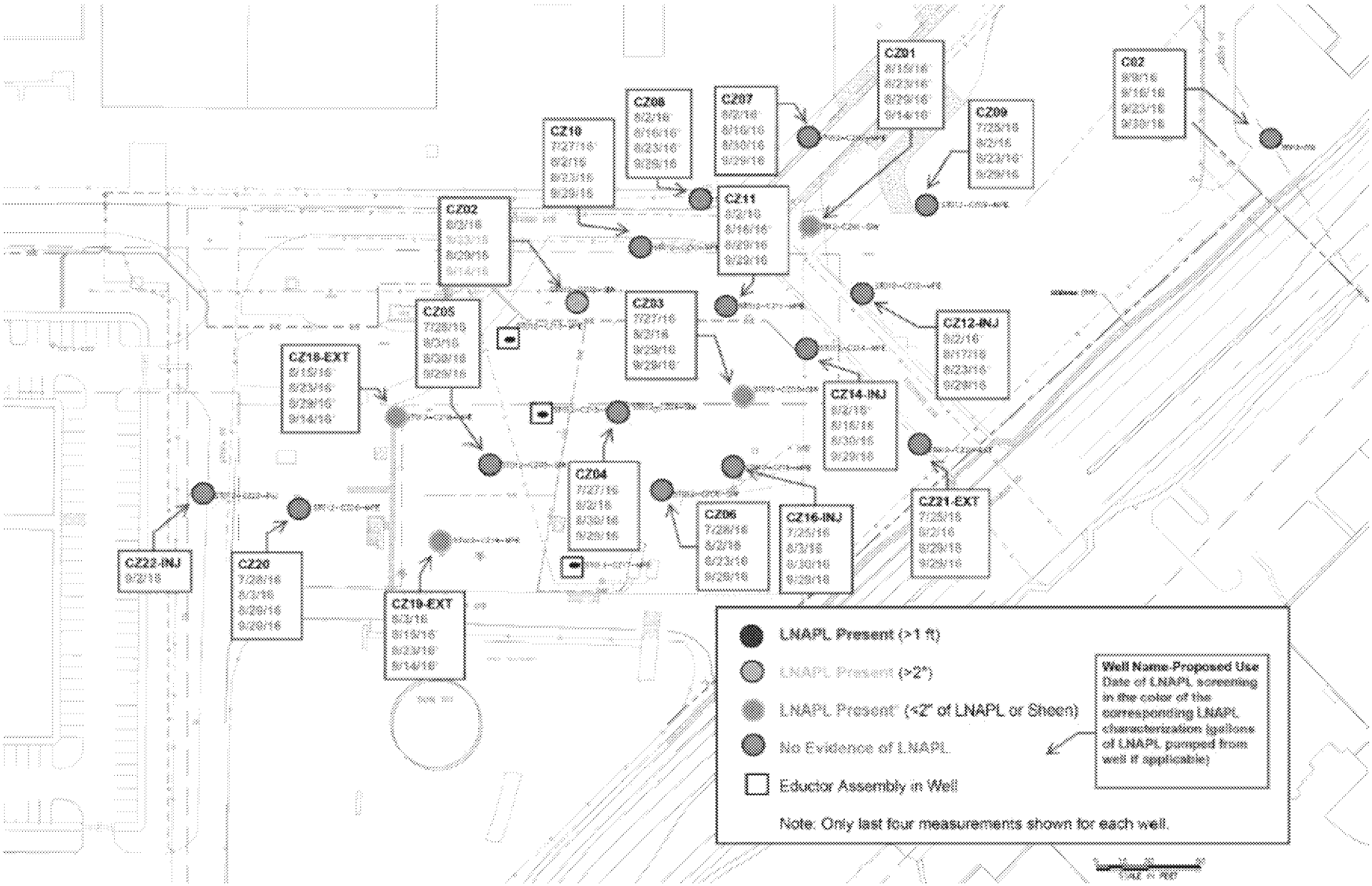


Site ST012 SVE System Summary

- Cumulative TPH removed June 2005-June 2016 – 329,600 gallons
- Mass removal increased since SEE treatment
- Methane concentration significant in some wells (> 100% of LEL) indicating significant biological activity
- Transition to post SEE SVE conditions complete
  - Reconnection of wells
  - Treatment system modifications and addition of flame oxidizer

LNAPL/Groundwater Monitoring Update

LNAPL Monitoring/Removal Status
Cobble Zone



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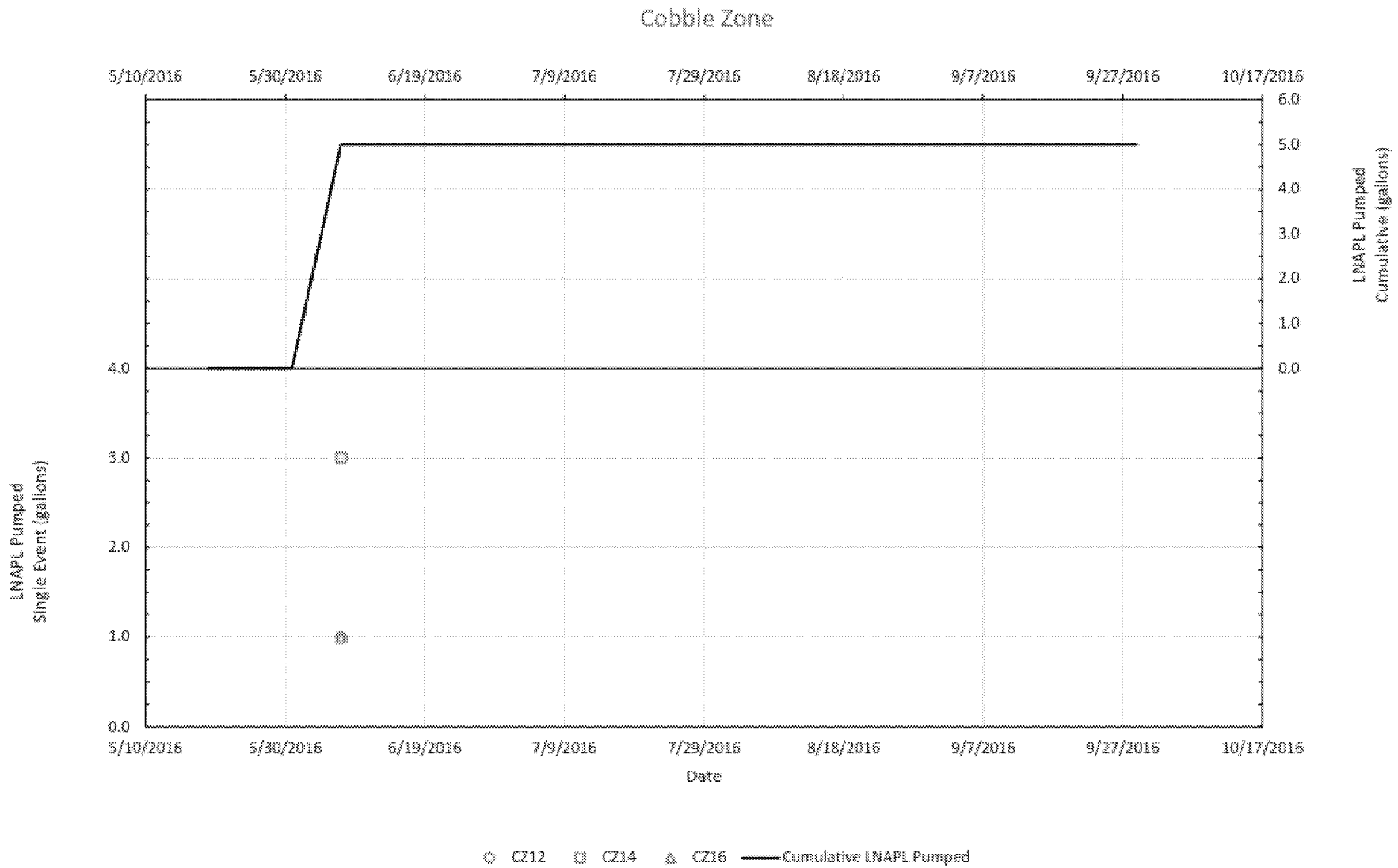
LNAPL Monitoring/Removal Status
Cobble Zone



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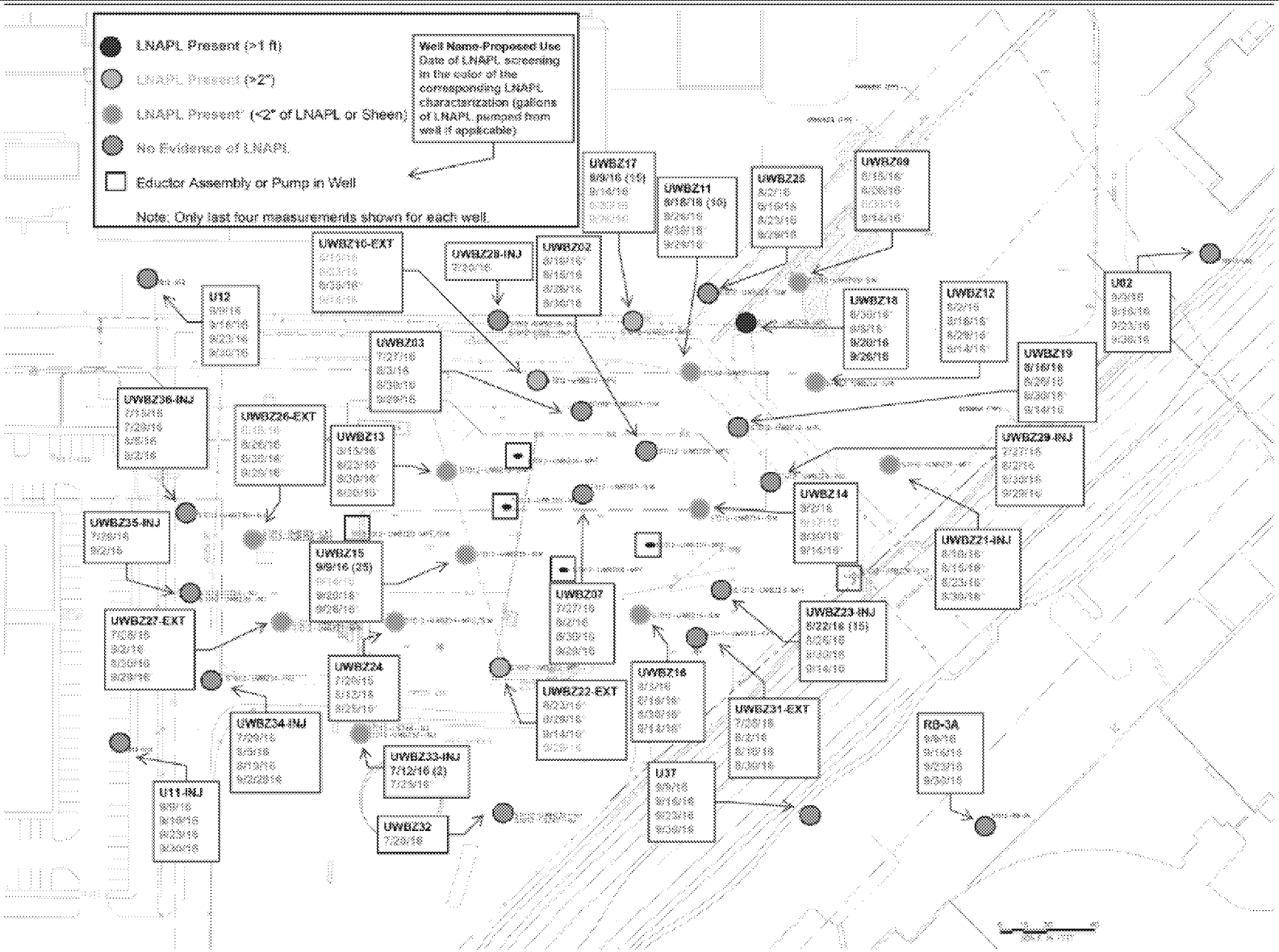
LNAPL Monitoring/Removal Status Upper Water Bearing Zone



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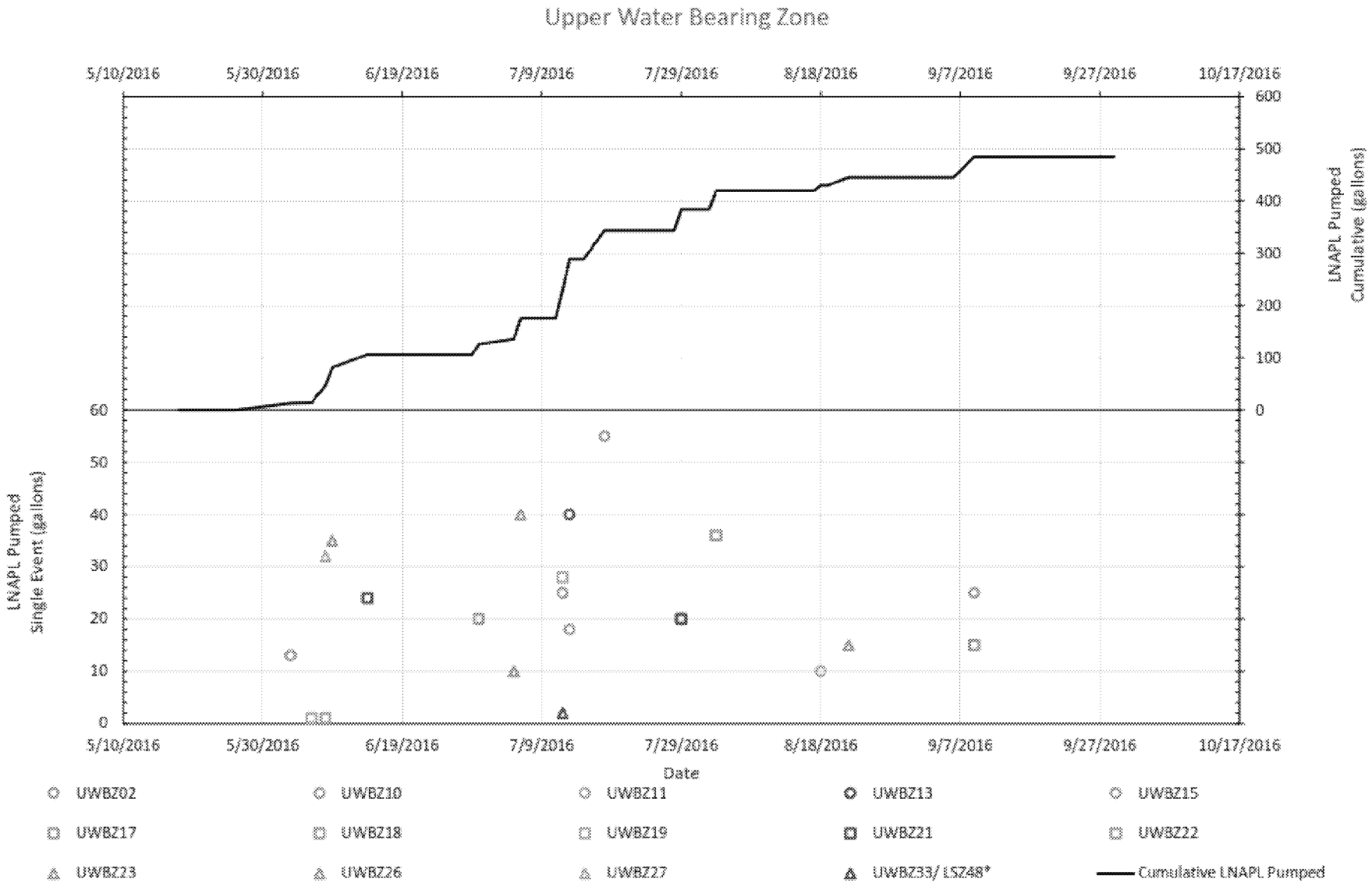
LNAPL Monitoring/Removal Status Upper Water Bearing Zone



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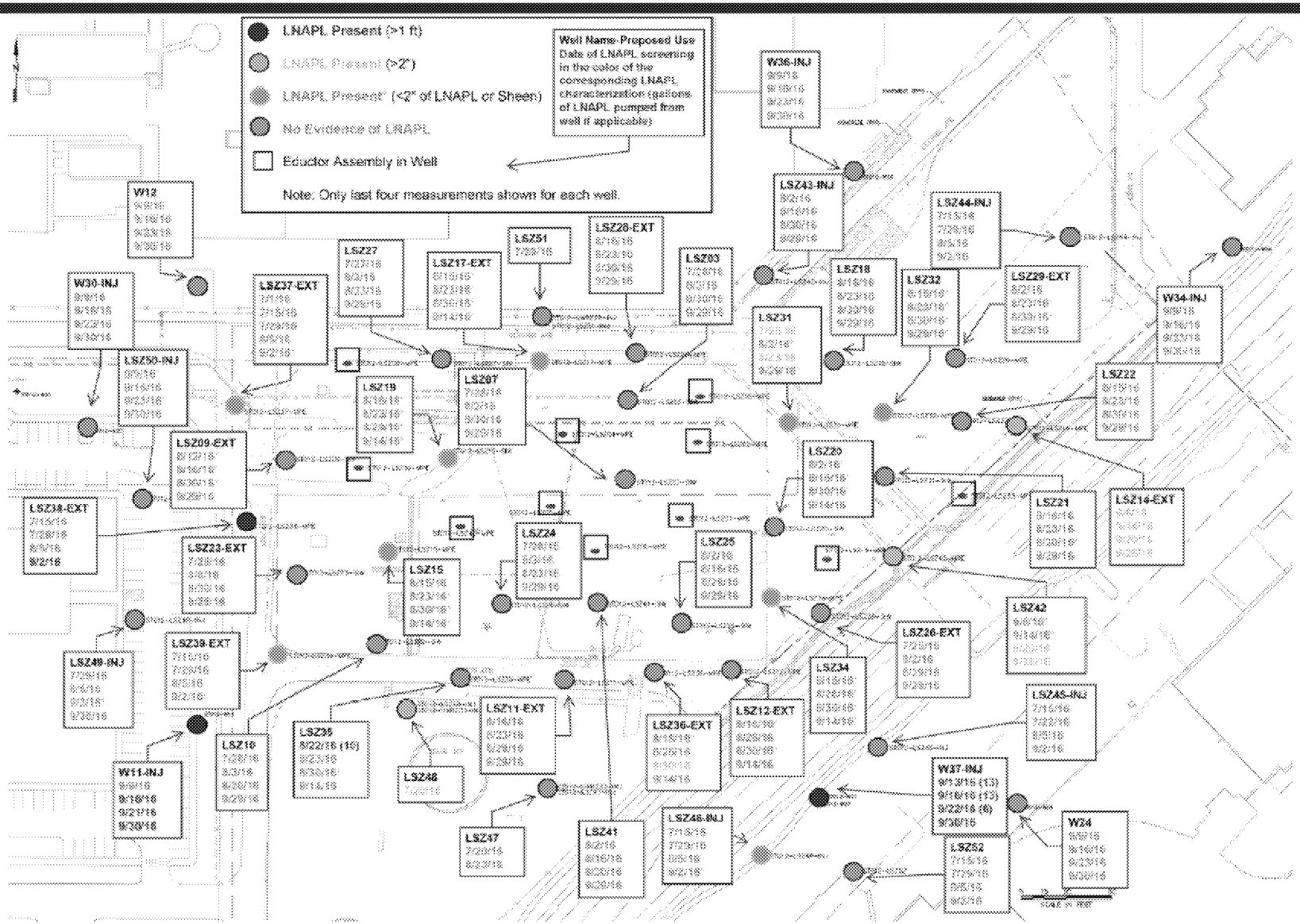
LNAPL Monitoring/Removal Status
Lower Saturated Zone



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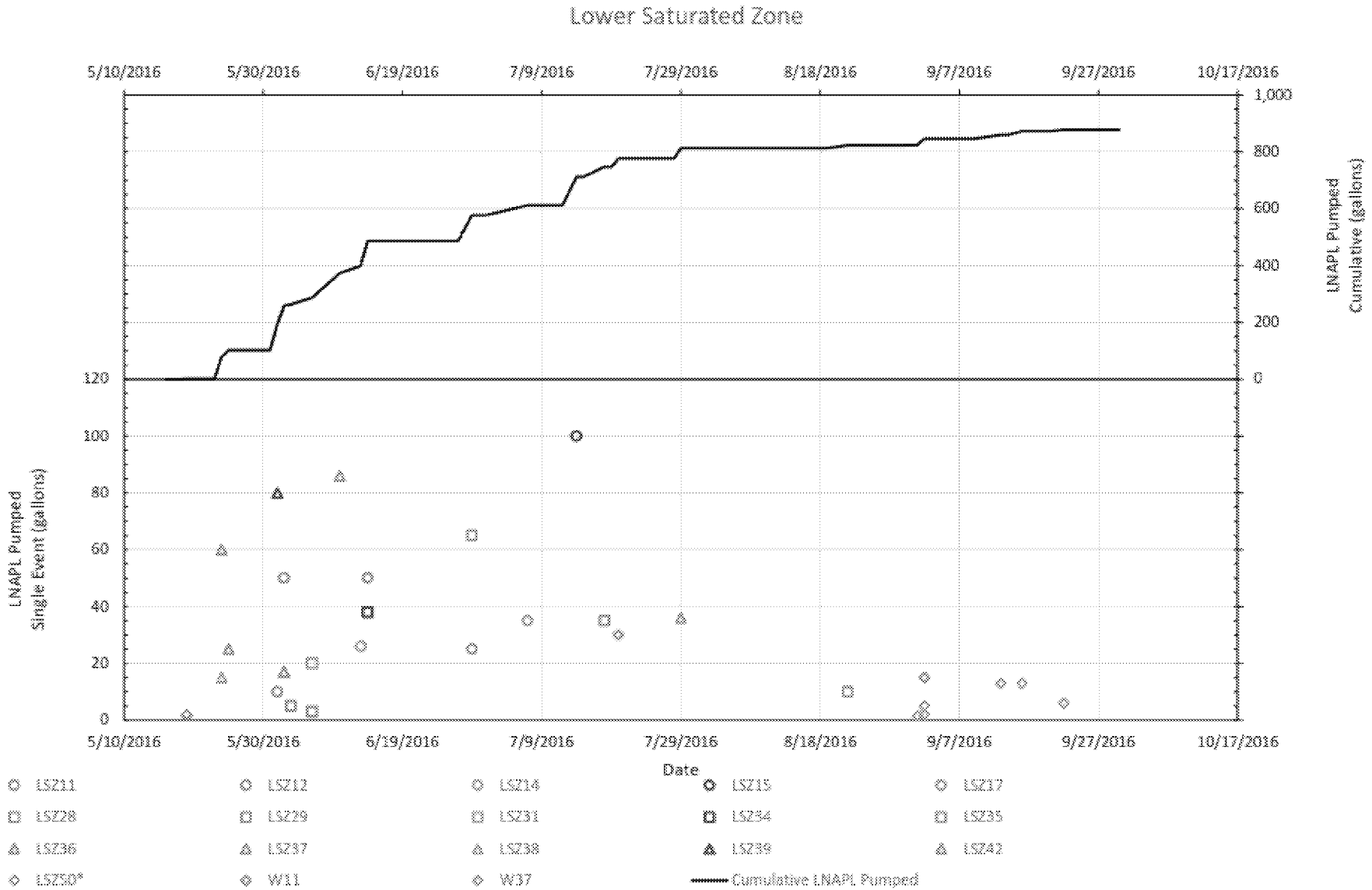
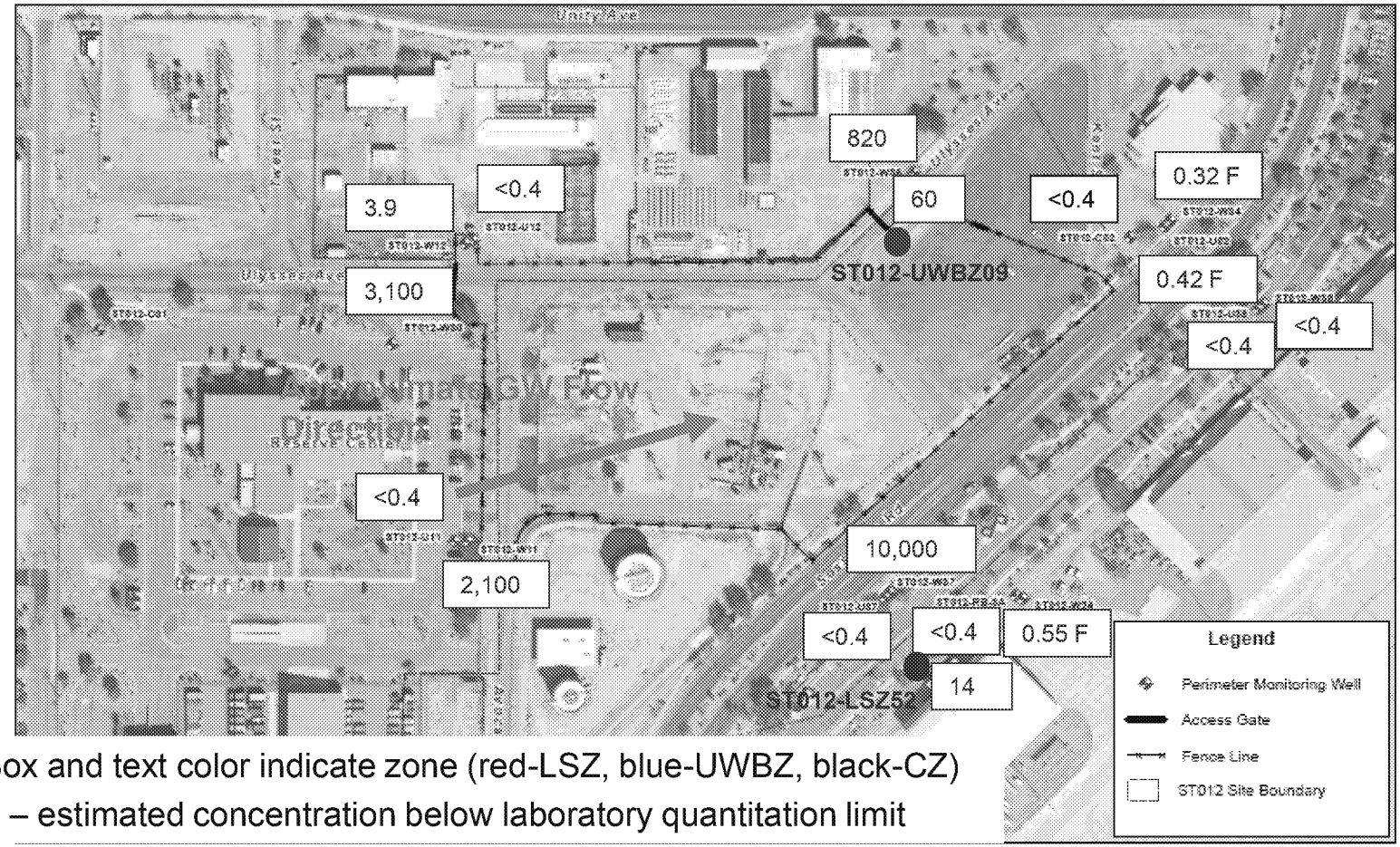
LNAPL Monitoring/Removal Status
Lower Saturated Zone



ST012 LNAPL Monitoring/Removal Summary

- CZ – ~5 gallons of LNAPL removed. None removed since early June
- UWBZ - ~475 gallons of LNAPL removed. ~90% of LNAPL was removed during initial screening (through July)
- LSZ - ~875 gallons of LNAPL removed. >90% of LNAPL was removed during initial screening (through July)

Site ST012 Preliminary September Perimeter Benzene Concentrations (µg/L)

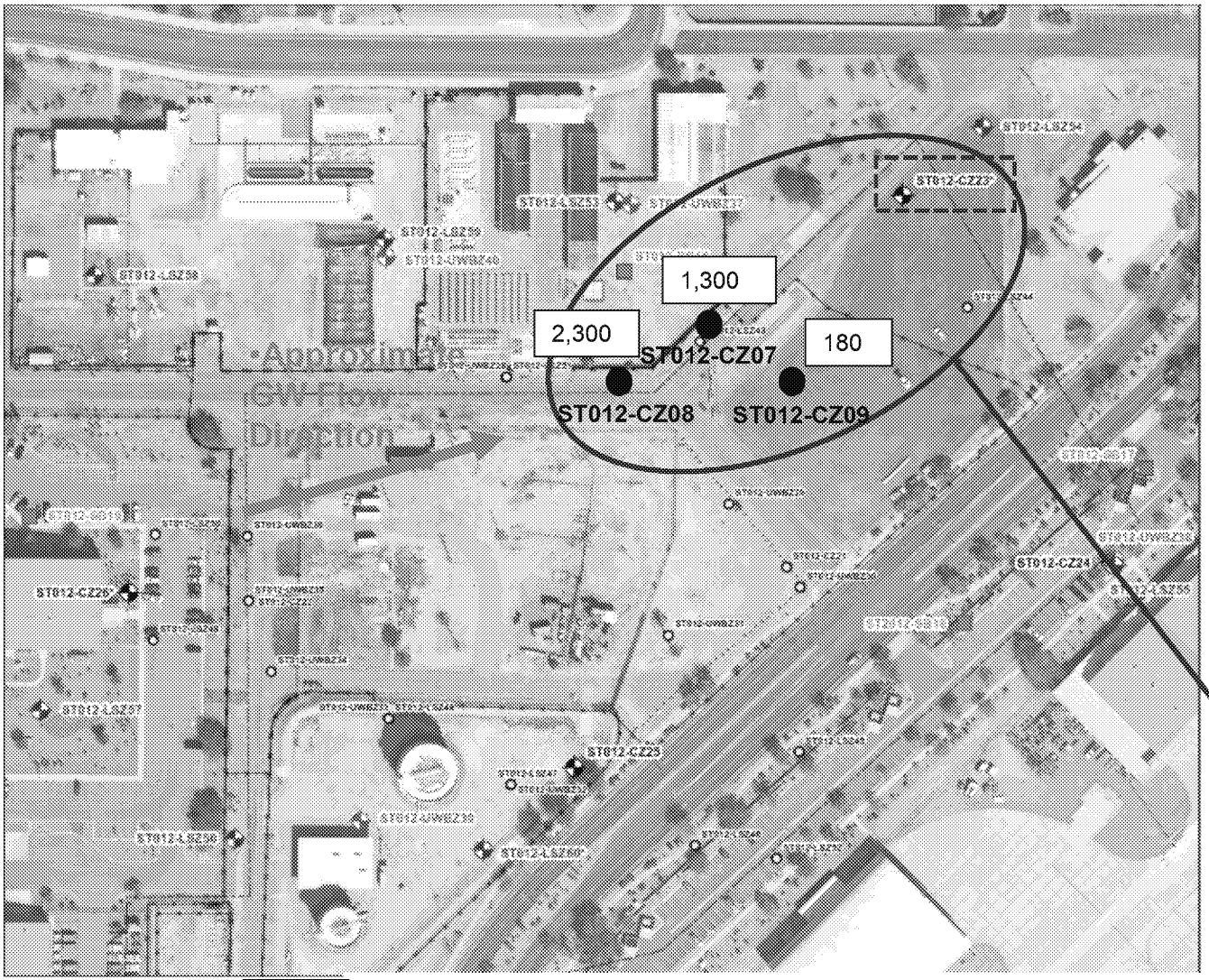


Box and text color indicate zone (red-LSZ, blue-UWBZ, black-CZ)

F – estimated concentration below laboratory quantitation limit

- **ST012-W11 and ST012-W37 samples collected and reflect LNAPL in vicinity**
- **ST012-W36 concentration has been increasing**
- **ST012-UWBZ09 sample not indicative of LNAPL in vicinity**
- **ST012-LSZ52 increased to above MCLs but ST012-W24 below MCLs downgradient**
- **Benzene concentration at other downgradient locations (CZ, UWBZ, and LSZ) were below MCLs**

Contingency Location – CZ23



Legend

Proposed Characterization Investigation

- Upper Water-Bearing Zone Groundwater Monitoring Well Location
- Cobble Zone Groundwater Monitoring Well Location
- Lower Saturated Zone Groundwater Monitoring Well Location
- Soil Boring Location

•Existing Features

- EBR Well Location
- Fence Line
- ST012 Site Boundary

Notes:

* Installation of well is contingent on additional sampling. See Drilling Plan table for details.

ST012-LSZ43 Well Identification

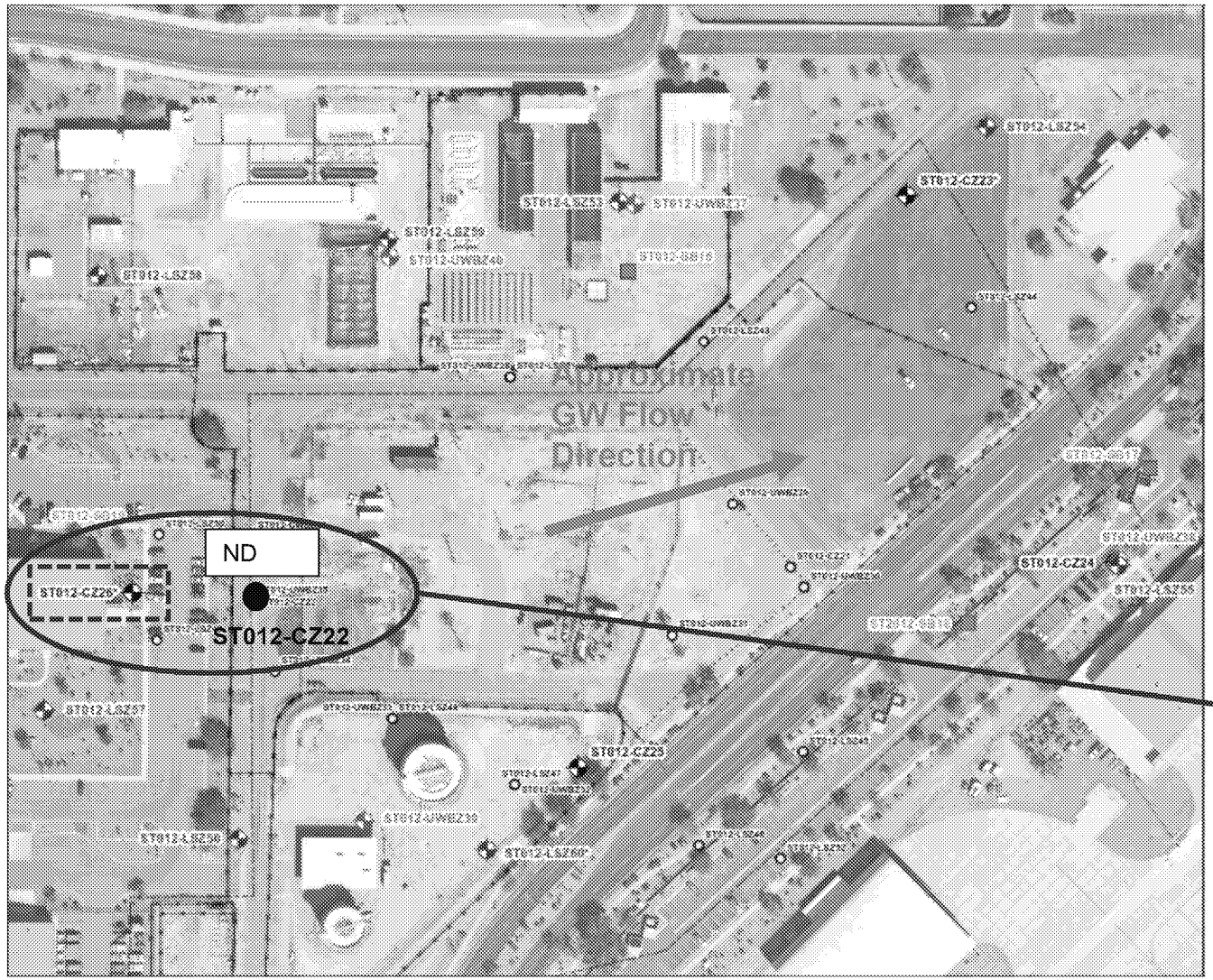
EBR Enhanced Bioremediation

- **CZ23 (boring will be installed, results at CZ07, CZ08, and CZ09 indicate that CZ23 is required for bounding groundwater plume**

2,300 **Benzene concentration (µg/L)**

(box and text color indicate zone [red-LSZ, blue-UWBZ, black-CZ])

Contingency Location – CZ26



Legend

Proposed Characterization Investigation

- Upper Water-Bearing Zone Groundwater Monitoring Well Location
- Cobble Zone Groundwater Monitoring Well Location
- Lower Saturated Zone Groundwater Monitoring Well Location
- Soil Boring Location

•Existing Features

- EBR Well Location
- Fence Line
- ST012 Site Boundary

Notes:

* Installation of well is contingent on additional sampling. See Drilling Plan table for details.

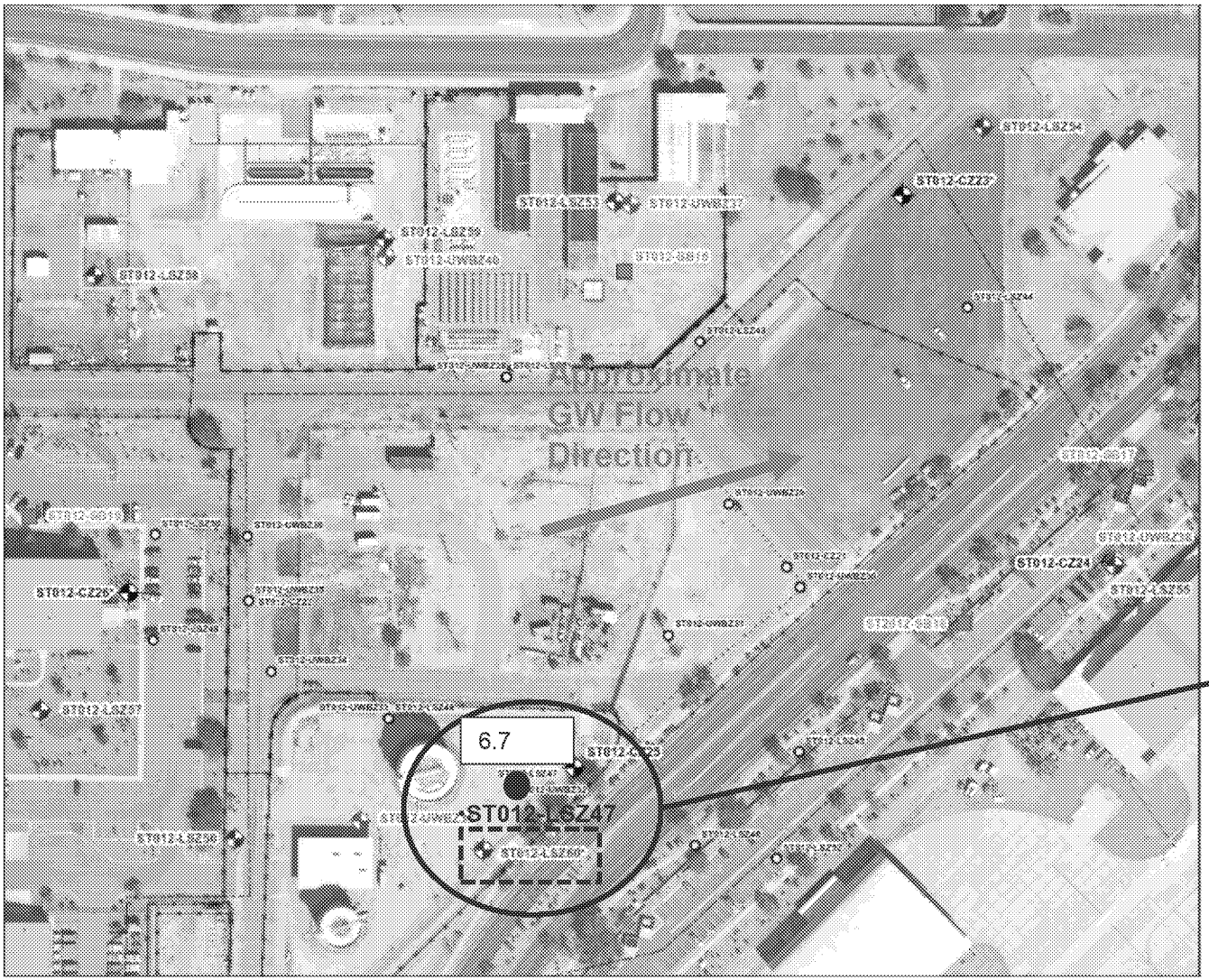
ST012-LSZ43 Well Identification

EBR Enhanced Bioremediation

- **Results at CZ22 indicate that CZ26 is not required (CZ22 bounds dissolved phase groundwater)**

ND **Benzene concentration (µg/L) (reporting limit pending)**
(box and text color indicate zone [red-LSZ, blue-UWBZ, black-CZ])

Contingency Location – LSZ60



Legend

Proposed Characterization Investigation

- Upper Water-Bearing Zone Groundwater Monitoring Well Location
- Cobble Zone Groundwater Monitoring Well Location
- Lower Saturated Zone Groundwater Monitoring Well Location
- Soil Boring Location

•Existing Features

- EBR Well Location
- Fence Line
- ST012 Site Boundary

Notes:

* Installation of well is contingent on additional sampling. See Drilling Plan table for details.

ST012-LSZ45 Well Identification

EBR Enhanced Bioremediation

- **LSZ60 will be re-evaluated following Phase 2 data collection**
- **Results at LSZ47 indicate benzene is slightly above (14 µg/L) MCL of 5 µg/L**

6.7 **Benzene concentration (µg/L)**

(box and text color indicate zone [red-LSZ, blue-UWBZ, black-CZ])

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ST012
Field Variance Memorandum Status

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ST012 FVM4 - Additional Characterization

- Phase 1 results and proposed Phase 2 presented at 24 August BCT meeting; AF/AMEC FW prepared to implement
- AF/AMEC FW addresses EPA/ADEQ comments and presents updated Phase 2 plan in 15 September BCT; AF/AMEC FW prepared to implement, EPA/ADEQ request work plan
- Field Variance Memorandum submitted on 29 Sep 2016
- Additional Phase 2 comments received 17 Oct 2016
- Response to comments will be prepared
- AF will either accommodate EPA/ADEQ comments or unresolved comments will be evaluated with Phase 2 data
- Phase 1, Phase 2 and site monitoring results will be evaluated to determine if additional characterization is needed.

ST012 FVM4 - Additional Characterization

- Notices of Intent prepared and undergoing signature process
- Driller selected and final procurement in process
- Arizona Blue Stake and private utility clearances completed
- Air knifing to commence this week
- Eductor removal to recommence week of 24 Oct 2016
- Final discussions with property owners, utility clearances, and driller logistics resulting in adjustments to some locations
- Drilling expected to start the week of 24 Oct 2016

ST012 FVM5 - Containment

- 24 August BCT - AF/AMEC FW ready to construct extraction system for 'immediate' containment, as requested by EPA/ADEQ
- 15 September BCT – AF/AMEC FW ready to construct; EPA/ADEQ request work plan
- Field Variance Memorandum submitted on 30 Sep 2016
- Field Variance Memorandum comments received 14 Oct 2016
- Modelling, design, and new requirements add significant delays and prevent achieving EPA/ADEQ request for immediate containment

ST012 FVM5 - Containment

- Extraction and treatment system will be evaluated based on operational performance, enhanced containment monitoring network, and Phase 2 characterization results (as presented at September BCT meeting)
- AF proceeding with containment implementation
- Response to comments will be prepared
- Modelling of containment system will be provided prior to startup
- Temperatures were considered in extraction pump and treatment system design
- Additional performance monitoring locations will be considered

ST012 FVM5 - Containment

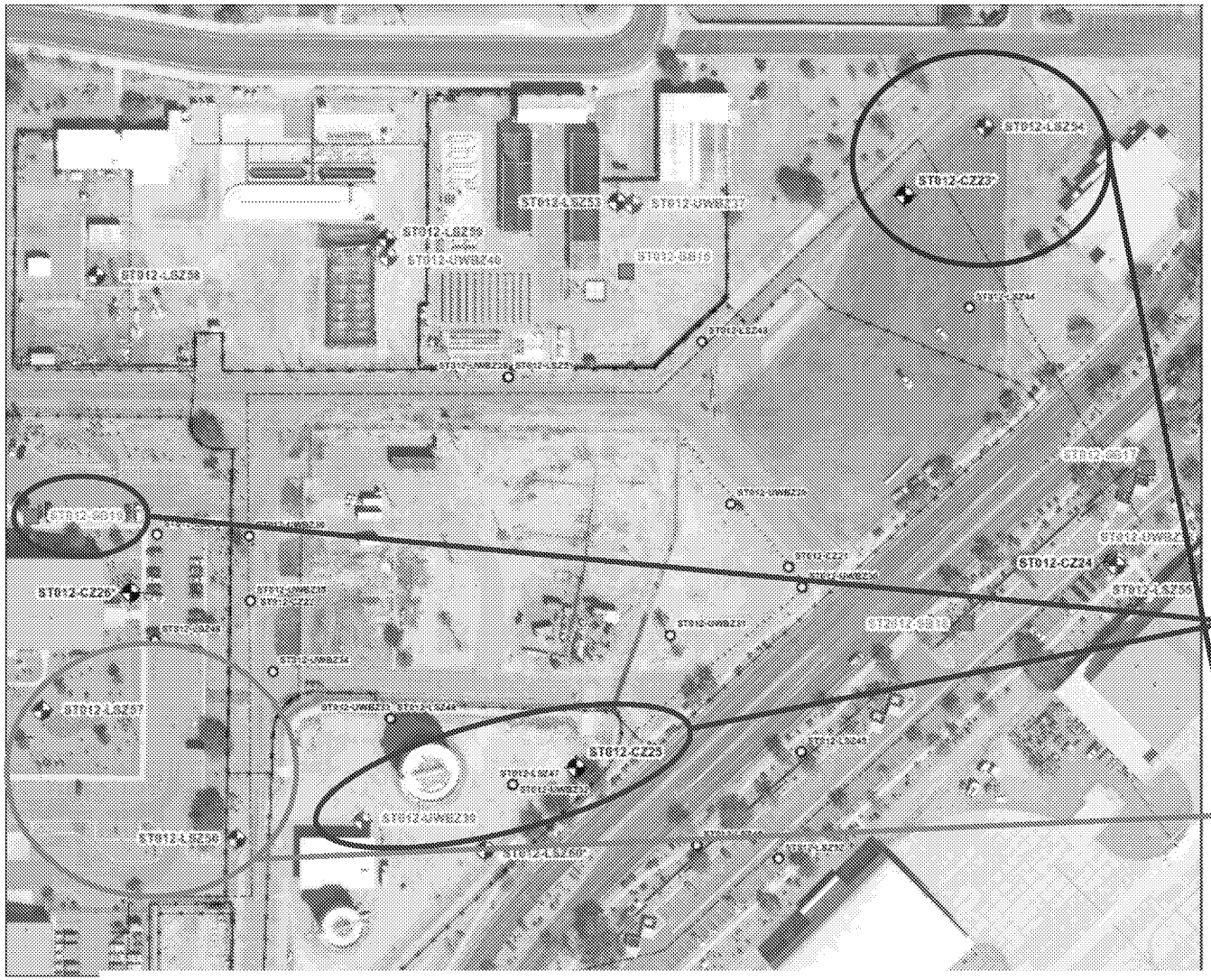
- **Subcontractor/Vendor Notifications**
  - Construction contractor remobilization tentatively scheduled for week of 24 Oct 2016
  - Control panel/instrumentation shipment will be initiated
  - Scheduling for pump installation in progress

ST012
Path Forward

Site ST012 Path Forward

- Continue SVE operation with flame oxidizer and thermal oxidizer
- Continue monitoring/pumping of LNAPL in SEE and perimeter wells
- Implement additional characterization
  - Soil borings/well installation (initial drilling plan on next slide)
  - Well development - estimated well development complete by mid to late December
  - Well sampling - groundwater sample collection in early January

Additional Characterization Drilling Plan



Legend

Proposed Characterization Investigation

- Upper Water-Bearing Zone Groundwater Monitoring Well Location
- Cobble Zone Groundwater Monitoring Well Location
- Lower Saturated Zone Groundwater Monitoring Well Location
- Soil Boring Location

•Existing Features

- EBR Well Location
- Fence Line
- ST012 Site Boundary

Notes:

* Installation of well is contingent on additional sampling. See Drilling Plan table for details.

ST012-LSZ43 Well Identification

EBR Enhanced Bioremediation

Shift 1 (10/4 schedule)

- **Rig 1: UWBZ39, CZ25, SB19**
- **Rig 2: LSZ54, CZ23**

Shift 2 (10/4 schedule)

- **Rig 1: LSZ57, LSZ56**

1. Drilling order modified from FVM based on schedule restrictions from ASU and PMGAA

2. Drilling order may be modified based on receipt of signed NOIs.

Site ST012 Path Forward

- **Construct containment**
  - Treatment system construction
  - Pump installation
  - Electrical/Control system installed
  - Commissioning
  - Estimated to be operational by mid Dec 2016
  - Extended operation of active containment will conflict with potential EBR implementation, result in further deterioration of optimal EBR conditions, reduce overall remediation progress, and prevent the projected achievement of remedial action objectives
  - AF recommends continuing evaluation of Phase 1 and 2 data to support sufficient characterization and monitoring for EBR implementation

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2016 BCT MEETINGS/CONFERENCE CALLS SCHEDULE

BCT Conference Call

20 October 2016

ACTION ITEMS

BCT Conference Call

20 October 2016