

Subject: Final Minutes, Quarterly Restoration Advisory Board (RAB) Meeting, Longhorn Army Ammunition Plant (LHAAP)

Location of Meeting: Karnack Community Center, Karnack, Texas

Date of Meeting: November 14, 2013, 6:00 – 7:30 PM

Meeting Participants:

LHAAP/BRAC: Rose M. Zeiler

USACE: Aaron Williams, Rick Smith

USAEC: Marilyn Plitnik, Robin Paul, Cathy Kropp

AECOM: Dave Wacker, Gretchen McDonnell

TCEQ: April Palmie

USEPA Region 6: Rich Mayer, Janetta Coats, Kent Becher (USGS)

USFWS: Paul Bruckwicki, Jason Roesner

RAB: **Present:** Paul Fortune, Carol Fortune, Richard LeTourneau, Tom Walker, Judith Johnson, James Lambright
Absent: Judy Vandeventer, Ken Burkhalter, Ted Kurz, Charles Dixon, Pickens Winters, Robert Cargill, Lee Guice, Nigel Shivers

RAB Candidates Terry Britt, John Pollard, Jr.

Public: Rick Lowerre, CLI-TAG
Bridget LaBorde and Robert Whittaker, TMD Technologies Group
Tina Walker, Tom Ellerbee, Carrie Bradford, and David Rivera, Texas State Department of Health

An agenda handout for the RAB meeting was provided for the meeting. Additional hard copy meeting materials provided included the AECOM slide presentation, Draft July RAB meeting minutes, a surface water and perimeter well perchlorate data handout, and a GWTP summary handout showing pounds of chemical s removed and volume of water treated.

Welcome – Rose Zeiler

Ms. Zeiler welcomed attendees to the meeting. Special guests were introduced by Ms. Zeiler:

- TMD Technologies Group (Ms. LaBorde and Mr. Whitaker) will be presenting an update on the demonstration study being conducted at LHAAP-37.
- Texas State Department of Health (TSDH) representatives (Mr. Rivera, Mr. Ellerbe, Ms. Walker and Dr. Bradford). Mr. Ellerbe stated that TSDH brought a handout to the meeting containing information relating to Longhorn, and that if anyone has any questions related to public health, they should contact TSDH.
- Ms. Cathy Kropp from US Army Environmental Center was introduced and will be providing an overview of the Longhorn RAB charter and the process of appointing new members.
- Mr. Rick Lowerre of Caddo Lake Institute (CLI) was introduced.
- Mr. Rick Smith of the U.S. Army Corps of Engineers (USACE) was introduced as replacing Mr. John Lambert as the USACE Project Manager for Longhorn.
- Mr. Terry Britt, a RAB membership candidate, was also introduced.

Open Items – Rose Zeiler

Minutes

Ms. Fortune made a motion to approve the July 2013 RAB meeting minutes. Motion seconded by Ms. Johnson.

New Members

Ms. Kropp provided a summary of the RAB member selection process and the RAB charter. Community RAB members must agree to attend regularly and on a voluntary basis (no compensation). A two-thirds vote of sitting RAB members in attendance is required to approve a new RAB member, and membership is effective starting with the next meeting, assuming approval of the Army BRAC Director.

Mr. Terry Britt was introduced as an applicant for RAB membership. Mr. Britt stated he is a resident of Uncertain, and has already been attending RAB meetings. Mr. Britt is interested in restoration of the refuge as a community member and hunter. Mr. Britt is also the President of the Caddo Lake WSC, with public water supply wells near the boundary of the former LHAAP footprint.

Mr. John Pollard, Jr. (arriving after the meeting was called to order) was introduced upon arrival as an applicant. Mr. Pollard stated that he is 79 years old and married, with children and grandchildren. Mr. Pollard served in the United States Army from 1954 – 1957 and is a deacon at Ebenezer Baptist Church in Marshall. Mr. Pollard stated that he feels it is important to be educated on what is going on in the community, and was interested in RAB membership when he saw the newspaper solicitation. Mr. Pollard is on the city planning and zoning commission, and has been on other boards in the past.

The voting members of the RAB in attendance were provided with paper ballots, and voted unanimously to accept both Mr. Britt and Mr. Pollard as new members. Mr. Britt and Mr. Pollard will be officially seated after approval by Mr. Tom Lederle, Army BRAC Director.

Tour

A RAB tour of Longhorn environmental sites will be scheduled for May on the day of the RAB meeting.

LHAAP-37 Bioplug Demonstration Project Update

Ms. Bridget LaBorde and Mr. Robert Whitaker of TMD Technologies Group provided a presentation explaining the Bioplug demonstration project being conducted at LHAAP-35B(37) by Aberdeen Test Center. RAB member questions regarding the technology were answered. See attached LHAAP-37 Bioplug Demonstration Study Presentation. RAB members were given the opportunity to ask questions about the technology.

Ms. Zeiler prefaced the presentation by saying that, prior to implementation of the approved monitored natural attenuation (MNA) remediation remedy for LHAAP-37, Aberdeen Test Center requested permission to conduct a demonstration study using the “bioplug” remediation technology at the site. Army is holding off on full implementation of the approved MNA remedy while the demonstration study is conducted to see what this technology can do to address the groundwater impacts.

Ms. LaBorde stated that the June 2013 data (after 8 months of operation) was not showing a trend for remediation, attributed to slower-than-anticipated groundwater flow across the site. Groundwater elevations have dropped at the site due to relatively dry conditions over the past several years, and groundwater flow rates have decreased along with that. However, September 2013 data (after 11 months of system operation) showed trends in some wells for degradation of volatile organic compounds (VOCs). The system is planned to operate for a total of 24 months.

Defense Environmental Restoration Program (DERP) Update – AECOM (Dave Wacker)

Fieldwork Completed and Upcoming Field Activities Planned

Mr. Wacker provided an update and summary of several sites where field work has recently been completed or is underway (LHAAP-46, LHAAP-67, LHAAP-18/24, LHAAP-35B(37), LHAAP-50, LHAAP-35A(58), LHAAP-03, LHAAP-12 and LHAAP-16). See attached AECOM PowerPoint presentation for maps and tables referenced below. Mr. Wacker also noted a display of photographs depicting recent field work conducted.

LHAAP-46 Plant 2 Area Update – Remedy In Place

Primary contaminant is trichloroethene (TCE) in groundwater at levels less than 100 micrograms per liter ($\mu\text{g/L}$), with a clean-up level of 5 $\mu\text{g/L}$. The remedy for the site is MNA and land use controls, so additional wells were installed earlier this year and the initial monitoring round conducted.

Contamination at the site consists of shallow (to ~30' bgs) and intermediate (~30-60' bgs) groundwater zone plumes with a total of 21 wells now being monitored to observe the plumes. Mr. Wacker showed maps of the shallow and intermediate zone groundwater TCE plumes,

comparing how the plumes were mapped before and after the addition of data from 7 new monitoring wells installed this Spring.

Mr. Wacker noted that during the most recent sampling event several of the wells monitoring the east side of the shallow groundwater zone plume were dry due to drought conditions. If water returns to those wells, the shape of the plume could change if the water is impacted. The analytical results from the first round of sampling were similar to historical results.

The intermediate groundwater zone plume was previously mapped as one continuous area of impact. However, analytical results from the first round of sampling showed no impacts at 46WW09, resulting in the plume being redrawn as two separate but smaller areas of contamination. Delineation of the north edge of the northern plume area has not been accomplished, so another well will be installed in that area to obtain a clean data point that defines the extent of the plume when future field work is completed in the next several months.

LHAAP-67 AST Farm – Remedy In Place

This site has TCE concentrations similar to the LHAAP-46 site, but confined to the shallow groundwater zone. MNA and land use controls for TCE in groundwater is the remedy. Additional wells were installed and the initial monitoring round conducted.

New wells and direct push sampling identified groundwater impacts farther to the west than had been previously mapped, so the next plume configuration map the RAB will see will show the plume extending farther west. The total plume size is still relatively small, approximately 300 feet by 400 feet.

LHAAP-18/24 Burning Ground 3 & Unlined Evaporation Pond – Interim Remedy In Place

A significant amount of additional investigation work has been completed at LHAAP-18/24 this year and a draft data report has been generated and submitted to TCEQ and EPA for review and comment. Ultimately, a revised feasibility study will be completed for the site.

As background, Ms. Zeiler stated that LHAAP-18/24 is the most highly contaminated at Longhorn. Mr. Wacker added that, because of the high level of contamination, compliance monitoring is performed at this site semi-annually, with ~60 wells being sampled during each event and the next event is planned for December.

LHAAP-35B(37) – Chemical Laboratory – Remedy In Place

This site is the former Chemical Laboratory with shallow groundwater impacted by tetrachloroethylene (PCE) and TCE plumes. LHAAP-35B(37) is the subject of the bioplug demonstration study briefed earlier in the meeting by TMD Technologies Group.

If the bioplug approach does not reduce contaminants to acceptable levels, the aquifer will be allowed to return to natural conditions and AECOM will begin the approved remedy using monitored natural attenuation. New wells have recently been installed, so the approved monitored natural attenuation remedy is ready for implementation if the bioplug activity is not successful.

LHAAP-50 Former Sump Water Tank – Remedy In Place

LHAAP-50 was the site of a large above-ground water tank that received sump water from across the plant. Issues at the site are perchlorate in soil, and perchlorate and VOCs in groundwater.

Two areas of perchlorate-impacted soil were recently excavated and removed (approximately 183 cubic yards), and disposed at an off-site landfill. Mr. Wacker showed several photographs of the excavation work that had been performed, including photos demonstrating the depth of the excavation and silt fencing installed between the excavation site and the nearby Goose Prairie Creek.

Confirmation samples were taken to establish that all perchlorate-impacted soils exceeding the clean-up goals had been removed, and the area was backfilled with clean soil. The confirmation sampling layout showing samples collected from the floor and sidewalls of the excavation was presented and explained.

To address groundwater 19 new monitoring wells were installed to support implementation of the approved monitored natural attenuation remedy.

LHAAP-58 Shops Area – Remedy In Place

Multiple plant activities were completed in this area and could have contributed to contamination at the site. VOC impacts to groundwater is the issue at the site. There are two groundwater plumes; “eastern plume” and “western plume”, each with their own remediation strategy.

In the heart of the east plume, where concentrations are on the order of a few thousand micrograms per liter, In-Situ Bioremediation (ISB) is being completed to more aggressively treat those higher concentration impacts. Approximately 225 gallons of Wil-Clear Plus, a sodium lactate nutrient for microbes that will degrade VOCs, was injected at each of 12 injection points in the east plume over a month ago. Nutrient was injected at depths of between 23 and 33 feet bgs. Mr. Wacker presented and explained photographs of the injection event activities. The type of microbes required to degrade the contaminants were not present at the site as confirmed by a treatability study completed several months ago by the Army, so bioaugmentation was performed this week to add the required microbes. Approximately one gallon of augmentation solution was injected at each of the locations. The next sampling event will be in January and will collect data to monitor progress of the ISB activities.

Fifteen new groundwater monitoring wells were installed this summer at LHAAP-58 to allow implementation of the monitored natural attenuation remedy for both the eastern and western plumes.

LHAAP-03 – Record of Decision In Progress

LHAAP-03 is a small area within LHAAP-35A(58) associated with the former paint shop. The remedy consists of excavating an approximate 20-foot by 25-foot area (~50 cubic yards) of shallow soil that is impacted with arsenic and lead, for landfill disposal. This will result in two or three truckloads of soil being transported. Any groundwater issues associated with LHAAP-03 will be dealt with as part of LHAAP-35A(58) which fully-encompasses LHAAP-03. Army has received TCEQ’s comments on the Record of Decision, and is awaiting EPA’s comments.

LHAAP-12 and LHAAP-16 – Remedy In Place (Operation and Maintenance)

Continuing operation and maintenance activities have been performed at these landfill sites. Repainting and relabeling of wells has been a recent focus to improve visibility.

CERCLA 5-Year Review Process for Multiple Sites

The 5-Year review has been performed and the report document is being reviewed by the agencies. The review includes LHAAP-12 and LHAAP-16 which are landfill sites with remedies in place, LHAAP-18/24 associated with the GWTP, the Pistol Range and LHAAP-49 Acid Storage Area.

GWTP

The GWTP continues to operate to contain the groundwater plumes at LHAAP-18/24 and LHAAP-16. See attached AECOM PowerPoint Presentation for more detail where a groundwater extraction data chart and contaminant mass was presented. There has been no flow in Harrison Bayou lately to facilitate discharge of treated water, so treated water has been applied to the ground surface of LHAAP-18/24 through the sprinkler system. The next semi-annual compliance monitoring event for LHAAP-18/24 will be conducted at the end of the month. Preventive maintenance and repairs continue. Quarterly extraction rates are on par with what has been extracted historically.

Perimeter Well Sampling

Perchlorate sampling is conducted for groundwater at several locations along the perimeter of the former facility footprint. A table showing perchlorate results for perimeter wells was presented and included in the hard copy slide packet available at the meeting. Mr. Wacker noted that five of the six designated perimeter wells were dry during the June 2013 event. These wells show a history of being dry depending upon site weather conditions.

Surface Water Sampling

Mr. Wacker explained a handout showing results of surface water sampling for perchlorate in Goose Prairie Creek and Harrison Bayou. The chart indicates very little perchlorate detected in surface water for the past few years.

Upcoming Work, Meetings and Documents

Remedial Action Operations will continue at LHAAP-46, LHAAP-50, LHAAP-58 and LHAAP-67. Semi-annual compliance sampling will be conducted at LHAAP-18/24. Finalization of the CERCLA 5-Year Review report and generation of draft Remedial Action Completion reports for LHAAP-37, LHAAP-46, LHAAP-50, LHAAP-58 and LHAAP-67 is ongoing.

Other Environmental Restoration Issues – Rose Zeiler

Dispute Resolution

Resolution of the ongoing dispute between USEPA and Army regarding clean-up goals continues. While no specific information is available on details of dispute resolution, Ms. Zeiler explained the impacts of the dispute on the remediation work.

LHAAP-16, LHAAP-17, LHAAP-001-R-01, and LHAAP-003-R-01 were on the original list of disputed RODs and progress on those sites stopped in September 2011 when the dispute was initiated. Progress on LHAAP-29 was halted shortly after the dispute was initiated, when it reached the draft final ROD stage. Draft final RODs have been generated for LHAAP-04 and LHAAP-47, but final RODs could not be achieved due to the dispute.

Ms. Zeiler stated that she would bring any new information relating to resolution of the dispute to the RAB as soon as she receives it. She advised the RAB that there are dispute issues on the table that could cause Army to have to go back and do more work on these sites (even those sites that have already been “closed”).

Mr Fortune asked if USEPA was telling Army that the sites haven’t been cleaned up correctly. Mr. Mayer stated that there is a disagreement on cleanup level that should be used for certain contaminants. Another part of the issue relates to what land use controls must consist of to protect residents if contamination is left at the site.

Ms. Palmie added that there are promulgated federal clean-up standards for most contaminants, but there is not a federal clean-up standard for perchlorate. Where a federal standard does not exist, state standards are usually used when available. The Texas perchlorate clean-up goals have been historically used at Longhorn, but USEPA now feels that a lower “health advisory level” should be used instead, so the crux of the dispute is whether we continue to use the Texas clean-up goal or start to use a lower concentration goal as USEPA wants to do.

Ms. Zeiler stated that Army can only agree to clean-up standards that have actually been made into legal standards by either state or Federal law, and the health advisory level USEPA wants to use is not a legal standard. Further, when the Federal Facility Agreement was signed, USEPA, TCEQ and Army agreed that the Army was grandfathered into the original Texas Risk Reduction Rules and would conduct all remediation work at LHAAP in accordance with those standards. Therefore, all the sampling and investigation that has been done at LHAAP has been done using those clean-up levels.

Mr. Fortune asked who in USEPA made this decision to dispute Longhorn’s contaminant clean up goals. Mr. Mayer stated that USEPA now has a policy that all Superfund sites where groundwater could be used for residential use would be cleaned up to residential standards. Mr. Mayer is hopeful a decision will be made within the next three or four months.

Community Involvement Plan / Community Relations Plan

Comments from the RAB Technical Assistance Grant (TAG) holder, CLI, were reviewed and discussed by Ms. Zeiler.

- CLI’s comment regarding placing all Administrative Record documents on a searchable website open to the general public (in addition to the Marshall Public Library repository) is being addressed. Although Army is not required to provide internet accessibility to the data to the general public, they have been working toward a website for some time. USAEC has agreed to fund the current contractor (AECOM) to develop a website. The site should be available about 6-8 weeks from when AECOM is authorized to proceed with development of the website.

- CLI suggested that criteria for determining whether the Community Relations Plan has met its objectives should be developed. Army believes that the best and most direct method for making this determining is through feedback through periodic questionnaires. Questionnaires allow open communication where suggestions for changes or improvements can be made directly.
- CLI suggested that the public be provided the opportunity to make formal comments on a variety of technical documents throughout the CERCLA remedy selection process, and specifically during the Remedial Design phase. Ms. Zeiler states that Army follows CERCLA regulation with respect to public comment, through the Proposed Plan public review process. While the Proposed Plan document itself does not provide all technical remedy selection details, it refers the reader to the documents used in the decision-making process leading to the Proposed Plan. Comments, including technical comments, received from the public during the Proposed Plan public comment period are addressed prior to the ROD. For example, Mr. Wacker cited two rounds of groundwater thallium sampling conducted at twenty wells as part of the remedial action at LHAAP-46, which was included in response to public comments on the ROD for LHAAP-46. Ms. Zeiler also stated that the RAB would be updated throughout the Remedial Design phase for upcoming sites and was welcome to provide comments in or after meeting updates.
- Population density information in the Community Relations Plan was questioned by CLI. Ms. Zeiler stated that the information in the plan was taken from the latest census data at the time it was being written.

Ms. Zeiler asked for any additional questions on these responses. Receiving no additional comments from either the RAB or Mr. Lowerre, CLI, Ms. Zeiler stated the Community Relations Plan would be finalized after the RAB meeting.

Look Ahead at the Schedule

Next RAB meeting is tentatively scheduled for February 20th from 6PM – 7:30PM at the Karnack Community Center.

A motion to adjourn was made by Mr. Fortune and seconded by Mr. Lambright.

Adjourn

November Meeting Attachments and Handouts:

- *Meeting Agenda*
- *Minutes from July 2013 RAB meeting*
- *AECOM Powerpoint Presentation*
- *GWTP Treated Groundwater Volumes Handout*
- *Surface Water Sampling Results Handout*
- *LHAAP-37 Bioplug Demonstration Study Presentation*

Acronyms

AECOM	AECOM Technical Services, Inc.
AST	above-ground storage tank
BRAC	Base Realignment and Closure
CERCLA	Comprehensive, Environmental Response, Compensation, and Liability Act
CLI	Caddo Lake Institute
DERP	Defense Environment Response Program
GWTP	Groundwater Treatment Plant
ISB	In-Situ Bioremediation
LHAAP	Longhorn Army Ammunition Plant
MNA	Monitored Natural Attenuation
PCE	tetrachloroethylene
RAB	Restoration Advisory Board
ROD	Record of Decision
TAG	Technical Assistance Grant
TCE	trichloroethene
TCEQ	Texas Commission on Environmental Quality
TSDH	Texas State Department of Health
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Center
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
µg/L	micrograms per liter
VOC	volatile organic compound
WSC	Water Supply Corporation



LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD
Karnack, Texas
(479) 635-0110

AGENDA

DATE: Thursday, November 14, 2013
TIME: 6:00 – 7:30 PM
PLACE: Karnack Community Center, Karnack, Texas

- 06:00** Welcome and Introduction
- 06:05** Open items {RMZ}
- RAB Administrative Issues
 - New Members
 - Minutes
 - Tour
- 06:10** Defense Environmental Restoration Program (DERP) Update {AECOM}
- Fieldwork completed and upcoming field activities planned
 - Groundwater Treatment Plant (GWTP) Update
 - Environmental Update for Active Sites
- 06:30** Other DERP Environmental Restoration Update {RMZ}
- Sitewide LUC Management Plan Update
- 06:45** Other Environmental Restoration Issues {RMZ}
- CRP/CIP status
 - Dispute Status Update
 - Schedule
- 07:00** Presentations:
- Bioplug Demonstration Update
 - Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Flow Process
 - Continued discussion of in-situ bioremediation
- 07:30** Adjourn {RMZ}

Subject: Draft Minutes, Quarterly Restoration Advisory Board (RAB) Meeting, Longhorn Army Ammunition Plant (LHAAP)

Location of Meeting: Karnack Community Center, Karnack, Texas

Date of Meeting: July 16, 2013, 6:00 – 8:00 PM

Meeting Participants:

LHAAP/BRAC: Rose M. Zeiler

USACE: Aaron Williams

USAEC: Marilyn Plitnik, Robin Paul

AECOM: Dave Wacker, Gretchen McDonnell

TCEQ: April Palmie

USEPA Region 6: Rich Mayer, Stephen Tzhone, Janetta Coats, Kent Becher (USGS)

USFWS: Paul Bruckwicki

RAB: **Present:** Paul Fortune, Carol Fortune, Richard LeTourneau, Tom Walker, Nigel Shivers
Absent: Judy Vandeventer, Ken Burkhalter, Ted Kurz, Jim Lambright, Charles Dixon, Pickens Winters, Judith Johnson, Robert Cargill, Lee Guice

Public: Dawn Orsack, CLI-TAG

An agenda for the RAB meeting was distributed prior to the meeting. Paul Fortune called the meeting to order.

Welcome – Rose Zeiler

Ms. Zeiler welcomed attendees to the meeting. Mr. Wacker advised attendees that there were handouts providing information on various sites at the entry tables.

Open Items – Rose Zeiler

RAB Administrative Issues

New Members

Membership applications were received from Terry Britt and John Pollard. A membership application was provided to Glenn Burkel through Mr. Fortune, but has not been returned. AECOM will send the two applications received to all the RAB members for consideration. RAB members will deliberate prior to the October RAB meeting to decide on installation of the applicants, with the possibility that the new members will be installed during the October RAB meeting.

Community Involvement Plan / Community Relations Plan

No comments have been received from the RAB. Mr. Fortune stated that there is little community interest in the LHAAP RAB and, consequentially, little interest in the Community Relations Plan. Ms. Coats suggested that the RAB send an email to Ms. Zeiler (copy to Ms. Coats, Mr. Mayer and Ms. Palmie) stating that the RAB has no comments. Then USACE will move to finalize the Community Relations Plan. Mr. Fortune agreed, asking that Ms. Zeiler send an email to him copying the others so that he would have their email addresses.

Minutes

Ms. Fortune made a motion to approve all the April 2013 RAB meeting minutes. Motion seconded by Mr. Walker.

Website

Ms. McDonnell gave an overview of the SharePoint website to give RAB members direct access online to pertinent documentation for documents under public review. CDs containing the historical LHAAP Administrative Record through 2012 were distributed to RAB members in attendance to give easier access to historical documentation. In the future, AECOM may issue to RAB members CDs with the Administrative Record documents sorted site-by-site. The SharePoint site is a work in progress so additional items can be added to the site. Ms. Zeiler asked for the addition of 1) the RAB meeting wall map; 2) a map of nearby public water supply wells, surface water sampling locations, and perimeter well locations; and, 3) a RAB meeting folder containing the recent RAB agendas and minutes. The RAB members can also provide requests for things that they might want to have added to the site. Mr. Mayer asked if the CERCLA phase process diagram could be added to the site.

Defense Environmental Restoration Program (DERP) Update – AECOM (Dave Wacker)

Fieldwork Completed and Upcoming Field Activities Planned

AECOM will be doing field work at three primary sites over the next few months; LHAAP-37, LHAAP-50 and LHAAP-58.

Additionally, wells recently installed at LHAAP-46, LHAAP-67 and LHAAP-18/24 will be surveyed, and IDW from recently installed wells will be removed to the disposal site.

LHAAP-35B(37) – Chemical Laboratory

The bioplug study is being performed by APG to treat VOCs in that area, and will run for approximately another year. APG will be presenting information to the RAB at the October RAB meeting.

AECOM's work is separate from the APG bioplug study. For a relative comparison, this site has VOC concentrations greater than LHAAP-46 and LHAAP-67, but much less than that at

LHAAP-18/24. DPT will be used to position permanent wells for monitoring of the remediation.

Mr. Fortune asked what was done at the Chemical Lab to create contamination. Ms. Zeiler stated that it's not confirmed what caused the impacts in that area. She stated that the PCE plume looks like it originated at the sump that was located outside the lab, but that the TCE plume source has not been identified.

Mr. Mayer stated that the bioplug work requires oxygenated conditions, while the AECOM MNA requires reducing conditions. If the bioplug approach does not reduce contaminants to acceptable levels, the aquifer will be restored to reducing conditions by the Bioplug contractor before AECOM begins MNA work.

LHAAP-50 Former Sump Water Tank

Soil and groundwater impacts at this site will be addressed. Two areas of perchlorate-impacted soil will be excavated to a depth of one foot (approximately 150 cubic yards), and disposed at an off-site landfill. Confirmation samples will be taken and excavation continued until all material exceeding the clean-up goal is removed. An additional location across the street will be assessed for potential perchlorate impacts to soils and will be excavated if impacts are found.

Mr. Mayer asked where certified clean backfill soil is obtained from. Mr. Wacker stated that Mr. Matt Munden has a local soil source that is currently being used.

Groundwater at this site is impacted with perchlorate. Additional DPT will be done to guide wells installation.

LHAAP-47 is just to the north of LHAAP-50 and the potential for interaction between the perchlorate plumes for each of these sites will be investigated further.

LHAAP-58 Shops Area

Multiple services were conducted in this area and could have contributed to contamination at the site. VOC impacts to groundwater is the issue at the site. There are two groundwater plumes; "eastern plume" and "western plume", each with their own remediation strategy. In the heart of the east plume, where concentrations are on the order of a few thousand micrograms per liter ($\mu\text{g/L}$), In-Situ Bioremediation (ISB) will be conducted to more aggressively treat those higher concentration impacts.

Continued Discussion of In-Site Bioremediation

Mr. Wacker provided follow-on information on how ISB is employed. Basic information on the LHAAP-58 treatability study was reviewed. Both substrates tested were effective, but sodium lactate was more efficient and is planned for use at the site.

Document Status/Environmental Sites

AECOM will be doing field work at LHAAP-37, LHAAP-50 and LHAAP-58 over the next few months. Field work has been finished on LHAAP-46, LHAAP-67 and LHAAP-18/24.

LHAAP-46 Plant 2 Area Update

Primary contaminant is trichloroethene with levels less than 100 ug/L, with a clean-up level of 5 ug/L. There are shallow (to 25') and intermediate (25-50') groundwater zone plumes. The remedy is MNA, so additional wells were installed earlier this year and the initial monitoring round conducted. Analytical data will be presented at the next RAB meeting. The monitoring well network was designed to complete delineation of the intermediate plume, so the new data should result in an updated plume map.

LHAAP-67 AST Farm

This site has TCE concentrations similar to the LHAAP-46 site. MNA for trichloroethene is the remedy. Additional wells have been installed and the initial monitoring round conducted. New data will be presented at the next RAB meeting.

The process for getting data from a new well takes several weeks. After installation, the well is allowed to "rest" and equilibrate for two weeks before sampling. After sampling, it takes 21 days for lab to provide data, and an additional 2-4 weeks to validate the data to ensure quality.

Groundwater at both LHAAP-46 and LHAAP-67 will be sampled quarterly for 2 years and then the MNA remedy will be assessed. These sites are in the Remedial Action Operation phase, which is the long, final phase of remediation of a site.

LHAAP-18/24 Burning Ground 3 & Unlined Evaporation Pond

The Groundwater Treatment Plant (GWTP) addresses impacts at this site. A data gap investigation report detailing findings of recent field work will be issued to agencies within the next month. Additional products (cross-sections, etc.) will be produced and be shared with the RAB, likely during the next meeting.

Mr. Walker recalled that the UEP "pond" area is actually a hill. Ms. Zeiler stated that the UEP was filled and covered as part of the closure, so now is a hill versus a depression. Mr. Walker asked how much contaminant material has actually been removed. Mr. Williams stated that 30,000 cubic yards of soil was removed and thermally treated. Ms. Palmie added that contaminant material is also removed from the groundwater. Volumes treated are running about 700,000 gallons per month, and currently removal rates are on the order of pounds per month. AECOM will add contaminant mass removal information to the quarterly RAB handouts. The GWTP treats the groundwater through a multi-stage process, with treated water discharged to Harrison Bayou or back to the surface of the site through sprinklers, and treatment sludge that is generated at a rate of one roll-off every 6 months disposed of off-site. Mr. Walker asked how perchlorates are being addressed in the system. AECOM will do a tutorial on the GWTP process for the next meeting.

Mr. Wacker stated that chlorinated volatiles will be treated through ISB providing food for soil microbes that encourages them to destroy the contaminant when they eat. Additionally, the correct microbes can be added if they don't already exist in the subsurface. Lab studies are done prior to implementation in the field to ensure the process will work in the field.

Of note, a well was installed on the north side of the Bayou to determine whether contamination had gone under Harrison Bayou. The preliminary data from that well shows no impacts in that well indicating the LHAAP-18/24 plume does not appear to extend under Harrison Bayou.

One of the objectives of the LHAAP-18/24 data gap investigation work was to determine whether additional source areas exist within the containment area, and whether contamination extends outside the containment area. The data developed through this investigation work will help answer those questions.

CERCLA 5-Year Review Process for Multiple Sites

The 5-Year review has been performed and the document is planned for submittal to the agencies next week.

LHAAP-03

Record of Decision is in progress, currently under EPA and TCEQ review. Excavation work is planned for the late fall.

LHAAP-12 and LHAAP-16

Continuing operation and maintenance activities have been performed at these landfill sites. Areas of minor erosion and subsidence have been identified and are being addressed with the application of additional soil cover material.

GWTP

The GWTP continues to operate to contain the groundwater plumes at LHAAP-18/24 and LHAAP-16. See attached AECOM PowerPoint Presentation for more detail. A groundwater extraction data chart was presented. AECOM will add a contaminant mass calculation to future handouts.

Surface Water - Recent surface water sampling results were presented for Goose Prairie Creek and Harrison Bayou.

Other DERP Environmental Restoration Update – Rose Zeiler

LHAAP-37 Bioplug Demonstration Project

Ms. Plitnik advised that a presentation on the initial results for the project is anticipated for the RAB meeting to be held in October.

EPA Quality Assurance Sampling (Kent Becher, USGS)

Mr. Mayer introduced Mr. Becher as a USGS liaison to EPA acting as technical support for EPA, providing quality assurance. Mr. Becher is particularly involved in split sampling at Longhorn. Mr. Becher provided information on the recent work in the split sampling program for LHAAP. EPA observes the Army's sampling efforts and provides a field report of their observations and recommendations, and compares analytical results.

The September 2012 sampling event was observed. A few minor deviations from the standard operating procedures were observed, but were corrected by Army during the event. The April 2013 sampling event for the emerging contaminant 1,4-dioxane was also observed.

The term "relative percent difference" was explained. Army and EPA samples correlated well for the most part.

1,4-dioxane is an emerging contaminant that EPA is now interested in looking at. It's a stabilizer associated with chlorinated solvents like 1,1,1-trichloroethane. This is a potential carcinogen that is more mobile in water than associated solvents and it degrades slowly. Army volunteered to sample 43 Longhorn wells for this analyte. Some low levels of 1,4-dioxane were found within sites that were thought most likely to have it (i.e., if 1,1,1-trichloroethane was known to be present). Although the Army used an appropriate laboratory method, the EPA split samples resulted in higher values because they were analyzed by a different method. 1,4-dioxane method guidance are currently being developed and refined by EPA.

In summary, Mr. Becher stated that Army and AECOM have been mostly accepting of recommendations EPA has provided, and they are doing a good job.

Other Environmental Restoration Issues – Rose Zeiler

Dispute Resolution

Dispute resolution continues. Nothing specific to update since last RAB meeting.

Look Ahead at the Schedule

Next RAB meeting is tentatively scheduled for Tuesday, October 29th from 6PM – 8PM at the Karnack Community Center.

A motion to adjourn was made by Mr. Fortune and seconded by Mr. LeTourneau.

Adjourn

July Meeting Attachments and Handouts:

- *Meeting Agenda*
- *Minutes from April meeting*
- *AECOM Powerpoint Presentation*
- *GWTP Treated Groundwater Volumes Handout*

Acronyms

AECOM	AECOM Technical Services, Inc.
BRAC	Base Realignment and Closure
CERCLA	Comprehensive, Environmental Response, Compensation, and Liability Act
CLI	Caddo Lake Institute
DERP	Defense Environment Response Program
DPT	Direct Push Technology
GWTP	Groundwater Treatment Plant
ISB	In-Situ Bioremediation
LHAAP	Longhorn Army Ammunition Plant
MNA	Monitored Natural Attenuation
RAB	Restoration Advisory Board
TAG	Technical Assistance Grant
TCEQ	Texas Commission on Environmental Quality
UEP	Unlined Evaporation Pond

USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Center
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
µg/L	micrograms per liter



LONGHORN ARMY AMMUNITION PLANT
RESTORATION ADVISORY BOARD
Karnack, Texas
(479) 635-0110

AGENDA

DATE: Tuesday, July 16, 2013
TIME: 6:00 – 8:00 PM
PLACE: Karnack Community Center, Karnack, Texas

- 06:00** Welcome and Introduction
- 06:05** Open items {RMZ}
- RAB Administrative Issues
 - New Members
 - Minutes
 - Website – discuss types of documents available
- 06:35** Defense Environmental Restoration Program (DERP) Update {AECOM}
- Fieldwork completed and upcoming field activities planned
 - Groundwater Treatment Plant (GWTP) Update
 - Continued discussion of in-situ bioremediation
- 07:15** Other DERP Environmental Restoration Update {RMZ}
- Status of Demonstration at Site 37
 - Sitewide LUC Management Plan Update
- 07:20** EPA Quality Assurance Sampling (KB)
- 07:45** Other Environmental Restoration Issues {RMZ}
- CRP/CIP status
 - Dispute Resolution
- 07:50** Look Ahead at the Schedule
- 08:00** Adjourn {RMZ}

Subject: Draft Minutes, Quarterly Restoration Advisory Board (RAB) Meeting, Longhorn Army Ammunition Plant (LHAAP)

Location of Meeting: Karnack Community Center, Karnack, Texas

Date of Meeting: April 4, 2013, 4:30 – 6:00 PM

Meeting Participants:

LHAAP/BRAC: Rose M. Zeiler

USACE: Aaron Williams, Wendy Lanier

AECOM: Dave Wacker, Gretchen McDonnell

TCEQ: April Palmie

USEPA Region 6: Rich Mayer, Janetta Coats, Kent Becher (USGS)

USFWS: Jason Roesner

RAB: **Present:** Paul Fortune, Pickens Winters, Judy Van Deventer, Judith Johnson, Robert Cargill, Lee Guice, Richard LeTourneau, Tom Walker,
Absent: Ken Burkhalter, Ted Kurz, Jim Lambright, Charles Dixon, Carol Fortune, Nigel Shivers

Public: Terry Britt, Bill Mauthe, Two additional unidentified (illegible roster signatures)

An agenda for the RAB meeting was distributed prior to the meeting.

Welcome – Rose Zeiler

Ms. Zeiler welcomed attendees to the meeting. Mr. Wacker advised attendees that there were handouts providing information on various sites at the entry tables.

Open Items – Rose Zeiler

RAB Tour

The RAB tour of LHAAP sites was conducted today from 2PM to 4PM. Mr. Dave Wacker, AECOM led the tour and provided information at each of the various sites, including the ground water treatment plant, 18/24, 04, 12, 16, 17, 29 and several others. A review of the tour will be presented at the next RAB meeting.

Attending the tour were:

Rose Zeiler	Longhorn AAP
Paul Fortune, Judith Johnson, Judy Van Deventer, Pickens Winters, Richard LeTourneau, Terry Britt (prospective member)	RAB Members
April Palmie	TCEQ
Rich Mayer, Janetta Coats	USEPA
Wendy Lanier, Aaron Williams	USACE
Dave Wacker, Gretchen McDonnell	AECOM
Jason Roesner	USFWS
Dawn Orsak	Caddo Lake Institute – USEPA TAG

RAB Administrative Issues

New Member Solicitation – Membership applications will be provided to Terry Britt and Bill Mauthe. An application form for Glenn Burkel will be sent to Paul Fortune.

Minutes

Ms. Johnson made a motion to approve all the January 2013 RAB meeting minutes. Motion seconded by Paul Fortune.

Website

Army is working with AECOM to develop a website where RAB members can access key documents. This will be discussed further in coming weeks. RAB members will likely receive notification of availability of the website within the next few weeks.

Defense Environmental Restoration Program (DERP) Update – AECOM (Dave Wacker)

Document Status/Environmental Sites

Ms. McDonnell provided descriptions of field activities shown in a display of photos from recent field work at LHAAP-18/24, LHAAP-46 and LHAAP-67.

Ms. Johnson asked about the comparative cost and speed of groundwater pump and treat and potential other technologies that have been developed over recent years. Ms. Zeiler stated that the final remedies for sites currently served by the GWTP may well include other technologies that can clean up the site more quickly and more cost effectively.

CERCLA 5-Year Review Process Video. Mr. Mayer introduced and presented an USEPA video created to help the public understand the 5-year review process at Superfund sites. Ms. Zeiler stated that the Army retains the responsibility for conducting the future 5-year reviews regardless of whether the land is transferred. Mr. Mayer stated that USEPA conducts the 5-year reviews at private, non-Federal sites. Ms. Zeiler stated that the most recent 5-year review report is in the administrative record, and the next review report will be coming out later this year.

Mr. Winters asked if Longhorn cleanup operations will be impacted by sequestration. Ms. Zeiler stated that there is no impact expected on the environmental cleanup due to sequestration. However, it will impact the days that meetings are held since Federal staff will be on mandatory furlough on Fridays through the end of the fiscal year.

Status reviews were presented for sites with significant activities upcoming in the near-term. (See attached AECOM Powerpoint presentation.)

LHAAP-03 Proposed Plan. The Proposed Plan public meeting date is tentatively June 11th, but may be rescheduled for May. This is a very small site, 30' x 20' which will likely be excavated. The Proposed Plan document will be coming to the RAB shortly.

Introduction to In-Situ Bioremediation. (See attached "Introduction to ISB" Powerpoint presentation.) ISB is one of the newer ways to remediate contamination. Mr. Winters asked if microbes and substrate could be injected at the same time. Mr. Wacker said they can be injected relatively close in time together, but would not be done during the same injection. The presentation covered topics such as bioaugmentation and contaminant breakdown products, and showed photos of ISB operations at other facilities. ISB will be used at LHAAP-04, LHAAP-47 and LHAAP-58, and may be used at LHAAP-18/24. AECOM will present some case studies showing remediation success with ISB at a future RAB meeting.

Groundwater Treatment Plant (GWTP) Update

The GWTP continues to operate to maintain containment of the plume at LHAAP-18/24. Treated water has been released to Harrison Bayou for the last few months, since sufficient water flow has been present in the bayou. A handout showing surface water sample results was also provided and reviewed. (See attached Surface Water Sampling Results handout.) Ms. Zeiler stated that this information can be shared with the public by the RAB members to show that contaminants have not been released to Caddo Lake for quite some time. Ms. Palmie noted that Goose Prairie Creek was dry in January, so AECOM went back and sampled in February when water was first observed in that area. Mr. LeTourneau asked if treated water is discharged from the GWTP to Harrison Bayou on a continual basis during the rainy season. Ms. Zeiler responded that there is discharge to Harrison Bayou during the rainy season but that it is done based on flow in the Bayou to ensure discharge limits are not exceeded. Ms. Zeiler also referenced the surface water sampling handout to show that there has been no contaminant exceedance in the Bayou for quite some time.

Decision Document Sites Review

Mr. Williams provided a review of four non-residential use sites (LHAAP-19, LHAAP-56, LHAAP-65 and LHAAP-69) for which Decision Documents are being developed. (See attached AECOM presentation.) All four sites were determined to be suitable for non-residential use. No further action is required for these four sites. The sites will be evaluated every five years to confirm the use remains non-residential. Ms. Palmie clarified that TCEQ will be looking at these sites to ensure protectiveness every five years as part of the 5-year review process. Ms. Zeiler noted that the purpose of the Decision Document is to document for the record the decisions made, and agency concurrence with decisions made, for management of these sites.

Mr. Fortune asked about a historical allegation of mercury disposal at LHAAP-19. The allegation was that mercury switches were disposed of illegally at LHAAP-19. Ms. Zeiler stated that Army and USEPA both investigated the allegations and determined there was no validity and no basis.

Mr. Mauthe asked if Tulsa District USACE is run by Fort Worth District USACE. Ms. Zeiler and Ms. Lanier explained that Fort Worth District did manage the project historically, but Tulsa District has been managing for quite some time due to specialized expertise with CERCLA sites held by the personnel in the Tulsa District.

Upcoming Field Work

Field work for LHAAP-18/24, LHAAP-46 and LHAP-67 should be complete by the end of April. Routine compliance sampling will start in late April or early May, and will take a few weeks to complete. This summer, field work will be conducted at LHAAP-37, LHAAP-50 and LHAAP-58, similar in nature to that currently being done at LHAAP-46 and LHAAP-67.

Other DERP Environmental Restoration Update – Rose Zeiler

LHAAP-37 Bioplug Demonstration Project

Ms. Zeiler advised that a presentation on the initial results for the project is anticipated for the RAB meeting to be held in September/October.

Sitewide Land Use Controls (LUC) Management Plan Update

Ms. Zeiler stated that the update of this plan for the year was recently completed.

Community Involvement Plan (CIP) – The document has been provided to the RAB for review and comment. All comments should be submitted by or before the next RAB meeting.

Military Munitions Response Program (MMRP) – USACE

No update at this time.

Other Environmental Restoration Issues – Rose Zeiler

Dispute Resolution

Dispute resolution continues. Nothing specific to update since last RAB meeting.

Look Ahead at the Schedule

Next RAB meeting is scheduled for July 16th from 4PM – 6PM at the Karnack Community Center.

The LHAAP-03 Proposed Plan public meeting is anticipated for June 11th, but RAB members should watch their email for this to change to an earlier date.

A motion to adjourn was made by Mr. Cargill and seconded by Ms. Zeiler.

Adjourn

April Meeting Attachments and Handouts:

- *Meeting Agenda*
- *Minutes from January meeting*
- *AECOM Powerpoint Presentation*
- *Introduction to ISB Powerpoint Presentation*
- *Surface Water Sampling Results Handout*

- *GWTP Treated Groundwater Volumes Handout*

Acronyms

AECOM	AECOM Technical Services, Inc.
BRAC	Base Realignment and Closure
CERCLA	Comprehensive, Environmental Response, Compensation, and Liability Act
CIP	Community Involvement Plan
CLI	Caddo Lake Institute
DERP	Defense Environment Response Program
GWTP	Groundwater Treatment Plant
ISB	In-Situ Bioremediation
LHAAP	Longhorn Army Ammunition Plant
LUC	Land Use Controls
MMRP	Military Munitions Response Program
RAB	Restoration Advisory Board
TAG	Technical Assistance Grant
TCEQ	Texas Commission on Environmental Quality
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Center
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

Longhorn Army Ammunition Plant Restoration Advisory Board Meeting July 16, 2013

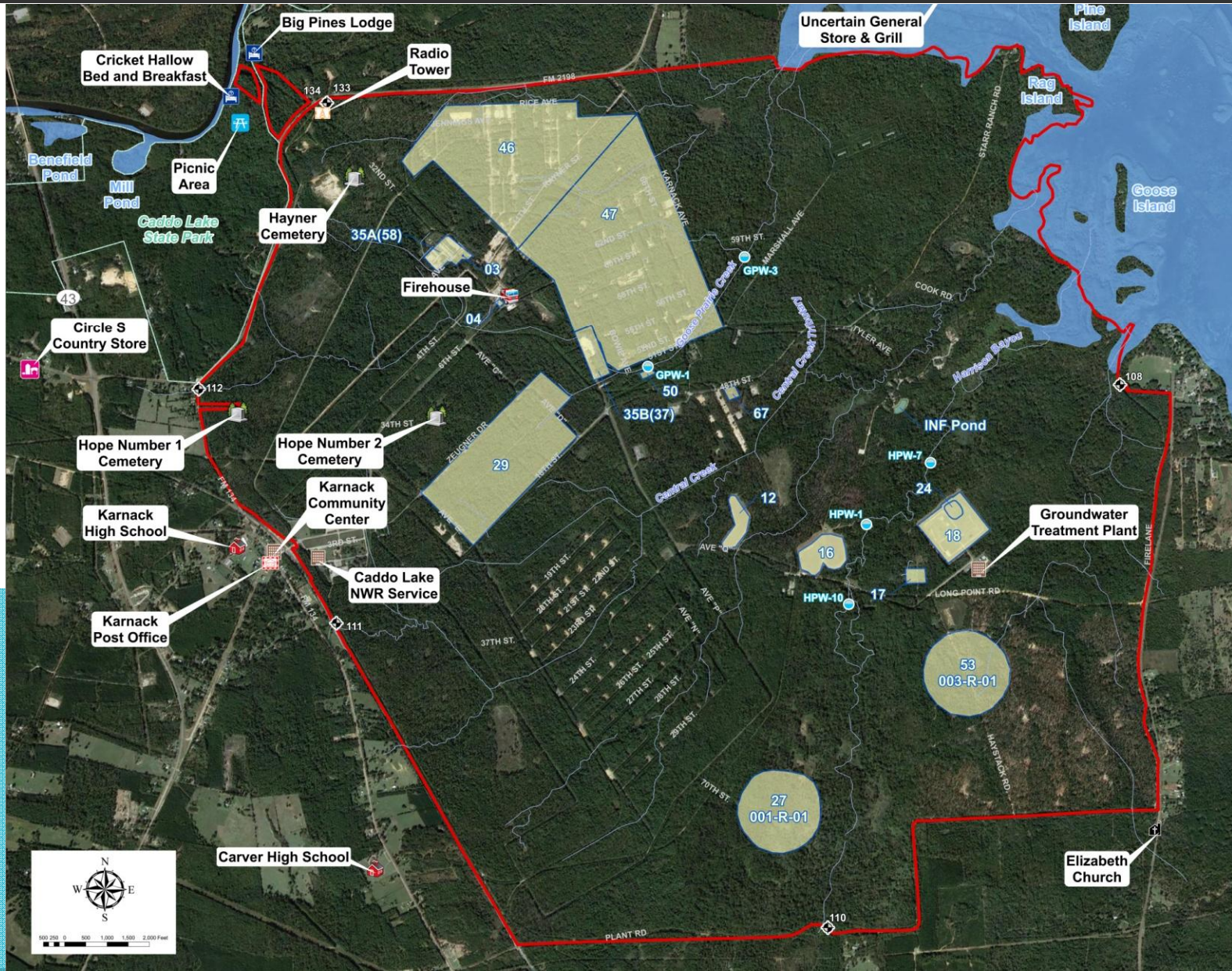
A large, semi-transparent green leaf graphic is positioned on the right side of the slide, partially overlapping the title text. The leaf has several serrated leaflets on a central stem.

AECOM Environment

Agenda

1. RAB Administrative Issues
2. SharePoint Website
3. Field Activities Update of Environmental Sites (46, 67, 18/24, 37, 50, 58)
4. Groundwater Treatment Plant (GWTP)
5. Surface Water Sample Results
6. Status of Demonstration at Site 37
7. EPA Quality Assurance Sampling
8. Community Relations Plan/Community Involvement Plan (CRP/CIP) Status
9. Dispute Status and Projected Schedule

Longhorn Map



AECOM Longhorn NPL Sites

LHAAP-03	Building 722 Paint Shop
LHAAP-04	Pilot Wastewater Treatment Plant
LHAAP-12	Landfill 12
LHAAP-16	Landfill 16
LHAAP-17	Burning Ground No.2/Flashing Area
LHAAP-18	Burning Ground No.3
LHAAP-24	Unlined Evaporation Pond
LHAAP-29	Former TNT Production Area
LHAAP-37	Chemical Laboratory Waste Pad
LHAAP-46	Plant Area 2
LHAAP-47	Plant Area 3
LHAAP-50	Former Sump Water Tank
LHAAP-58	Maintenance Complex
LHAAP-67	Aboveground Storage Tank Farm
LHAAP-001-R-01	South Test Area/Bomb Test Area
LHAAP-003-R-01	Ground Signal Test Area

RAB Administrative Issues

4.3 Nomination and Selection of RAB members. Candidates for new RAB members may be presented at any time by current RAB community members. Individuals interested in participating in the RAB must submit a completed RAB Application Form to the Co-chairs in order to be eligible for selection. The community RAB members may, by a two-thirds majority vote, nominate replacement and new RAB members. All RAB members must be approved by the Army's responsible official to ensure diversity and balance in regard to gender, age, race /ethnicity, type of employment, neighborhood, expertise, income, and education levels.

SharePoint Website

- <https://extranet.aecom.com/sites/longhornaapwers>
- The Home Page

Site Actions Browse Page Smith, Altricia ▾

AECOM Longhorn AAP WERS ▸ Home I Like It Tags & Notes

Home Search this site...

Libraries
Site Pages
Shared Documents

Lists
Calendar
Tasks

Discussions
Team Discussion

Recycle Bin
 All Site Content

Welcome to your site!

Add a new image, change this welcome text or add new lists to this page by clicking the edit button above. You can click on Shared Documents to add files or on the calendar to create new team events. Use the links in the getting started section to share your site and customize its look.

Shared Documents

<input type="checkbox"/> Type	Name	Modified	<input type="checkbox"/> Modified By
	1 AECOM Internal Drafts	8/7/2012 8:41 AM	McDonnell, Gretchen
	2 Prelim Drafts - US Army	8/7/2012 9:29 AM	McDonnell, Gretchen
	3 Drafts - US Army-TCEQ-EPA-USFWS	8/7/2012 8:42 AM	McDonnell, Gretchen
	4 Draft Finals - US Army-EPA-TCEQ-USFWS	8/7/2012 9:29 AM	McDonnell, Gretchen
	5 Final Documents - US Army-EPA-TCEQ-USFWS	8/7/2012 9:30 AM	McDonnell, Gretchen
	Comments and RTCs - US Army-TCEQ-EPA	8/7/2012 9:02 AM	McDonnell, Gretchen
	Reference Docs	8/7/2012 9:43 AM	McDonnell, Gretchen
	Restoration Advisory Board	8/14/2012 9:58 AM	McDonnell, Gretchen

Add document

Getting Started

- Share this site
- Change site theme
- Set a site icon
- Customize the Quick Launch

SharePoint Website

Site Actions Browse Page Smith, Altricia ▾

AECOM Longhorn AAP WERS ▸ Home I Like It Tags & Notes

Home

Libraries
Site Pages
Shared Documents

Lists
Calendar
Tasks

Discussions
Team Discussion

Recycle Bin
 All Site Content


Welcome to your site!

Add a new image, change this welcome text or add new lists to this page by clicking the edit button above. You can click on Shared Documents to add files or on the calendar to create new team events. Use the links in the getting started section to share your site and customize its look.

Shared Documents

<input type="checkbox"/> Type	Name	Modified	<input type="checkbox"/> Modified By
	LHAAP-18_24 ROD Reference Documents	7/8/2013 10:34 AM	McDonnell, Gretchen

Add document



Getting Started

- Share this site
- Change site theme
- Set a site icon
- Customize the Quick Launch

SharePoint Website

- Documents that can be found in the “LHAAP-18_24 ROD Reference Documents” folder:
 - Draft Final Feasibility Study, LHAAP-18/24, Burning Ground No. 3 and Unlined Evaporation Pond, Longhorn Army Ammunition Plant, Karnack, Texas
 - DOW Environmental, Inc. (DEI) (Formerly AWD Technologies, INC.) Pilot Study Report - Phase II March 1995
 - Environmental Site Assessment (Plexus, 2005)
 - Closure of Unlined Evaporation Pond, Kindle, Stone & Associates, July 15, 1984
 - Jacobs, Phase III, 1998
 - Jacobs, Phase II, 1995
 - Jacobs, Phase I, 1993

SharePoint Website – How to Use

- Your User Name
 - Domain\UserID
 - Example: John Doe would be “ACM\DoeJ”



SharePoint Website - Troubleshooting

- You are presented with the same screen
 - This means your login was unsuccessful



- 401 – Unauthorized
 - After three unsuccessful attempts, you will be presented with this error.
 - You will be unable to access the SharePoint **for a few** hours.
 - After **a few hours** have passed, you may attempt to log on again.

401 - Unauthorized: Access is denied due to invalid credentials.

You do not have permission to view this directory or page using the credentials that you supplied.

SharePoint Website – How to Use

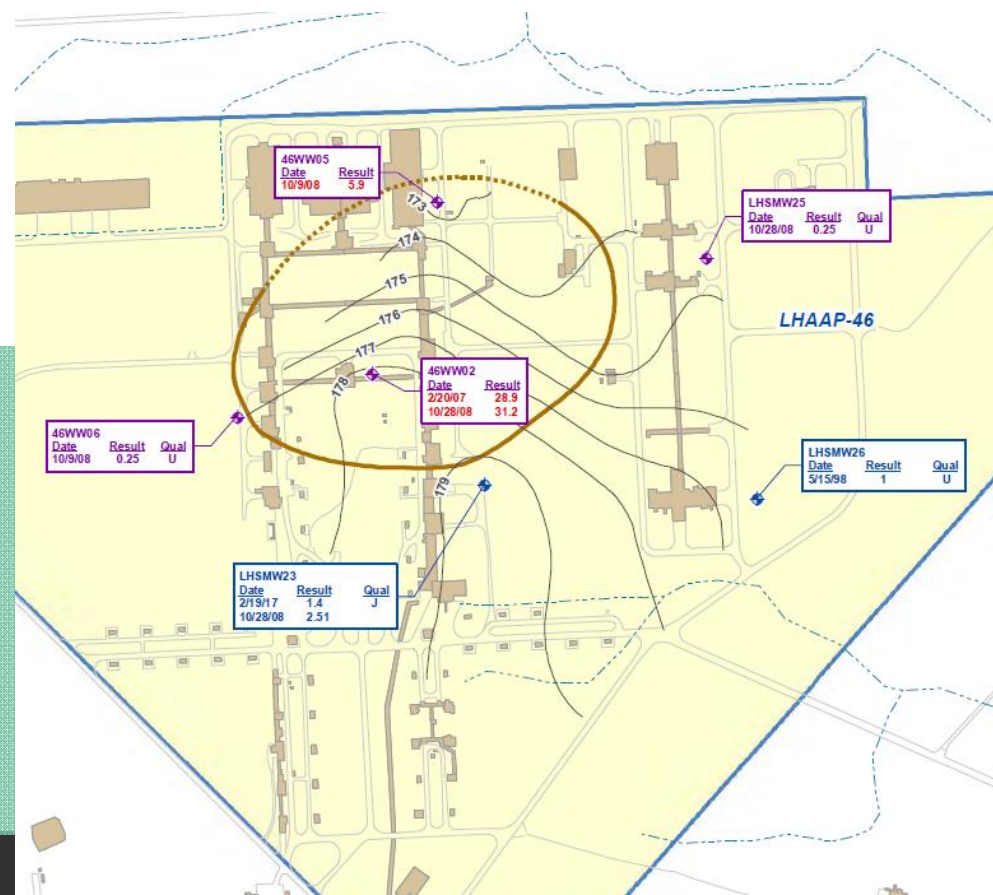
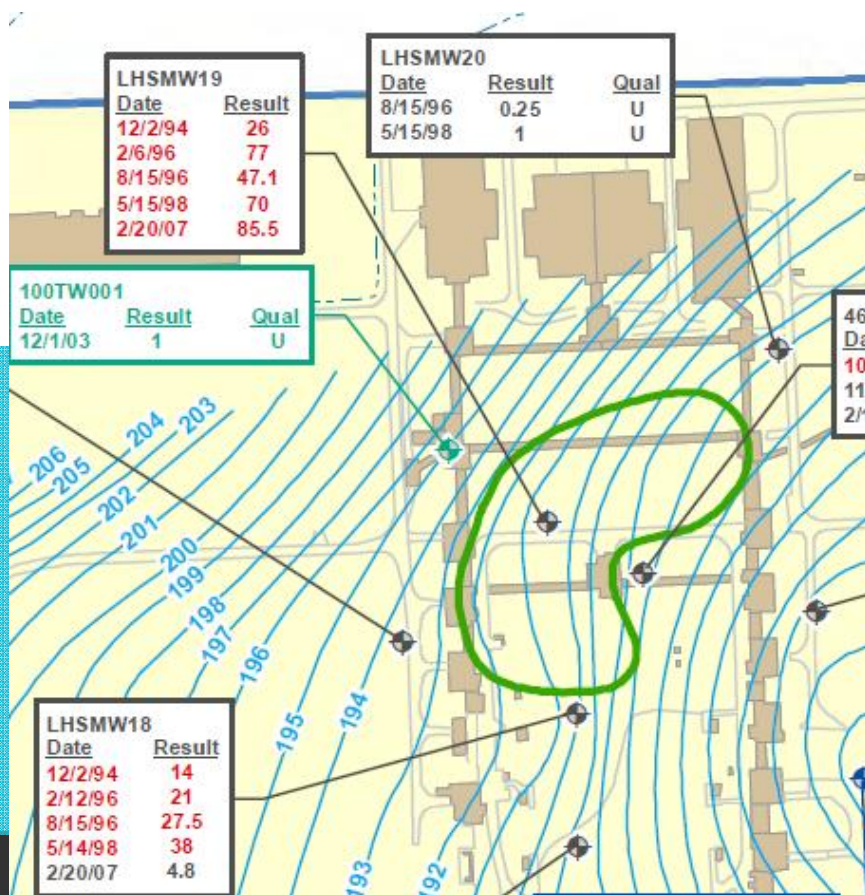
- Your Password

- Your password will be provided to you.
 - If you copy/paste your password, please be sure not to copy the space. It will count as a character and you will be denied access.
- Passwords Valid for 6 months
 - First password will expire at end of September
 - New password will be issued at that time
- Contact Gretchen McDonnell if you need your username or password

Status of Environmental Sites

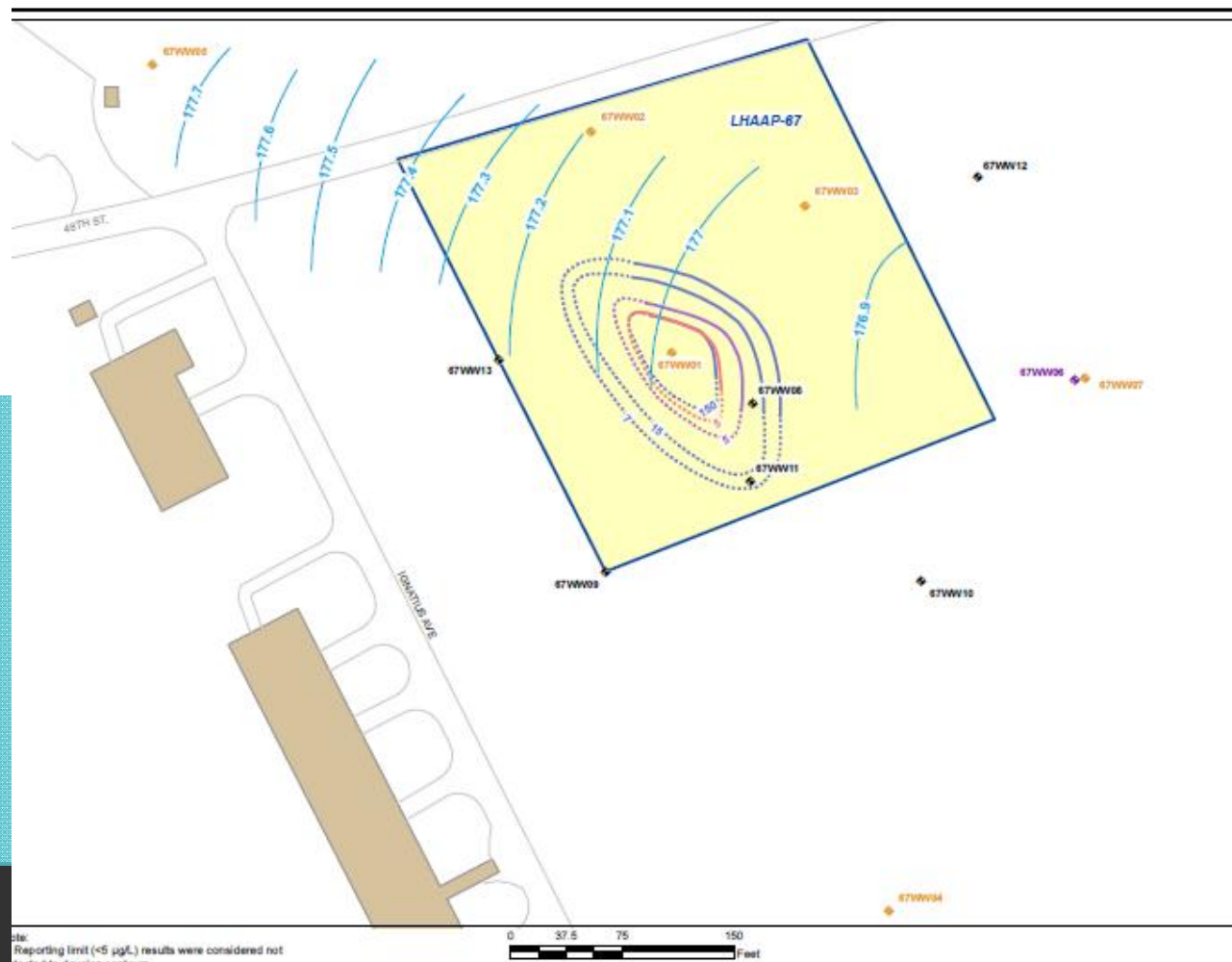
– LHAAP-46 Plant Area 2 –

- Remedial Action Work Plan Completed
- Installed Wells, Began Quarterly Sampling for Monitored Natural Attenuation Evaluation over the next two years. ~shallow plume on left, intermediate depth plume on right below:



Status of Environmental Sites (cont)

- LHAAP-67 Aboveground Storage Tank Farm –
 - Well installation complete, Quarterly Sampling initiated and Monitored Natural Attenuation Evaluation to be completed over the next two years. Plumes shown below:



Status of Environmental Sites (cont)

- LHAAP-35B (37) – Chemical Laboratory
 - Remedial Action Work Plan Complete
 - Bio-Plug Study on-going
 - Plan to Install Wells, Complete Sampling following completion of bio-plug study

Table 1-1 below presents the cleanup levels for the LHAAP-35B (37) site.

Table 1-1: Cleanup Levels

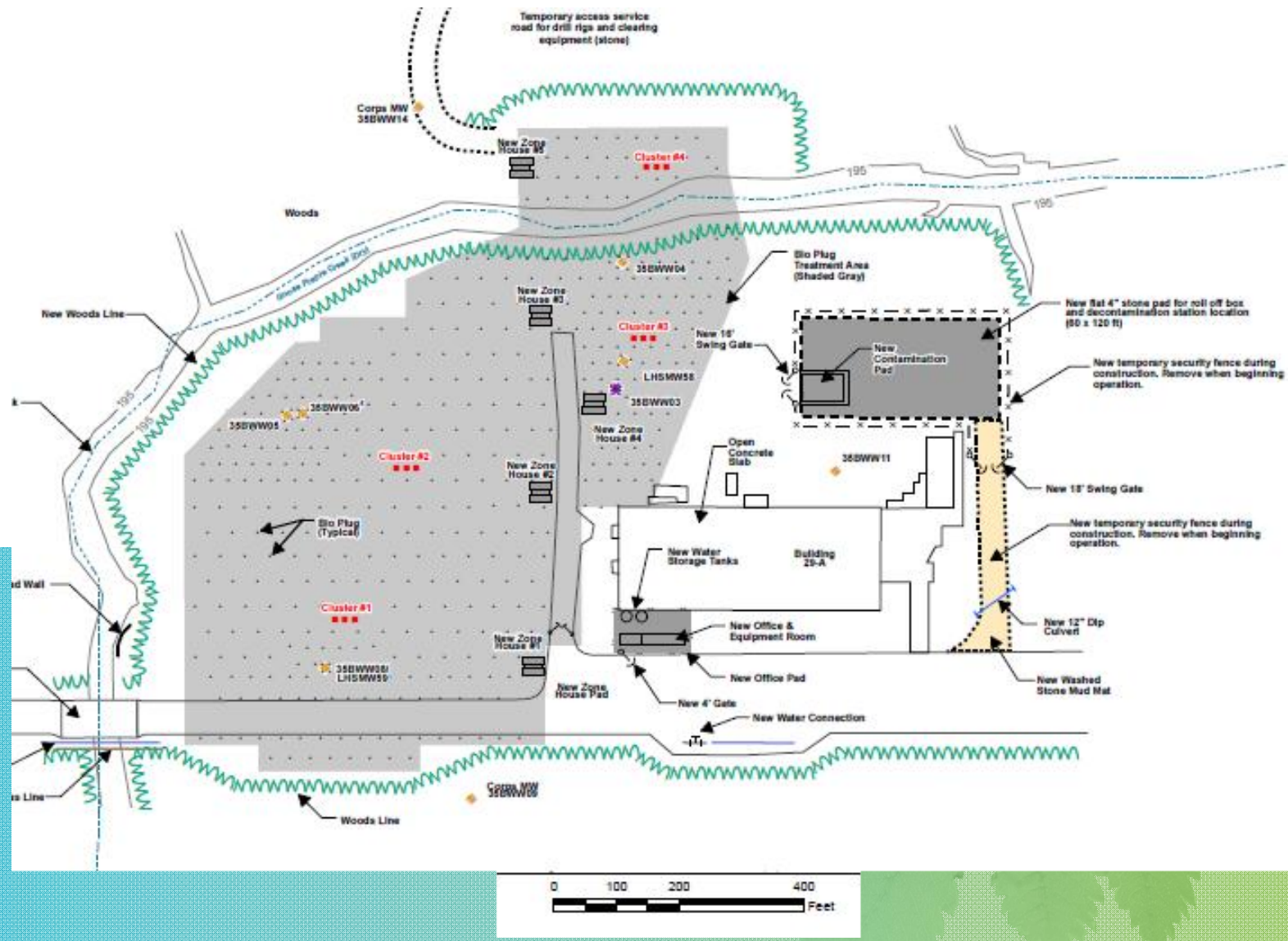
Chemical of Concern (COC)	Concentration (µg/L)	Basis
Trichloroethylene	5	MCL
Tetrachloroethylene	5	MCL
1,1-Dichloroethylene	7	MCL

Notes and Abbreviations:

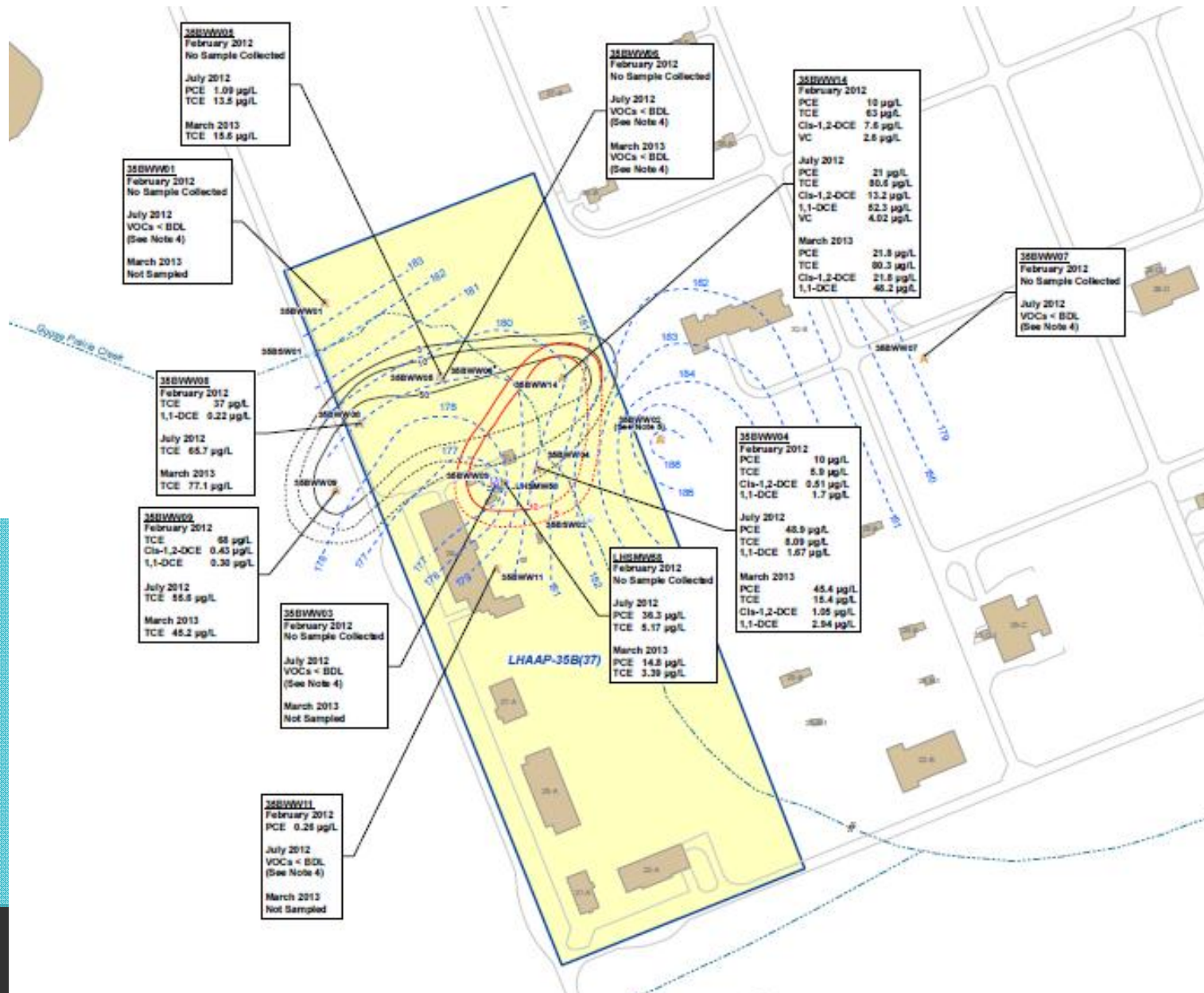
µg/L – micrograms per liter

MCL – maximum contaminant level

Status of Environmental Sites (cont)

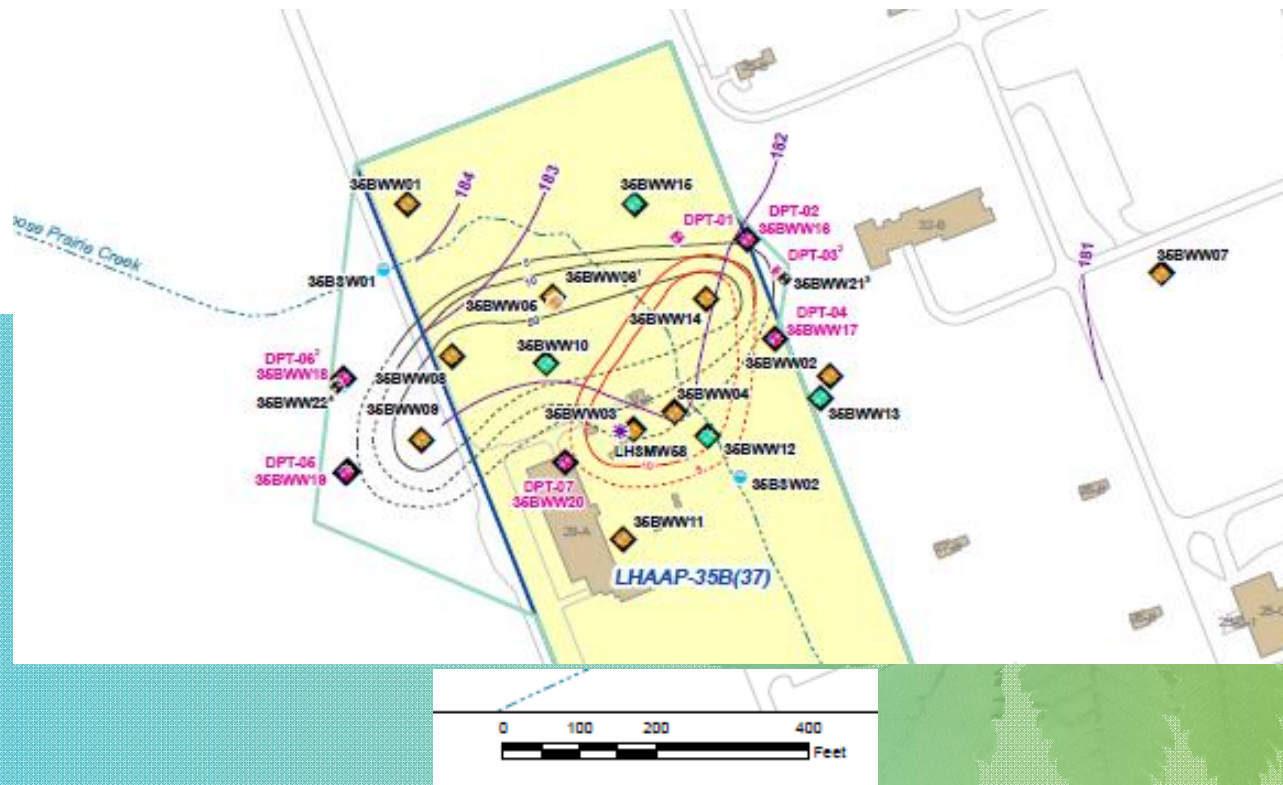


Status of Environmental Sites (cont)



Status of Environmental Sites (cont)

- LHAAP-35B (37) –
 - Remedial Action Work Plan Complete
 - Plan to Install Wells, Complete Quarterly Sampling and perform Monitored Natural Attenuation Evaluation over the next two years. Shallow and intermediate plumes below:



Status of Environmental Sites (cont)

- LHAAP-50 – Former Sump Water Tank
 - Industrial waste production sump water received from throughout the plant at this site which also had a 47,000 gallon AST

Table 1-1: Cleanup Levels

Chemical of Concern (COC)	Concentration	Basis
Soil (µg/kg)		
Perchlorate	7,200	GWP-Ind
Groundwater (µg/L)		
Tetrachloroethylene	5	MCL
Trichloroethylene	5	MCL
1,1-Dichloroethylene	7	MCL
1,2-Dichloroethane	5	MCL
Cis-1,2-dichloroethylene	70	MCL
Vinyl chloride	2	MCL
Perchlorate	72	GW-Ind
Surface Water (µg/L)		
Perchlorate	26	GW-Res

Notes and Abbreviations:

µg/kg – micrograms per kilogram

µg/L – micrograms per liter

GW-Ind – Groundwater MSC for industrial use for perchlorate

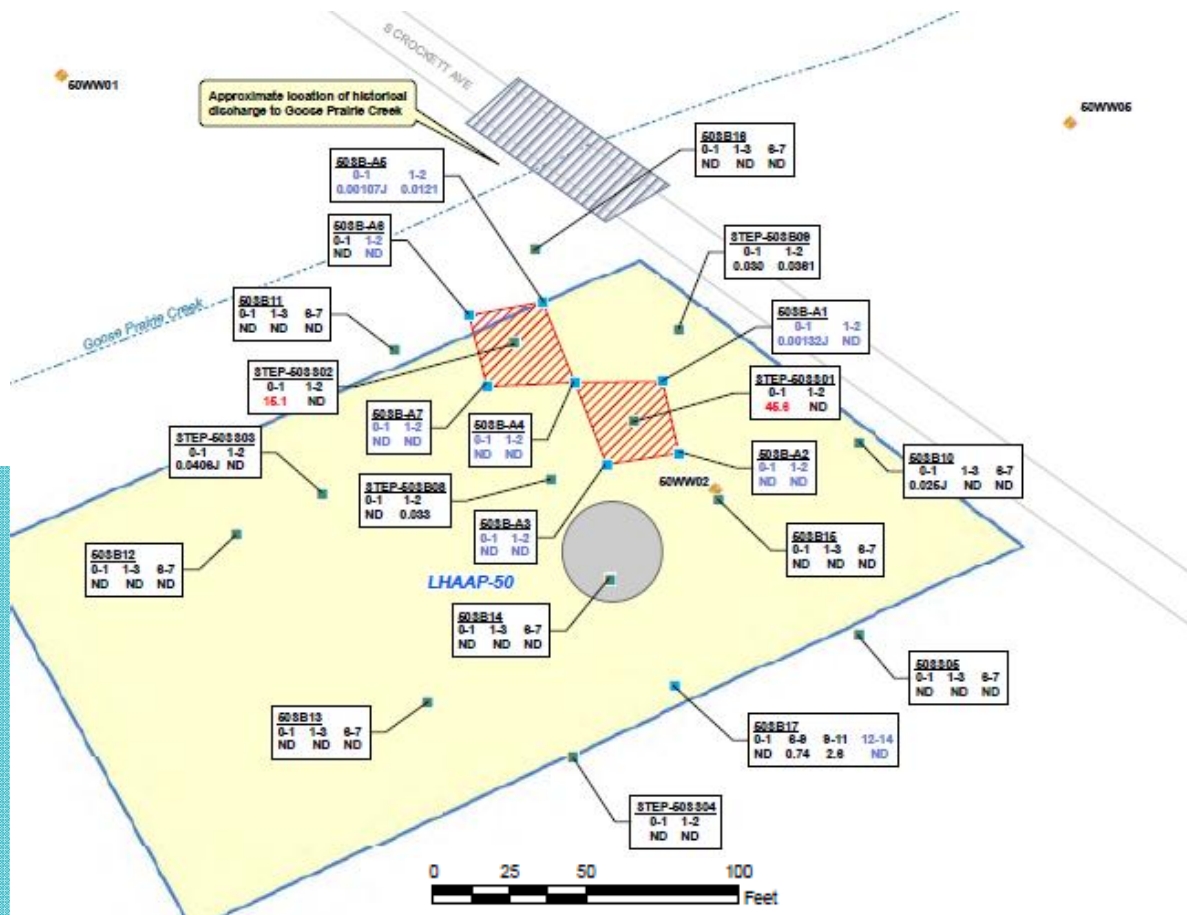
GW-Res – Groundwater MSC for residential use for perchlorate

GWP-Ind – Soil MSC for industrial use based on groundwater protection

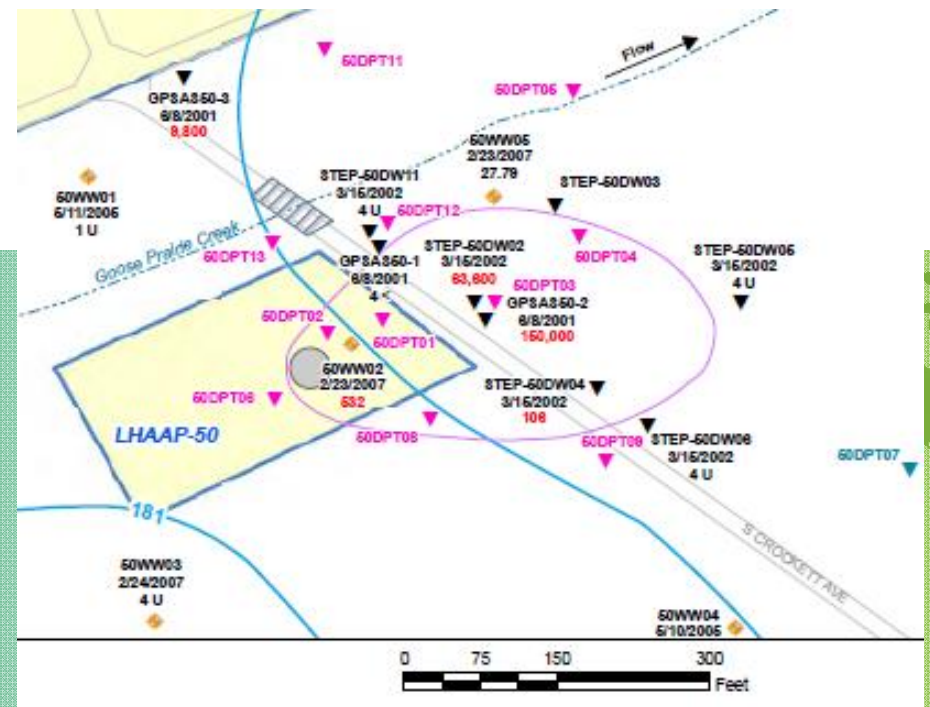
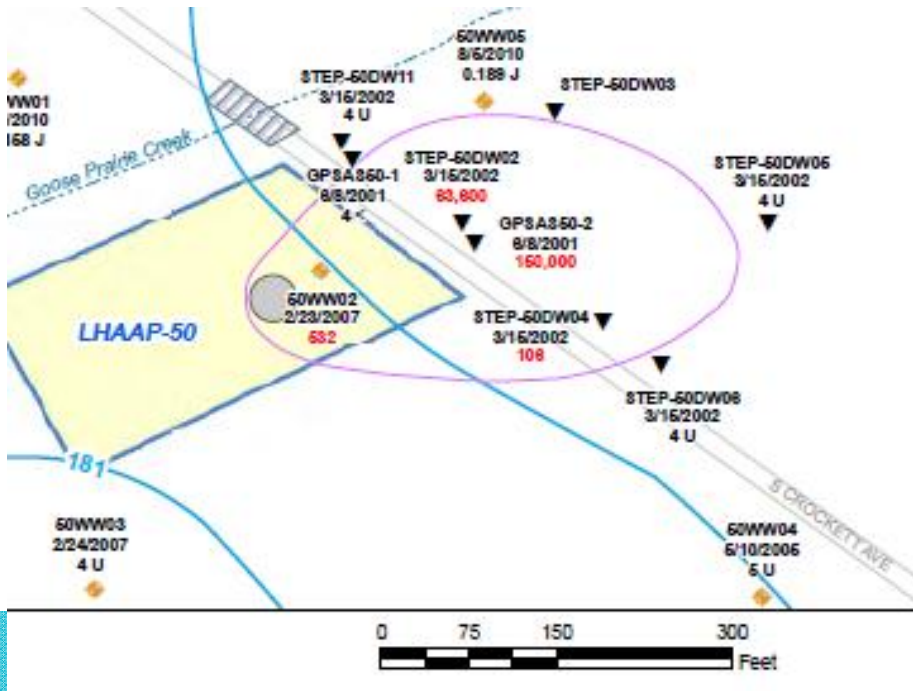
MCL – maximum contaminant level

Status of Environmental Sites (cont)

- LHAAP-50 – Former Sump Water Tank
 - Area of soil contamination



Status of Environmental Sites (cont)



Status of Environmental Sites (cont)

– LHAAP-58 Shops Area –

- Plant operated laundry, automotive, woodworking, metal working, painting, refrigeration, and electrical services operated in this area

Table 1-1: Cleanup Levels

Chemical of Concern (COC)	Concentration	Basis
Groundwater (µg/L)		
Tetrachloroethene	5	MCL
Trichloroethylene	5	MCL
1,1-Dichloroethene	7	MCL
Cis-1,2-dichloroethene	70	MCL
Trans-1,2-dichloroethene	100	MCL
Vinyl chloride	2	MCL
1,1,2-trichloroethane ^(a)	5	MCL
1,1-dichloroethane ^(a)	10,000	GW-Ind
Chloroethane ^(a)	41,000	GW-Ind
Arsenic ^(b)	10	MCL

Notes and Abbreviations:

^(a) Not currently classified as a constituent of concern, but will be included in the list of chemicals for Long-Term Monitoring (see ROD section 2.12.2)

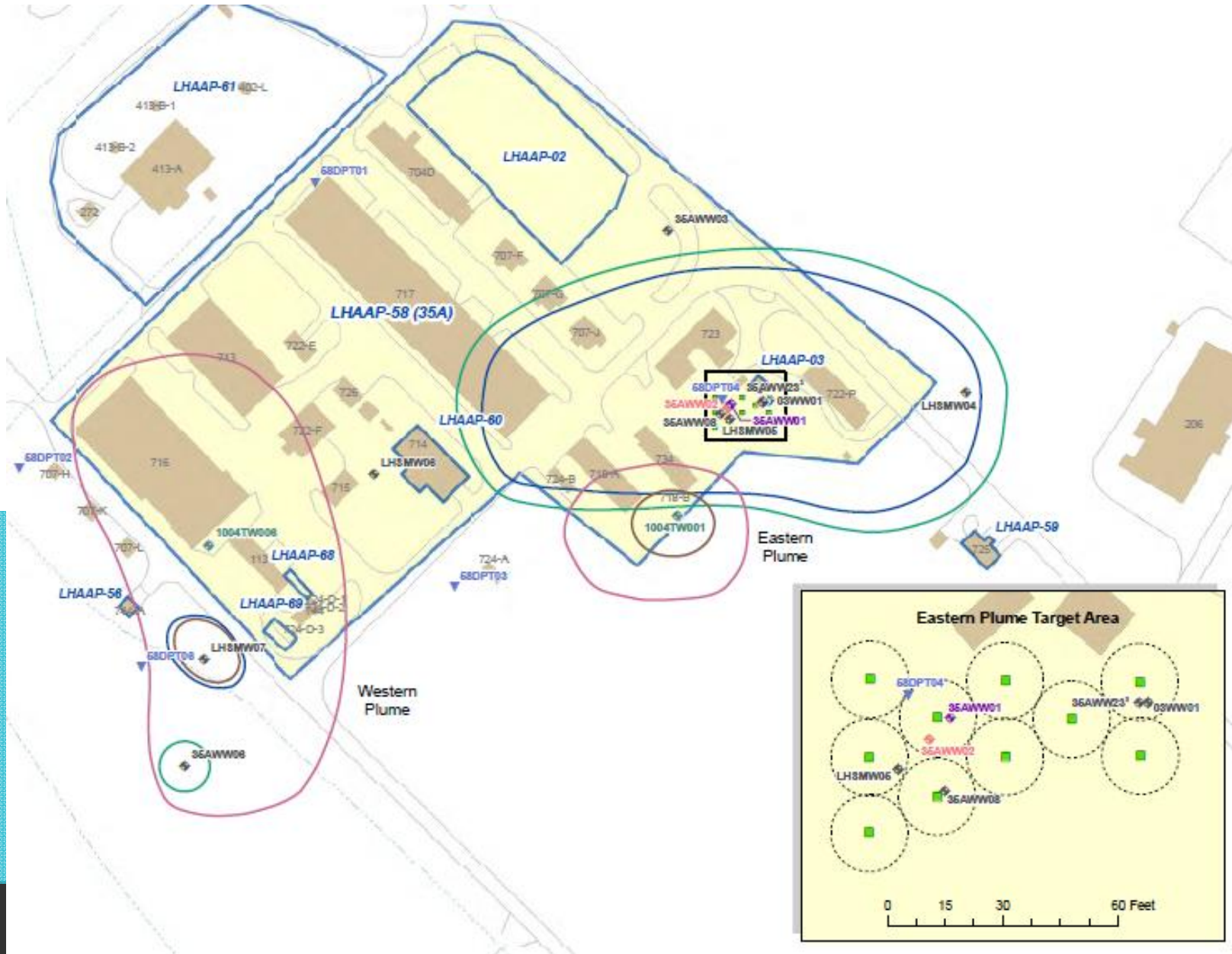
^(b) Arsenic is not a COC at the site as stated in the ROD. The paragraph below this table discusses monitoring for arsenic, and Table 4-4 identifies wells planned to be monitored for arsenic. The arsenic MCL of 10 µg/L will be used to compare arsenic data in site groundwater during arsenic monitoring.

µg/L – micrograms per liter

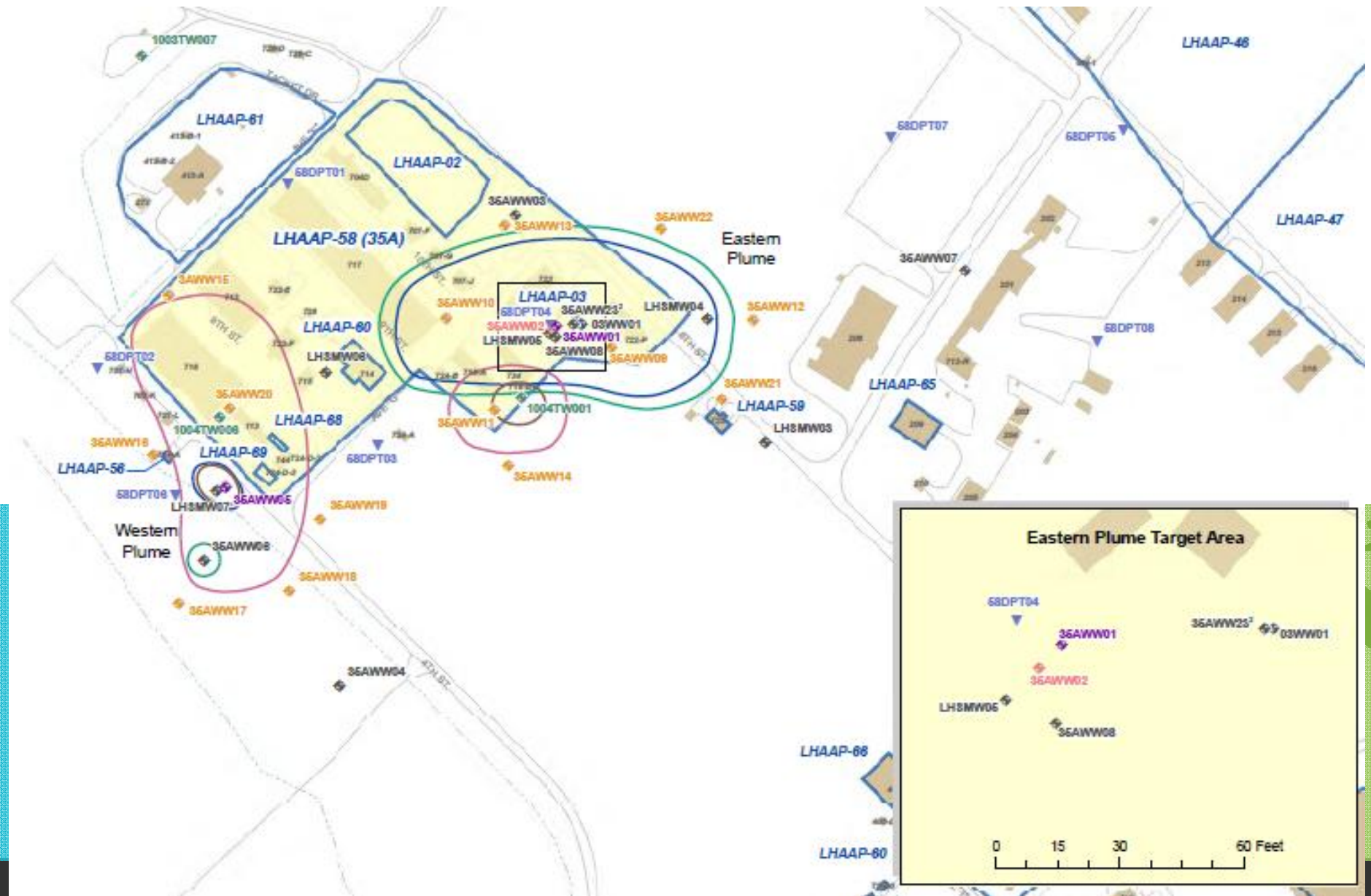
GW-Ind – Texas Commission on Environmental Quality groundwater medium-specific concentration for industrial use, since no MCL exists

MCL – maximum contaminant level

Status of Environmental Sites (cont)



Status of Environmental Sites (cont)



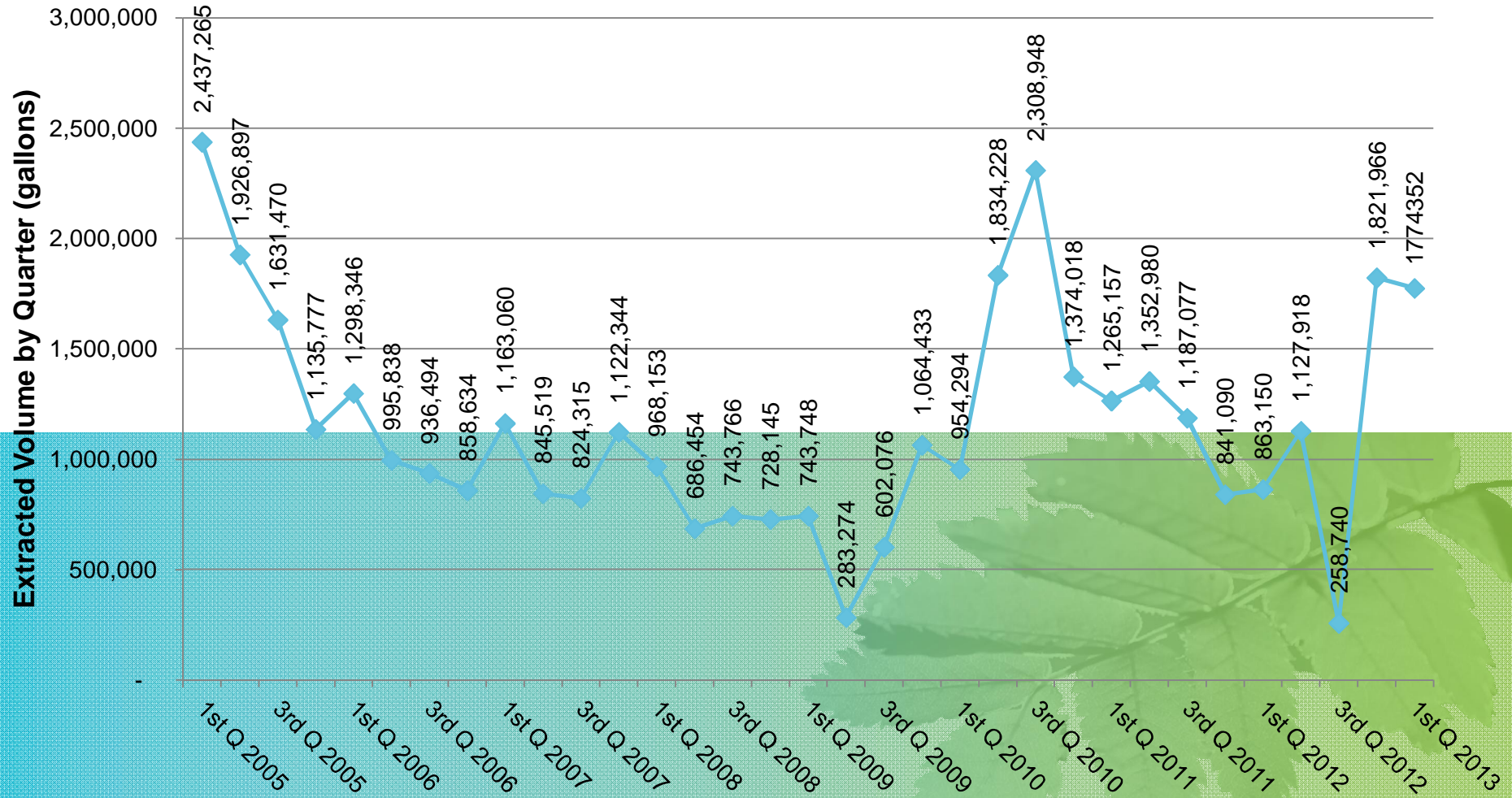
Status of Environmental Sites (cont)

- LHAAP-37, LHAAP-50, LHAAP-58
 - RAWPs approved, fieldwork mobilized July 9
 - Completing DPT, well installation and groundwater sampling for MNA for groundwater
 - Completing soil excavation at LHAAP-50 (~150 cubic yards)
- CERCLA 5 Year Review Process for Multiple Sites
 - TCEQ and EPA review later this month
- LHAAP-03
 - ROD in progress, EPA and TCEQ reviewing, planned excavation in late fall
- LHAAP-12/LHAAP-16
 - Completing O&M mowing, sign maintenance, etc...
 - Repaired Areas Requiring Additional Soil
 - Maintenance of Wells (painting, fixing locks and hinges)

Groundwater Treatment Plant Operations and Management

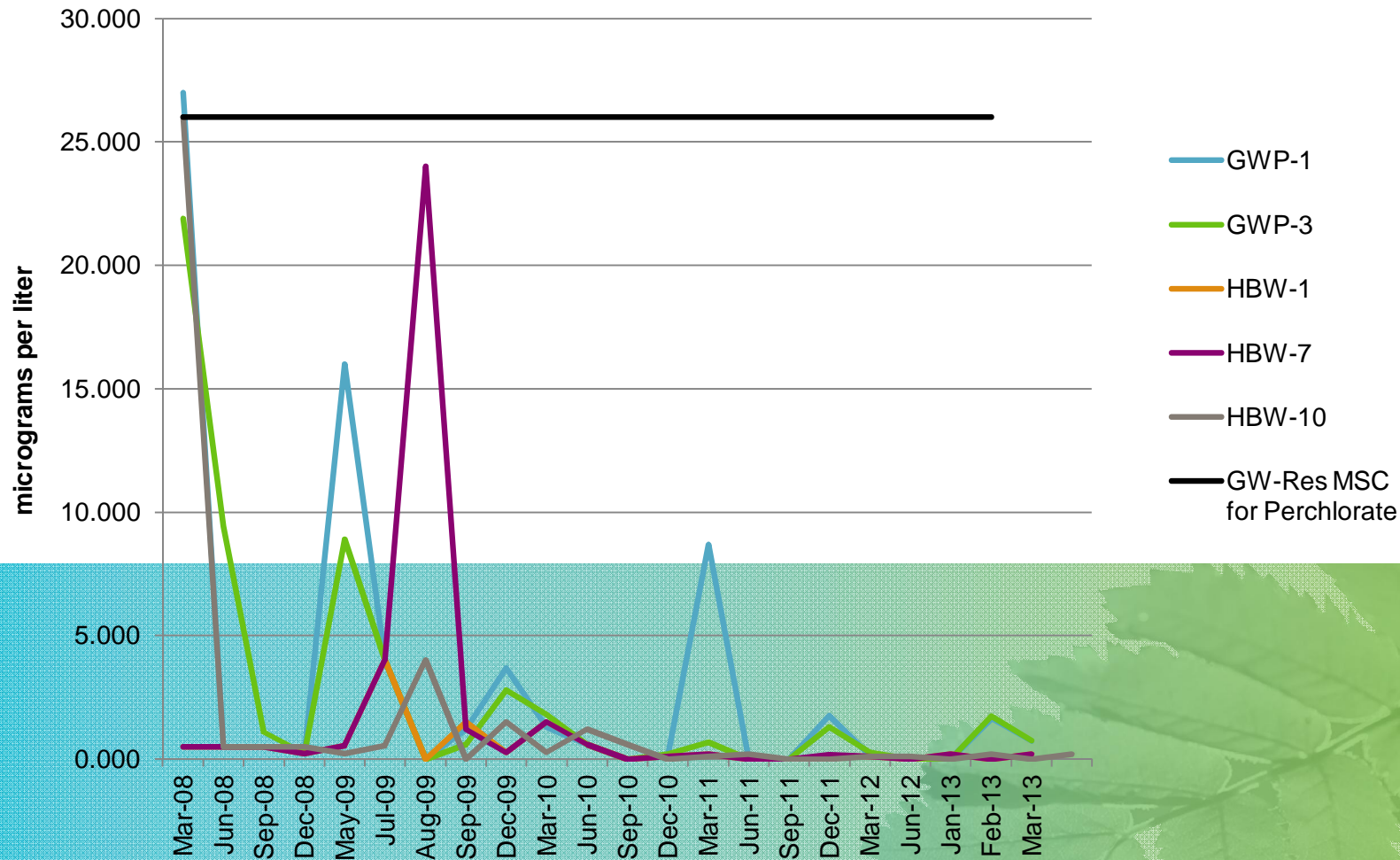
- The Groundwater Treatment Plant continues to operate to contain the plume at LHAAP-18/24 and LHAAP-16
- Water continues to be returned to LHAAP-18/24 or into Harrison Bayou depending on the amount of water in the bayou
- Compliance monitoring continues per existing sampling plan
- Maintenance and repairs of wells, pumps, tanks, and ancillary equipment is on-going

Quarterly Extraction Rate



Surface Water Sample Results

Surface Water Samples - Perchlorate



GPW – Goose Prairie Creek
HBW – Harrison Bayou

Continued Discussion of In-Situ Bioremediation

- Treatability Study (TS) at LHAAP-58
 - Groundwater was collected from monitoring well 35AWW08 and a soil sample was collected near the well using direct push technology.
 - One lactate based carbon source (e.g. sodium lactate) and one vegetable oil based carbon source (e.g. emulsified vegetable oil (EVO)) were evaluated during the TS.
 - The following environments were constructed in the laboratory:
 - Anaerobic sterile control
 - Anaerobic active control
 - Treatment microcosm with lactate-based carbon source
 - Treatment microcosm with EVO-based carbon source.
 - Seven post-baseline events were performed to document the progress of the TS. These included:
 - Microcosm Sampling
 - Chemicals of concern
 - pH
 - Chlorinated volatile organic compound and dissolved hydrocarbon gasses
 - Anion parameters
 - Volatile fatty acids
 - Total organic carbon

Continued Discussion of In-Situ Bioremediation Cont.

- Treatability Study (TS) at Site 58

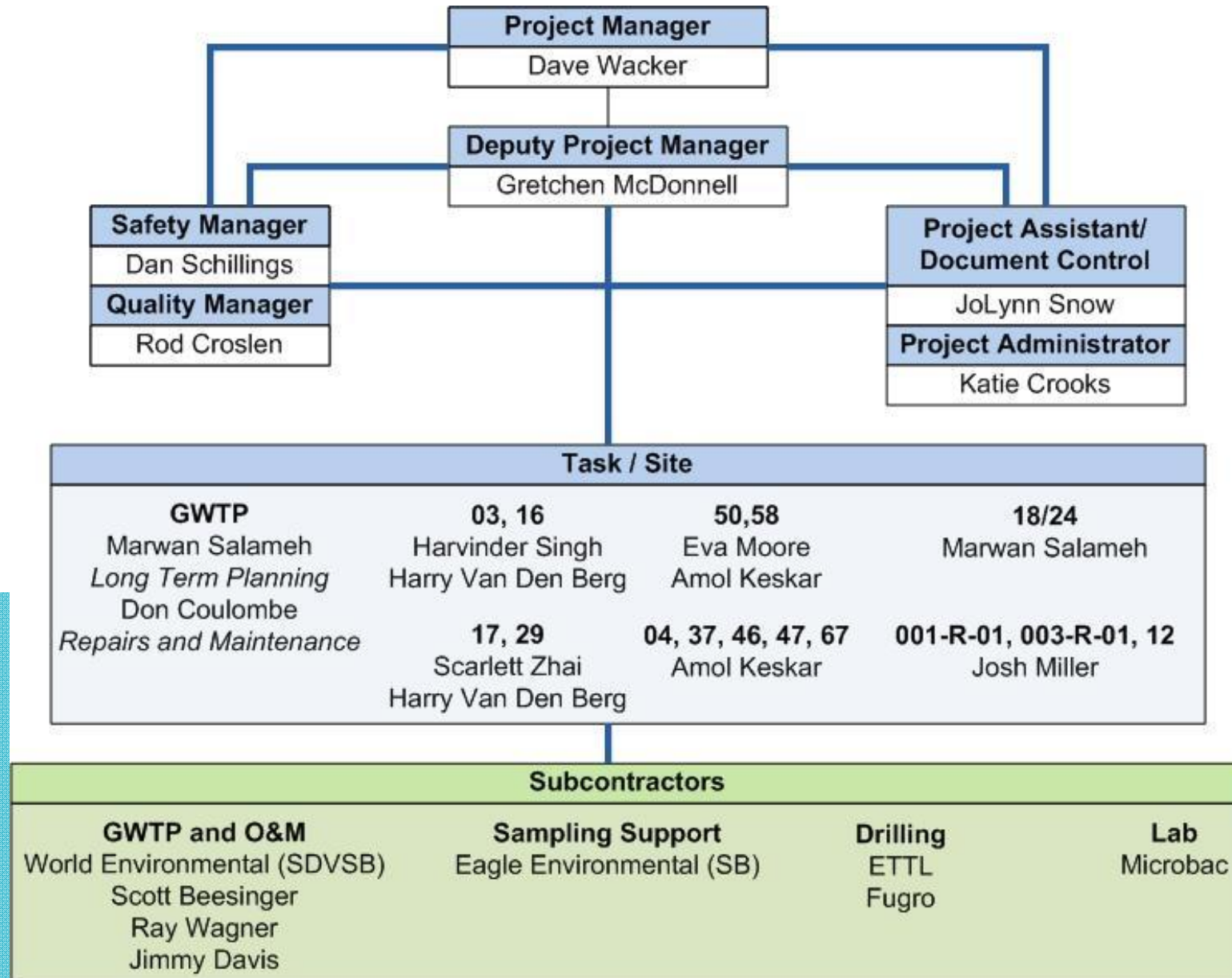
- The results of the TS indicated that both treatment microcosms achieved completed dechlorination (reduction of PCE/TCE to ethene). The chlorinated VOCs in the control microcosms remained stable as expected. Similarly, reductions in sulfate concentrations were observed in both treatment microcosms.
- The lactate-based amendment is a relatively fast substrate compared to the EVO-type substrates as evidenced by the TS data and is proposed for use as a carbon source during remedial action for LHAAP-58 groundwater, as needed.

Upcoming Fieldwork, Meetings, and Documents

1. Surveying of wells and DPT locations and IDW mgmt at LHAAP-18/24, 46, and 67.
2. Well installation and Direct Push Technology at LHAAP-37, 50, 58.
3. Excavation at LHAAP-50
4. EISB at LHAAP-58

Back-up Slides

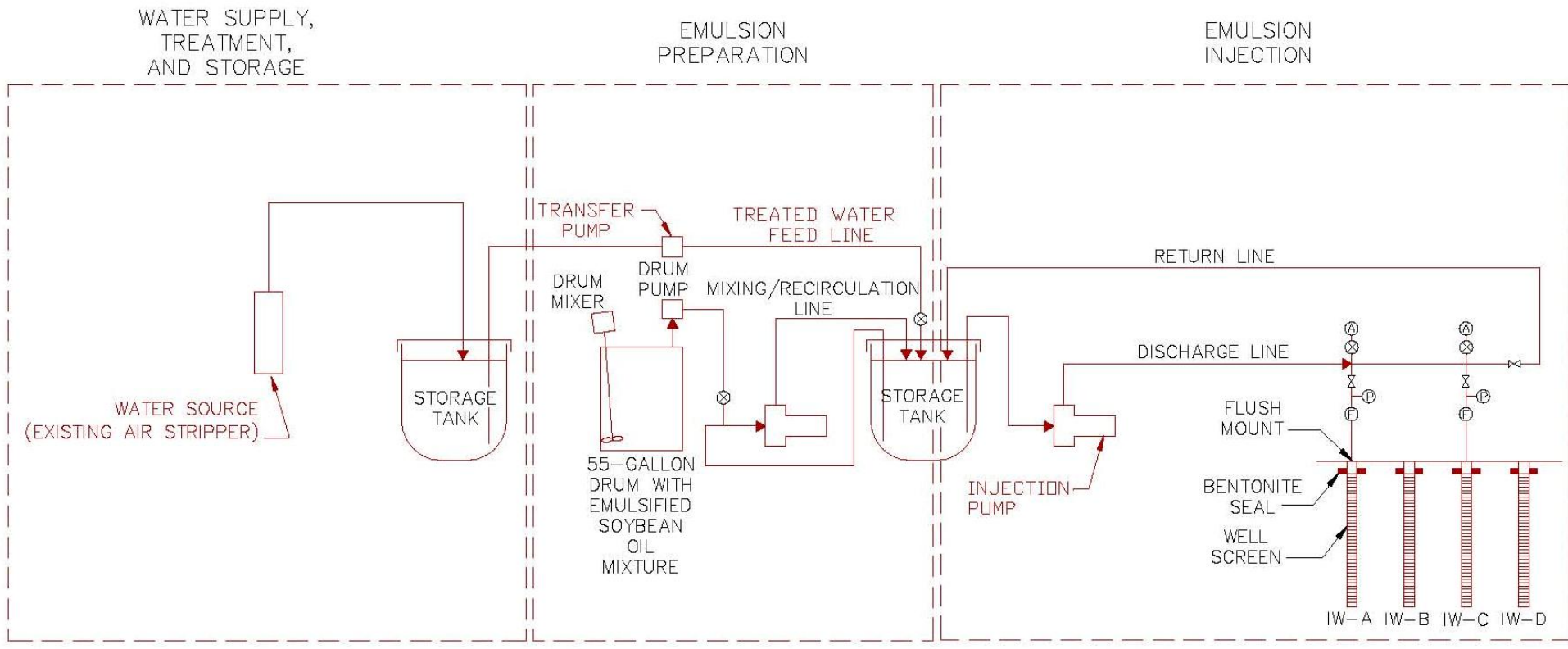
AECOM Longhorn Project Organization Chart



In-situ Bioremediation

LEGEND

PRESSURE GAGE	Ⓟ
FLOW METER	Ⓢ
VALVE – GATE	⋈
VALVE – BALL	⊗
QUICK-CONNECT UNION	— — —
AIR RELEASE VALVE	Ⓐ



Groundwater Treatment Plant - Treated Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of treated water returned to LHAAP-18/24, released to the INF Pond, or discharged to Harrison Bayou. The Army is currently completing a study to confirm flow numbers and material balance for the Groundwater Treatment Plant. This sheet will be updated with any new findings.

Treated Water Data (in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199

Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716

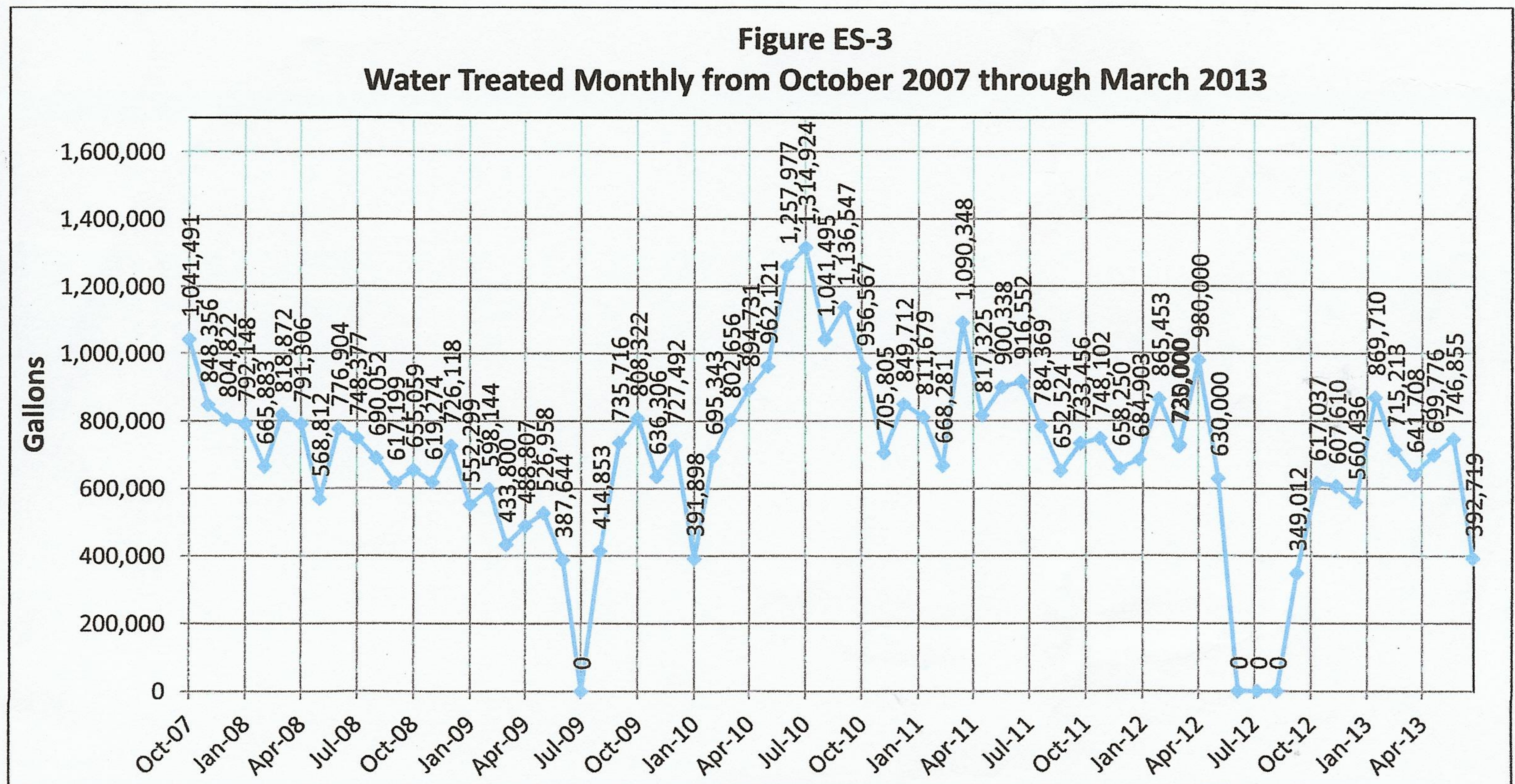
Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547

Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456

Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012

Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13
617,037	607,610	560,436	869,710	751,213	641,708	699,776	746,885	392,719

* Indicates estimate



**Longhorn Army Ammunition Plant
Restoration Advisory Board Meeting
November 14, 2013**

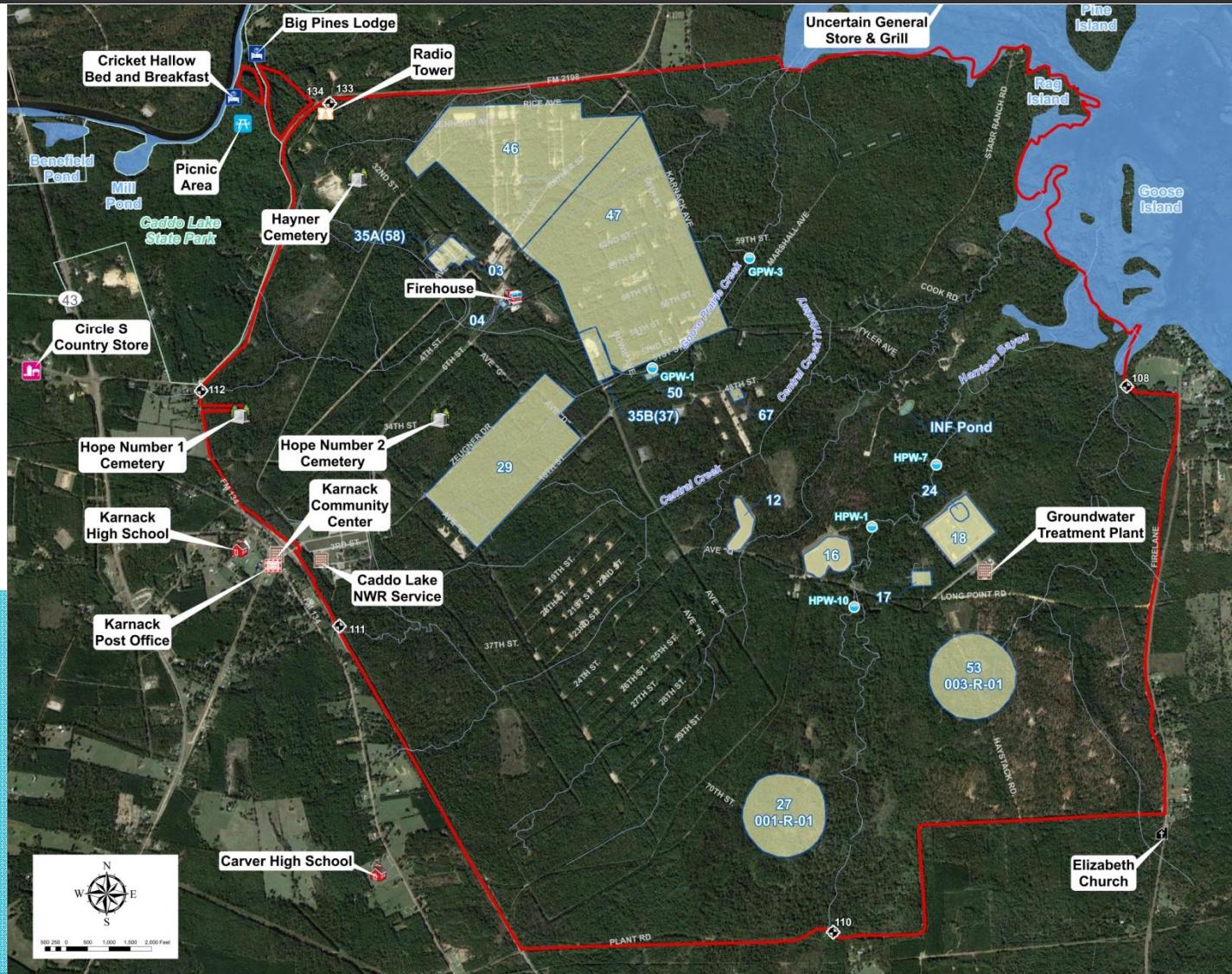
A faint, stylized green leaf graphic is positioned on the right side of the slide, partially overlapping the text area. The leaf is composed of several smaller leaflets on a central stem, rendered in a light green color with a subtle texture.

AECOM Environment

Agenda

1. Longhorn Map and Site Overview
2. Status of Environmental Sites LHAAP-46, 67, 18/24, 35B(37), 50, 58, 03, 12, 16
3. Perimeter Wells
4. CERCLA Five Year Review
5. Groundwater Treatment Plant (GWTP) Update
6. Community Relations Plan/Community Involvement Plan (CRP/CIP) Status
7. Dispute Status
8. Status of Demonstration at Site 37
9. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Flow Process
10. In-Situ Bioremediation Discussion

Longhorn Map



Longhorn Active Site List

LHAAP-03	Building 722 Paint Shop
LHAAP-04	Pilot Wastewater Treatment Plant
LHAAP-12	Landfill 12
LHAAP-16	Landfill 16
LHAAP-17	Burning Ground No.2/Flashing Area
LHAAP-18	Burning Ground No.3
LHAAP-24	Unlined Evaporation Pond
LHAAP-29	Former TNT Production Area
LHAAP-37	Chemical Laboratory Waste Pad
LHAAP-46	Plant Area 2
LHAAP-47	Plant Area 3
LHAAP-50	Former Sump Water Tank
LHAAP-58	Maintenance Complex
LHAAP-67	Aboveground Storage Tank Farm
LHAAP-001-R-01	South Test Area/Bomb Test Area
LHAAP-003-R-01	Ground Signal Test Area

Status of Environmental Sites

- LHAAP-46 – Plant Area 2
 - Final Remedy: Monitored Natural Attenuation (MNA) and Land Use Controls (LUCs)
 - Contaminants of Concern: Volatile Organic Compounds (VOCs)



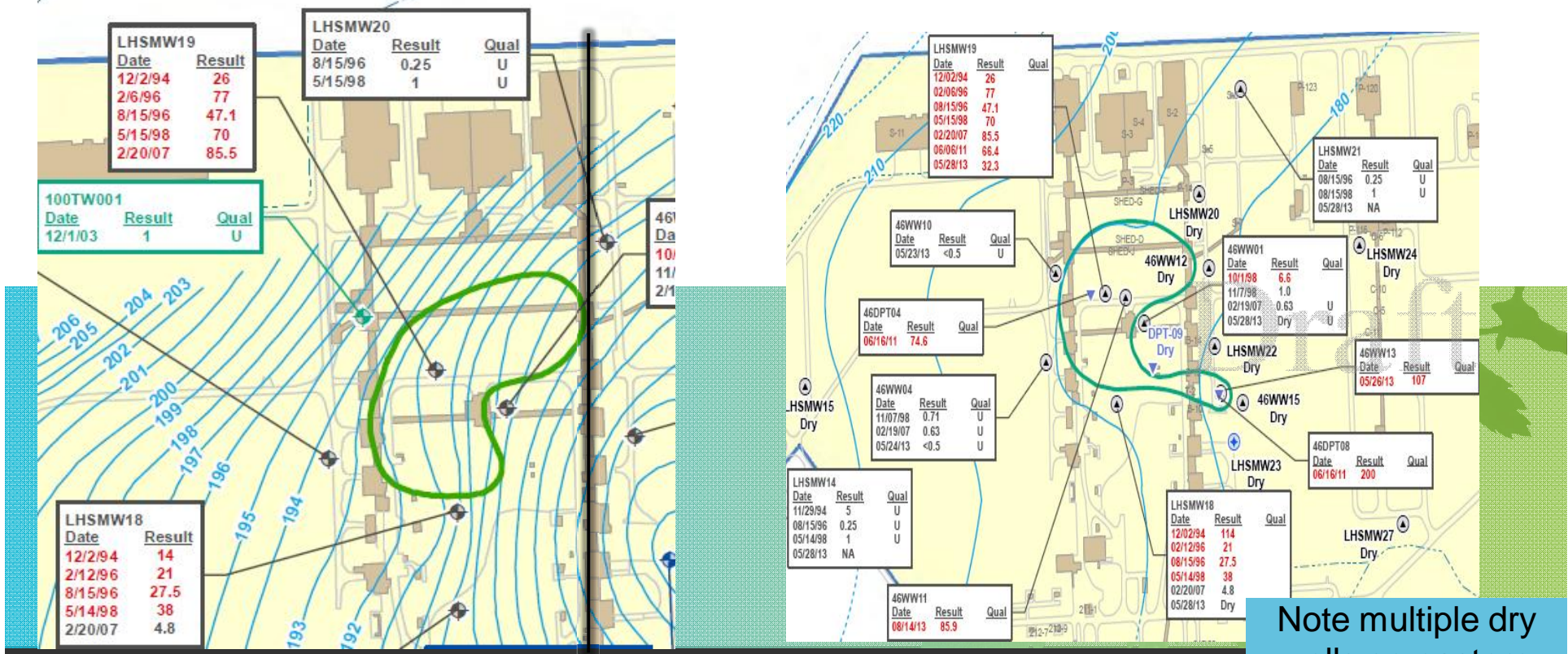
Status of Environmental Sites (cont)

- LHAAP-46 – Plant Area 2
 - Implemented Remedial Action Work Plan in March/April, 2013
 - Installed 4 monitoring wells in the shallow zone (~30ft bgs), and 3 in the intermediate zone (~60ft bgs)
 - Performed baseline groundwater sampling at 21 well locations (11 shallow, 9 intermediate, 1 deep) in May and a second round was collected in August, several shallow locations were dry in both events due to drought conditions
 - Draft Remedial Action Completion Report in-progress

Status of Environmental Sites (cont)

- LHAAP-46 – Plant Area 2

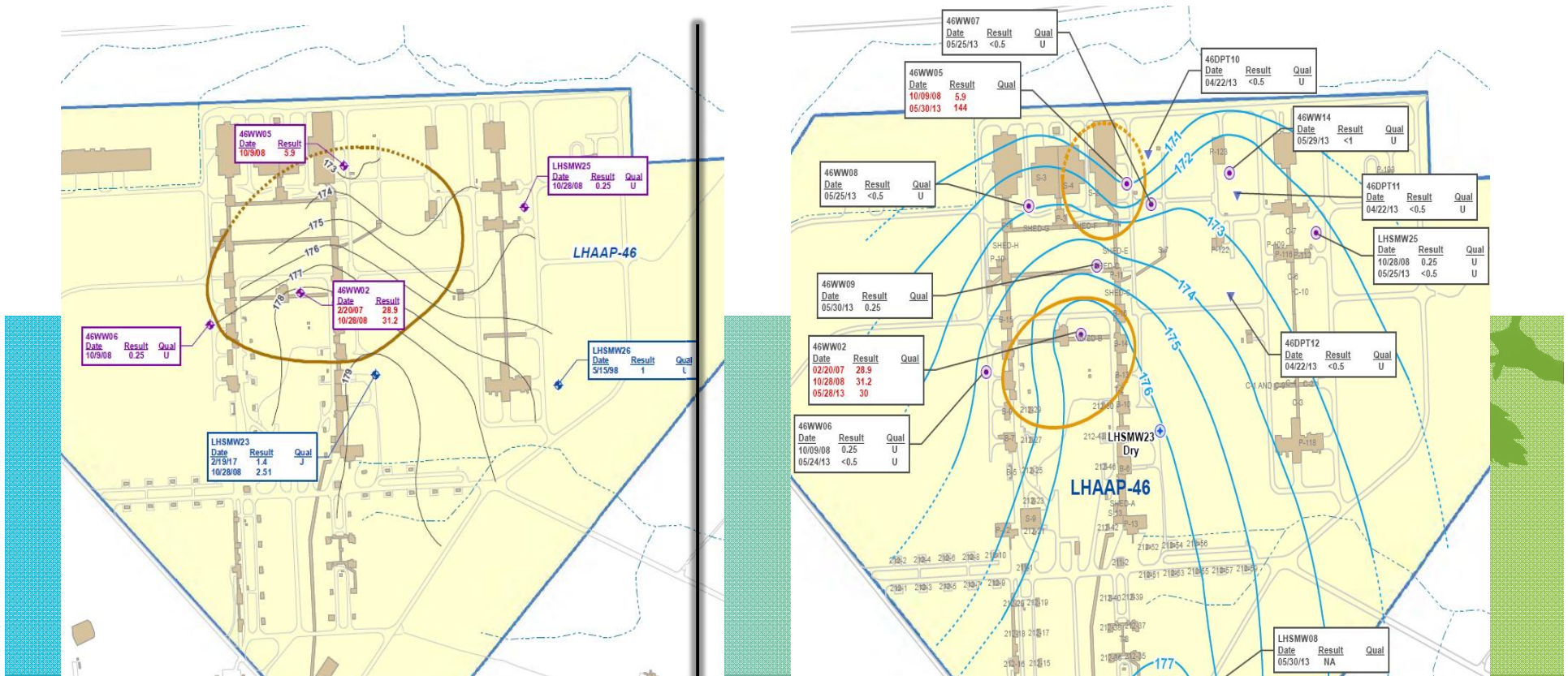
- Shallow TCE plume below. Previous plume boundary on left, draft updated boundary (based upon first data set) on the right:



Note multiple dry wells on eastern side of plume

Status of Environmental Sites (cont)

- LHAAP-46 – Plant Area 2
 - Intermediate TCE plume below. Previous plume boundary on left, draft updated boundary (based upon first data set) to the right:



Status of Environmental Sites (cont)

- LHAAP-67 – Aboveground Storage Tank Farm
 - Final remedy: MNA, LUC
 - Contaminants of Concern: VOCs
 - Contaminants are confined to the upper shallow groundwater zone

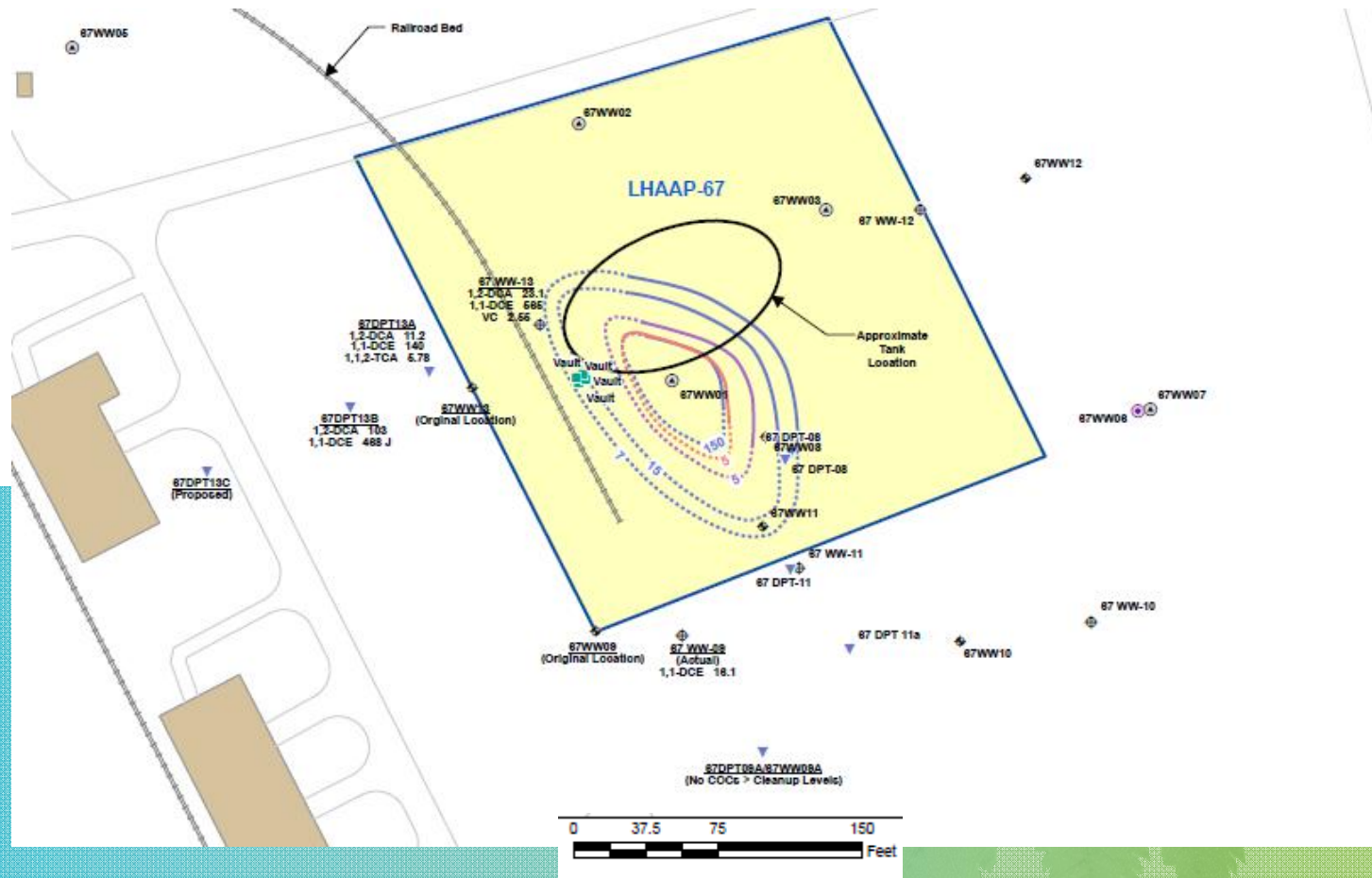


Status of Environmental Sites (cont)

- LHAAP-67 – Aboveground Storage Tank Farm
 - Implemented Remedial Action Work Plan in March/April 2013
 - Installed 7 monitoring wells in the shallow zone (~30ft bgs)
 - Completed baseline and one additional round of sampling in May and September 2013 at 13 shallow well locations (6 existing and 7 new)
 - Collected VOC data and MNA data to document MNA remedy
 - Draft Remedial Action Completion Report in-progress

Status of Environmental Sites (cont)

- LHAAP-67 – Aboveground Storage Tank Farm
 - Changes in plume understanding with new data:



Status of Environmental Sites (cont)

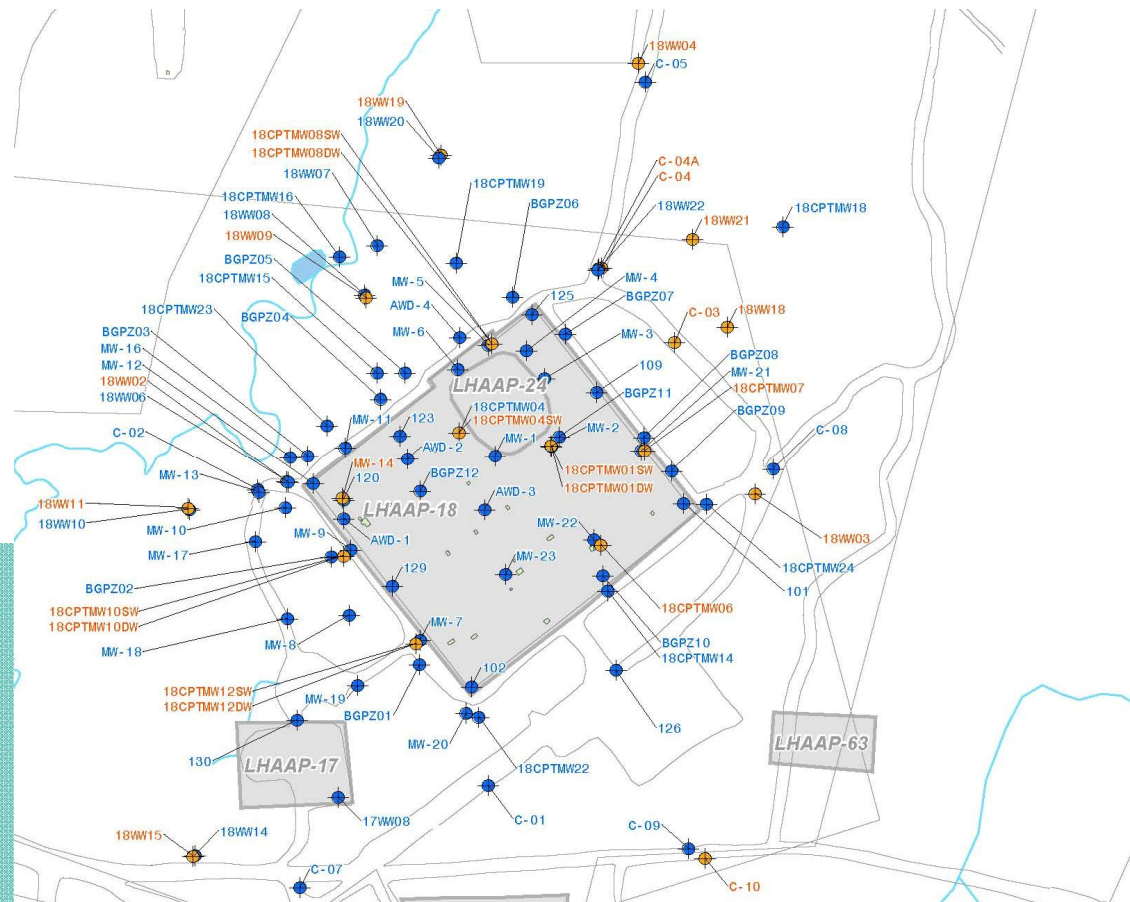
- LHAAP-18/24 – Burning Grounds #3 and Unlined Evaporation Pond
 - Interim remedy: Continuous extraction and treatment of groundwater from collection trenches surrounding and within the site (green in image below)
 - Contaminants of concern: Perchlorate, VOCs, Metals



Status of Environmental Sites (cont)

– LHAAP-18/24

- RTCs for EPA and TCEQ comments and Draft Final Data Gap Report in-progress
- Revised Feasibility Study under development
- Completing semi-annual compliance sampling in November/December (~60 wells)
- Presentation of LHAAP-18/24 Status Based Upon Recently Completed Work Planned for Next RAB



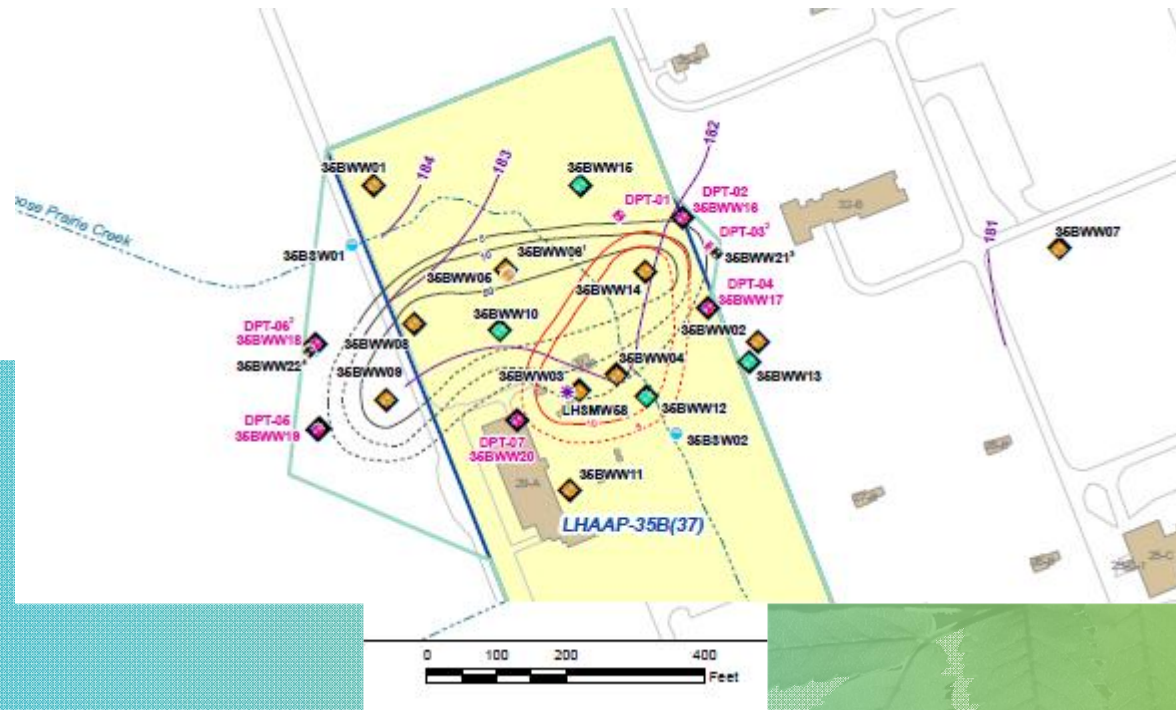
Status of Environmental Sites (cont)

- LHAAP-35B (37) – Chemical Laboratory
 - Final remedy: Monitored Natural Attenuation and Land Use Controls
 - Contaminants of concern: VOCs (PCE and TCE)
 - Only present in the shallow groundwater zone
 - 9 monitoring wells installed in the shallow zone (~35ft bgs)
 - Performed groundwater sampling in September 2013
 - Bio-plug Study On-going



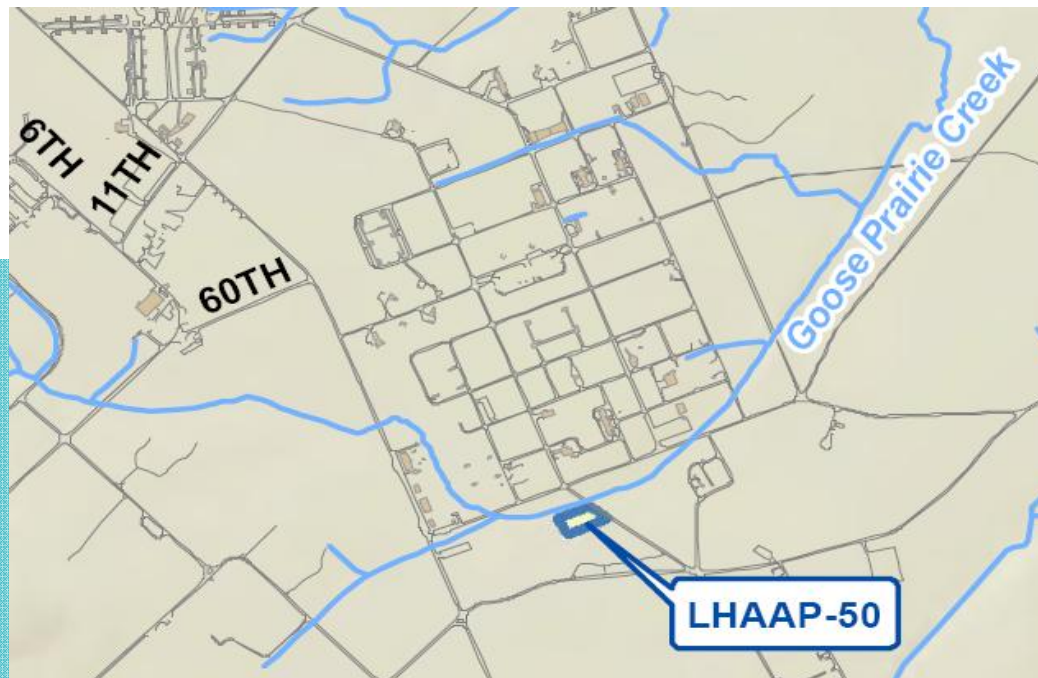
Status of Environmental Sites (cont)

- LHAAP-35B (37) – Chemical Laboratory
 - Shallow TCE and PCE plumes below, including work completed in September, 2013



Status of Environmental Sites (cont)

- LHAAP-50 – Former Sump Water Tank
 - Final remedy: Soil excavation, Monitored Natural Attenuation and Land Use Controls for groundwater
 - Contaminants of concern: Perchlorate in soil, and Perchlorate and VOCs in groundwater

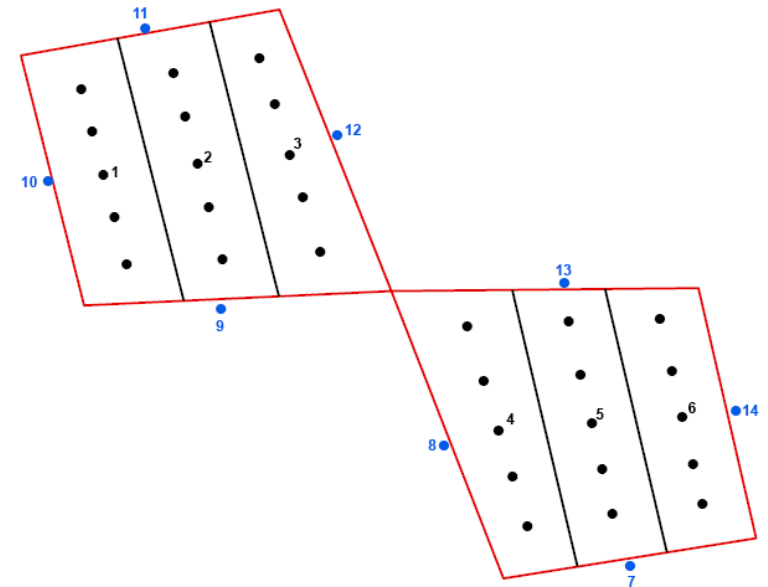
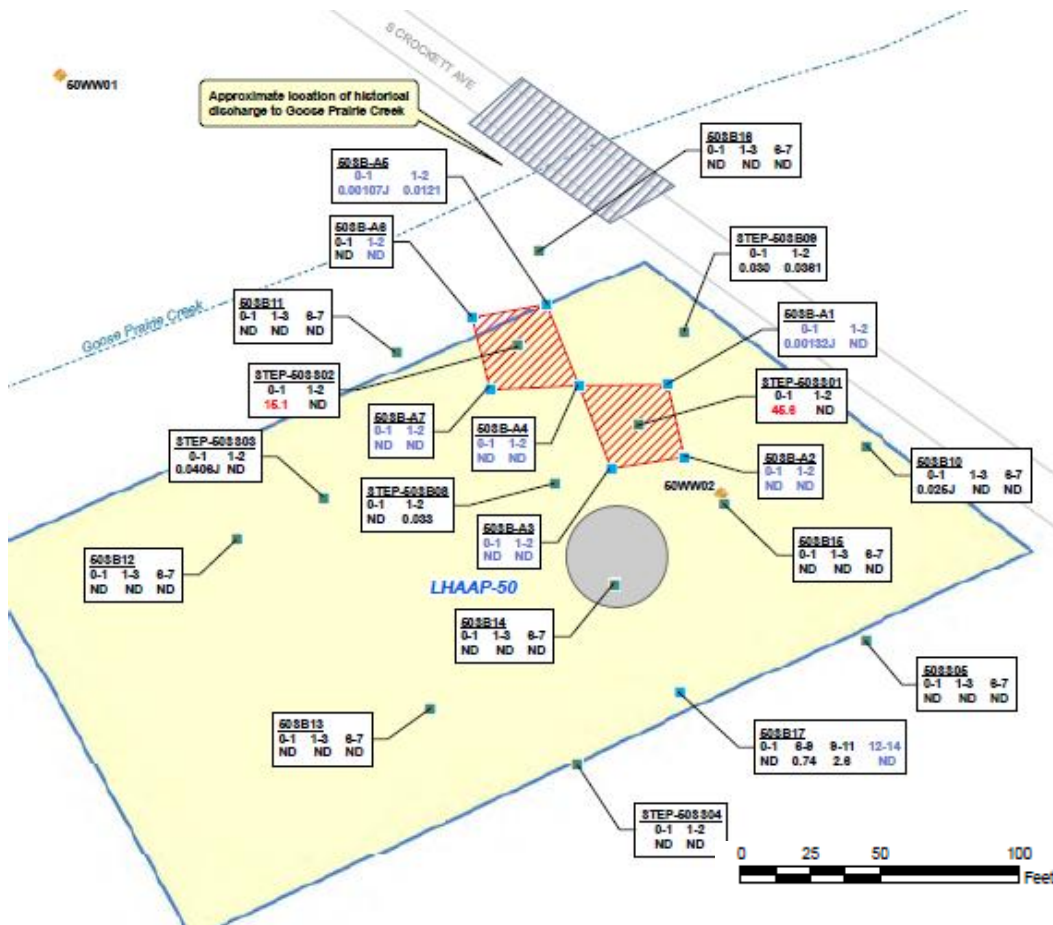


Status of Environmental Sites (cont)

- LHAAP-50 – Former Sump Water Tank
 - Installed 11 upper shallow (~35ft bgs), 5 lower shallow (~60ft bgs), 3 fully-penetrating shallow (~60ft bgs), and 1 intermediate (109ft bgs) monitoring wells
 - Performed baseline sampling of Monitored Natural Attenuation network (30 wells)
 - Excavation of perchlorate impacted soil completed in September, 2013
 - Excavation consisted of using GPS to locate planned limits of excavation based upon historical sampling, planned excavation of 150 cubic yards of soil (4,000 square feet to one foot depth) for off site disposal
 - Excavation was completed to ~18 inches throughout the footprint and 183 cubic yards of soil were removed
 - Confirmation sampling was completed and upon receipt of data indicating all soil exceeding the clean-up goal was removed, the site was back-filled with certified clean soil provided by a local vendor
 - The site was subsequently compacted and seeded, and site restoration is underway
 - A Draft Remedial Action Completion Report is in progress for the site

Status of Environmental Sites (cont)

- LHAAP-50 – See Photo Board for Excavation Photographs
 - Area of excavation (in red). Confirmation sampling strategy on the right.



Status of Environmental Sites (cont)

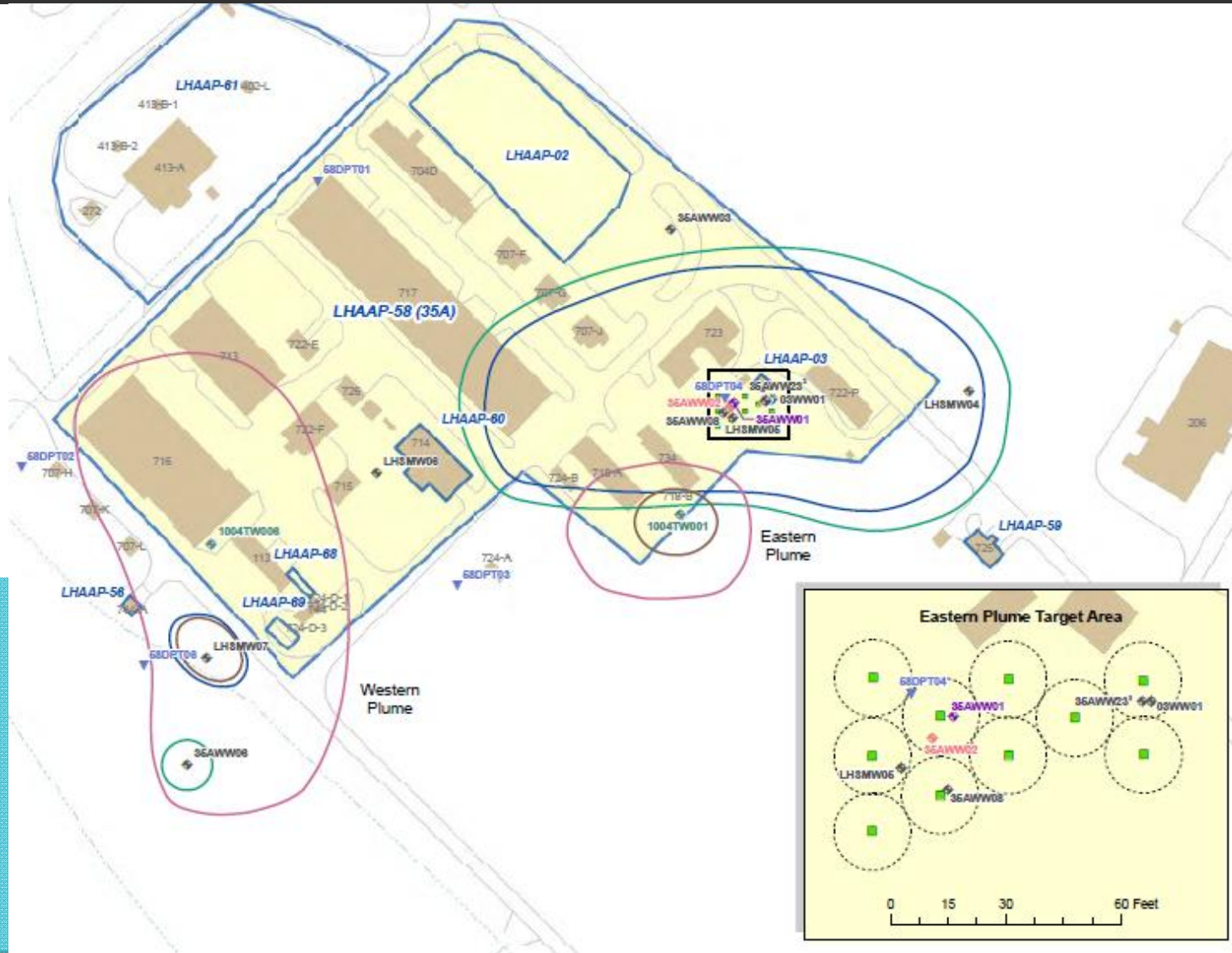
- LHAAP-58 – Shops Area
 - Final remedy:
 - Eastern Plume: In-situ Bioremediation, MNA, LUCs
 - Western Plume: MNA, LUCs
 - Contaminants of concern: VOCs



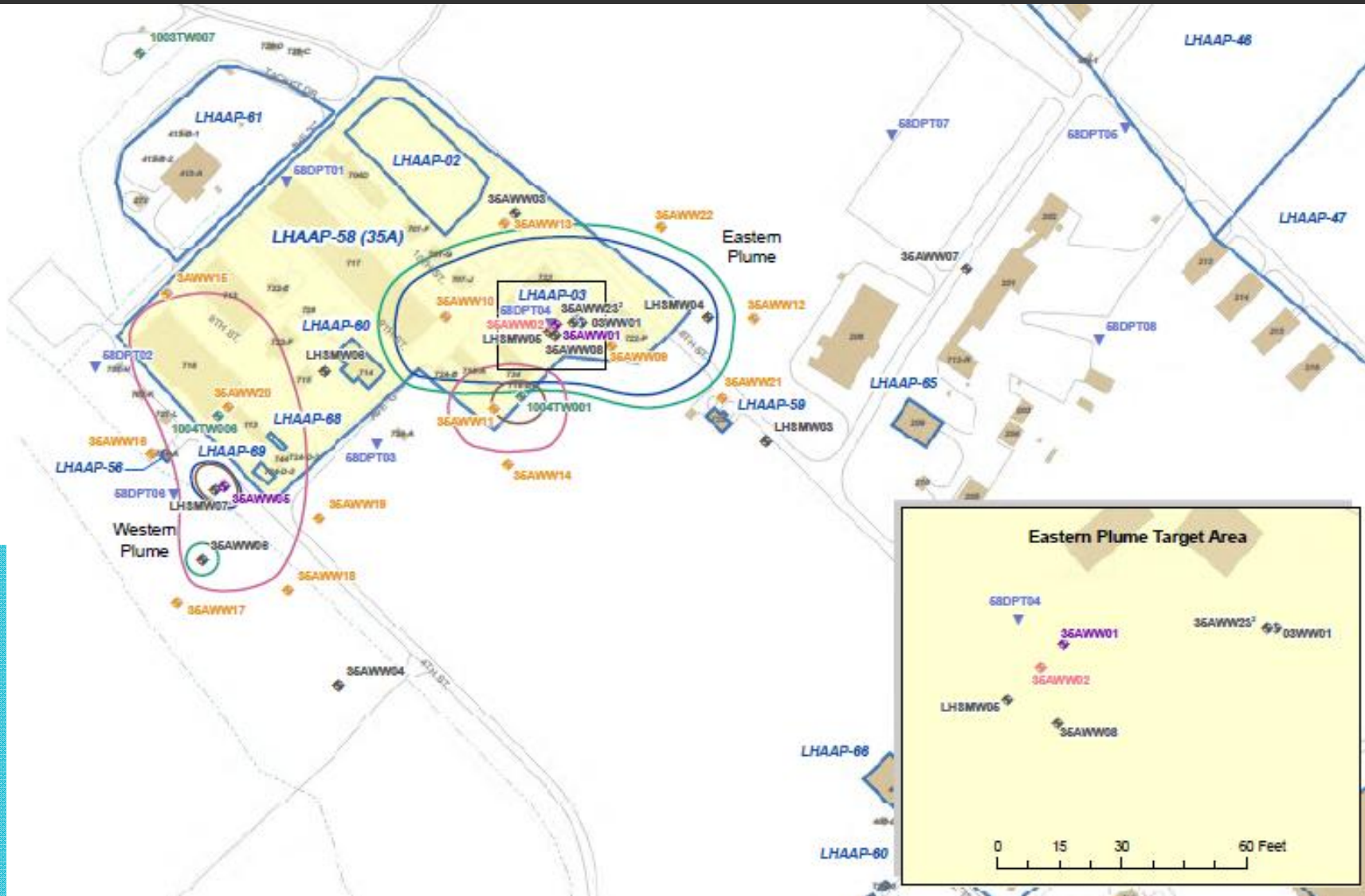
Status of Environmental Sites (cont)

- LHAAP-58 – Shops Area
 - Installed 15 shallow monitoring wells (~35ft bgs) for implementation of MNA remedy
 - Performed baseline groundwater sampling for MNA in September at 20 locations
 - Implemented Enhanced In-situ Bioremediation in the Eastern Plume Area
 - Injected a 20% dilute solution of Wilclear Plus (Sodium Lactate) in 12 DPT injection points
 - Injection depths ranged from 23 ft bgs to about 33 ft bgs.
 - Approximately 200 to 225 gallons of the diluted lactate solution was injected in each point
 - A baseline sampling event was completed prior to injecting to establish conditions at the start of EISB, VOC sampling and biogeochemical data are currently being collected to document the progress of the remedy
 - Bioaugmentation occurring this week

Status of Environmental Sites (cont)

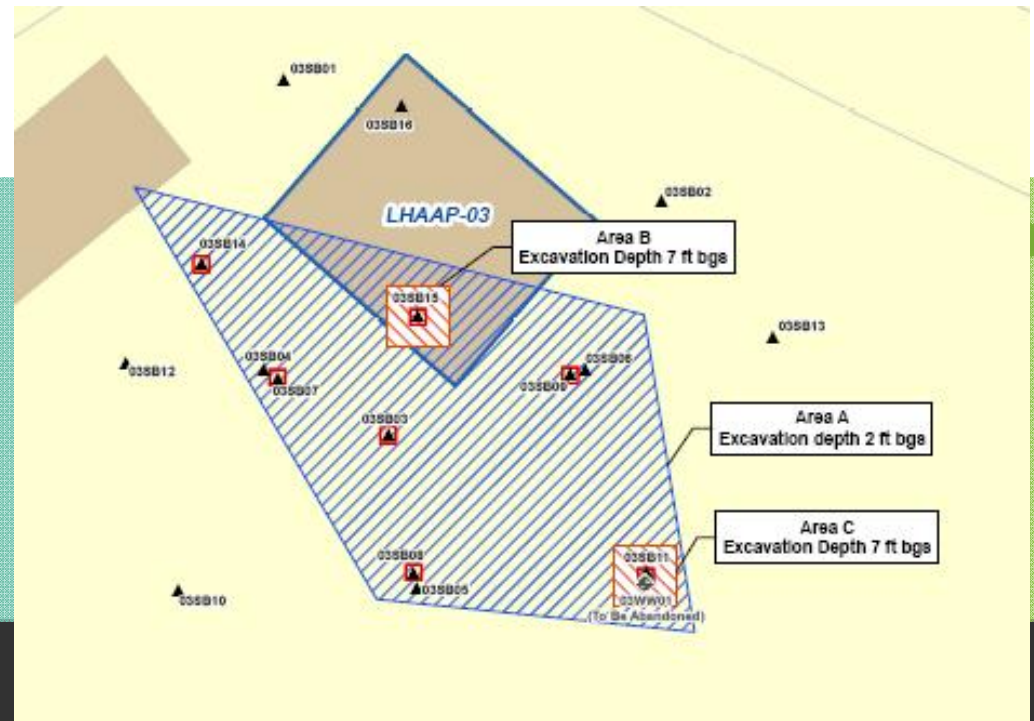
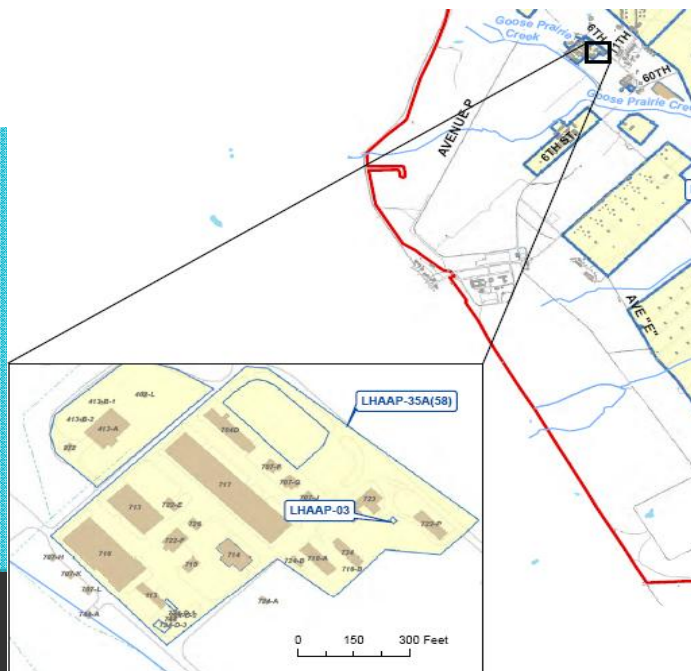


Status of Environmental Sites (cont)



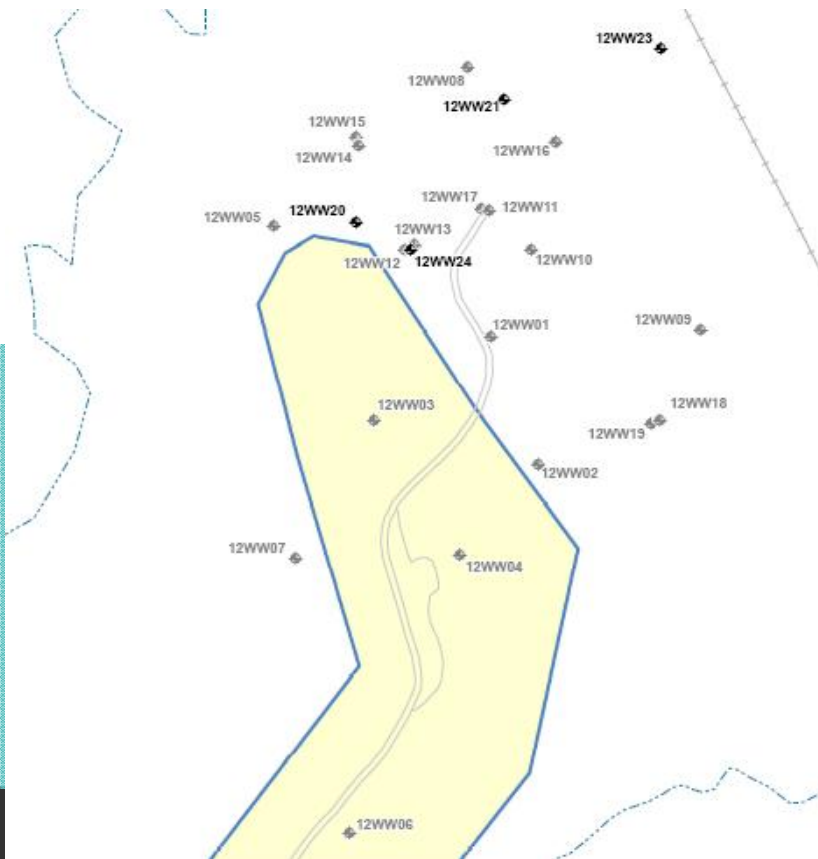
Status of Environmental Sites (cont)

- LHAAP-03 – Former Waste Collection Pad
 - Proposed Final Remedy: Excavation and off-site disposal of between 50-150 cubic yards (as much soil as it takes to achieve the clean-up objectives)
 - Contaminants of concern: lead and arsenic
 - All other monitoring and reporting requirements associated with the groundwater and land use, including CERCLA five-year reviews, will be met under LHAAP-35A (58)
- Currently Finalizing Record of Decision



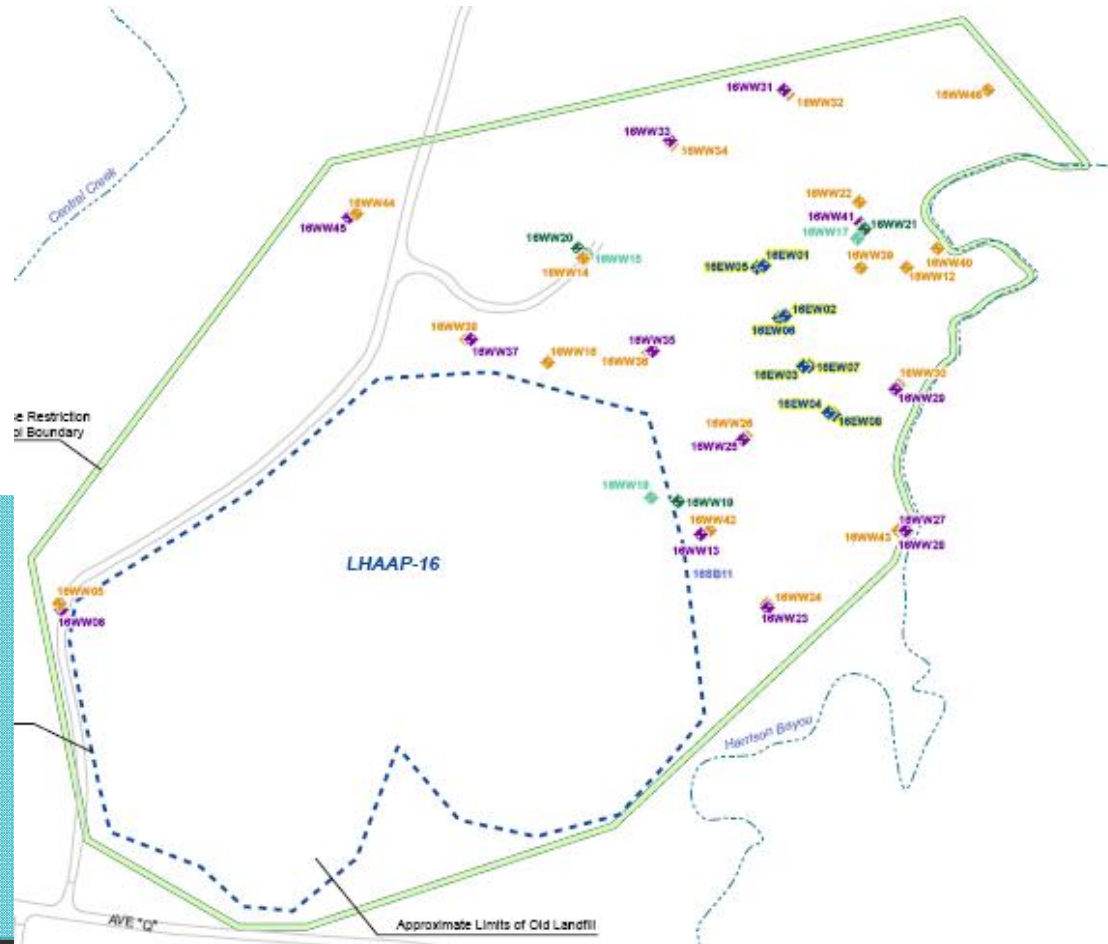
Status of Environmental Sites (cont)

- LHAAP-12 – Landfill 12
 - Completing Operations and Maintenance (mowing, signs, repairing sparse vegetation or subsidence areas)
 - Monitoring wells were recently re-painted and re-labeled



Status of Environmental Sites (cont)

- LHAAP-16 – Landfill 16
 - Monitoring wells re-painted and re-labeled



Status of Environmental Sites (cont)

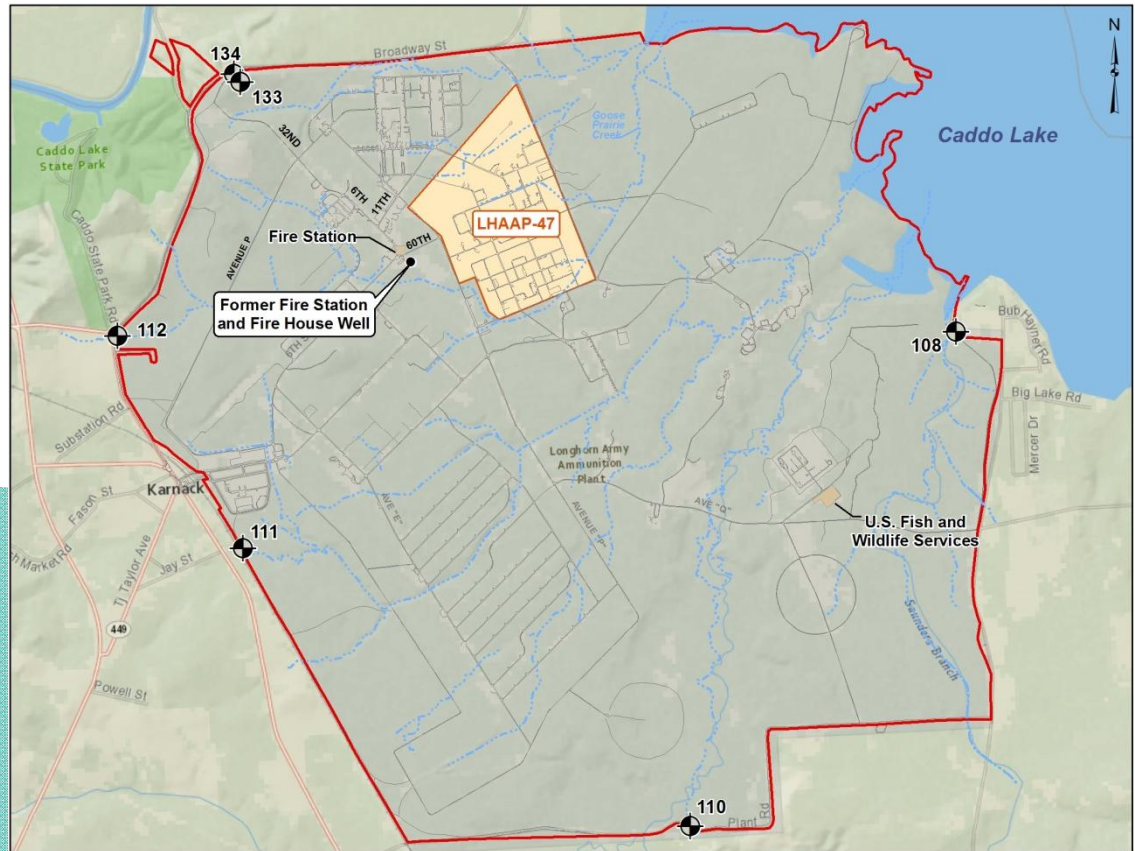
- LHAAP-16 – Landfill 16
 - Monitoring wells re-painted and re-labeled



Status of Environmental Sites (cont)

– Perimeter Wells

Well ID	Screen Depth (feet bgs)
108	5.5 - 20.5
110	5 - 20
111	5.4 - 20.4
112	5.25 - 20.25
133	64.5 - 84.5
134	90 - 110



Status of Environmental Sites (cont)

- Perimeter Wells

- Sampling Program

- 1994 through 1999

- » Explosives
 - » Metals
 - » VOCs
 - » SVOCs
 - » Nitrate
 - » Nitrite

Low levels or no detection

- 2000 through 2004

- » Explosives
 - » Metals
 - » VOCs
 - » SVOCs
 - » Nitrate
 - » Nitrite
 - » Perchlorate

Low levels or no detection

- 2005 through present day

- » Semiannual sampling conducted for perchlorate per dispute resolution

Status of Environmental Sites (cont)

– Perimeter Wells

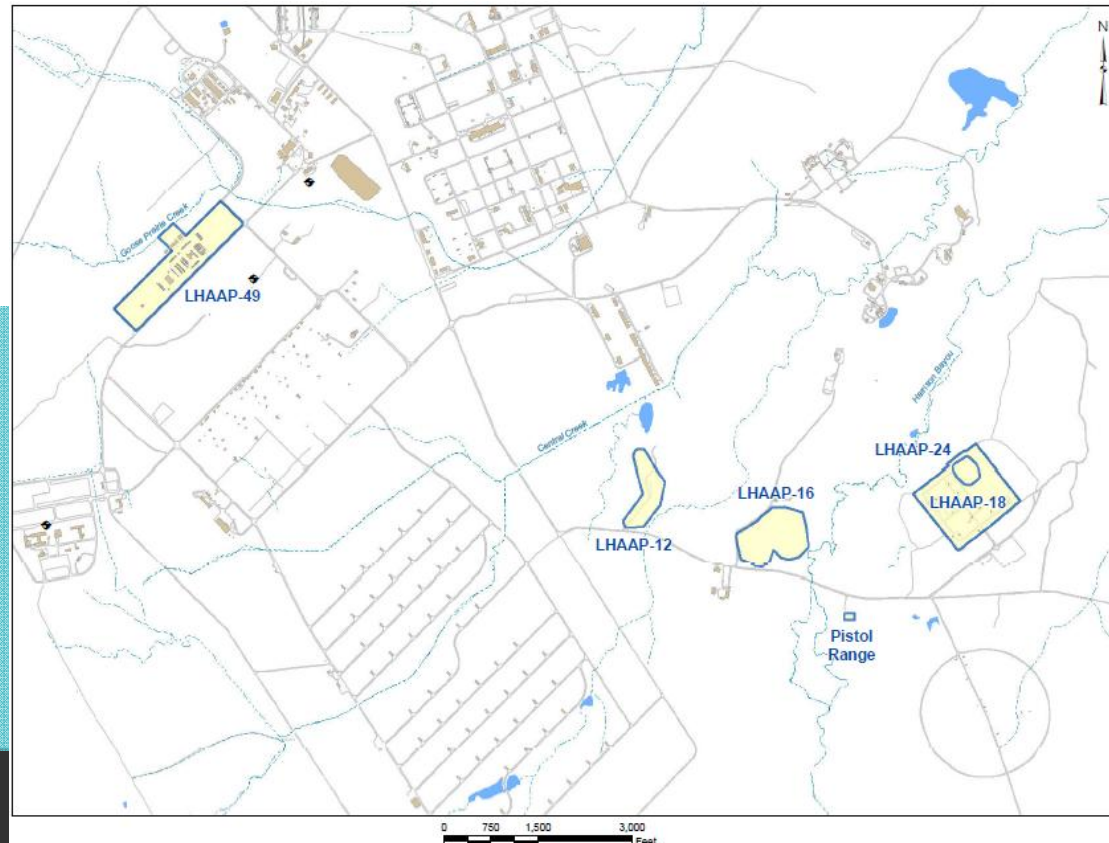
Perchlorate in µg/L

Well ID	Jun 2005	Sep 2005	Sep 2006	May 2007	Aug 2007	Dec 2007	Mar 2008	Sep 2008	May 2009
108	Dry	Dry	10 U	Dry	0.5 U	Dry	Dry	2.5 U	Dry
110	Dry	Dry	10 U	Dry	10 U	Dry	Dry	5.0 U	Dry
111	Dry	Dry	4 U	Dry	0.5 U	Dry	Dry	0.5 U	Dry
112	Dry	Dry	5 U	Dry	3 U	Dry	Dry	2.0 U	Dry
133	0.541	0.597	1.08	1 U	1.09	0.5 U	0.5 U	0.5 U	0.47 J
134	0.881	0.725	0.708 J	1 U	0.949 J	0.5 U	0.5 U	0.829 U	0.04 J

Well ID	Sep 2009	Mar 2010	Sep 2010	Mar 2011	Sep 2011	Oct 2012	Mar 2013	Jun 2013
108	1.2U	Dry	3U	Dry	0.1U	0.2U	0.2U	Dry
110	6U	Dry	Dry	Dry	Dry	0.535	0.2U	Dry
111	0.3U	Dry	Dry	Dry	Dry	Dry	1.32	Dry
112	3U	Dry	3U	Dry	0.26	0.2U	0.2U	Dry
133	0.32	Dry	0.32	Dry	0.68	0.598	0.655	Dry
134	0.3U	0.3 U	0.45	0.636	1.11	0.671	0.698	0.706

Status of Environmental Sites (cont)

- CERCLA 5-Year Review Process for Multiple Sites
 - Review Activities Completed
 - Comment/Response to Comments on the Five Year Review Report On-going
 - Review completed for LHAAP-12, LHAAP-16, LHAAP-18, LHAAP-24, LHAAP-49, and LHAAP-004-R-01



Dispute Status

Sites at which Work has Ceased Pending Resolution of the Dispute

TIMELINE →	2011			2012												2013												2014												2015	2016	2017 Sep																																																																																																																																																								
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	J	F	M	A	M	J	J	A	S	O	N	D																																																																																																																																																											
SITE ↓																																							↓ Dispute Initiated																																							↓ AECOM Start																																							↓ Pre-Dispute RIP																																							↓ Current Date																																						
LHAAP-16	ROD is with Regulators in Dispute / AECOM has submitted RAWP to U.S. Army																																																																																																																																																																																																	
<i>Site in Dispute</i>																																							↓																																							↓																																							↓																																							Remediation Time on hold to date (months)																																						25
LHAAP-17	ROD is with Regulators in Dispute / AECOM has submitted RAWP to U.S. Army																																																																																																																																																																																																	
<i>Site in Dispute</i>																																							↓																																							↓																																							↓																																							Remediation Time on hold to date (months)																																						25
LHAAP-001-R-01	ROD is with Regulators in Dispute																																																																																																																																																																																																	
<i>Site in Dispute</i>																																							↓																																							↓																																							↓																																							Remediation Time on hold to date (months)																																						25
LHAAP-003-R-01	ROD is with Regulators in Dispute																																																																																																																																																																																																	
<i>Site in Dispute</i>																																							↓																																							↓																																							↓																																							Remediation Time on hold to date (months)																																						25
LHAAP-29	ROD is with Regulators																																																																																																																																																																																																	
<i>Site in Dispute</i>																																							↓																																							↓																																							↓																																							Remediation Time on hold to date (months)																																						25
LHAAP-04	Work completed through DF ROD																		ROD with Regulators																																																																																																																																																																															
<i>Site in Dispute</i>																																							↓																																							Remediation Time on hold to date (months)																																						5																																																																														
LHAAP-47	Work completed through DF ROD																		ROD with Regulators																																																																																																																																																																															
<i>Site in Dispute</i>																																							↓																																							Remediation Time on hold to date (months)																																						4																																																																														

Schedule Impacted

Schedule Impacted

Notes:
 AECOM AECOM Technical Services, Inc. PP Proposed Plan
 EE/CA Engineering Evaluation/Cost Analysis PSI Post-Screening Investigation
 FFS Focused Feasibility Study ROD Record of Decision
 LHAAP Longhorn Army Ammunition Plant

\\work\60256\31\CON\SHORN\Firm Fixed Price\4.0 Project Management\2.2 Six Month Tracker\Dispute

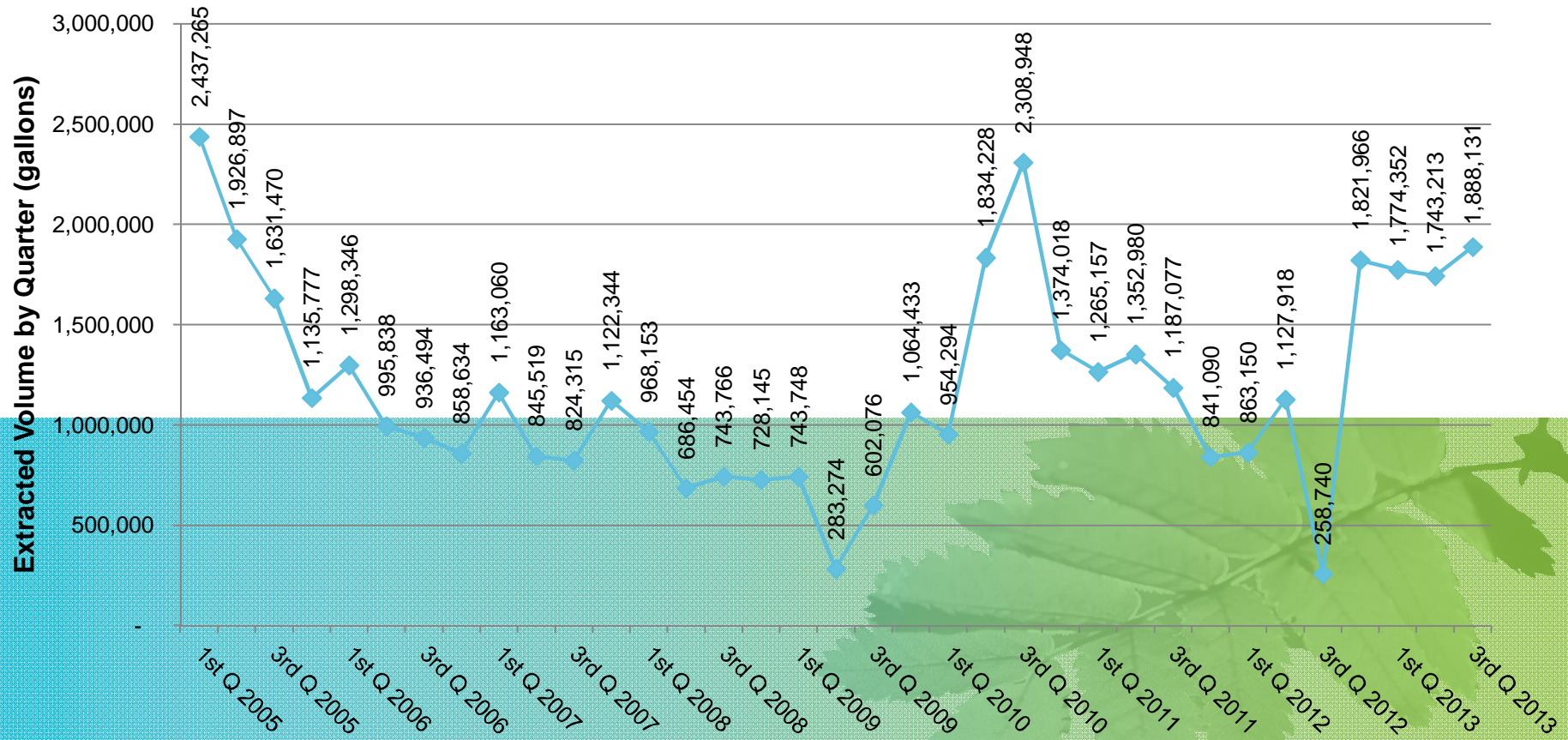
Groundwater Treatment Plant Operations and Management

- The Groundwater Treatment Plant continues to operate to contain the plume at LHAAP-18/24 and LHAAP-16.
- Water continues to be returned to LHAAP-18/24 or into Harrison Bayou, depending on the amount of water in the bayou.
- Compliance monitoring continues per existing sampling plan.
- Maintenance and repairs of wells, pumps, tanks, and ancillary equipment is ongoing.



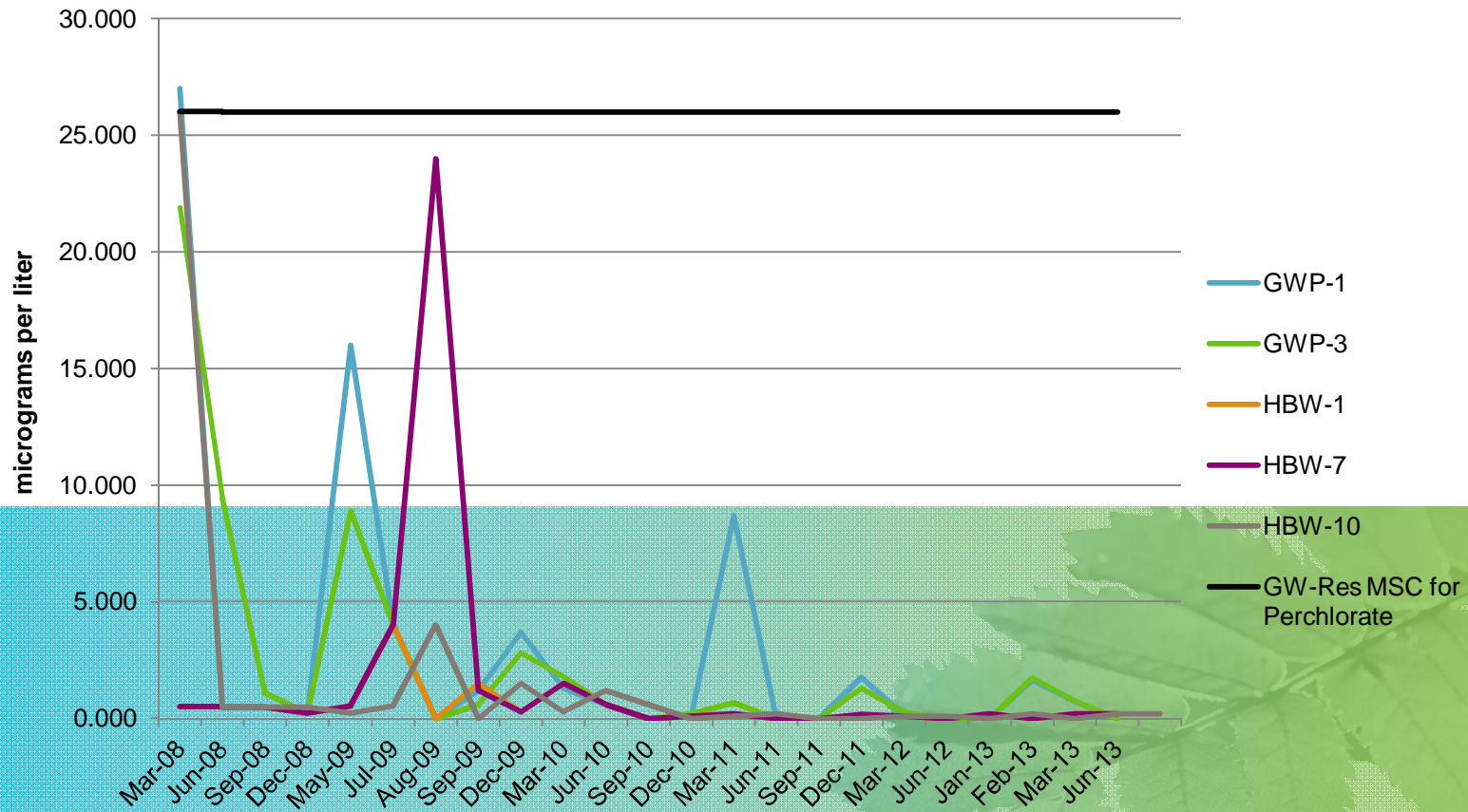
GWTP O&M (cont)

Quarterly Extraction Rate



Surface Water Sample Results

Surface Water Samples - Perchlorate



GPW – Goose Prairie Creek
HBW – Harrison Bayou

Upcoming Fieldwork, Meetings, and Documents

1. Continue quarterly groundwater sampling for recently completed monitoring networks at LHAAP-46, 50, 58, 67, in addition to semi-annual compliance sampling at LHAAP-18/24
2. CERCLA 5-year review: To be Signed winter 2013
3. Draft Completion Reports for LHAAP-37, 46, 50, 58, 67
4. Sites where work has ceased pending dispute resolution:
 1. LHAAP-04
 2. LHAAP-47
 3. LHAAP-16
 4. LHAAP-17
 5. LHAAP-29
 6. LHAAP-001-R-01
 7. LHAAP-003-R-01

CERCLA Flow Process

- Comprehensive Environmental Response, Compensation, and Liability Act
 - Please see poster board



Bio Plug Study at LHAAP 35B (37)

- See separate slide presentation



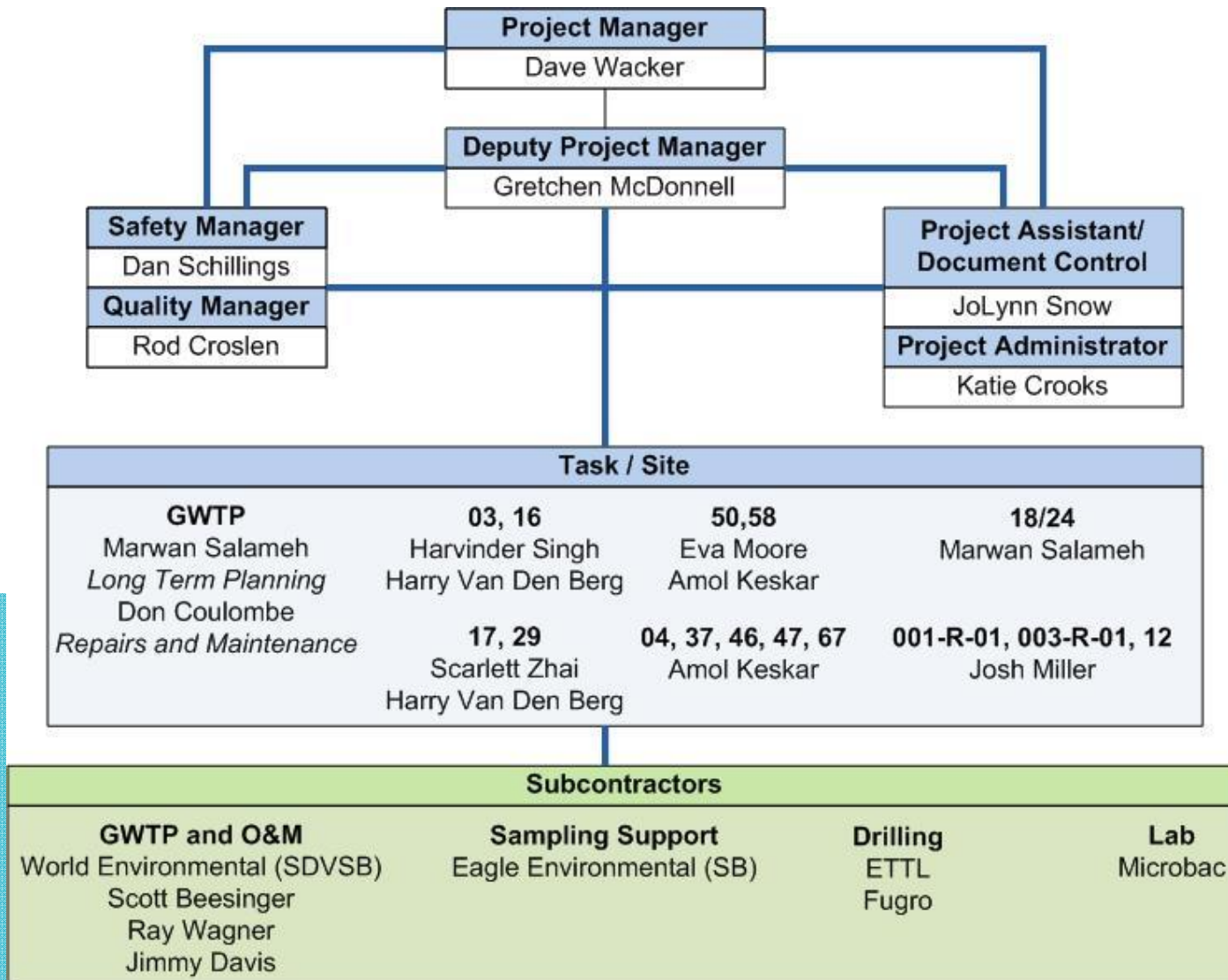
Continued Discussion of In-situ Bioremediation

- See separate slide presentation



Back-up Slides

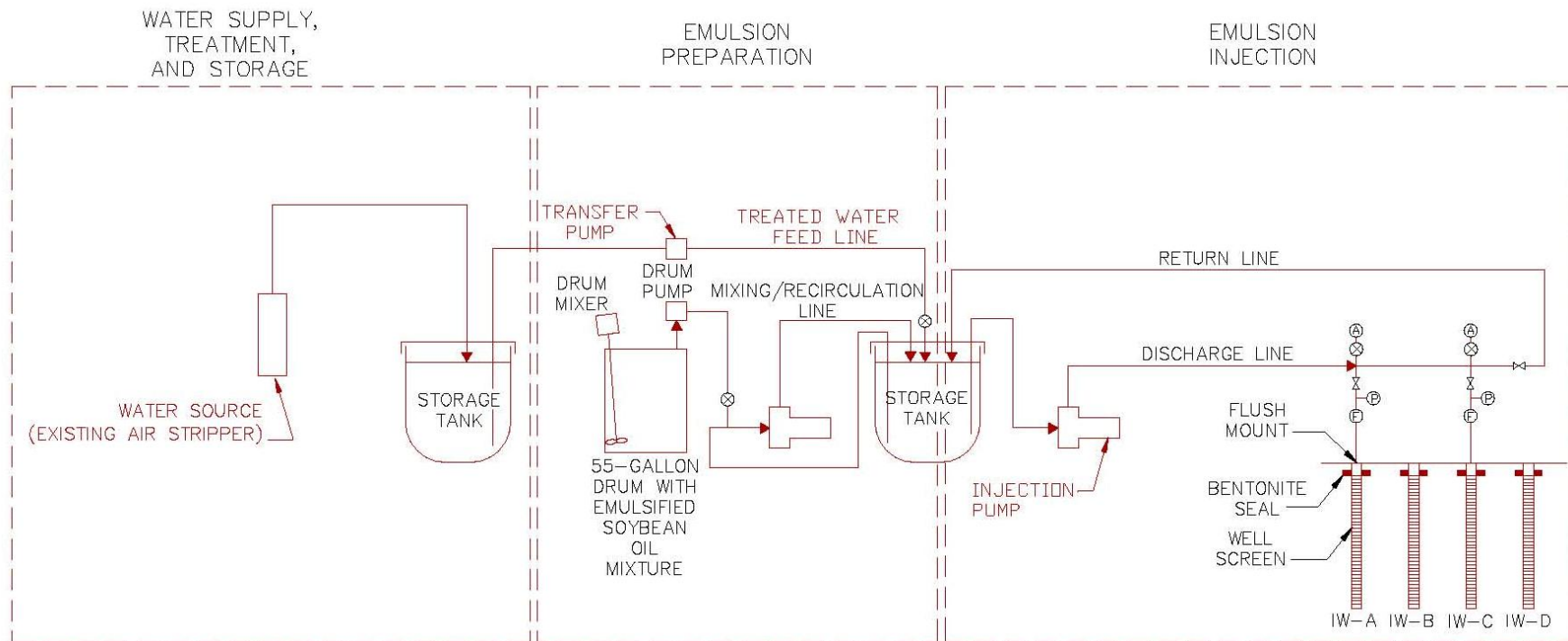
AECOM Longhorn Project Organization Chart



In-situ Bioremediation

LEGEND

PRESSURE GAGE	Ⓟ
FLOW METER	Ⓢ
VALVE - GATE	⋈
VALVE - BALL	⊗
QUICK-CONNECT UNION	—┘┐—
AIR RELEASE VALVE	Ⓐ

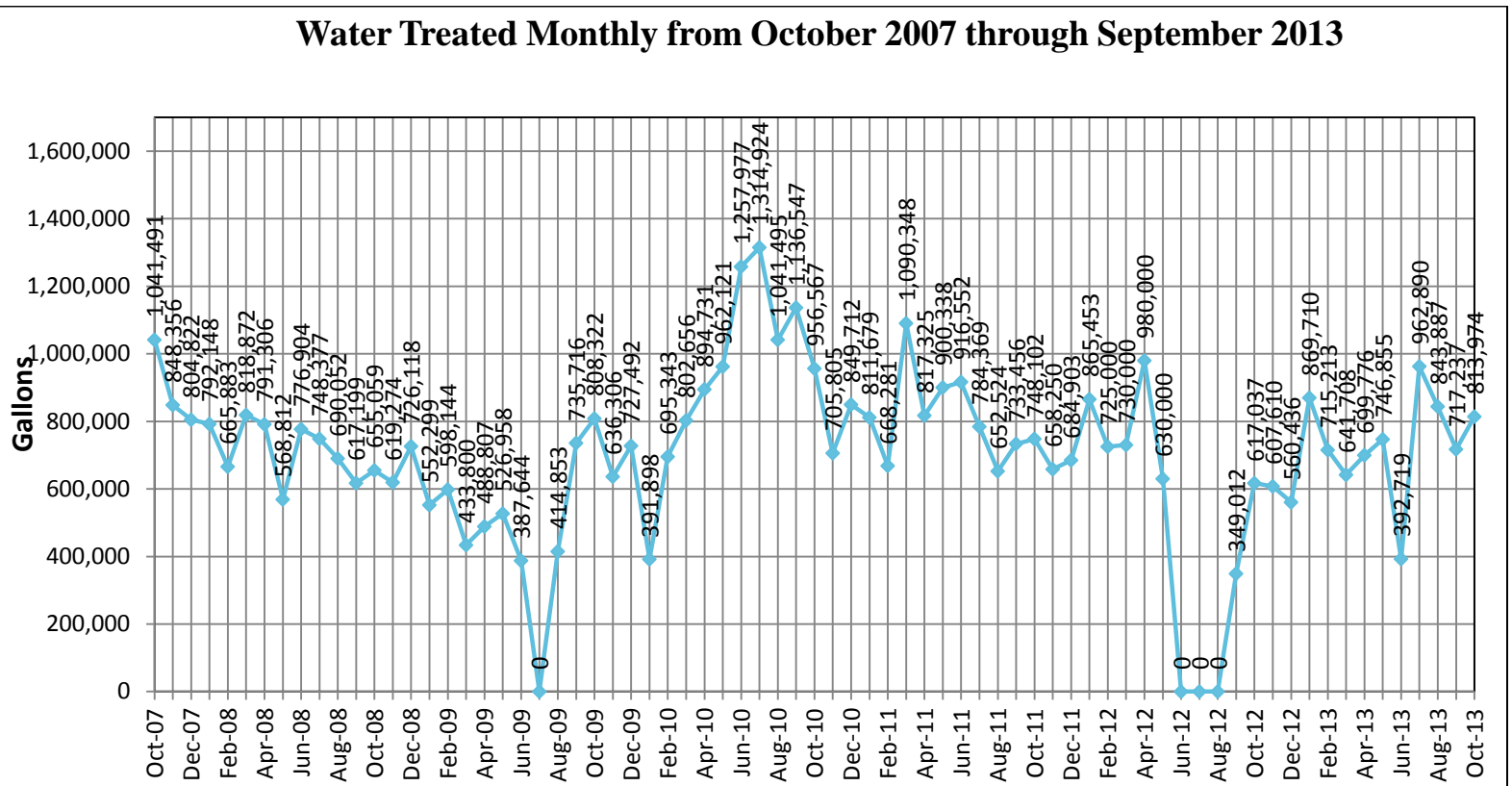


Groundwater Treatment Plant - Treated Groundwater Volumes

The amount of groundwater treated is determined by measuring the number of gallons of treated water returned to LHAAP-18/24, released to the INF Pond, or discharged to Harrison Bayou.

Treated Water Data (in gallons)

Oct-07	Nov-07	Dec-07	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08
1,041,491	848,356	804,822	792,148	665,883	818,872	791,306	568,812	776,904	748,377	690,052	617,199
Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	May-09	Jun-09	Jul-09	Aug-09	Sep-09
655,059	619,274	726,118	552,299	598,144	433,800	488,807	526,958	387,644	0	414,853	735,716
Oct-09	Nov-09	Dec-09	Jan-10	Feb-10	Mar-10	Apr-10	May-10	Jun-10	Jul-10	Aug-10	Sep-10
808,322	636,306	727,492	391,898	695,343	802,656	894,731	962,121	1,257,977	1,314,924	1,041,495	1,136,547
Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11
956,567	705,805	849,712	811,679	668,281	1,090,348	817,325	900,338	916,552	784,369	652,524	733,456
Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12
748,102	658,250	684,903	865,453	725,000*	730,000*	980,000*	630,000*	0	0	0	349,012
Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13
617,037	607,610	560,436	869,710	715,213	641,708	699,776	746,885	392,719	962,890	843,887	717,237
Oct-13											
813,974	* Indicates estimate										



The pounds of chemicals removed for the 3rd Quarter of 2013 can be found below and are calculated by the following formula:

$$\frac{(\text{Concentration } [\mu\text{g/L}] \times \text{Volume } [\text{gallons}] \times 3.785 \text{ [liters per gallon]})}{(453,600,000 \mu\text{g per pound})}$$

**Pounds of Chemicals Removed From
LHAAP-18/24, 3rd Quarter 2013**

	Trichloroethylene	Methylene Chloride	Perchlorate
Jul-13	64.5	118.2	90.5
Aug-13	53.7	35.1	72.9
Sep-13	49.7	27.2	78.5

Harrison Bayou and Goose Prairie Creek – Perchlorate Data

Surface water samples are collected quarterly from each location in Harrison Bayou and Goose Prairie Creek unless they are dry.

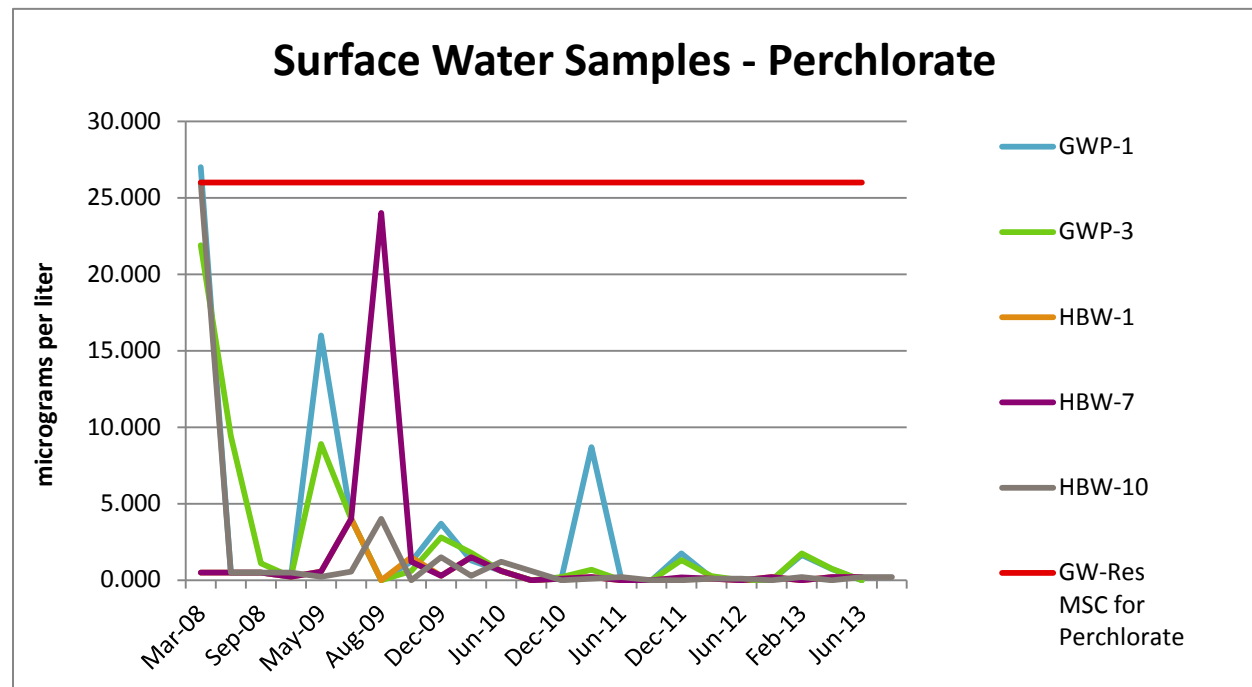
Historic Surface Water Sample Data (in micrograms per liter)

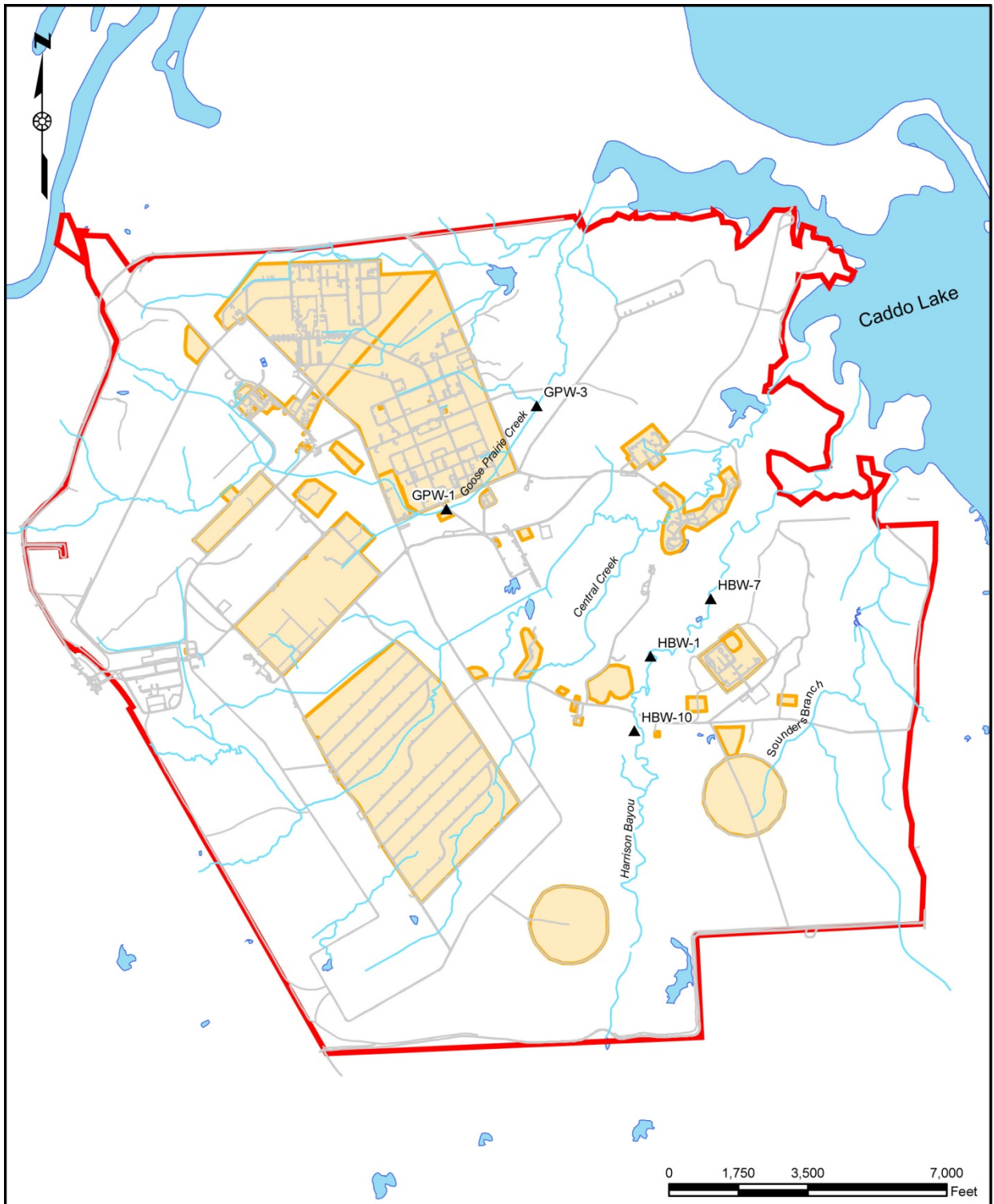
Creek Sample ID	Mar 2008	Jun 2008	Sep 2008	Dec 2008	May 2009	July 2009	Aug 2009	Sep 2009	Dec 2009	Mar 2010	Jun 2010
GPW-1	27	0.5U	0.5U	0.22U	16	4U	dry	1.2U	3.7	1.3J	0.6U
GPW-3	21.9	9.42	1.1	0.22U	8.9	4U	dry	0.6U	2.8	1.8J	0.6U
HBW-1	0.5U	0.5U	0.5U	0.22U	0.55U	4U	dry	1.5U	0.275U	1.5U	0.6U
HBW-7	0.5U	0.5U	0.5U	0.22U	0.55U	4U	24	1.2U	0.275U	1.5U	0.6U
HBW-10	0.5U	0.5U	0.5U	0.22U	0.55U	4U	dry	1.5U	0.275U	1.2U	0.6U

Creek Sample ID	Sep 2010	Dec 2010	Mar 2011	Jun 2011	Sep 2011	Dec 2011	Mar 2012	Jun 2012	Jan 2013	Feb 2013	Mar 2013
GPW-1	dry	0.1U	8.7	dry	dry	1.76	0.163J	dry	dry	1.65	0.735
GPW-3	dry	0.199J	0.673	dry	dry	1.31	0.261	dry	dry	1.74	0.754
HBW-1	dry	0.1U	0.2U	dry	dry	0.1U	0.1U	dry	<0.2U	dry	<0.2U
HBW-7	dry	0.1U	0.2U	dry	dry	0.171J	0.1U	dry	<0.2U	dry	<0.2U
HBW-10	dry	0.1U	0.2U	dry	dry	0.1U	0.1U	dry	<0.2U	dry	<0.2U

Creek Sample ID	Jun 2013	Sept 2013
GPW-1	dry	Samples at Lab, Data not yet Available
GPW-3	dry	
HBW-1	<0.2U	
HBW-7	<0.2U	
HBW-10	<0.2U	

Notes:
Perchlorate Screening Criteria - TCEQ GW_{Ing} (mg/L) $5.1E^{-02}$





Legend

- ▲ Surface Water Sampling Location
- Stream
- Road
- Site
- Lake

U.S. ARMY CORPS OF ENGINEERS
TULSA DISTRICT
TULSA, OKLAHOMA

SURFACE WATER SAMPLING LOCATION

LONGHORN ARMY AMMUNITION PLANT
KARNACK, TEXAS

Sustainable Solutions to Environmental Challenges

LHAAP (35B)37

Using the TMD Technologies Group, LLC
Patented ISBR Technology

RAB Meeting
November 14, 2013

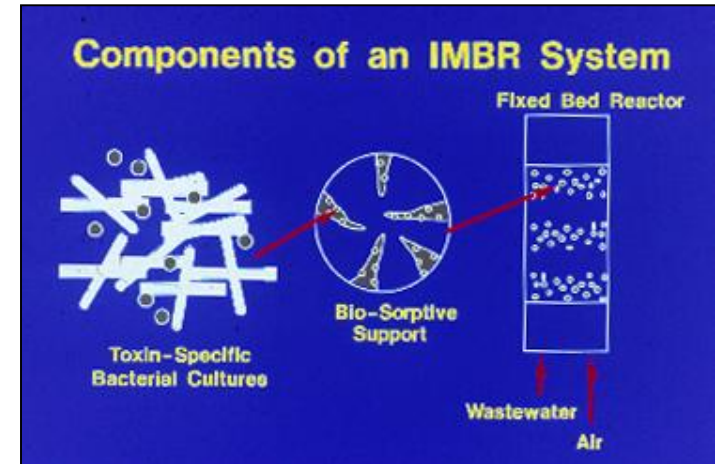
121-B Venture Blvd.
Spartanburg, SC 29306
864.595.1204 P
864.592.1952 F

www.TMD-Technologies.com



IMBR Technology

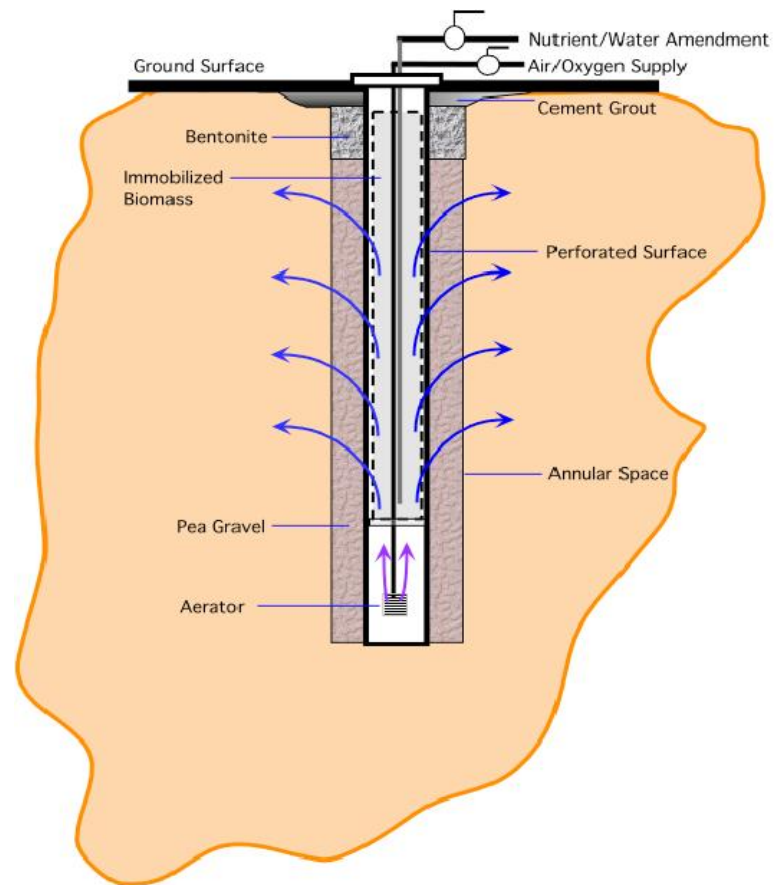
- Immobilized Microbe Biological Reactor (IMBR)
 - Series of tanks, pipes or baskets packed with media that deliver microbes directly to a contaminated waste stream.
- Media
 - Uniquely developed biocarrier that allows microbes to live, regenerate and protect against toxic upset. Over 8m² of surface area and 10⁹ microbes per gram. Microorganisms are specifically chosen depending on the contaminant stream.



Unique Characteristics of the IMBR Technology:

- Employs in-situ utilization of patented Immobilized Microbe Bio Reactor (IMBR) system which includes permanently immobilized toxin-specific microorganisms onto inert porous structural support matrix.
- Requires no relocation/replacement of affected soils or groundwater, in-place treatment.
- Requires no excavation beyond drilling required to install Bio-Plug units.
- Employs sub-surface installation of immobilized surface bio-reactor system.
- Employs sub-surface constant delivery of water, which delivers the designed amounts of dissolved oxygen and site-specific nutrients to sustain and promote microbial growth, respiration and movement of selected organisms to the contaminants of concern.
- Establishes and sustains sub-surface aerobic conditions enabling contiguous bio-reactive remedial treatment zones for full coverage of targeted contaminated area.
- Establishes in-situ, continuous regeneration of contaminant-specific microorganisms.
- Avoids decomposition of targeted organic contaminant compounds into toxic daughter compounds, i.e., achieve substantially complete mineralization.
- Causes minimal, or zero, displacement of targeted contaminants outside of treatment / containment area.
- Groundwater is used as mobile phase of in-situ remediation of soil/sediment in the system.

Cross-Section of the Bio Plug

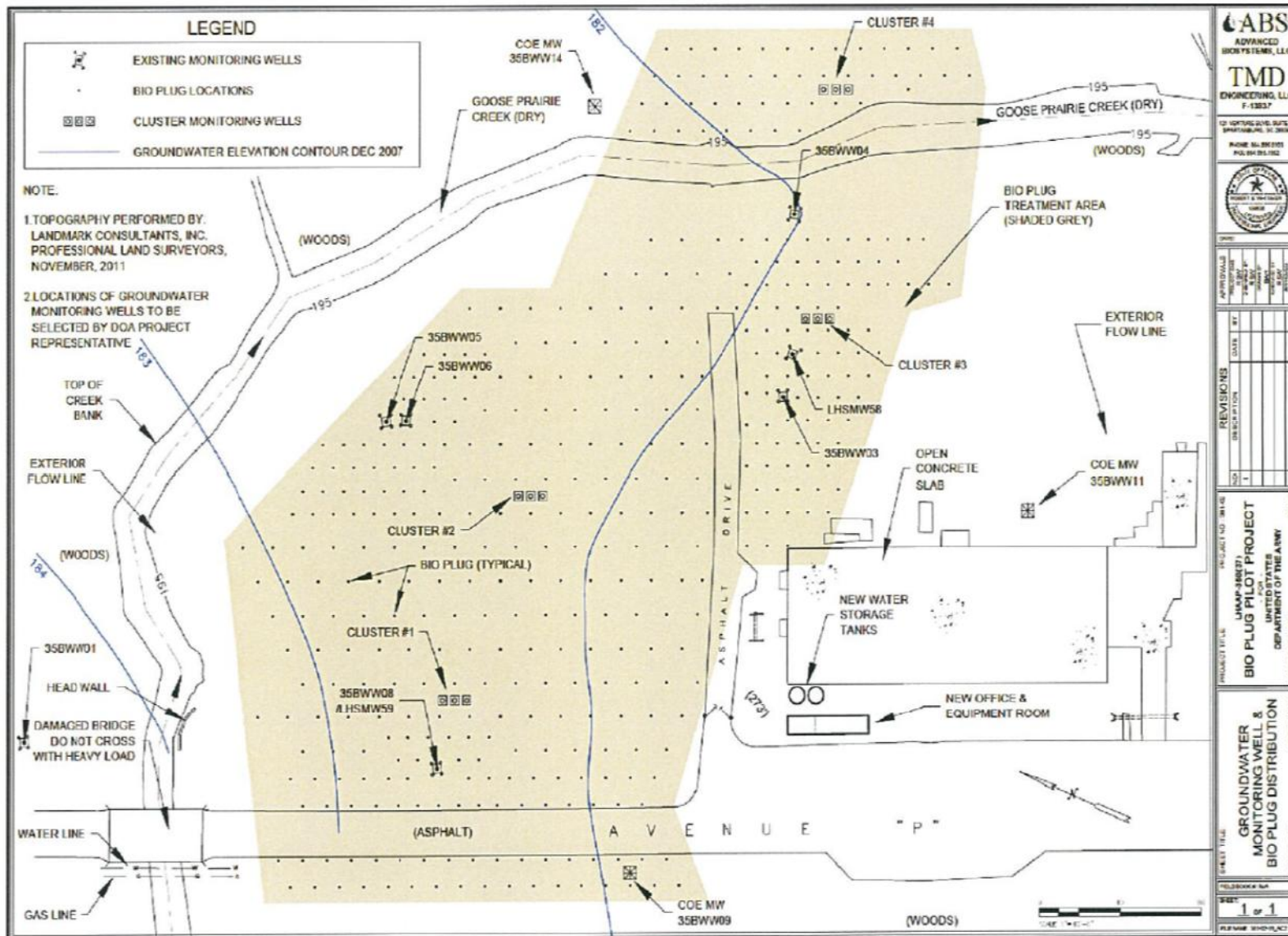


LHAAP (35B)37

Karnack, TX

- A pilot-scale field test of the bio plug technology was initiated at a chlorinated organic contaminated groundwater remediation site at the former Longhorn Army Ammunition Plant (LHAAP) in Karnack, TX.
- LHAAP-35B(37) is the location of a former chemical laboratory built in the mid-1950's to support propellant production activities at LHAAP.
- Industrial solid wastes and possibly hazardous wastes were generated at the site. In addition, one wash rack sump was located on the site. The primary groundwater contaminants of concern are tetrachloroethene (PCE) and trichloroethene (TCE).
- The ABS technology was employed as a pilot-scale field test at LHAAP. System operation was initialized and stabilized in October 2012.

The following figure depicts the locations of the bio plugs within the estimated contaminant plume, as well as, the bioreactor support equipment (i.e. zone distribution sheds, nutrient mixing equipment, etc.), monitoring well clusters between the bio plug arrays, and existing site monitoring wells.



ATC Interim Report Findings

- After approximately 11 months of operation the bio plug system appears to be increasing the rate of bioremediation within some areas of the test site.
- The fourth quarter (Sep 2013) TCE concentrations in MW 1-1 and MW 1-2 indicate a significant reduction in TCE contaminate levels (approximately 70 to 90 percent reduction in TCE concentrations compared to baseline concentrations).
- With the exception of the area between cluster well groups 2 and 3 where there is apparently stagnant groundwater flow, bio plug system operation is expected to continue to increase the rate of bioremediation within the test area.

Monitoring and Cluster Well Data

PCE
DATA
(µg/L)

Well ID	Jul-12	Jun-13	Sep-13
35BWW01	ND	NS	NS
35BWW02	NS	NS	NS
35BWW03	ND	ND	NS
35BWW04	48.90	50.60	68.80
35BWW05	1.09	1.23	1.56
35BWW06	ND	NS	NS
35BWW07	ND	NS	ND
35BWW08	ND	ND	ND
35BWW09	ND	ND	ND
35BWW11	ND	NS	ND
35BWW14	21.00	24.00	26.80
LHS-MW-58	36.30	25.80	29.00
MW 1-1	ND	ND	ND
MW 1-2	ND	ND	ND
MW 1-3	ND	NS	NS
MW 2-1	2.65	2.84	1.67
MW 2-2	ND	ND	ND
MW 2-3	ND	ND	ND
MW 3-1	30.10	18.70	18.70
MW 3-2	41.80	37.90	40.10
MW 3-3	60.50	40.50	36.20
MW 4-1	20.10	24.20	24.90
MW 4-2	9.60	8.25	8.76
MW 4-3	18.80	5.87	6.18

Well ID	Jul-12	Jun-13	Sep-13
35BWW01	ND	NS	NS
35BWW02	NS	NS	NS
35BWW03	ND	ND	NS
35BWW04	8.09	11.40	13.40
35BWW05	13.50	18.80	17.30
35BWW06	ND	NS	NS
35BWW07	ND	NS	ND
35BWW08	65.70	67.50	49.6
35BWW09	55.60	43.90	53.6
35BWW11	ND	NS	ND
35BWW14	80.60	90.90	89.70
LHS-MW-58	5.17	5.02	4.99
MW 1-1	16.80	22.1	4.83
MW 1-2	8.66	9.13	0.817
MW 1-3	2.80	NS	NS
MW 2-1	4.59	3.35	2.15
MW 2-2	0.27	0.320	ND
MW 2-3	1.44	0.840	0.289
MW 3-1	2.42	2.02	2.05
MW 3-2	3.07	2.71	3.02
MW 3-3	5.99	7.64	5.50
MW 4-1	3.63	5.32	5.48
MW 4-2	4.21	4.53	6.14
MW 4-3	13.50	4.97	5.53

TCE
DATA
(µg/L)

ABS Groundwater Flow Findings

- There remain unknown hydrogeological conditions affecting the movement of groundwater through the project site. The mean horizontal hydraulic gradient varies from 0.00019 ft/ft to 0.0034 ft/ft.
- The general porosity soils used in the calculation of velocity is 30%.
- The horizontal velocity component of the ground water movement varies from near zero feet per day between well clusters 2 and 3 to a maximum of 0.0222 feet per day between monitoring well Cluster No 1 and Cluster No 2.
- A general direction of flow to the north for the upper portion of the site and a more easterly direction at the lower portion of the site.

Estimated Groundwater Movement

Table 5
Distance of Groundwater Movement
October 22, 2012 through June 13, 2013

Number Of Days	Cluster 1 to 2 (ft)	Cluster 1 to 3 (ft)	Cluster 1 to 4 (ft)	Cluster 2 to 3 (ft)	Cluster 2 to 4 (ft)	Cluster 3 to 4 (ft)
234	5.73	2.57	2.95	-0.23	1.19	2.71
365*	8.94	4.01	4.60	-.32	1.86	4.23

* Indicates projected distances per year

Technology-driven, cost-effective biological solutions
to challenges facing our global community.

121-B Venture Blvd.
Spartanburg, SC 29306
864.595.1204 P
864.592.1952 F

www.TMD-Technologies.com

