The minutes were approved by the RAB via email on July 20, 2016.

# Hill Air Force Base
# Restoration Advisory Board

## Meeting Minutes
April 28, 2016

| Members Present: | Organization: | Members Present: | Organization: |
|---|---|---|---|
| Loren Allen | Davis County Health Dept. | Jeff MacFarlane | North Davis Sewer District |
| Earnest Aycock | Clearfield Community Alternate | TJ Mitchell | Clinton City |
| Travis Bonsteel | Clinton Community | Brad Nelson | Weber Basin Water |
| Sandra Bourgeois | Environmental Protection Agency | Ivan Ray | Davis & Weber Counties Canal Company |
| Summer Day | Weber-Morgan Health Dept. | Muhammad Slam | Utah Department of Environmental Quality |
| Buck Ekstrom | Clearfield Community | Rick Smith | Davis & Weber Counties Canal Company |
| Bambi Gibson | Sunset Community | Ed Sorensen | Roy City |
| Stephen Jackson | Layton City | Jan Ukena | South Weber Community |
| | | Brian Wesoloski | Riverdale Community |
| Douglas Johnson | Hill AFB Community | Darrin Wray | Hill AFB RAB Co-Chair |
| Tim Lane | Roy Community | Scott Zigich | Davis County School District |
| Tamara Long | South Weber City | | |

| Facilitator: | Organization: |
|---|---|
| Tim Sueltenfuss | Galen Driscol, LLC |

| Members Absent: | Organization: | Members Absent: | Organization: |
|---|---|---|---|
| Clint Holm | Layton Community | Vern Phipps | Clearfield City |
| Tim Lane | Roy Community | Brett Nelson | Central Weber Sewer District |
| Joe Maylin | Sunset City | Rich Sirken | Weber State University |

| Other Attendees: | Organization: | Other Attendees: | Organization: |
|---|---|---|---|
| Dave Allison | UDEQ | Dave Harris | Ageiss |
| Carly Brown | Ageiss | Tom O'Hara | CH2M |
| Andy Castor | CH2M | Brent Poll | South Weber Coalition |
| Jarrod Case | AFCEC-Hill | Mike Reynolds | CH2M |
| Gary Colgan | CH2M | Mark Roginske | AFCEC-Hill |
| Jeremy Cox | CH2M | Kalem Sessions | AEEC |
| Ann Dziechciarz | CH2M | Tom Simpkin | CH2M |
| Barbara Fisher | Hill AFB Public Affairs | Sandy Staigerwald | EA Engineering |
| Randy Gates | CH2M | Jason Wilde | AFCEC-Hill |

### Handouts Distributed at Meeting:

*Pre-RAB Training: Zero-Valent Iron/Clay Mixing Technology*
*Updated Hill AFB Basewide Plume Map*
*Operable Units Site Summary Spreadsheet*
*Cleanup System Glossary*

## Agenda Item #1. Welcome

Mr. Darrin Wray, the Hill Air Force Base (Hill AFB) Restoration Advisory Board (RAB) Air Force co-chair, called the meeting to order and welcomed RAB members to the meeting. He said the Air Force appreciates the RAB's feedback and welcomes their input at the meeting.

Mr. Wray introduced Mayor Tammy Long, the new South Weber City RAB representative. He announced that Mr. Robert Becker, the Ogden Sierra Club RAB representative for the last six years, resigned his position on the RAB due to health reasons. Mr. Wray said the Sierra Club is aware of his resignation and will appoint someone else to the position.

Mr. Wray recognized Mr. Ivan Ray, the Davis and Weber Counties Canal Company (DWCCC) RAB representative, because he is retiring and this would be his final Hill AFB RAB meeting. Mr. Wray presented him with a certificate of appreciation that was signed by Base Commander Colonel Ronald E. Jolly Sr, and an Environmental Management coin to thank him for his service on the Hill AFB RAB for the last 12 years. Mr. Wray introduced Mr. Rick Smith, who will be taking over Mr. Ray's position on the RAB as the DWCCC representative. Mr. Ray said that he appreciates all that the staff has done to make things better on-base and encouraged RAB members to support them in the cleanup.

## Agenda Item #2. Staff Introductions

Mr. Jarrod Case announced he was filling in for Mr. Mark Loucks, who was absent due to illness. He noted that a current staff list and site assignment sheet was provided in the handouts (Attachment 1). Mr. Case introduced Mr. Jason Wilde as a new addition to the staff and said there were some adjustments made to the assignment list since the last meeting. Contact information for each site manager was provided in the breakout packets.

## Agenda Item #3. RAB Business

Mr. Tim Sueltenfuss briefly went through the packet distributed at the meeting. The meeting agenda is attached (Attachment 2). He reviewed the three RAB ground rules posted on the back of the name tents:

1. Participate with intent
2. Appreciate diversity of perspectives
3. Maintain a respectful space

**Action Item List.** Mr. Sueltenfuss said that a current action item list was included in the packet (Attachment 3). He encouraged RAB members to look through the action items and to speak up if any of the action items needed attention. He noted that Item 2015-11, the revision of the RAB Operating Procedures, would be addressed during the meeting.

**Schedule.** A schedule of upcoming RAB meetings and a list of potential future training and tour events was provided to the RAB (Attachment 4). [Subsequent to the conclusion of the meeting, the 28 July 2016 RAB meeting was rescheduled to 11 August 2016.] Mr. Sueltenfuss said future RAB meeting dates are included for the RAB's awareness and encouraged them to mark their calendars now.

Mr. Sueltenfuss noted upcoming events, such as the RAB Annual Operable Unit Tour on June 15, and the Thunderbirds Practice Air Performance on June 24. Ms. Carly Brown said that she is collecting background check information either in-person at the RAB meeting, or via her office phone line, due to the sensitive nature of the information needed (driver's license number). She said an initial guest count is

due by May 6 and it will then be decided if requests for additional spots can be opened to RAB members. More details will be emailed to RAB members about the day of the performance.

**RAB Operating Procedures Vote.** The RAB Operating Procedures revisions were emailed to RAB members the week before the RAB meeting so they could come to the meeting prepared to vote. Ms. Brown said most of the revisions were minor and were made to reflect how the RAB is currently operating; however, she noted the two RAB positions that are proposed to be removed from the RAB membership list: Boyer Hill Military Housing and the Weber County School District. Both organizations have been asked several times to appoint a representative and have not taken the opportunity. Mr. Sueltenfuss asked RAB members if there were any additional changes they wanted to suggest or discuss. No RAB members commented. Mr. Sueltenfuss asked for a vote by show of hands to approve the suggested revisions. All voting members in attendance at the meeting approved the revisions.

**Operable Unit 12 Explanation of Significant Differences (ESD).** Mr. Case reminded the RAB about the Operable Unit 12 ESD that will document the removal of the requirement to treat at the Permeable Reactive Barrier (PRB) in Roy. The OU12 ESD is currently under review with the Utah Department of Environmental Quality (UDEQ) and Environmental Protection Agency (EPA). Once the OU12 ESD is signed, a public notice will be prepared to notify the public and the RAB about the availability of the OU12 ESD document.

## Agenda Item #4. Public Comment Opportunity

Mr. Sueltenfuss said Ms. Jan Ukena, the RAB community co-chair, suggested the opportunity for public comment be moved to earlier in the meeting. She noted that if a RAB meeting ends early, the opportunity for public comment (previously at the end of the meeting) may be at a different time than advertised on the agenda. In order to ensure members of the public will be able to attend at the advertised time to make a comment, it was proposed to move the public comment opportunity to the beginning of the meeting. Mr. Sueltenfuss said if a significant amount of public comment is received at the beginning of the meeting, as the RAB facilitator, he will make appropriate adjustments to the agenda.

Mr. Sueltenfuss asked if there were any members of the public in the audience who would like an opportunity to comment. There were no comments at this time.

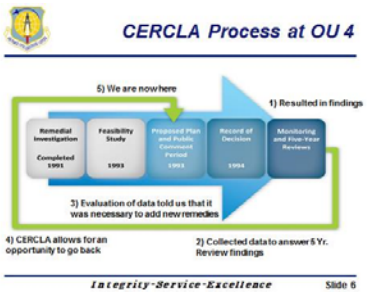
## Agenda Item #5. Operable Unit 4 (On-base, South Weber, Riverdale) Revised Proposed Plan

Mr. Case and Andy Castor presented the Operable Unit 4 (OU4) Revised Proposed Plan (Attachment 5) to the RAB.

Mr. Case began by explaining the difference between an ESD, such as what is being done at OU12, and a Record of Decision (ROD) Amendment, as is being done at OU4. He used an analogy about buying a car to explain those differences.

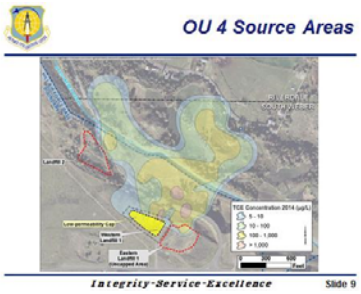
- When you first purchase a car, you buy it because it meets your needs and does what you need it to do at that time. The OU4 ROD that was signed in 1994 met ROD requirements and worked as needed for quite some time.
- Later, you decide a minor change is needed, such as painting the car a new color or buying fancy wheels. This is similar to an ESD. An OU4 ESD, signed in 2006, documented the discontinued use of vapor extraction from beneath the landfill because it was not effective.

- If your needs change and your little car no longer suits those needs, you purchase a different vehicle. This is similar to a ROD Amendment. At OU4, it is proposed to add new remedies beyond what is in the original ROD. This requires a ROD Amendment.




In order to amend the ROD, the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) process must still be followed. Slide 6 detailed the CERCLA process at OU4. The 2013 Five-Year Review (FYR) on Hill's cleanup sites found that the remedy at OU4 was protective in the short-term, but may not be protective in the long-term. Because of this finding, the Air Force did additional investigative work at the site. Results from this investigation has lead the Air Force to recommend new remedies to the ROD to make it protective in the long-term. Mr. Case said the CERCLA process allows for an opportunity to go back and complete a Revised Proposed Plan to outline the new remedies. This process will also include opportunities for public comment at a public meeting and through a public comment period.

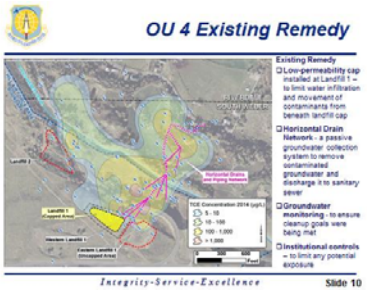
Mr. Case noted that a Revised Proposed Plan was completed for OU4 in 2015. A public meeting was held in Riverdale in August 2015 and the Air Force began drafting a ROD Amendment to complete the next step in the CERCLA process. While drafting the OU4 ROD Amendment, additional data was collected to finalize the design of the remedy. Unanticipated results from this data caused the Air Force to reevaluate again and reconsider the proposed expanded remedy altogether. This has lead to a new Proposed Plan, which includes another public meeting and public comment period.




OU4 is a groundwater plume that is located on the north side of the base that extends into small portions of Riverdale and South Weber Cities (shown on Slide 9). There are three sources at OU4: Eastern Landfill 1 (uncapped), Western Landfill 1 (capped) and Landfill 2 (uncapped).

**OU4 Existing Remedy**

A map and a list of existing remedies outlined in the 1994 OU4 ROD were shown on a map on Slide 10. Mr. Castor said that the 2013 Five-Year Review found that the OU4 remedy is not functioning as intended but remains protective in the short-term.




**Landfill 1 Cap.** Results from a follow-up investigation found that the low-permeability Landfill 1 cap likely does its job and prevents surface water from infiltrating the landfill; however, it was found that trichloroethene (TCE) concentrations downgradient from the landfill are increasing. He said this means that the contents of Landfill 1 are an ongoing source of TCE contamination and because of this, the cleanup timeframe would be indefinite. Mr. Castor said that one of two things is happening: 1) There may be something leaking from within the landfill, such as a drum or other source, or, 2) Rising water table levels from the subsurface have risen into the landfill and are pulling contaminants out of the landfill.

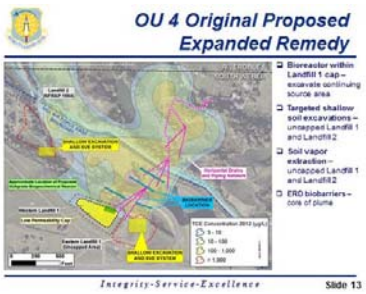
**Horizontal Drains.** The horizontal drains have extracted 37 million gallons of groundwater and 227 pounds of TCE since 1996. Mr. Castor said the drains are removing contaminants but are not having an effect on the cleanup timeframe.

**Uncapped Landfill 1 and Landfill 2.** Mr. Castor said that the uncapped portion of Landfill 1 and Landfill 2 were also identified as on-going TCE source areas.

**New Remedy**

Mr. Castor detailed the original proposed expanded remedy (proposed at a public meeting in August 2015) and explained the differences in the new revised proposed expanded remedy that is now being proposed.

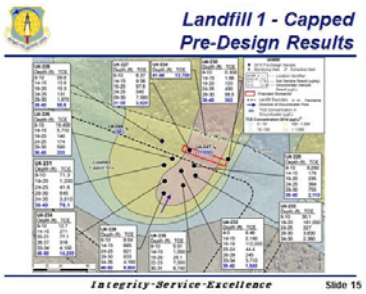
**Original Proposed Expanded Remedy (2015).** A map of the original proposed expanded remedy was provided on Slide 13. It included the following remedies:




- Install a bioreactor within the Landfill 1 cap – Intent was to excavate the source area and build a biochemical reactor that would encourage breakdown of contaminants.
- Targeted shallow soil excavations in uncapped Landfill 1 and Landfill 2 – Target areas of high concentrations and excavate shallow soil in source areas (highlighted in yellow).
- Soil vapor extraction (SVE) in uncapped Landfill 1 and Landfill 2 – Install SVE system in areas of high concentrations in source areas (highlighted in yellow, co-located with soil excavations) to remove contaminant vapors from the soil.
- Enhanced Reductive Dechlorination (ERD) biobarriers – ERD injections of carbon substrate to encourage breakdown of contaminants (highlighted in blue).

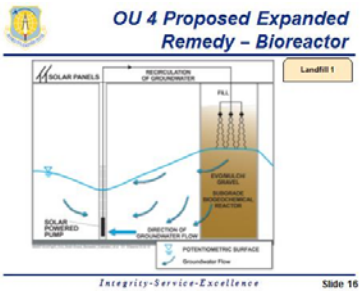
**Revised Proposed Expanded Remedy (Present).** A map of the revised proposed expanded remedy was provided on Slide 14. It includes the following remedies:


- Bioreactor downgradient of Landfill 1 cap – Rather than install the bioreactor within the Landfill 1 cap, it is now proposed to install the bioreactor on the downgradient edge without excavating the source area. The bioreactor will actually be a series of bioreactor columns, or borings between 12 and 18 inches thick spaced approximately 5 feet apart.
- Low-permeability cap on Eastern Landfill 1 – Mr. Castor said the most significant change in the revised proposed expanded remedy is the installation of a cap on Eastern Landfill 1 to prevent infiltration of surface water into the landfill.
- ERD biobarriers – The biobarriers will be installed as proposed in the original proposed expanded remedy.
- SVE Treatability Study in Landfill 2 – Mr. Castor said they are still determining how best to treat contaminants at Landfill 2 and would like to test SVE as a possibility. SVE will be removed as a remedy in the ROD Amendment. He said they will watch the treatability study closely to determine if it can be implemented as a potential long-term remedy.

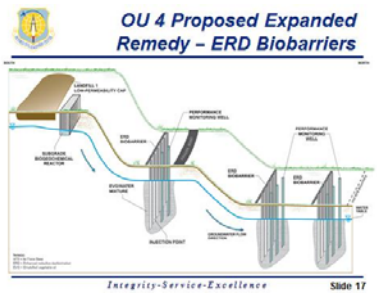



Mr. Castor said the Original Proposed Expanded Remedy was modified due to unexpected results during the pre-design phase before installing the remedy at Landfill 1 (shown on Slide 15). The black dots represent soil columns that were analyzed for contaminants to help determine the ideal location to install bioreactors. The columns also showed TCE concentrations in the soil at different depths and TCE results at the groundwater table (shown in blue). Mr. Castor said if something was leaking in the landfill, they would expect to see high concentrations in

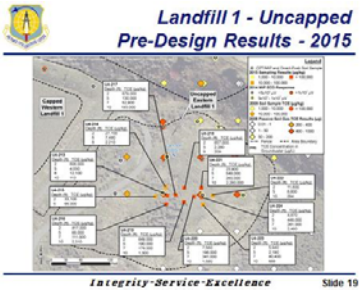
the soil near the leaking source with high concentrations all the way down the column leading to high concentrations in the groundwater. But, Mr. Castor said, that is not what they found. He said that in most cases, concentrations would peak in the soil, with lower concentrations in the deeper soil samples and water table samples. Mr. Castor said this means they were unable to find the source. Results from the two most upgradient soil columns (U4-234 and U4-229) show significantly higher concentrations in the water table than in the soil above it, which Mr. Castor said indicates the source of TCE must be farther upgradient than expected. Instead of going through this process over and over again, and riddling the landfill cap with holes, it was proposed to move the bioreactor to the edge of the landfill cap and use bigger borings, spaced closer together to treat more of the contaminants coming out of Landfill 1.



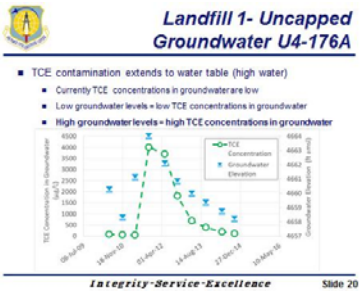

A general schematic of the OU4 bioreactors was shown on Slide 16. Contaminated groundwater will be treated as it flows through the bioreactor and will recirculate through the bioreactor, containing ERD substrate material, such as emulsified vegetable oil (EVO), which encourages breakdown of the contaminants.




An illustration of the ERD biobarriers was provided on Slide 17. After going through the bioreactor, groundwater will flow down the hillside through a series of biobarriers that are injected with EVO. Results will be monitored through monitoring wells installed downgradient of each set of biobarriers.



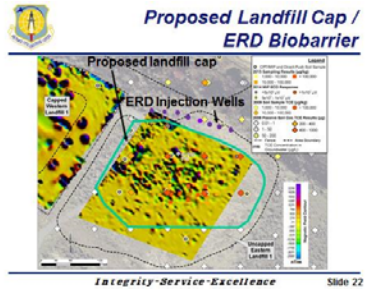

Soil data from the pre-design investigation at uncapped Landfill 1 were provided on Slide 19. The original proposed expanded remedy called for SVE and targeted shallow excavation so an investigation was done to decide where to excavate. Twelve soil borings were sampled to a depth of 10 feet to delineate the area to be excavated. Mr. Castor said that because results for every sample showed high concentrations (one even as high as 2.2 million parts per billion), they began to rethink the strategy at uncapped Landfill 1. He said that they were confused how TCE results could show such high concentrations in the shallow soil, since TCE has been in the area for over 50 years. He said it's uncommon for TCE, a volatile chemical that prefers to evaporate and is easily degraded by sunlight, to stay in the shallow soil. Mr. Castor said the likely answer came when they found carbon in the form of crushed charcoal in the landfill. TCE likes to stick to carbon and does not easily volatilize off the carbon. He said SVE would not be effective with the carbon present in the landfill because of how difficult it is to pull TCE off of carbon. This investigation found a larger area of high concentrations of TCE that could not be delineated in uncapped Landfill 1.




Groundwater sampling results and water table data in uncapped Landfill 1 were provided on Slide 20. Mr. Castor said it was discovered that when the groundwater was low, the TCE concentrations in the groundwater were low; and when the groundwater levels were high, the TCE concentrations in the groundwater were high. He said this indicates one of two things:

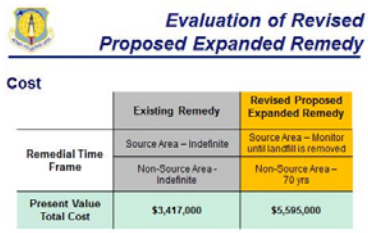
- In a wet year, the surface water infiltrates the landfill, picking up the TCE and contaminating the groundwater, or,
- There may be a TCE source located near the water table, so as groundwater rises during a wet year it rises and picks up the TCE and contaminants the groundwater.

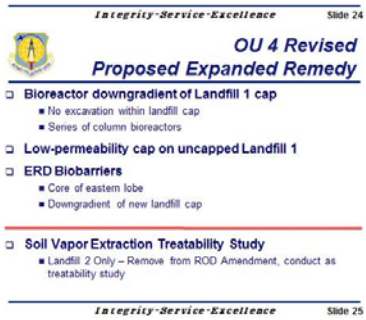
Mr. Castor said the proposed landfill cap will prevent infiltration into the landfill from above, but if the latter of the two possibilities is occurring, the landfill cap will not prevent the groundwater levels from rising. He said the landfill cap, however, will be beneficial no matter which is occurring, because at the very least it prevents direct contact with contaminants.




To determine where to place the landfill cap, Mr. Castor said a magnetic geophysical survey was conducted in 2013 to determine the location of debris within uncapped Landfill 1, as TCE is typically found near debris in landfills. The results of the survey and the proposed location of the landfill cap were shown on Slide 22. Mr. Castor restated that the landfill cap will not prevent groundwater levels from rising up into the landfill and releasing TCE. A line of ERD injection wells will be installed downgradient of the uncapped Landfill 1 and will initially be used to monitor TCE concentrations and groundwater levels coming from the landfill. If needed, the wells can be used as ERD injection points to form a biobarrier to treat TCE coming out of the landfill if TCE concentrations rise. The injection wells can deliver carbon substrate into the subsurface to encourage the breakdown of TCE.


**Evaluation of Revised Proposed Expanded Remedy.** Mr. Castor said the revised proposed expanded remedy meets all nine of the CERCLA evaluation criteria listed on Slide 23. Slide 24 compares the cost and cleanup timeframe of the current remedy to the revised proposed expanded remedy. Mr. Castor said that the cleanup timeframe for the current remedy is indefinite because the source areas are still releasing TCE into the groundwater. In the new remedy, the sources are cut off before they can release the TCE into the groundwater heading off-base, so the cleanup timeframe for the OU4 plume will now be around 70 years.




Mr. Castor summarized the revised proposed expanded remedy on Slide 25. The review process for the OU4 Updated Revised Proposed Plan will be completed in May. The 30-day public comment period will occur in May or June, during which a public meeting will be held to present the cleanup plan to the public. [The OU4 Updated Revised Proposed Plan public meeting was held from 7 to 8 p.m. on June 22 at the Riverdale Community Center.] The ROD Amendment, the next step in the CERCLA process, will be ready for review and signature by the EPA, UDEQ and the Air Force in the summer, followed by the design phase of the remedy and actual implementation of the chosen remedy by Fall 2016.

Mr. Ray asked if there were any homes downgradient of OU4. Mr. Castor said there are no homes within the boundary of the plume. Mr. Ray asked if the ERD biobarriers will extract groundwater for treatment. Mr. Castor said the ERD injection wells will only allow injections of carbon substrate and monitoring of the groundwater conditions.

Mr. Wray asked if the current horizontal drain system will collect carbon substrate (such as emulsified vegetable oil) that will be injected as part of the ERD biobarrier. Mr. Castor said that a portion of the horizontal drain system will likely be shut down for a time in order to avoid sending the carbon substrate to the sanitary sewer, which is not permitted for discharge. The most downgradient horizontal drains will

likely stay on, but the middle and most upgradient drains will be turned off. Once the ERD injections have time to work, the entire horizontal drain system will be turned back on.

There were no additional comments or questions on this presentation.

## Agenda Item #6. 2013 Five-Year Review

Mr. Case provided an update on the findings from the 2013 Five-Year Review (FYR) (Attachment 6). A FYR is required for all cleanup actions under CERCLA. The purpose is to "evaluate the implementation and performance of a remedy to determine if the remedy is or will be protective of human health and the environment." The evaluation is based on data and observations.

Mr. Case said the FYR asks three questions about each site and remedy, which include the following:

1. Question A: Is the remedy functioning as intended by the decision documents?
2. Question B: Are the assumptions used to design the remedy still valid?
3. Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

The FYR is not conducted under the Performance-Based Remediation (PBR) contract and is not conducted by the PBR contractor. Mr. Case said that this ensures an independent review of the cleanup actions by those not currently operating those remedies. If a recommendation is made in the FYR, however, the PBR contractor is responsible to address it.

Mr. Case provided a list of the recommendations made in the 2013 FYR and their status on Slides 5-8. He noted that many are either completed or in progress. For instance, the OU4 recommendations will be addressed in the OU4 Updated Revised Proposed Plan/ROD Amendment. He noted that if an operable unit is not listed, it means there were no recommendations for that site.

The fifth FYR for Hill AFB will be completed in December 2018 and will address cleanup activities from October 2012 to September 2017. Work on the 2018 FYR will begin in Spring 2017 and will take 18 months to complete. Mr. Case said that in the past, the Hill AFB RAB has created a work group to review the FYR report and recommendations. The RAB will have the same opportunity for the 2018 FYR and will be hearing more about the upcoming FYR in 2017.

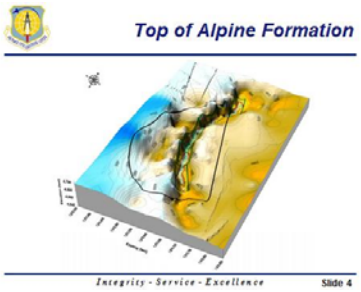
There were no additional comments or questions on this presentation.

## Agenda Item #7. Break/Breakout Sessions

RAB members broke into small groups, by community, to meet with AFCEC-Hill project managers to discuss items in more detail and any other issues of concern. Informational material provided during the breakout sessions is attached (Attachment 7).

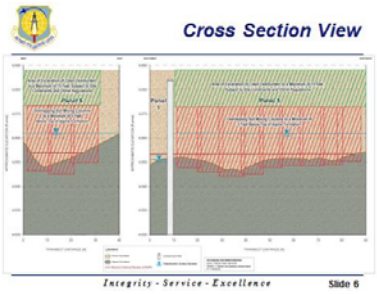
## Agenda Item #8. Zero-Valent Iron (ZVI)/Clay Mixing Implementation at Operable Unit 2 (On-base and South Weber)


Mr. Jeremy Cox provided a presentation on the Operable Unit 2 (OU2) Soil Mixing Treatability Study (Attachment 8). Mr. Cox pointed out the location of OU2 on the north side of the base that extends into a small portion of South Weber City. A map of the OU2 source area was provided on Slide 3. Mr. Cox said the panels highlighted in orange are not actual structures, but are used to identify sections of the source area. The containment wall, shown by the black outline around Panels 1 thru 4, was created by mixing clay with the soil to prevent further migration of the pooled TCE and other contaminants from leaving the source area. Mr. Cox said it was later discovered that part of the source area (Panel 5) lies outside the containment wall.




Slide 4 shows the top of the subsurface clay layer currently underneath the sand and gravel layers that make up the topography in the OU2 source area. Mr. Cox said the clay layer is a paleo channel that is a remnant of Lake Bonneville. He said the channel was a stream that cut into the clay layer and remains in the subsurface. Waste solvents dumped in the area pooled and collected in the paleo channel now known as the OU2 source area.

Mr. Cox said that since Panel 5 is outside of the containment wall there is a continued source of contamination into the groundwater which has to be addressed. The OU2 treatability study will evaluate the use of soil mixing of zero-valent iron (ZVI) and clay to treat the dense non-aqueous phase liquid (DNAPL), or undissolved contaminants heavier than groundwater, that lies at the bottom of the Panel 5 portion of the paleo channel. Mr. Cox said that clay impedes the flow of groundwater and binds contaminants to prevent movement. The ZVI causes a chemical reaction and breaks down the contaminants in the subsurface. Mr. Cox said ZVI/clay mixing is a passive technology once put in place.




Slide 6 provided a cross section view of Panel 5. The top sandy layer of clean dirt will be excavated down as much as 15 feet below the surface. A large specialized machine with an auger attachment will be brought in to mix the ZVI and clay in overlapping columns, as indicated by the red boxes on the image. The auger will mix to the depth of the channel and into the top three-feet of the clay layer to treat contaminants that have become bound in the clay. Once the auger mixes the appropriate amounts of ZVI and clay into the area, the area will be backfilled with clean soil and restored to its original condition.


A photo of the soil mixing machine and auger was shown on Slide 7. Due to the potential for contaminant vapors during mixing, a vapor hood is installed over the auger to prevent the vapors from leaving the area. Clay, ZVI and water are delivered through a pipe while the auger moves up and down in the subsurface. Mr. Cox said it will be mapped out beforehand how deep the auger will need to go in each column and will be done in overlapping columns until all soil is mixed. All water and soil generated by the mixing will be contained in the area.

Mr. Cox said the soil mixing equipment will be mobilized to OU2 in late Summer 2016, depending on the schedule of the sub-contractor. He said that because this is such specialized work, the schedule will be dependent upon the availability of the sub-contractor. The work is expected to take between one and two months and will be located only on-base, but will be visible from South Weber Drive. The treatability study will be monitored for two years through monitoring wells. Findings will be detailed in a Treatability Study report. Mr. Cox said they expect to see significant reductions of TCE and other contaminant concentrations in Panel 5.

Mr. Bonsteel asked Mr. Cox to define the expected reduction in concentrations. Mr. Cox said they could potentially see around a 95 percent reduction of concentrations.

Mr. Jeff MacFarlane asked how they know the correct mixture of clay and ZVI to get the desired treatment. Mr. Gary Colgan said Colorado University did an extensive amount of work in a lab over a dozen times to understand the mixing ratio to get the desired treatment, while erring on the conservative side. Mr. Cox said the mixture will contain 2 percent ZVI and 3 percent clay (similar to the containment wall) to get to the desired results. Mr. Cox said samples will be collected during the mixing of the clay and ZVI to ensure the optimal mixture and treatment. If the percentages are off, Mr. Cox said the sub-contractor will have to re-do the mixing, so it is in everyone's best interest to get it correct the first time.

Mr. MacFarlane said he remembers that the Source Recovery System, the original system installed at OU2 to pump the undissolved contaminants from the paleo channel, worked very well at first, but slowed down over time. He asked how close this site is to being cleaned up. Mr. Cox said OU2 will take decades to reach the cleanup standard of five parts per billion, but addressing the source area with this new technology will speed up that timeframe.

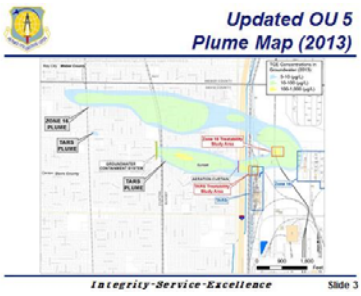
Ms. Summer Day said that adding only 3 percent clay to the soil does not seem enough to make it impermeable. Mr. Tom Simpkin said that adding only 3 percent of clay in this area is equivalent to the mixture used to create the impermeable containment wall at OU2. He said that if you add too much clay it can cause other problems such as swelling.

There were no additional comments or questions on this discussion.

## Agenda Item #9. Operable Unit 5 (Clinton and Sunset) Revised Plume Map

Mr. Castor provided the RAB with a revised plume map of Operable Unit 5 (OU5) that was created using more recent data (Attachment 9). OU5 is located on the west side of the base and extends into Sunset City and a portion of Clinton City. The source of the southern-most leg of the plume is the Tooele Army Rail Shop (TARS), so that portion is called the TARS plume. The northern leg of the plume is called the Zone 16 plume.


The previous 2012 OU5 map was provided on Slide 2. It depicts the OU5 plume as it was estimated at that time. Mr. Castor pointed out the cleanup systems already in place in OU5, such as the Aeration Curtain along 1900 West in Sunset and the Groundwater Extraction Trench in Clinton. Mr. Castor said treatability studies are being conducted in the source areas of both legs of the OU5 plume to determine if ERD injections of a carbon substrate will help to break down contaminants in the groundwater.




The updated OU5 map, created with the most current data, was provided on Slide 3. Mr. Castor noted the TARS plume downgradient of the Groundwater Extraction Trench in Clinton has degraded to below cleanup standards and is no longer shown on the map. In the upgradient portion of the TARS plume, the area of higher concentrations (shown by the yellow contour) has significantly decreased in size. He also noted the decrease in the width of the Zone 16 plume. Mr. Castor said these more recent results indicate that natural attenuation is occurring to break down the contaminants in the groundwater and the cleanup systems are working.

Mr. Castor said plume maps are updated every four years and changes are based on data collected from the monitoring well network. He said some wells are sampled annually, some every other year and some even every four years, depending on relative importance to the network. The next OU5 plume map revision will begin in 2017 and will be ready for public release in 2018.

Following a question from Mr. Doug Johnson about how often monitoring wells are sampled, Mr. Castor said that wells are sampled more frequently (quarterly or semi-annually) until the plume is defined and more is known about how the groundwater behaves in the area. Over time, the Air Force and the contractors can recognize trends for that particular site, which allows them to collect samples based on what is needed. Mr. Castor said monitoring wells near cleanup systems and treatability study locations are sampled more frequently, some as often as quarterly, to ensure they are operating as designed and to gauge treatment.

There were no additional questions or comments on this presentation.

## Agenda Item #10. Potential Agenda Items for Next Hill AFB RAB Meeting

Mr. Sueltenfuss asked RAB members for input on the meeting and asked if anything needs to be adjusted for the next RAB meeting.

Ms. Day said she appreciates the level of technicality in the presentations. She said she feels the RAB is a diverse group that has a technical understanding, so she would like to see more of the same.

Mr. Ray said he preferred the public comment opportunity near the end of the meeting. Mr. Sueltenfuss said that it causes some issues if someone from the public comes to make a comment at an advertised time and the meeting has ended early. Mr. Buck Ekstrom said he has worked with a wrestling tournament that puts a disclaimer on their schedule that says something similar to, "The potential exists that we may be ahead of schedule, so if we can end early, we will." Mr. Sueltenfuss said the Air Force will work with the co-chairs at the next planning meeting to discuss options.

Potential Agenda Items for the July 28 Hill AFB RAB Meeting

- Operable Unit 15 (OU15) – Indoor Air Sampling Program
  - Results of 2015/2016 Indoor Air Sampling Program
  - OU15 Proposed Plan
  - OU15 Risk Assessment
- Operable Unit 8 Treatability Study Results

## Item #11. Adjournment

Meeting adjourned at 8:40 p.m.

## Attachments:

1. Updated Staff List
2. Agenda
3. Action Item List
4. RAB Schedule
5. Presentation Slides – Operable Unit 4 Revised Proposed Plan
6. Presentation Slides – 2013 Five-Year Review Update
7. Breakout Materials
8. Presentation Slides – ZVI/Clay Mixing Implementation at Operable Unit 2
9. Presentation Slides – Operable Unit 5 Revised Plume Map

# Hill AFB
# Restoration Advisory Board
# Meeting

6:30 p.m., April 28, 2016

**Sunset City Building** (Sunset Room)
**200 West 1300 North**
**Sunset, Utah**

Pre-RAB Meeting Training Session

**6 p.m.** **Zero Valent Iron (ZVI)/Clay Mixing Technology**
*Training on the ZVI/clay mixing technology that will be used at Operable Unit 2 in Summer 2016* ..... Tom Simpkin (CH2M)

## RAB Meeting Agenda

**6:30 – 6:35** **Welcome**..... Darrin Wray, RAB Air Force Co-Chair

**6:35 – 6:40** **Staff Introductions** ..... Mark Loucks, AFCEC-Hill

**6:40 – 6:55** **RAB Business**..... Tim Sueltenfuss, RAB Facilitator
- Action Items
  - Action Item List
  - RAB Schedule
  - RAB Operating Procedures – Vote
- Operable Unit 12 Explanation of Significant Differences – Mark Loucks

**6:55 – 7:00** **Public Comment Opportunity**

**7:00 – 7:40** **Operable Unit 4 (On-base, South Weber, Riverdale) Revised Proposed Plan**
30 minutes Presentation..... Mark Loucks (AFCEC-Hill) and Andy Castor (CH2M)
10 minutes RAB Questions and Discussion

**7:40 – 8:00** **2013 Five-Year Review Update**
10 minutes Presentation..... Jarrod Case (AFCEC-Hill)
10 minutes RAB Questions and Discussion

**8:00 – 8:25** **Break/Breakout Sessions**

**7:25 – 7:40** **ZVI/Clay Mixing Implementation at Operable Unit 2 (On-base & South Weber)**
10 minutes Presentation.....Shannon Smith (AFCEC-Hill) and Jeremy Cox (CH2M)
5 minutes RAB Questions and Discussion

**8:40 – 8:55** **Operable Unit 5 (Clinton & Sunset) Revised Plume Map**
10 minutes Presentation.....Jason Wilde (AFCEC-Hill) and Andy Castor (CH2M)
5 minutes RAB Questions and Discussion

**8:55 – 9:00** **Agenda Items for July 28, 2016 Meeting**

**9:00** **Adjourn**

# Acronym Definitions

The following acronyms are commonly used in cleanup program reports and documents.

**AFB:** Air Force Base
**AFCEC:** Air Force Civil Engineering Center
**ARA:** Alliance for Risk Assessment
**ARARs:** Applicable or Relevant and Appropriate Requirements
**ASTP:** Air Stripper Treatment Plant
**ASU:** Arizona State University
**ATSDR:** Agency for Toxic Substances and Disease Registry
**BTEXN:** Benzene, Toluene, Ethylbenzene, Xylenes, and Naphtalene
**BRA:** Baseline Risk Assessment
**CE:** Civil Engineering
**CERCLA:** Comprehensive Environmental Response, Compensation and Liability Act
**CRP:** Community Relations Plan
**CWSID:** Central Weber Sewer Improvement District
**DCA:** Dichloroethane
**DCE:** Dichloroethene
**DNAPL:** Dense Non-aqueous Phase Liquid
**DOD:** Department of Defense
**EA:** Enhanced Attenuation
**EA:** Environmental Assessment
**EE/CA:** Engineering Evaluation/Cost Analysis
**EPA:** Environmental Protection Agency
**ERA:** Environmental Restoration Account
**ERD:** Enhanced Reductive Dechlorination
**ERP-O:** Environmental Restoration Program Optimization
**EVO:** Emulsified Vegetable Oil
**EUL:** Enhanced Use Lease
**FFA:** Federal Facilities Agreement
**FS:** Feasibility Study
**FY:** Fiscal Year
**FYR:** Five-Year Review
**GIS:** Geographic Information System
**IRA:** Interim Remedial Action
**IRP:** Installation Restoration Program
**IST:** Installation Support Team
**IWTP:** Industrial Wastewater Treatment Plant
**LNAPL:** Light Non-aqueous Phase Liquid
**LTM:** Long-term monitoring
**LUST:** Leaking Underground Storage Tank
**MAL:** Mitigation Action Level
**MCL:** Maximum Contaminant Level
**MD:** Munitions Debris
**MEC:** Munitions and Explosives of Concern
**MMRP:** Military Munitions Response Program
**MRS:** Munitions Response Site
**MTBE:** Methyl Tertiary Butyl Ether
**MNA:** Monitored Natural Attenuation
**MPO:** Minimum Performance Objectives
**MRL:** Minimal Risk Level
**NAS:** National Academies of Science
**NIT:** North Interceptor Trench
**NDSID:** North Davis Sewer Improvement District
**NPL:** National Priorities List
**O&M:** Operations and Maintenance
**OU:** Operable Unit
**OES:** Optimized Exit Strategy
**PA/SI:** Preliminary Assessment/Site Inspection
**PBR:** Performance-Based Remediation
**PCB:** Polychlorinated Biphenyls
**PCE:** Perchloroethylene (tetrachloroethene**)**
**PMP:** Performance Monitoring Plan
**PP:** Proposed Plan
**PPB:** Parts per billion
**PPBV:** Parts per billion by volume
**PPM:** Parts per million
**PRB:** Permeable Reactive Barrier
**PSVR:** Performance Standard Verification Report
**QA/QC:** Quality Assurance/Quality Control
**RAB:** Restoration Advisory Board
**RCRA:** Resource Conservation and Recovery Act
**RA:** Remedial Action
**RC:** Response Complete
**RD:** Remedial Design
**RfC:** Reference Concentration
**RFP:** Request for Proposal
**RI:** Remedial Investigation
**RIP:** Remedy in Place
**ROD:** Record of Decision
**RPM:** Remedial Project Manager
**RSL:** Regional Screening Level
**SC:** Site Closeout
**SRS:** Source Recovery System
**SVE:** Soil Vapor Extraction
**SVOC:** Semi-volatile Organic Compound
**TAG:** Technical Assistance Grant
**TARS:** Tooele Army Rail Shop
**TCA:** Trichloroethane
**TCE:** Trichloroethene
**TPH:** Total Petroleum Hydrocarbons
**UDEQ:** Utah Department of Environmental Quality
**UTTR**: Utah Test and Training Range
**VI:** Vapor Intrusion
**VOC:** Volatile Organic Compound
**VRS:** Vapor Removal System
**ZVI:** Zero-Valent Iron
**µg/L:** Micrograms per liter

# Hill Air Force Base
# 2016 RAB Action Items

| Item No. | Action Item | Requester | Date Requested | Action Taken | Responsible Party | Target Completion Date | Status |
|---|---|---|---|---|---|---|---|
| 2016-2 | Ask RAB if they would like to form a work group to review the 2018 Five-year Review. | C. Brown | 4/28/2016 RAB Mtg | | C. Brown | 8/1/2017 | In progress |
| 2016-1 | Notify RAB when Operable Unit 12 Explanation of Significant Differences (ESD) is available | C. Brown | 4/28/2016 RAB Mtg | | C. Brown | 6/15/2016 | In progress |
| 2015-1 | Request for information (cleanup site info, RAB schedule, RAB mtg material, etc.) easily accessible from web | Various RAB members | 8/27/15 RAB Mtg | 1/2016: In progress, working with Hill PA to create link on Hill AFB website<br>1/28/16: Hill Public Affairs will build the site in Feb. 2016<br>3/1/16: Air Force is migrating to different format and would require all linked pages (environmental included) to re-load all documents. Decision was made to wait until migration is completed. | M. Loucks B. Fisher D. Harris | 1/28/2016 | In progress |
| 2015-5 | Provide tour opportunity for RAB members to see bio-remediation injections | B. Gibson D. Johnson E. Sorensen | 10/29/2015 RAB Mtg | | M. Loucks C. Brown | 3/1/2016 | When Appropriate |
| 2015-7 | Provide revised BASAP report to RAB once approved | B. Ekstrom | 10/29/2015 RAB Mtg | 1/2016: BASAP still in review | M. Roginske | 3/1/2016 | In progress |
| 2015-9 | Post air sampling notice on Hill AFB website | Various RAB members | 10/29/2015 RAB Mtg | 12/29/2015: Request made to add to webpage being created on Hill AFB website<br>1/28/2016: Will post once website up and running | B. Fisher | 1/28/2016 | In progress |
| 2016-3 | Research excavation work taking place along the south side of South Weber Drive near Operable Unit 4 to determine if it is associated with Hill AFB. | T. Long | 4/28/2016 RAB Mtg | Jarrod looked into the work taking place in that location and reported back to Mayor Long that the work is not associated with Hill AFB or the environmental work. | C. Brown | 5/1/2016 | Complete |
| 2015-8 | Provide more information about the methodology used to make air sampling determinations (specifically in regards to graduation?) | B. Ekstrom | 10/29/2015 RAB Mtg | 1/2016 - Decision to graduate residents has been postponed to allow time to collect additional data | M. Roginske C. Schwabenlander | 1/1/2016 | Postponed |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2015-11 | Revise RAB Operating Procedures to reflect current status (website & membership) | C. Brown | | 1/13/2016: Changes have been made and approved internally, sent out to AFCEC PA, facilitator and RAB co-chairs for review<br>1/21/2016: Postponed to allow time to review and consider other options<br>3/1/2016: Directed to reopen<br>4/2016: Emailed revisions to RAB for review prior to vote at 4/28 RAB meeting. | Various | 4/28/2016 | Complete |
| 2015-2 | Provide OU site summary spreadsheet at RAB mtgs | Various RAB members | 8/27/15 RAB Mtg & 10/29/2015 RAB Mtg | 10/2015: Working to add exposure pathways column<br>1/28/2016: Provided at Hill AFB RAB Mtg | Various | 1/28/2016 | Complete |
| 2015-6 | Provide confidence interval about air sampling data to Clint Holm. | C. Holm | 10/29/2015 RAB Mtg | 1/12/2016: In progress - should be completed before RAB meeting<br>1/22/2016: Mark Roginske emailed Mr. Holm the data that was requested. | M. Roginske C. Schwabenlander | 1/1/2016 | Complete |
| 2015-12 | Conduct email vote for community member positions expiring end of 2015, according to current RAB OP | C. Brown | 10/29/2015 RAB Mtg | 12/15/15: Emailed RAB members to vote for community member positions. Vote due by Dec. 20 | C. Brown | 12/12/2015 | Complete |
| 2015-10 | Email air sampling fact sheet to RAB members so they are aware of what residents are receiving | Various RAB members | 10/29/2015 RAB Mtg | Emailed fact sheet to RAB members. | C. Brown | 12/9/2015 | Complete |

# Restoration Advisory Board Calendar
**April 2016**

## RAB Meetings

| | | |
|---|---|---|
| **2016** | Thursday, July 28 | Sunset City Building |
| | Thursday, Oct. 27 | Sunset City Building |
| **2017** | Thursday, Jan. 26 | Sunset City Building |
| | Thursday, April 27 | Sunset City Building |

## RAB Training

April 28 Zero-Valent Iron (ZVI)/Clay Mixing 6 p.m. (prior to RAB meeting)

Potential Future Trainings

- Cleanup Technologies – Pre-meeting Training
  - Bio-reactors
- Geology/Hydrogeology
- Well network optimization
- How plume maps are created

## RAB Tours

June 15 Annual Operable Unit Tour 6 to 8 p.m.

- Annual windshield tour of the on- and off-base Operable Units, or cleanup sites associated with Hill AFB
- Meet at the Riverdale Park-n-Ride (5234 S Freeway Rd next to the Piano Gallery)
- Please arrive a little early so we can leave promptly at 6 p.m.

June 24 Thunderbirds Practice Air Performance TBD

- Each RAB member can bring up to five guests (six total, including the RAB member)
- Call Carly (801-775-6760) or Dave (801-775-6892) with required information for each guest for background check
  - Full name
  - Driver's license number and state of issue
  - Birthdates for minors without driver's license
- More details to come about specifics for the day

Potential Future Tours

- Enhanced Reductive Dechlorination (ERD) Injection Tour (Summer 2016 - OU4)
- Operable Unit 2 ZVI Implementation (Summer 2016)
- Operable Unit 4 Bio-reactors (Summer 2016)

# Air Force Civil Engineer Center

*Integrity-Service-Excellence*

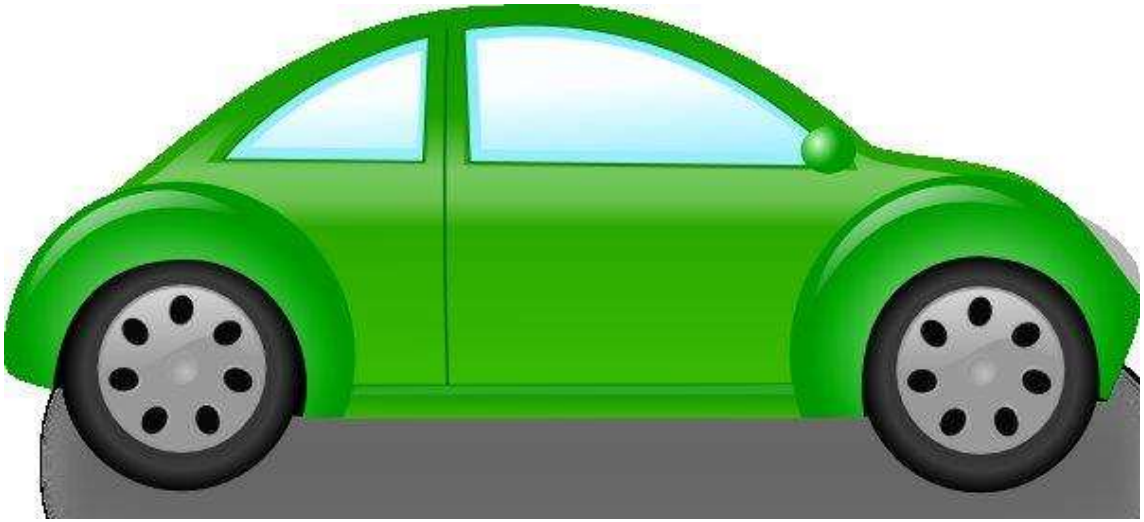

# Operable Unit 4 Updated Revised Proposed Plan

**Mark Loucks – AFCEC/CZOM Hill Section**
**Andy Castor – EA Team**
**April 28, 2016**

# ESD vs ROD Amendment

**You buy a car. At the time it meets your needs and does what you need it to do.**

**OU4 ROD in 1994 met our ROD requirements and worked fine for a long time.**



# ESD vs ROD Amendment

**Later you decide to change it up a little. Maybe paint it and get some fancy wheels.**

**That's an ESD. It's still the same car, but purple with fancy rims.**

**For OU4 we discontinued vapor extraction from beneath landfill (was not effective).**

# ESD vs ROD Amendment

**Your life situation changes and all of a sudden, the little car isn't working for you anymore. You need something different.**

**You need to either cut your car apart and add more doors and seats or get a totally different vehicle.**

**This is a ROD Amendment.**

**At OU4 we are adding new remedies beyond what was in the original ROD.**

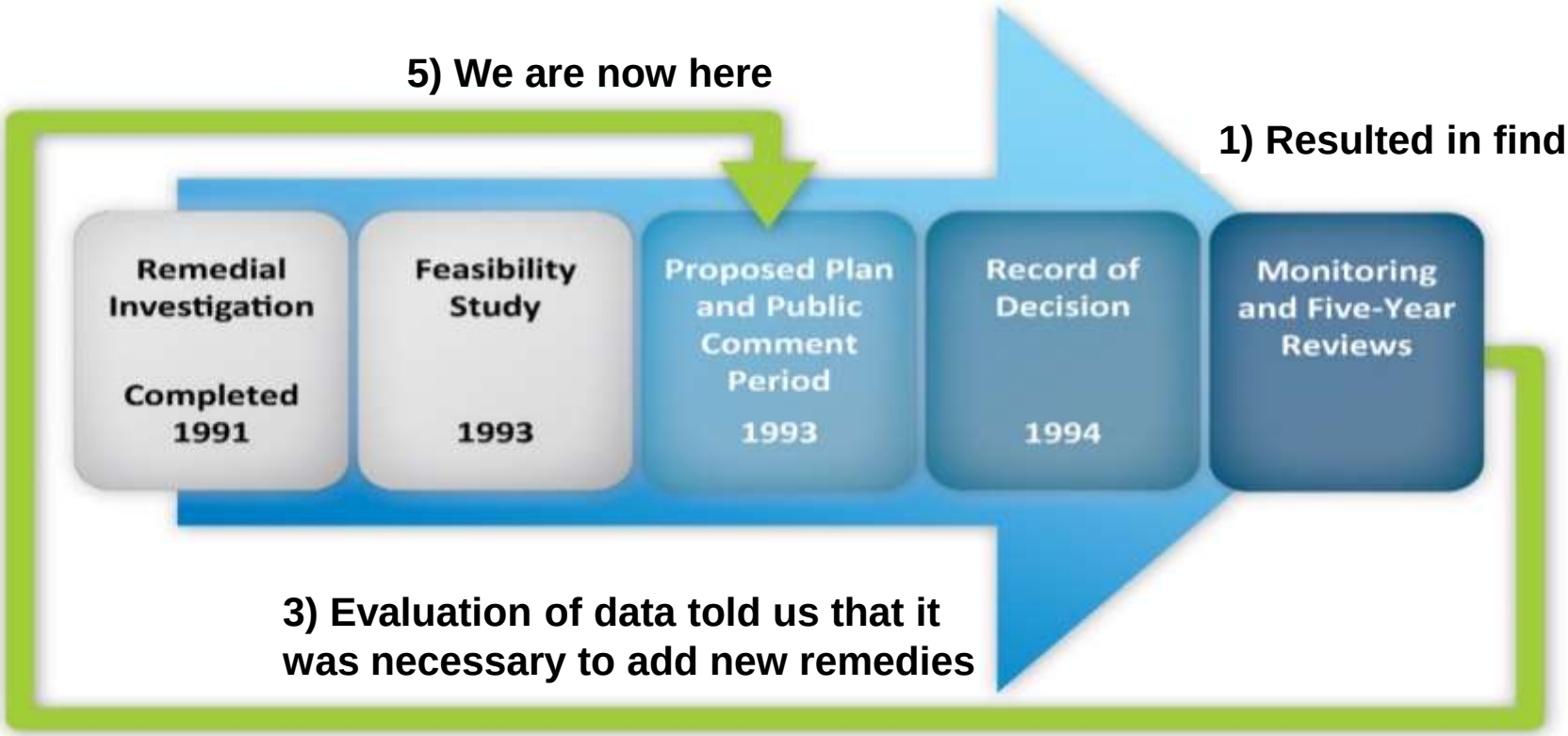
# How does one Amend a ROD

- CERCLA process must be followed
- Amendment only applies to a fundamental change in remedy
- In an amendment we do the following:
  - Draft a Revised Proposed Plan with new remedies
  - Hold public meeting and comment period
  - Amend Record of Decision and get approval
  - Create a remedial action work plan
  - Implement new remedy

# CERCLA Process at OU 4

5) We are now here

1) Resulted in findings




3) Evaluation of data told us that it was necessary to add new remedies

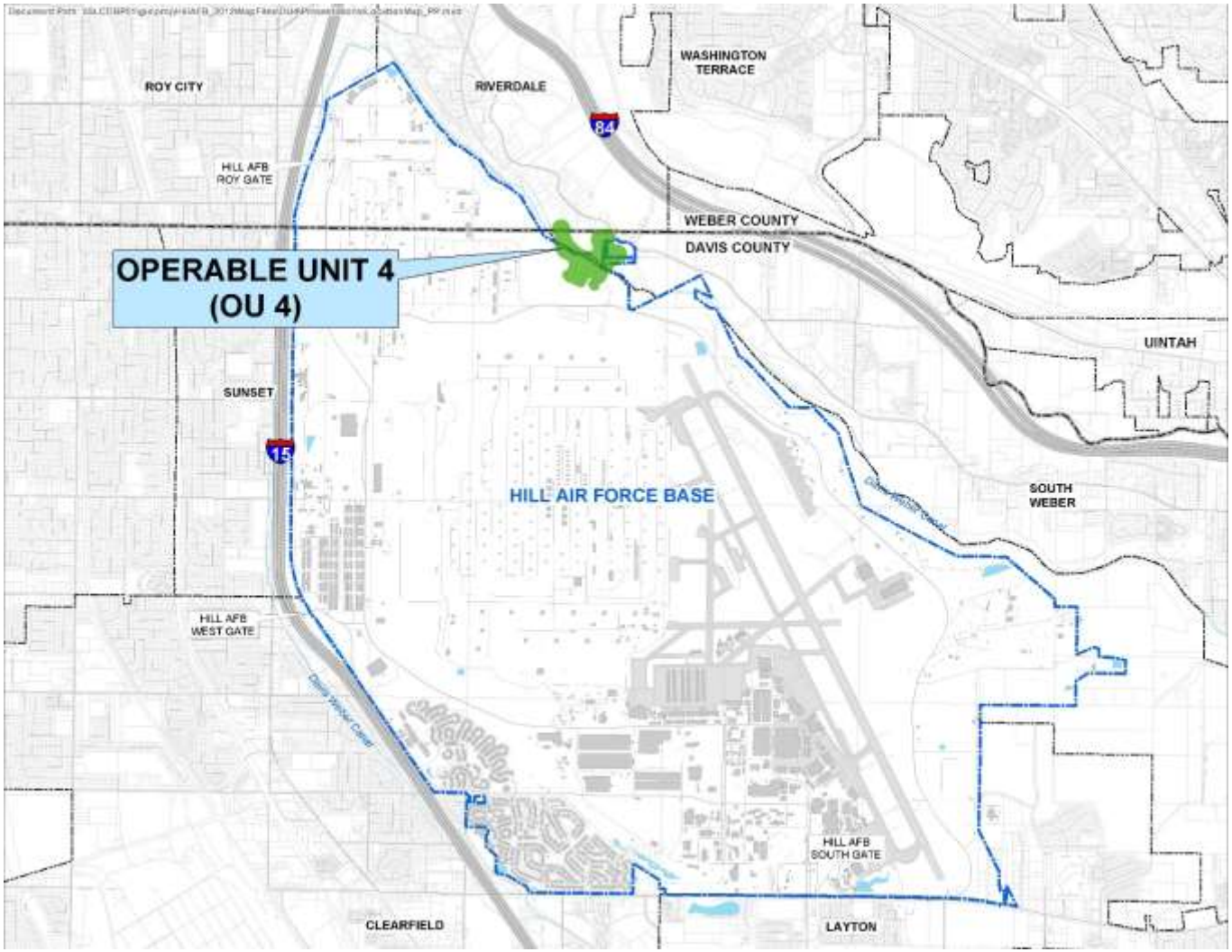
4) CERCLA allows for an opportunity to go back

2) Collected data to answer 5 Yr. Review findings

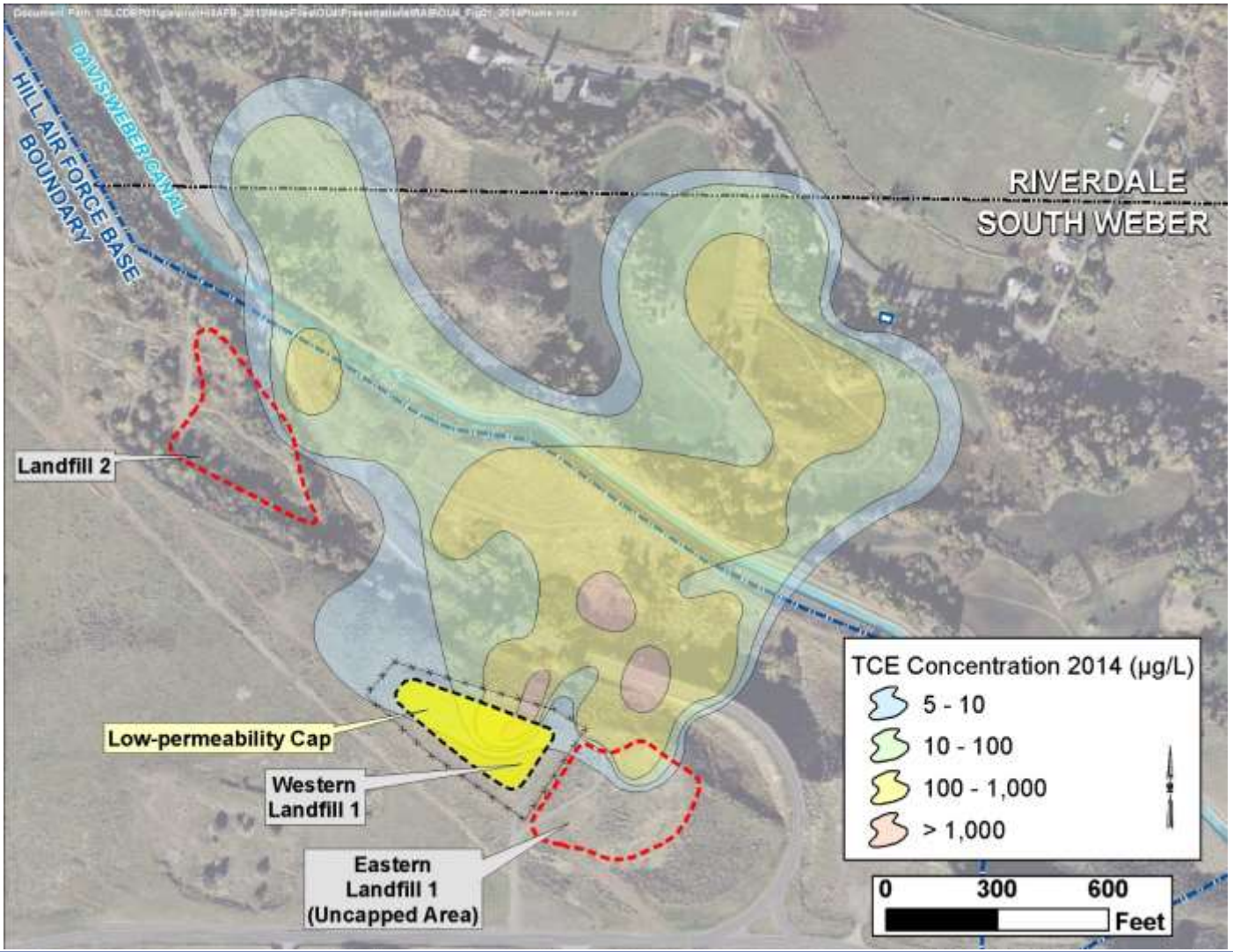
# *We Returned to Proposed Plan So What's Next*

- **Drafted a Revised Proposed Plan – Jul 2015**
- **Public meeting/comment period in Riverdale – Aug 2015**
- **Started drafting Record of Decision Amendment**
- **Collected more data to finalize design – Oct 2015**
- **Unanticipated results from data collection**
  - **Caused us to reevaluate the proposed expanded remedy**
  - **Necessitates we step back to the Proposed Plan**
    - **New public meeting/comment period**

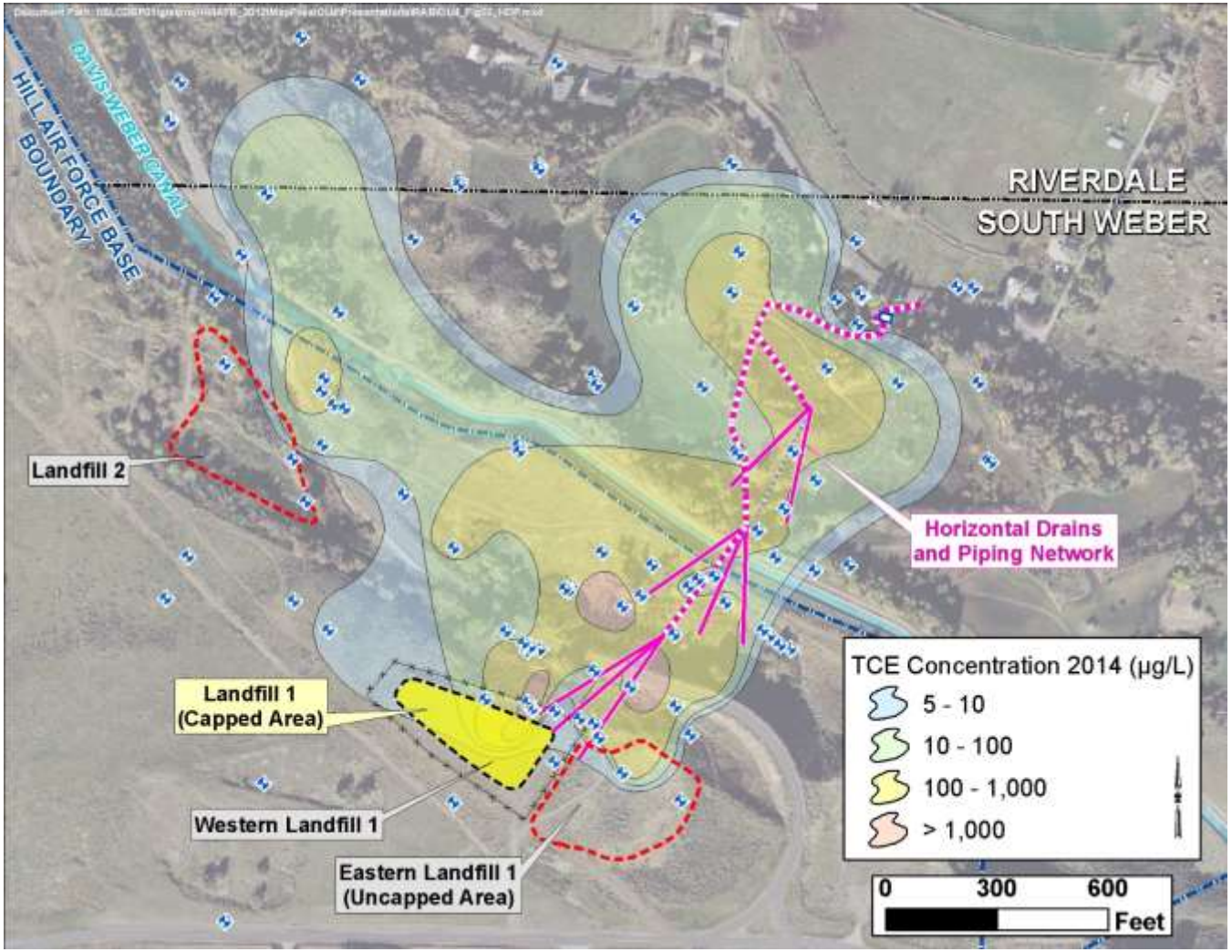
# Hill AFB – OU 4 Location



# OU 4 Source Areas



# OU 4 Existing Remedy




**Existing Remedy**

- **Low-permeability cap** installed at Landfill 1 – to limit water infiltration and movement of contaminants from beneath landfill cap
- **Horizontal Drain Network** - a passive groundwater collection system to remove contaminated groundwater and discharge it to sanitary sewer
- **Groundwater monitoring** - to ensure cleanup goals were being met
- **Institutional controls** – to limit any potential exposure

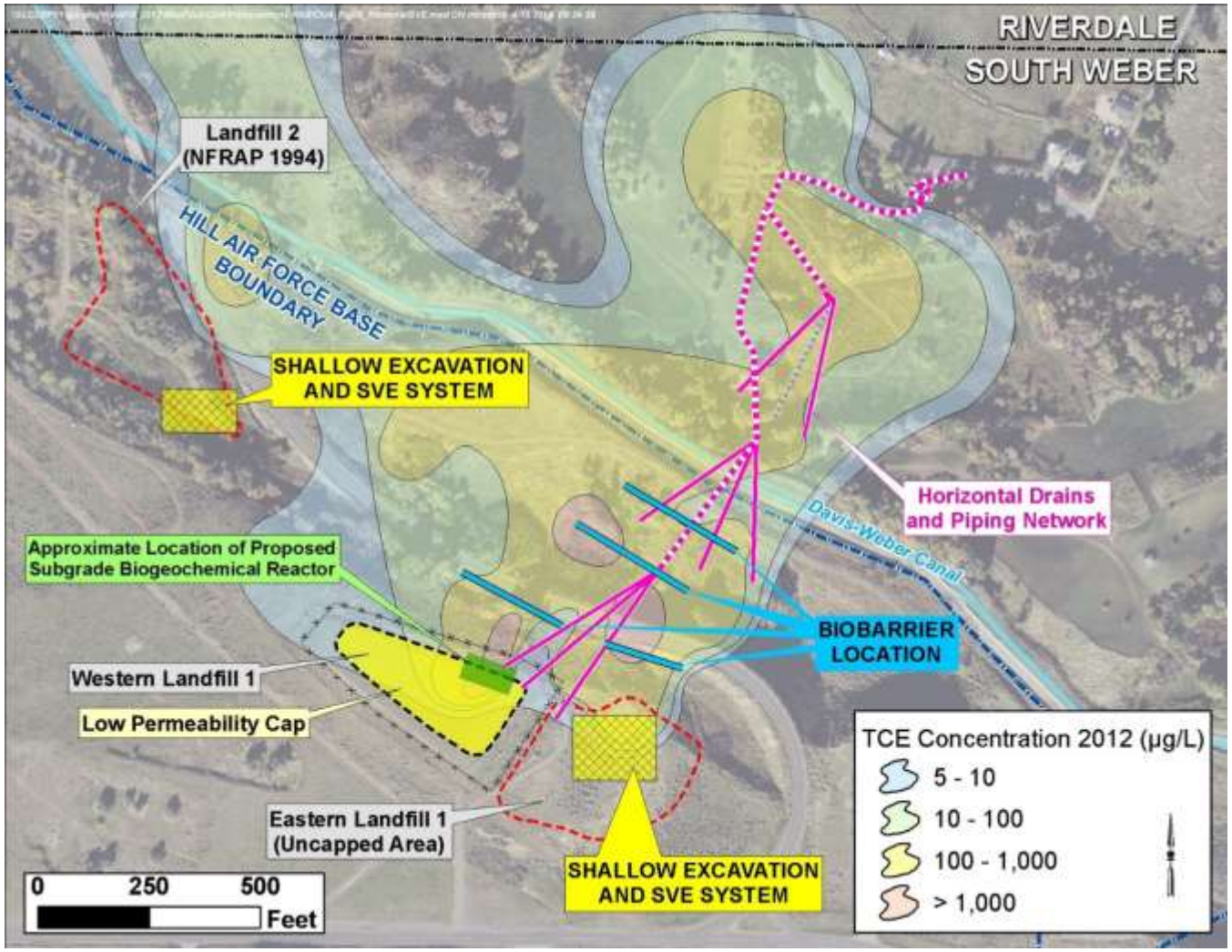
# Existing Remedy Performance

- **2013 Five-Year Review**
  - Current remedy is not functioning as intended but remains protective in the short-term
- **Low-permeability Landfill 1 cap**
  - Likely limits infiltration of surface water
  - Increase in TCE concentrations in groundwater downgradient of Landfill 1
  - Landfill 1 contents - Ongoing source of TCE contamination - Indefinite remedial timeframe
- **HDUS**
  - Extracted 37 million gallons of groundwater and 227 pounds of TCE since 1996
  - Works but is not reducing remedial timeframe
- **Uncapped Landfill 1 and Landfill 2 also identified as on-going TCE source areas**

# New Remedy Must Meet These Cleanup Goals

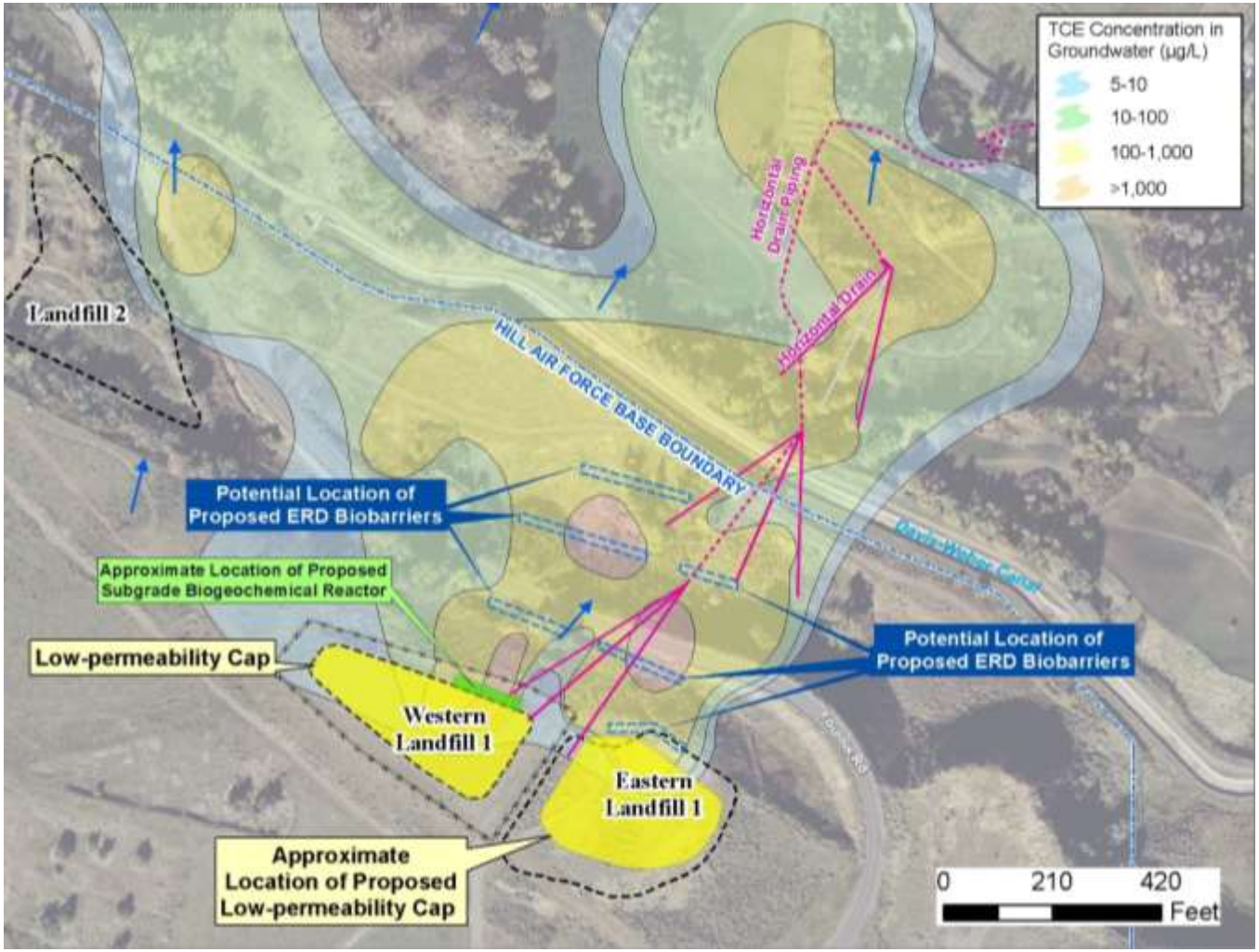
- Meet groundwater regulatory requirements (MCLs).
- Limit human health risks due to accidental ingestion, dermal contact, or inhalation of vapors.
- Prevent further degradation of groundwater quality.
- Eliminate/reduce the source(s) of groundwater contamination either through removal or source control.
- Prevent migration of contaminated vapors into residences.

# OU 4 Original Proposed Expanded Remedy




- **Bioreactor within Landfill 1 cap** – excavate continuing source area
- **Targeted shallow soil excavations –** uncapped Landfill 1 and Landfill 2
- **Soil vapor extraction** – uncapped Landfill 1 and Landfill 2
- **ERD biobarriers** – core of plume

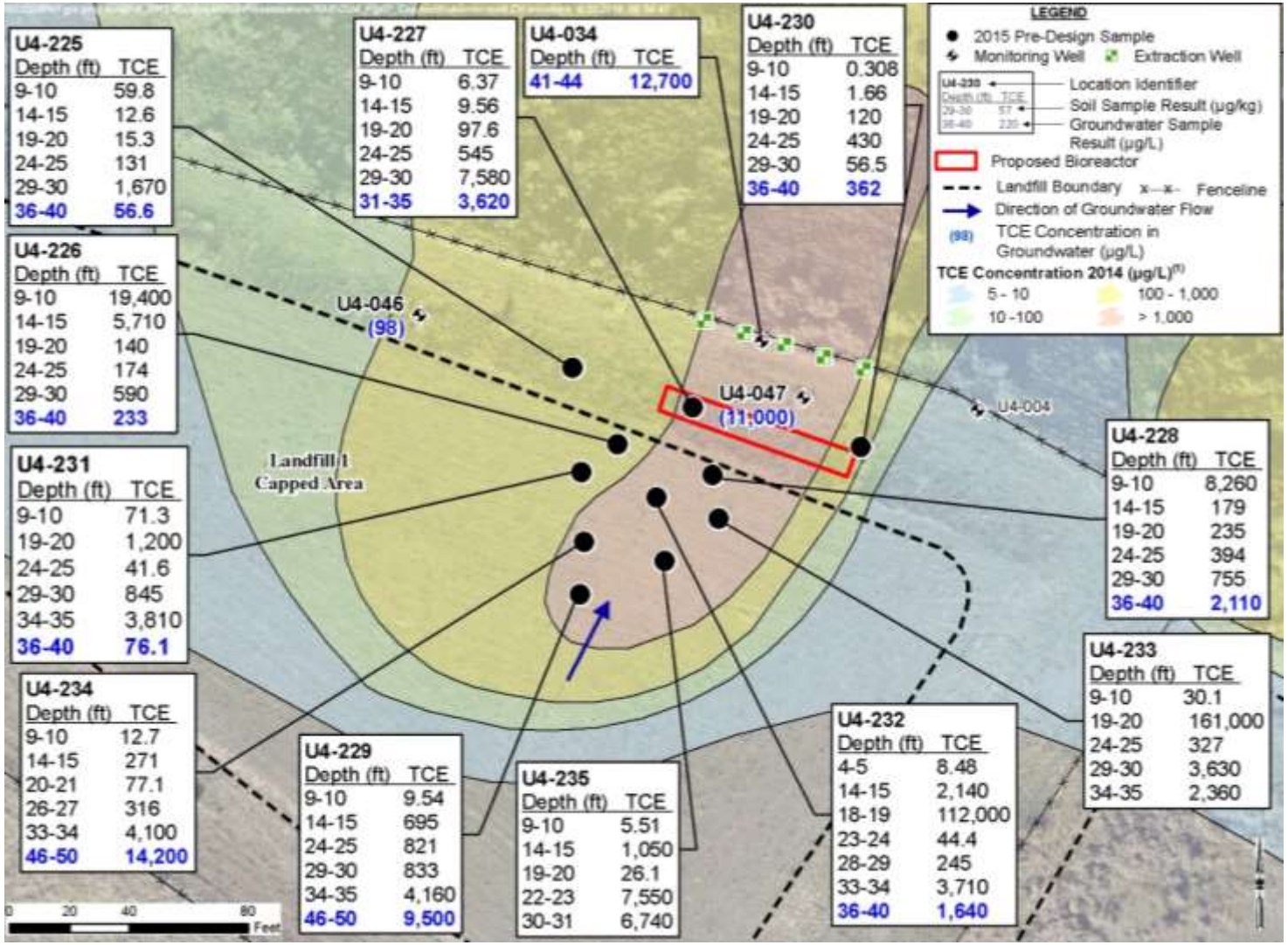
# OU 4 Revised Proposed Expanded Remedy




- **Bioreactor downgradient of Landfill 1 cap** – no excavation, series of column bioreactors
- **Low-permeability cap on Eastern Landfill 1**
- **ERD biobarriers** – core of plume and downgradient of new landfill cap

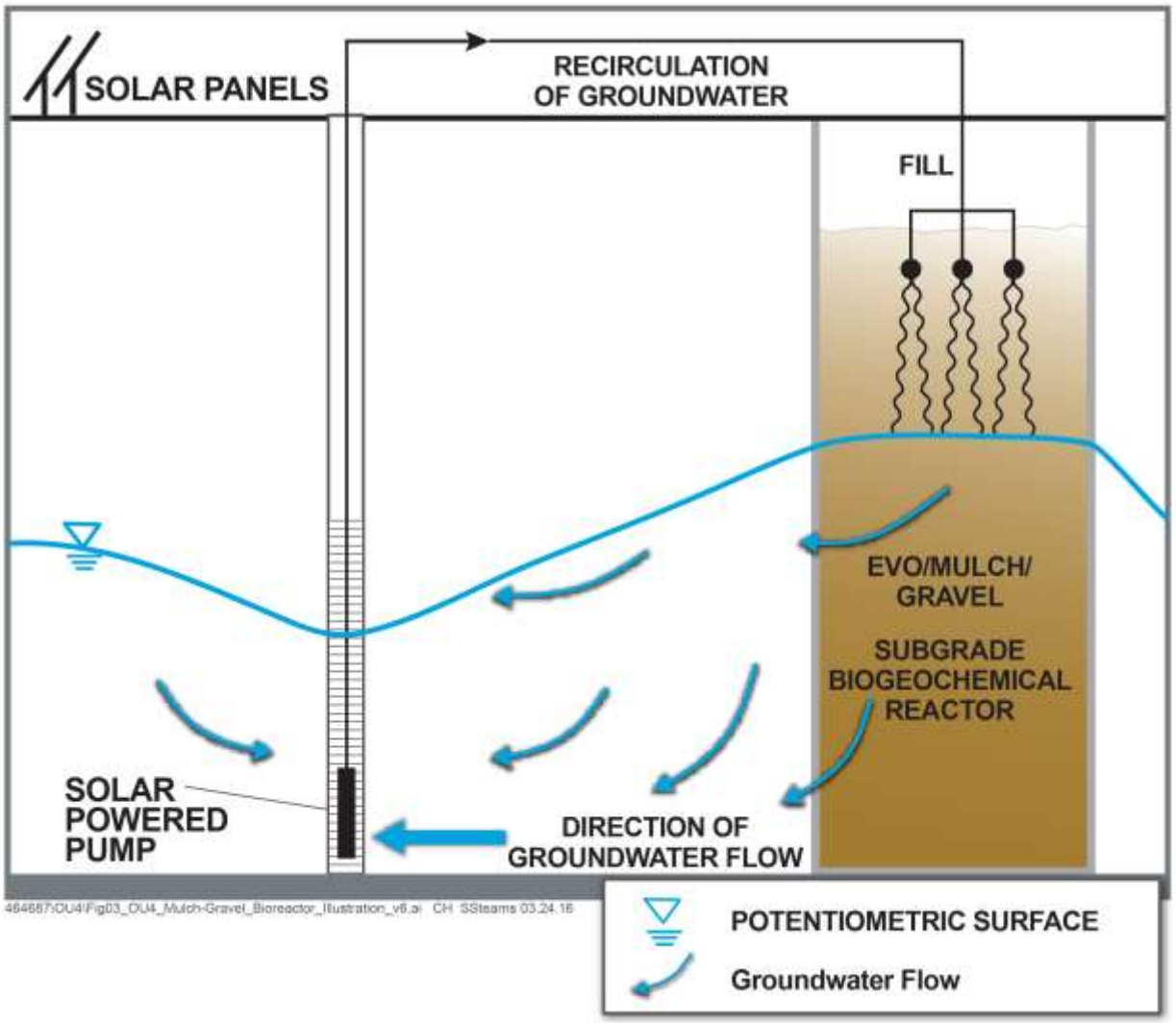
- **Soil Vapor Extraction Treatability Study** – Landfill 2 only, remove SVE as remedy in ROD Amendment

# Landfill 1 - Capped Pre-Design Results

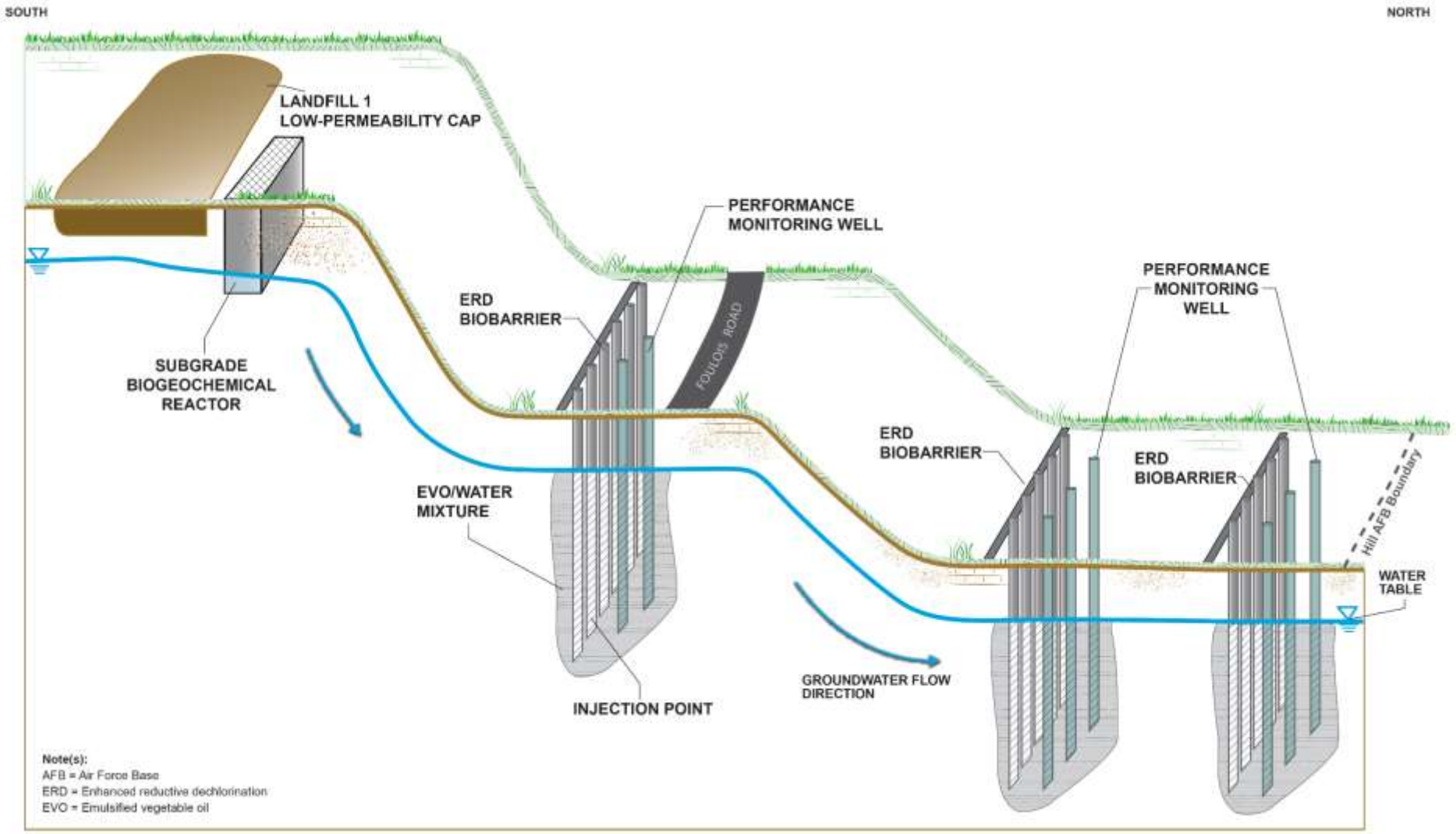


# OU 4 Proposed Expanded Remedy – Bioreactor

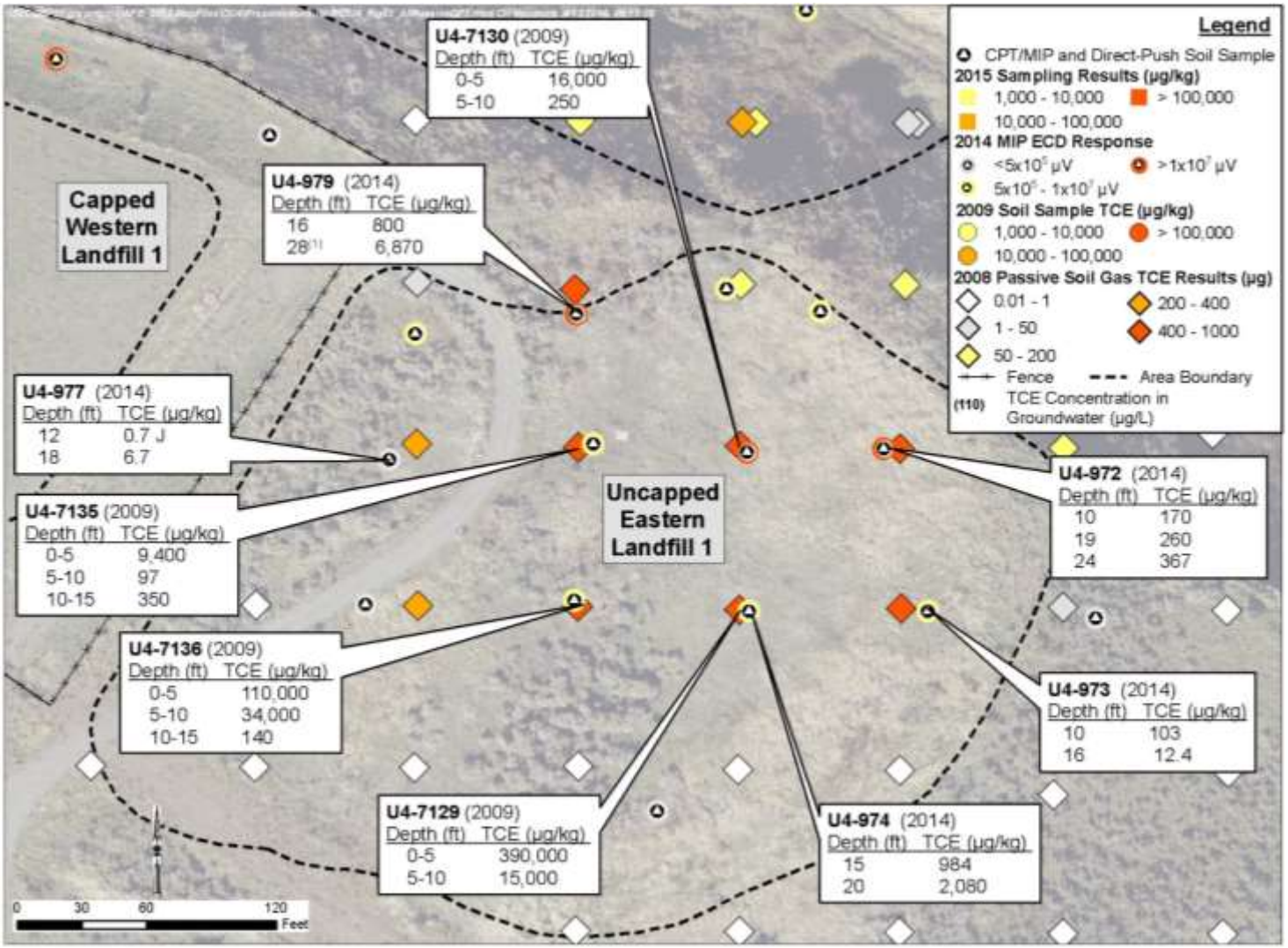
**Landfill 1**



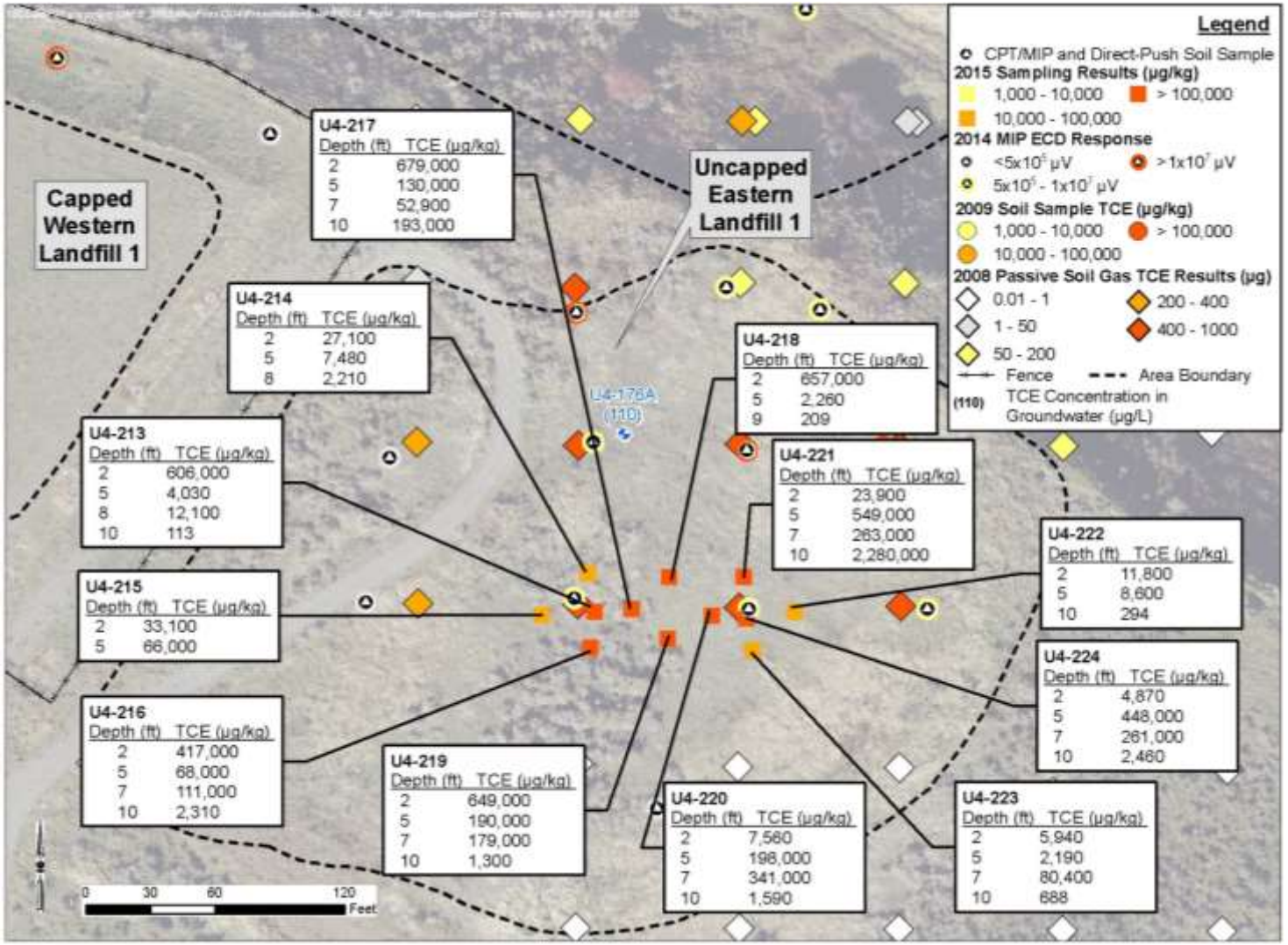
# OU 4 Proposed Expanded Remedy – ERD Biobarriers



# Landfill 1 - Uncapped Previous Results through 2014

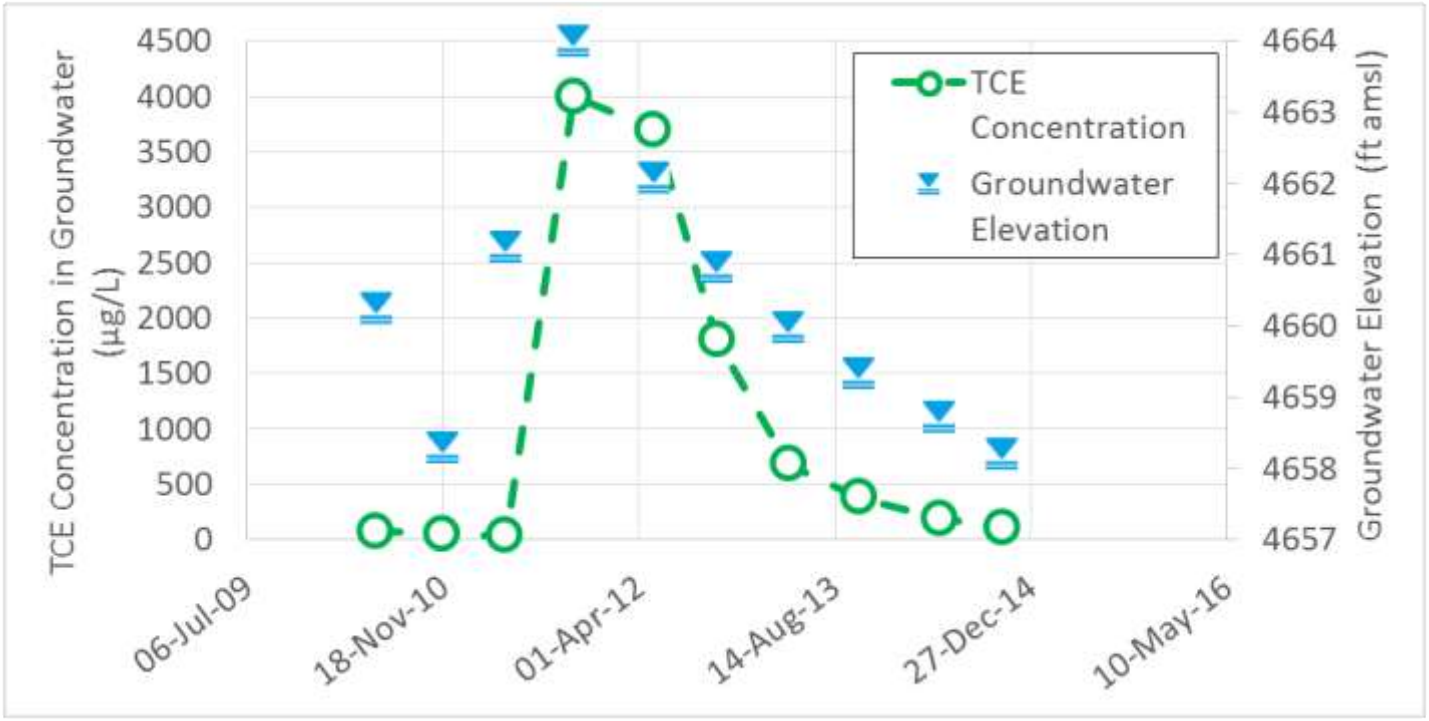


# Landfill 1 - Uncapped Pre-Design Results - 2015

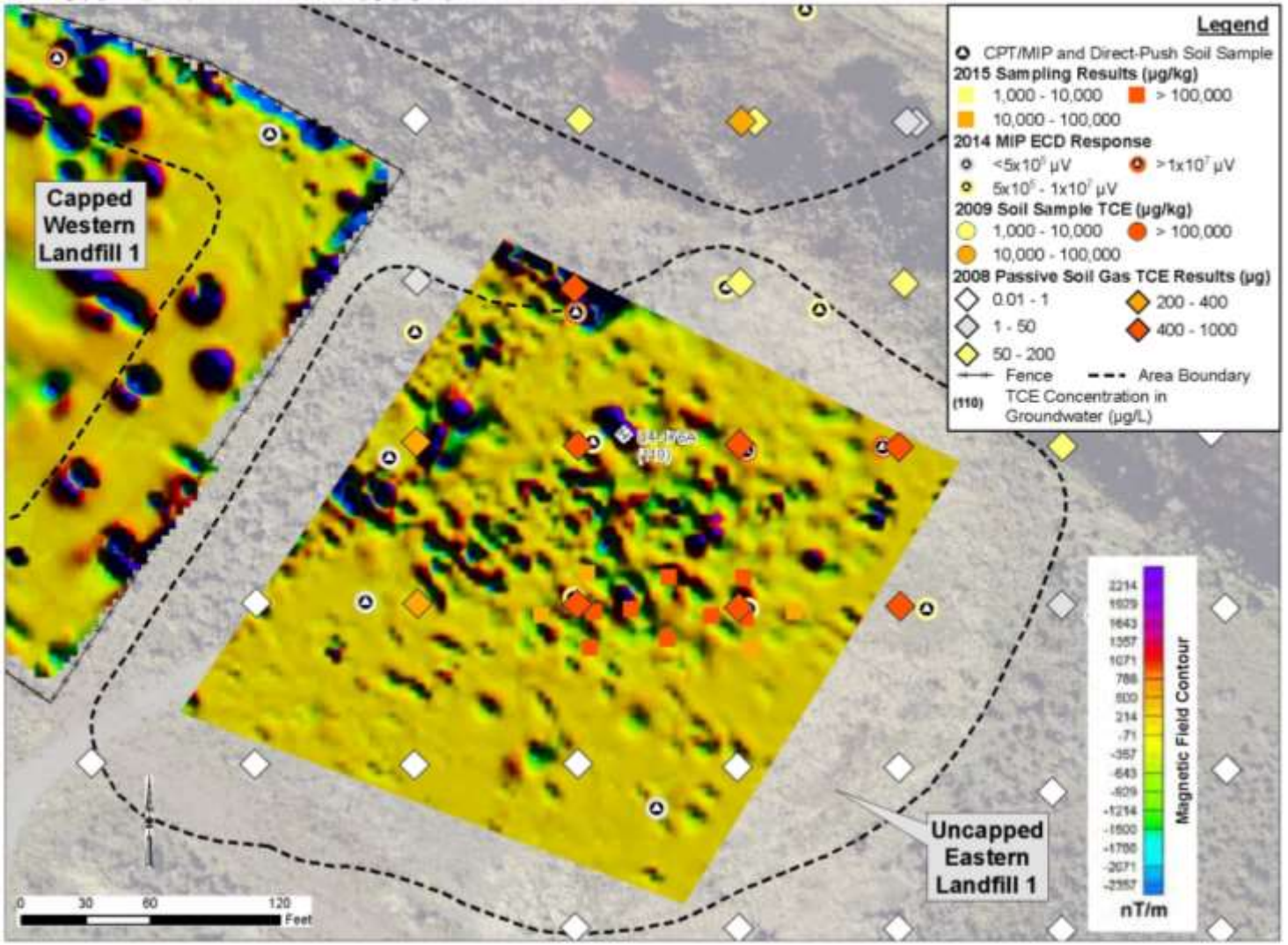


# Landfill 1- Uncapped Groundwater U4-176A

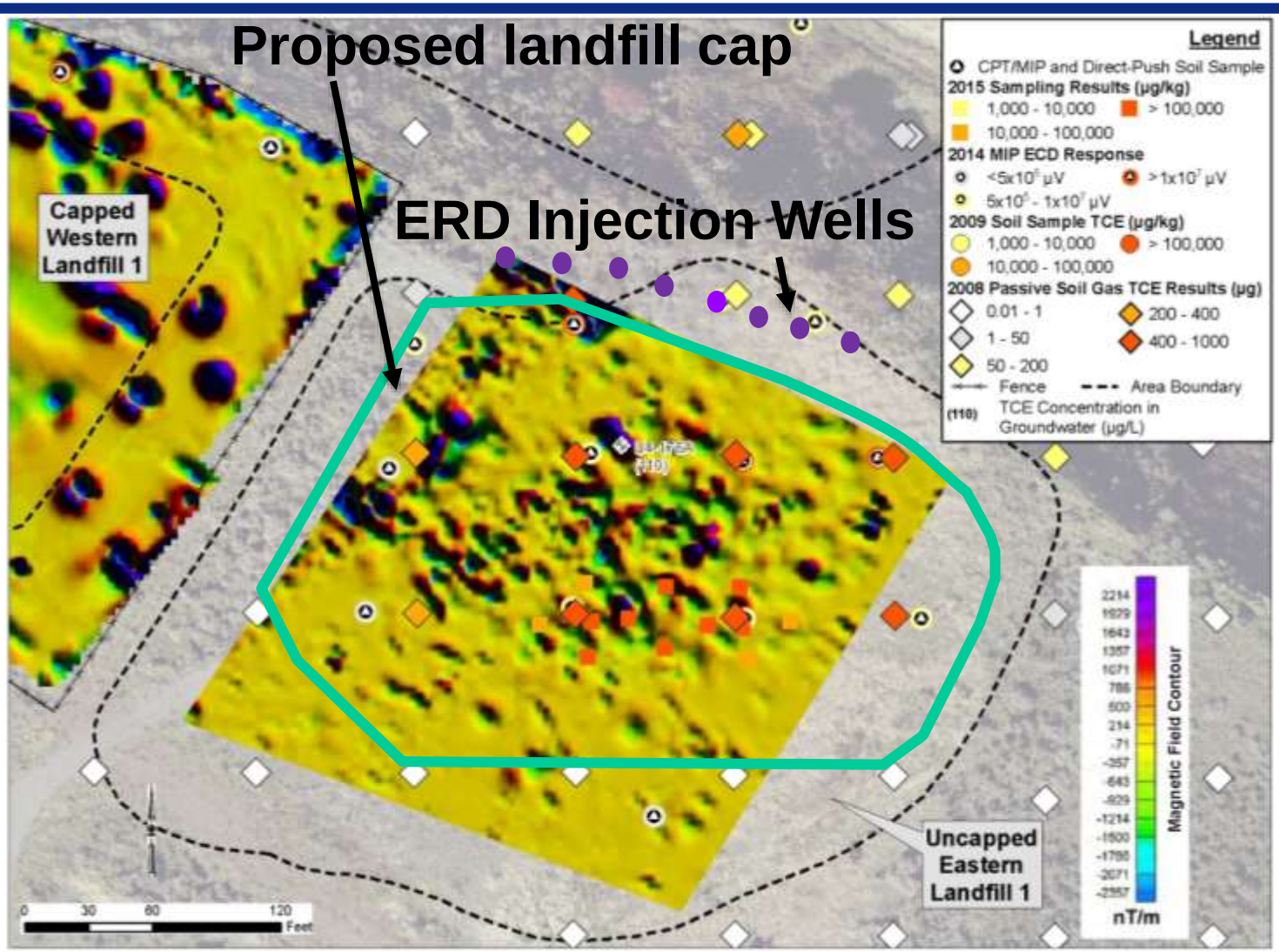
- TCE contamination extends to water table (high water)
  - Currently TCE concentrations in groundwater are low
  - Low groundwater levels = low TCE concentrations in groundwater
  - **High groundwater levels = high TCE concentrations in groundwater**



# Landfill 1 - Uncapped Magnetic Field Survey - 2013



# Proposed Landfill Cap / ERD Biobarrier



# Evaluation of Revised Proposed Expanded Remedy

- Meets all nine CERCLA evaluation criteria
  - ✓ Overall protection of human health and environment
  - ✓ Compliance with state and federal regulations (ARARs)
  - ✓ Long-term effectiveness and permanence
  - ✓ Reduction of toxicity, mobility, or volume
  - ✓ Short-term effectiveness
  - ✓ Implementability
  - ✓ Cost
  - ✓ Regulatory acceptance
  - ✓ Community acceptance

# Evaluation of Revised Proposed Expanded Remedy

## Cost

| | Existing Remedy | Revised Proposed Expanded Remedy |
|---|---|---|
| **Remedial Time Frame** | Source Area – Indefinite | Source Area – Monitor until landfill is removed |
| | Non-Source Area - Indefinite | Non-Source Area – 70 yrs |
| **Present Value Total Cost** | **$3,417,000** | **$5,595,000** |

# OU 4 Revised Proposed Expanded Remedy

- **Bioreactor downgradient of Landfill 1 cap**
  - No excavation within landfill cap
  - Series of column bioreactors
- **Low-permeability cap on uncapped Landfill 1**
- **ERD Biobarriers**
  - Core of eastern lobe
  - Downgradient of new landfill cap

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- **Soil Vapor Extraction Treatability Study**
  - Landfill 2 Only – Remove from ROD Amendment, conduct as treatability study

# OU 4 Schedule

- Updated Revised Proposed Plan – May 2016
- Public Comment Period – TBD (May-June) 2016
- Record of Decision Amendment – Summer 2016
- Remedial Design/Remedial Action Work Plan – Summer 2016
- Implementation of Proposed Expanded Remedy – Summer/Fall 2016

# Questions?

# Air Force Civil Engineer Center

*Integrity - Service - Excellence*

# 2013 Five-Year Review Update

April 28, 2016

**Jarrod Case, P.E.**

**801-777-3943**
**jarrod.case@us.af.mil**

# Five-Year Review (FYR) Refresher

**Required for all remedial actions selected under CERCLA § 121(c).**

**The purpose is to "*Evaluate the implementation and performance of a remedy to determine if the remedy is or will be protective of human health and the environment.*"**

**Evaluation based on data and observations.**

# FYR Refresher cont.

- **Question A: Is the remedy functioning as intended by the decision documents?**
- **Question B: Are the assumptions used to design the remedy still valid?**
- **Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

# FYR and the PBR Contract

- FYR not conducted under the Performance-Based Remediation (PBR) contract
- FYR not conducted by PBR Contractor
- 2013 FYR conducted by Leidos
- PBR Contractor responsible for addressing FYR recommendations

# Status of 2013 FYR Recommendations

| OU | Recommendation | Status |
|---|---|---|
| 1 | Prepare Explanation of Significant Difference (ESD) based on the Supplemental Human Health Risk Assessment (i.e. arsenic contaminated sediment). | Completed |
| 1 | Add differential settlement to Inspection Logs for the landfills to determine if repairs are required. | In Progress |
| 4 | Fencing of springs/seeps is required; issue should remain until a Record of Decision Amendment or Explanation of Significant Difference removes the requirement. Annual inspections should check for evidence of trespassing, or the likelihood of trespassing, at those springs/seeps that are not fenced. | In Progress |

# Status continued

| OU | Recommendation | Status |
|---|---|---|
| 4 | Conduct additional investigation at Landfill 1<br>• Eastern uncapped Landfill 1<br>• Dense Non-Aqueous Phase Liquid (DNAPL) in the Landfill 1 source area.<br>Modify remedy or select a new remedial approach<br>• Prepare Record of Decision Amendment or Explanation of Significant Difference | In Progress |
| 4 | Re-evaluate No Further Response Action Planned (NFRAP) status of Landfill 2. Conduct additional investigation at Landfill 2 to determine extent of contamination. | In Progress |
| 6 | Continue groundwater sampling to monitor extent of plume, conduct additional investigation of plume off-Base, and re-evaluate effectiveness of on- and off-Base systems in capturing the northern portion of the plume. | In Progress |

# Status continued

| OU | Recommendation | Status |
|---|---|---|
| 8 | Conduct additional investigation to understand the extent of the on-Base Trichloroethene (TCE) plume and address data gaps. | Completed |
| 8 | Conduct additional investigations to define off-Base TCE and 1,2-Dichloroethane (DCA) plumes. To better understand the capture of the 1,2-DCA Extraction System, either (1) establish correction factors for water elevations in extraction wells; or (2) install new piezometers. | In Progress |
| 8 | Update OU 8 Conceptual Site Model (CSM) based on additional investigations, and expand the comprehensive on-Base CSM. | Completed |
| 9 | Continue collection of groundwater data to fill data gaps and re-evaluate natural attenuation. Finalize selection of the remedy and prepare a Record of Decision. | Completed |

# Status continued

| OU | Recommendation | Status |
|---|---|---|
| 10 | Select a remedy and prepare a Record of Decision. | Completed |
| 11 | Select a remedy and prepare a Record of Decision. | Completed |
| 12 | Modify the Permeable Reactive Barrier (PRB) or determine an alternative solution for treating the off-Base TCE Plume. | In Progress |
| 13 | Finalize the ROD and place document in the Administrative Record and Information Repositories. | Completed |
| 14 | Complete the Feasibility Study and proceed with remedy selection as appropriate. | Completed |
| 15 | Establish Remedial Action Objectives and select a final remedy. Prepare a Record of Decision. | In Progress |

# 2018 FYR Schedule

- **Fifth FYR for Hill AFB; period of activities covered will be October 2012 through September 2017**
- **Contract to be awarded in Spring 2017**
- **2018 FYR required to be completed by Dec 2018**

# Questions?

# Air Force Civil Engineer Center

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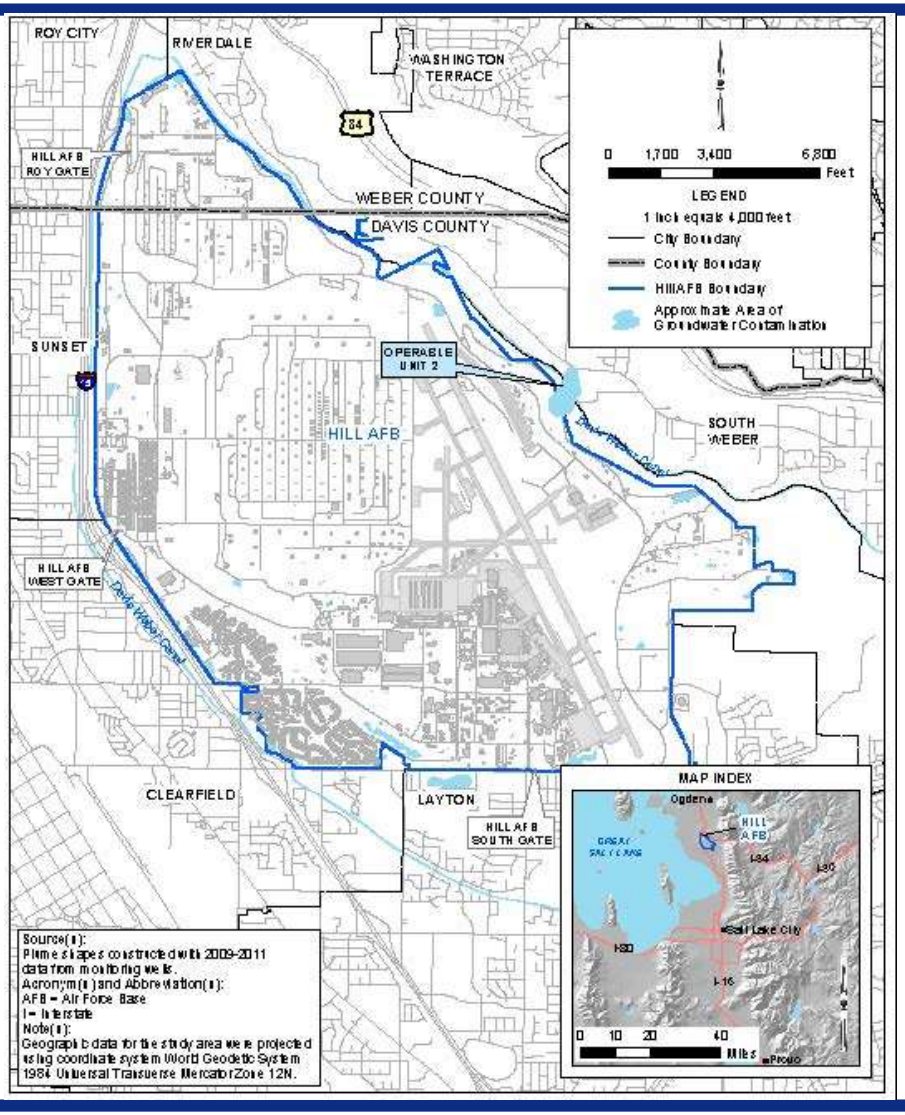
# OU 2 Soil Mixing Treatability Study

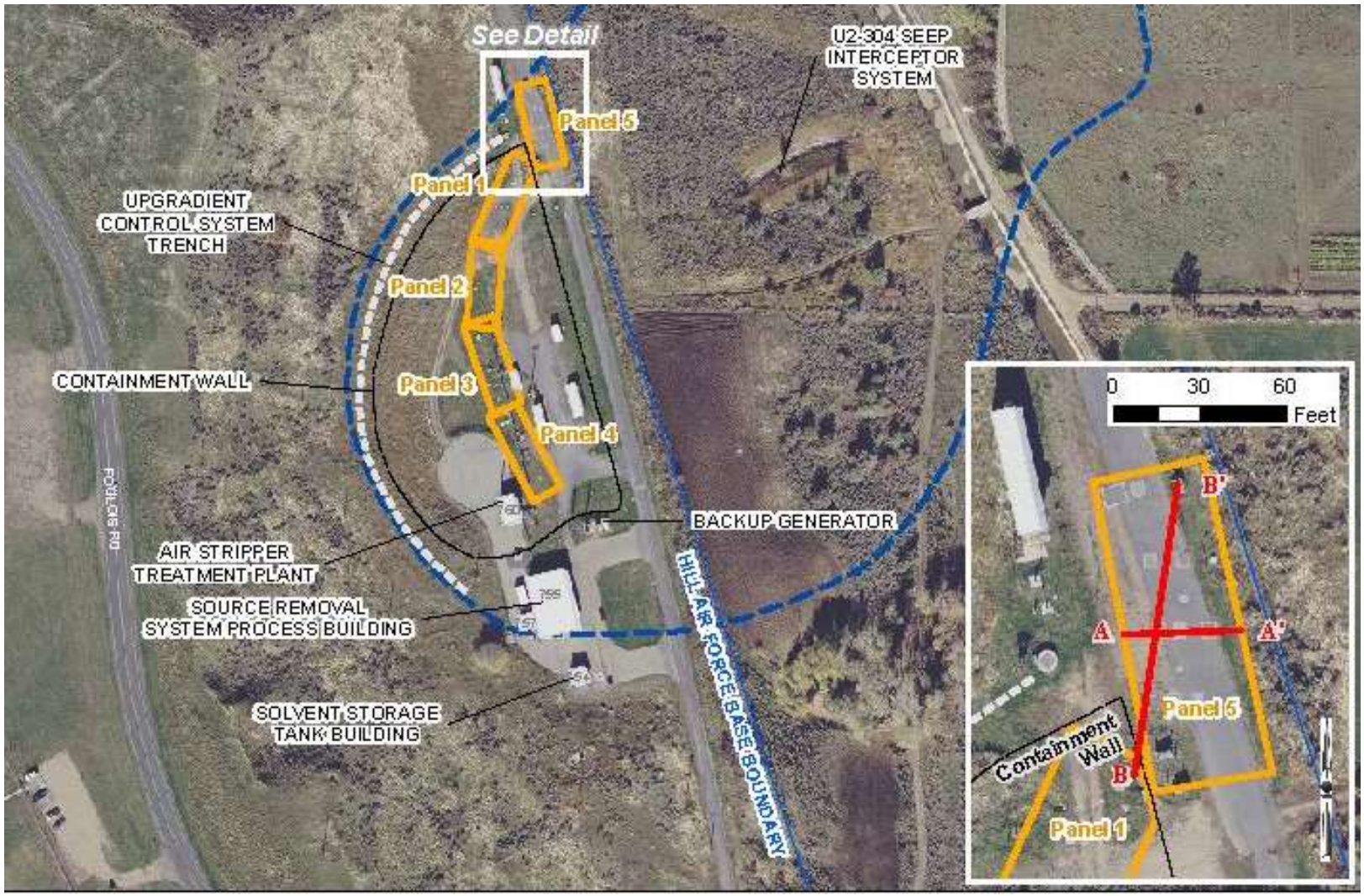
April 2016

Shannon Smith – AFCEC/CZOM Hill Section
Todd Isakson – OU 2 Site Manager, EA Team
Jeremy Cox – Environmental Engineer, EA Team

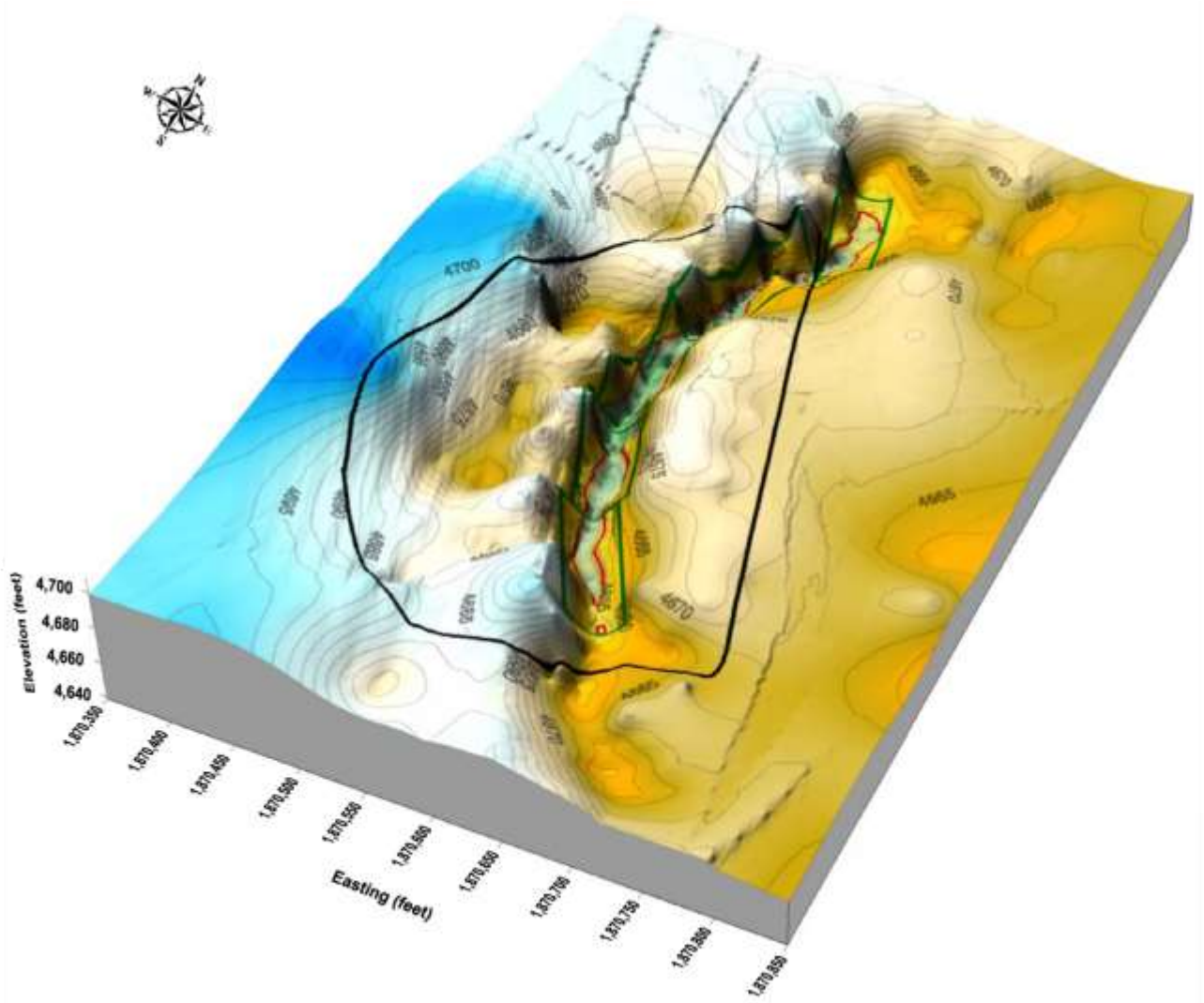
# Operable Unit 2 Location



# Operable Unit 2 Site Map



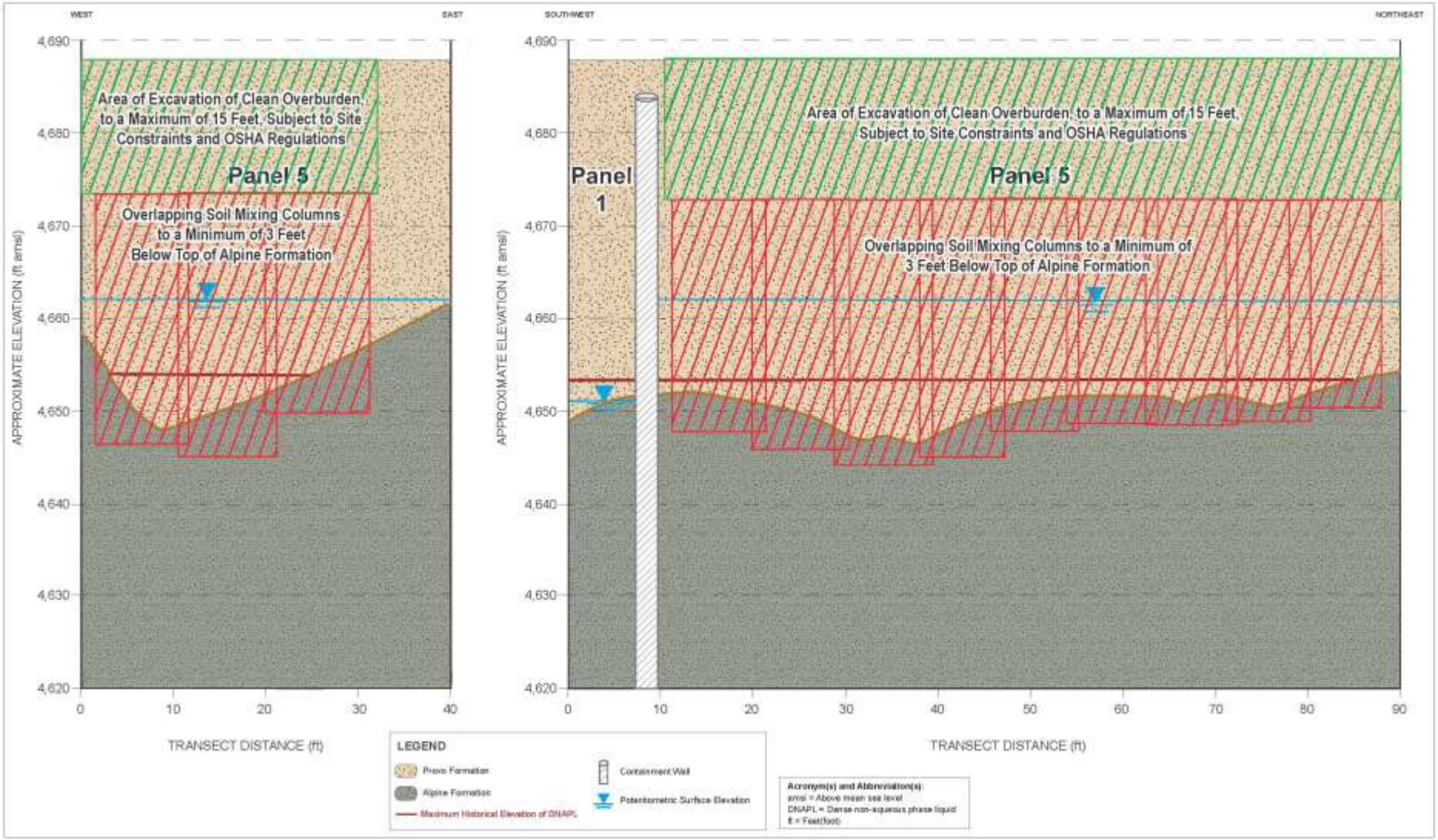
# Top of Alpine Formation



# Objectives of Treatability Study

- Evaluate soil mixing of zero-valent iron (ZVI) / clay to treat the dense non-aqueous phase liquid (DNAPL) contaminants within Panel 5.
  - Clay binds contaminants and reduces groundwater flow through treated area
  - ZVI treats contaminants
- If successful, technology could be employed in remainder of source area.

# Cross Section View



# Soil Mixing Photo

# Schedule for Treatability Study

- Mobilize equipment to site in late summer 2016.
- Work expected to take ~ 1 to 2 months.
  - Work will be on-Base but visible from South Weber Drive.
- Monitor two years; produce Treatability Study Report.
- After completion of study, expect significant reductions of TCE and other VOC concentrations in Panel 5 groundwater .

# Questions?

# *Air Force Civil Engineer Center*

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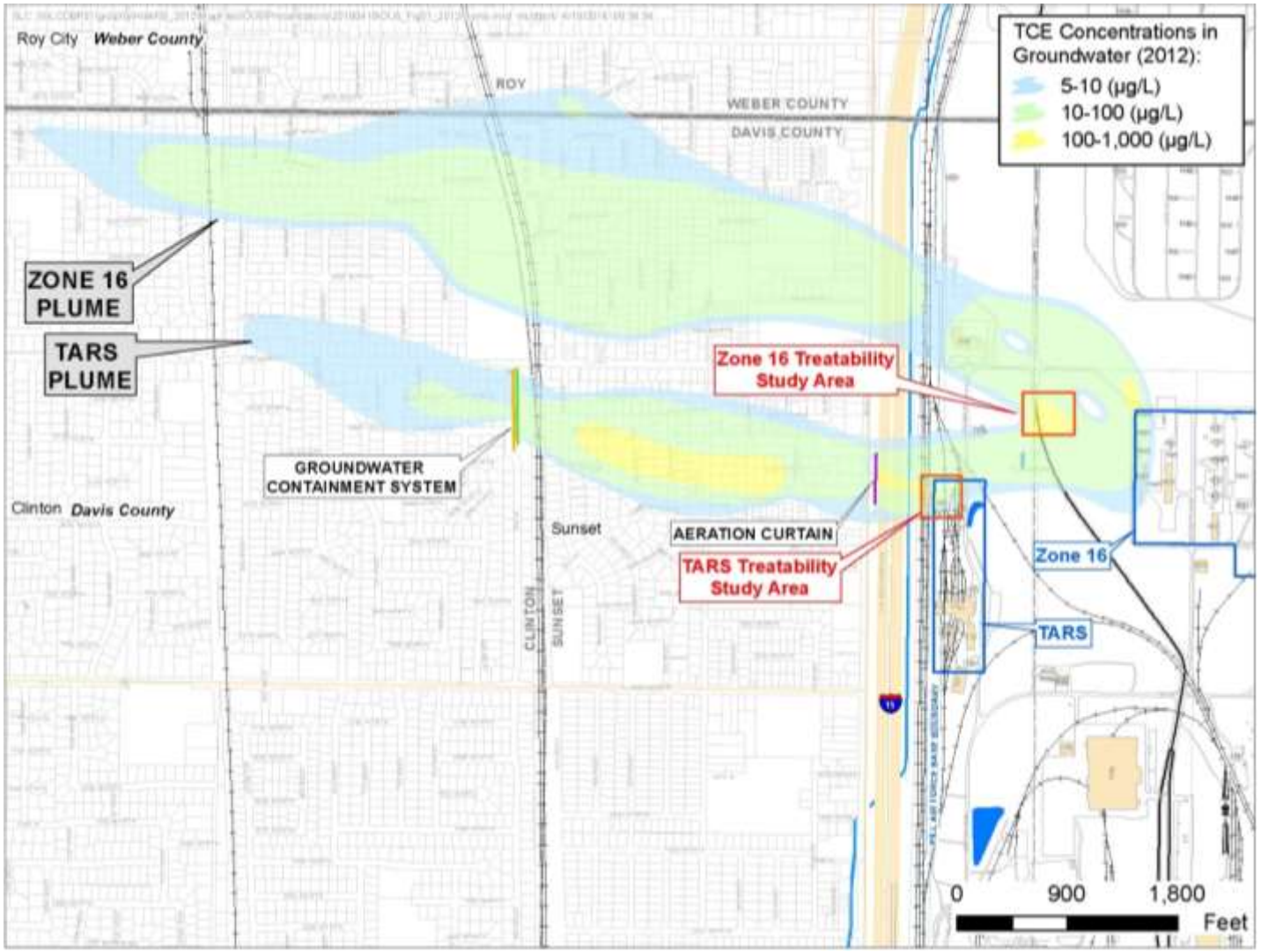
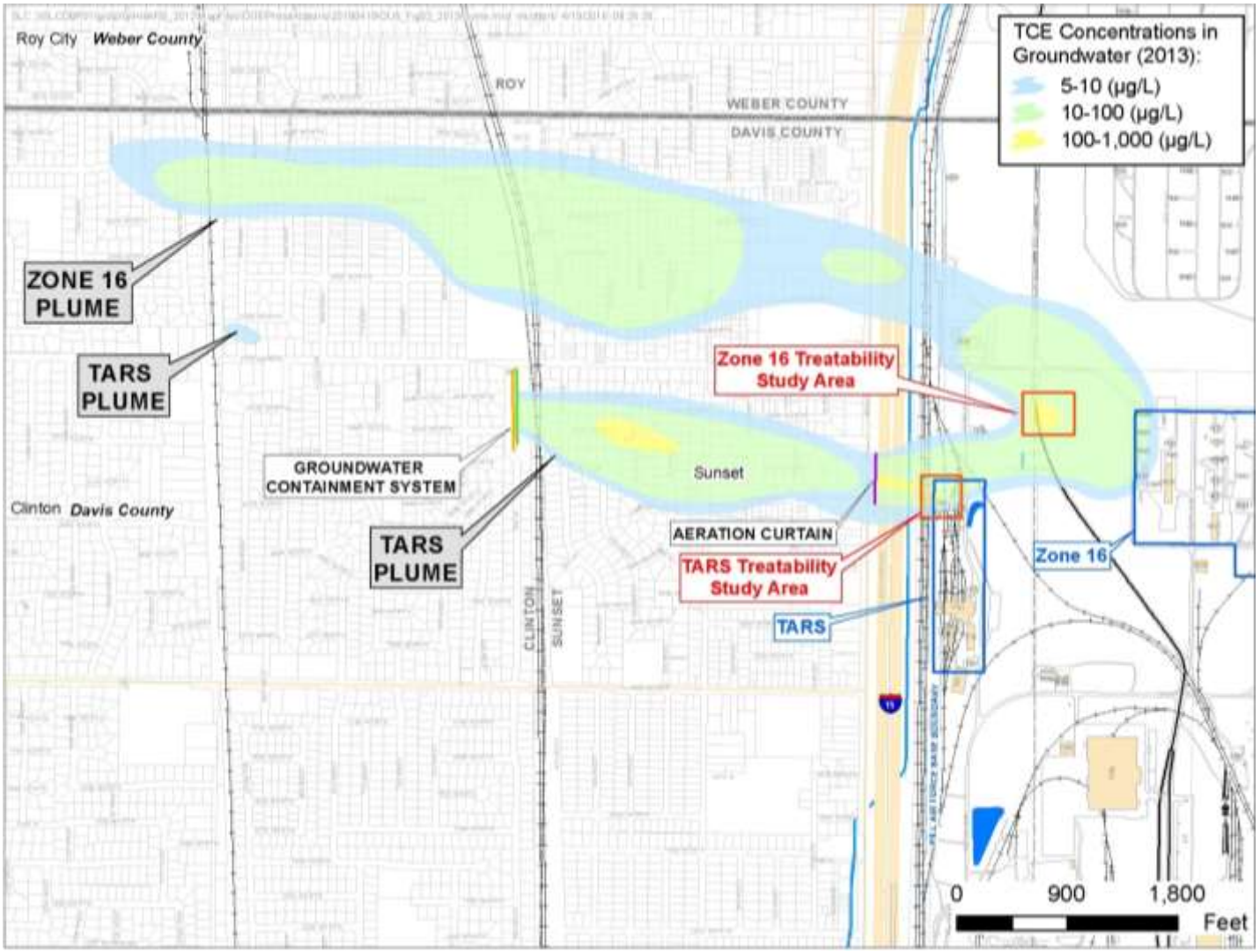
# Operable Unit 5 Plume Update

**Jason Wilde – AFCEC/CZOM Hill Section**
**Andy Castor – EA Team**
**April 28, 2016**

# Previous OU 5 Plume Map (2012)



# Updated OU 5 Plume Map (2013)



# Changes to OU 5 Plume Map

- TCE concentrations attenuated to below MCL downgradient of Groundwater Containment System
- Boundaries of Zone 16 plume have receded
- Groundwater Containment System is working
- Natural Attenuation is occurring
- Plume map is updated every 4 years
  - Well sampling frequency – 1, 2, and 4 years
  - Next plume map update in 2017

# Questions?

# Air Force Civil Engineer Center

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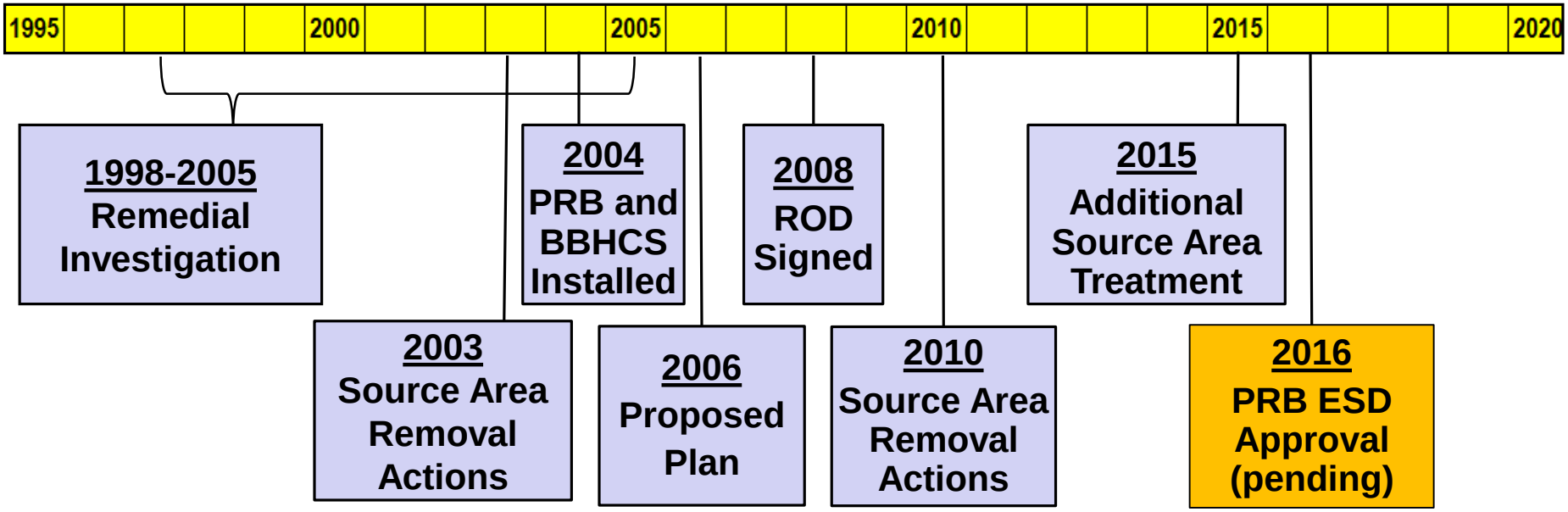
# Update Regarding OU 12 Permeable Reactive Barrier

April 2016

Jason Wilde – AFCEC/CZOM Hill Section
Mike Reynolds – OU 12 Site Manager, EA Team
Jeremy Cox – Environmental Engineer, EA Team

# OU 12 – CERCLA Process

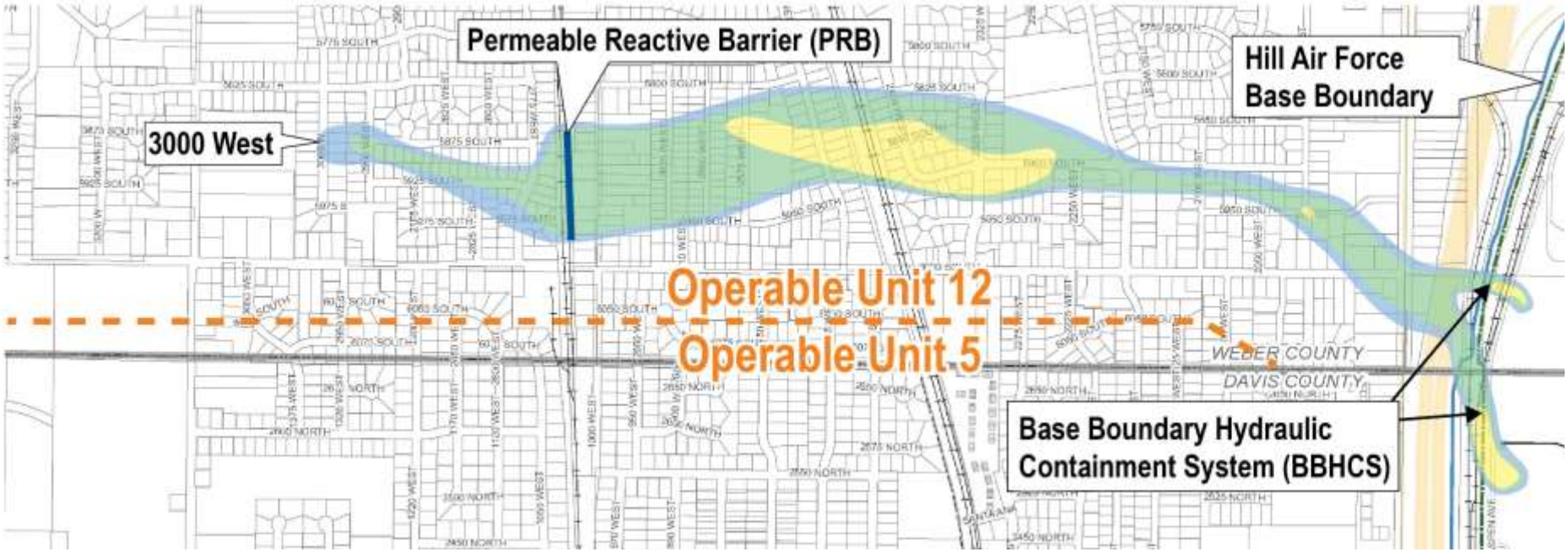



**ACRONYMS**

BBHCS = Base Boundary Hydraulic Containment System
ESD = Explanation of Significant Differences
PRB = Permeable Reactive Barrier
RI = Remedial Investigation
ROD = Record of Decision

# OU 12 Overview

**Operable Unit 12 (OU 12) consists of TCE in groundwater in Roy.**



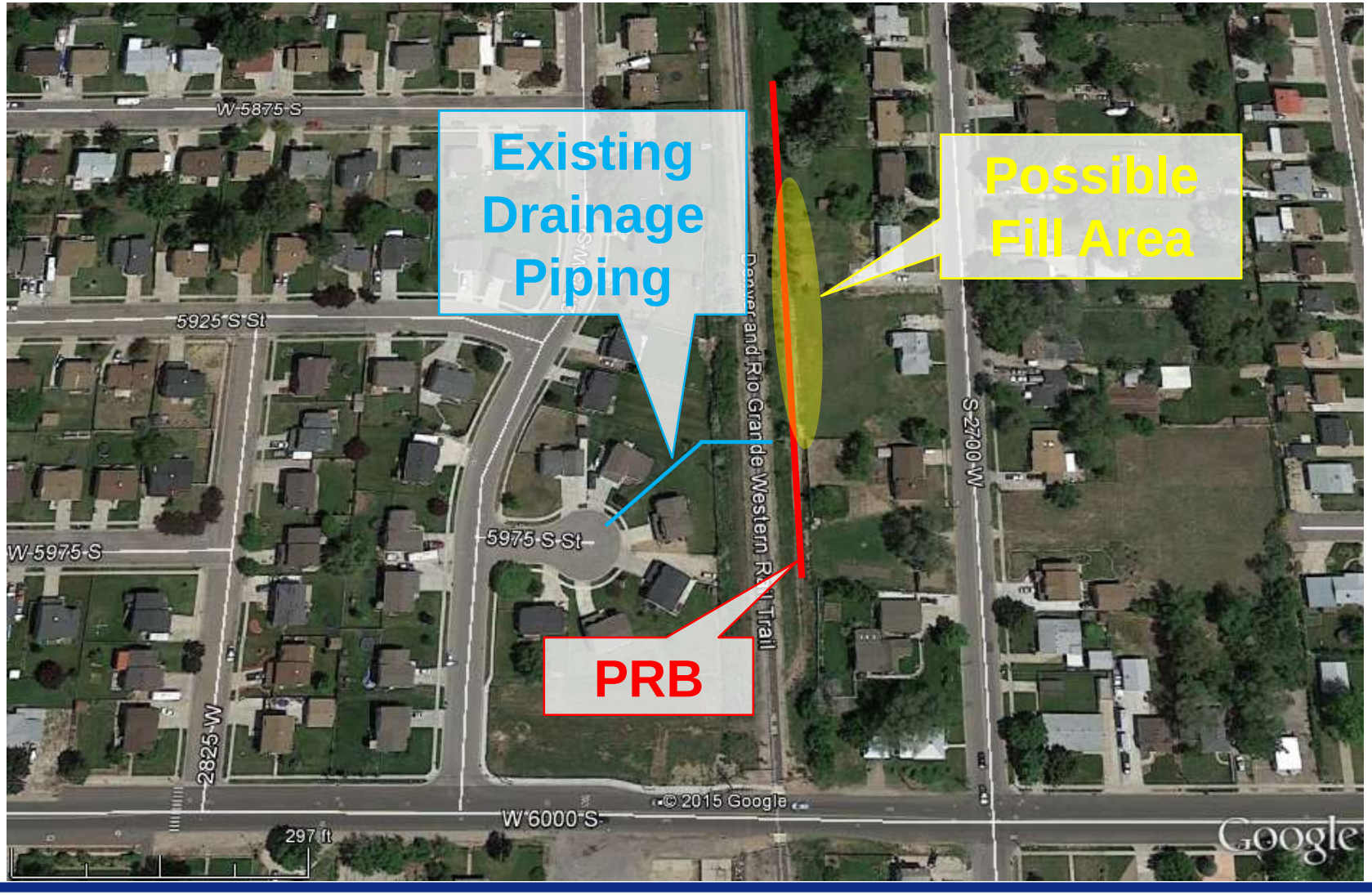
# PRB Summary

- PRB not operating as expected.
- MNA occurring faster than expected at the time of the ROD (2008).
- Predictions of current model:
  - Maximum downgradient plume extent will occur around 2015/2016 without treatment at PRB
  - Downgradient TCE plume will gradually shrink without any treatment at the PRB
- PRB operation no longer required.

# ESD Update

- The Air Force prepared an Explanation of Significant Differences (ESD) to document:
  - Removal of the ROD requirement for treatment at the PRB
- Regulatory agencies reviewed the ESD.
- ESD expected to be signed in Spring / Summer 2016.

# In-Place Decommissioning



# Questions?