The minutes were approved by RAB members via email on July 11, 2017.

Hill Air Force Base
Restoration Advisory Board

Meeting Minutes
April 27, 2017

Members Present:	Organization:	Members Present:	Organization:
Earnest Aycock	Clearfield Community Alternate	TJ Mitchell	Clinton City
Sandra Bourgeois	Environmental Protection Agency	Brad Nelson	Weber Basin Water
Summer Day	Weber-Morgan Health Dept.	Vern Phipps	Clearfield City
Linda Ebert	Davis County Health Dept. Alternate	Muhammad Slam	Utah Department of Environmental Quality
Buck Ekstrom	Clearfield Community	Rick Smith	Davis & Weber Counties Canal Company
Bambi Gibson	Sunset Community	Kevin Tubbs	Roy City Alternate
Clint Holm	Layton Community	Jan Ukena	South Weber Community
Stephen Jackson	Layton City	Darrin Wray	Hill AFB RAB Co-Chair
Douglas Johnson	Hill AFB 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:
Loren Allen	Davis County Health Dept.	Brett Nelson	Central Weber Sewer District
Travis Bonsteel	Clinton Community	Rich Sirken	Weber State University
Jeff MacFarlane	North Davis Sewer District	Ed Sorensen	Roy City
Joe Maylin	Sunset City	Brian Wesoloski	Riverdale Community

Other Attendees:	Organization:	Other Attendees:	Organization:
Dave Allison	UDEQ	Mark Loucks	AFCEC-Hill
Sisay Ashenafi	EPA	Carol MacKenzie	AFCEC-Hill
Jarrod Case	AFCEC-Hill	Brent Poll	South Weber Coalition
Gary Colgan	CH2M	Mark Roginske	AFCEC-Hill
Natasha Davis	EPA	Corey Schwabenlander	CH2M
Barbara Fisher	Hill AFB, Public Affairs	Kalem Sessions	AEEC
Randy Gates	CH2M	Carly Siddoway	AGEISS
Dave Harris	AGEISS	Seth Smith	AFCEC
Dr. Chuck Holbert	CH2M	Sandy Staigerwald	EA Engineering
Kellie Koenig	CH2M	Jason Wilde	AFCEC-Hill

Handouts Distributed at Meeting:

Pre-RAB Training: Geology 101
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 introduced Kellie Koenig, CH2M public involvement specialist.

Agenda Item #2. RAB Business

Mr. Tim Sueltenfuss, RAB Facilitator, briefly went through the packet distributed at the meeting. The meeting agenda is attached (Attachment 1).

Action Item List. A current action item list was included in the packet (Attachment 2). He said Item 2016-2 regarding establishing a Five-Year Review Work Group will be done in the July 27 RAB meeting.

Schedule. A schedule of upcoming RAB meetings and a list of potential future training and tour events were provided to the RAB (Attachment 3).

RAB Membership. Ms. Carly Siddoway, the RAB coordinator, said Ms. Jan Ukena's term as the RAB community co-chair will expire in July. Ms. Ukena has indicated she would like to continue on the RAB, so an email will be sent out to the RAB prior to the July meeting asking RAB members to either confirm her in the position or open the position to additional nominees. If two thirds of a quorum (comprised of 11 RAB members) vote to confirm her in the position, it will be renewed for another two-year term; if she receives less than two thirds of a quorum, additional nominations will be solicited from the RAB members.

Ms. Ukena said Mr. Tim Lane, the Roy Community Representative, resigned his position on the RAB. She said Mr. Lane's service was unmatched. She praised his service to the RAB in various capacities and said he will be sorely missed on the RAB and hopes he will decide to serve on the 2018 Five-Year Review Work Group. Ms. Siddoway said a full solicitation will be conducted for the position prior to the July RAB meeting and the RAB will be provided with the applications that are received for the position prior to voting at the July meeting.

Regulatory Review Has Resumed. Mr. Mark Loucks, Hill Installation Support Team (IST) Restoration Lead, welcomed the regulators back to the RAB meeting. He said all the issues with payment have been resolved and that the Air Force is glad to have the Utah Department of Environmental Quality (UDEQ) back at the table.

Fieldwork Update – Operable Unit 4 (South Weber/Riverdale) Remedial Action. Mr. Loucks said a bioremediation system comprised of mulch and enhanced reductive dechlorination (ERD) injections of a substrate (emulsified vegetable oil) and other ERD injection points have all been put into place. In May a new cap will be built over an area of the landfill not previously covered. Mr. Loucks said there will be an update on the cap installation at the next RAB meeting.

Fieldwork Update – Operable Unit 2 (South Weber) Status of Zero-valent Iron (ZVI) Clay/Soil Mixing Treatability Study. Mr. Jarrod Case, standing in for site manager Ms. Shannon Smith, provided an update on the ZVI Clay/Soil Mixing Treatability Study that was conducted in the OU2 source area. He said there were 125 columns completed and three monitoring wells installed inside the mixed area. Initial tests indicated elevated levels of contaminants in those wells, which is a good sign that the columns were mixed in the appropriate area. Mr. Case said the wells will be monitored quarterly for the first time in the spring or summer because the groundwater moves slowly. Road base has been put down and they will

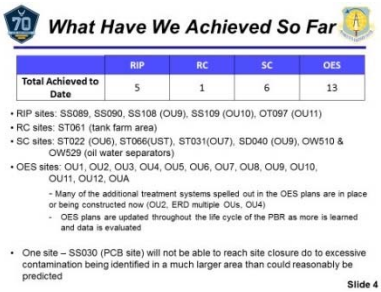
allow it to settle before paving the road. The final report on the study is due in 2018 and will be reported to the RAB at that time.

Agenda Item #3. Performance-based Remediation (PBR) Contract Status

Mr. Loucks provided a presentation on the status of the Performance-based Remediation (PBR) contract (Attachment 4). His presentation included the accomplishments of the PBR contract to this point, what is left to accomplish and the challenges/lessons learned about PBR contracts.

The Hill AFB PBR contract began in Fiscal Year (FY) 2013 and will end in FY 2020. The contract awarded $71 million to EA Engineering Science and Technology and team (including CH2M and AEEC), but Mr. Loucks said the financial details cannot be provided due to proprietary information involved. The contract contained 34 milestones to accomplish within the length of the contact and would be determined by the following metrics:

- Response in Place (RIP): All elements of the Record of Decision have been implemented
- Response Complete (RC): All active remediation complete, with only Land Use Controls (LUC) and Long Term Monitoring (LTM) remaining
- Site Closure (SC): No additional money spent on sites and closed to residential risk standards
- Site Optimized Strategic Plan (Air Force calls it Optimized Exit Strategy, or OES): For the larger sites that will extend beyond the length of the PBR contract, a strategic plan will be put into place to speed up the cleanup timeframe

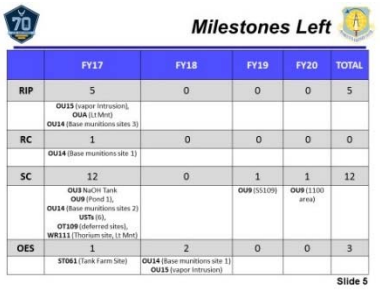


What Have We Achieved So Far

	RIP	RC	SC	OES
Total Achieved to Date	5	1	6	13

- RIP sites: SS089, SS090, SS108 (OU9), SS109 (OU10), OT097 (OU11)
- RC sites: ST061 (tank farm area)
- SC sites: ST022 (OU6), ST066(UST), ST031(OU7), SD040 (OU9), OW510 & OW529 (oil water separators)
- OES sites: OU1, OU2, OU3, OU4, OU5, OU6, OU7, OU8, OU9, OU10, OU11, OU12, OUA
  - Many of the additional treatment systems spelled out in the OES plans are in place or being constructed now (OU2, ERD multiple OUs, OU4)
  - OES plans are updated throughout the life cycle of the PBR as more is learned and data is evaluated
- One site – SS030 (PCB site) will not be able to reach site closure do to excessive contamination being identified in a much larger area than could reasonably be predicted

Slide 4



Milestones Left

	FY17	FY18	FY19	FY20	TOTAL
RIP	5	0	0	0	5
	OU15 (vapor intrusion), OUA (LTMm), OU14 (Base munitions site 3)				
RC	1	0	0	0	0
	OU14 (Base munitions site 1)				
SC	12	0	1	1	12
	OU3 NaOH Tank, OU9 (Pond 1), OU14 (Base munitions sites 2), USTs (6), OT109 (deferred sites), WR111 (Thorium site, (t Mnt)		OU9 (SS109)	OU9 (1100 area)	
OES	1	2	0	0	3
	ST061 (Tank Farm Site)	OU14 (Base munitions site 1), OU15 (vapor intrusion)			

Slide 5

Slide 4 detailed the PBR achievements to this point. Five sites have reached RIP, one site has RC and five sites have obtained SC. Mr. Loucks noted that sites with strategic plans (or OES) are updated throughout the life cycle of the PBR and through the length of the cleanup. Mr. Loucks noted that one site (SS030) in the base's industrial area contains soil contaminated with polychlorinated biphenyls (PCBs). This site will not reach SC due to a larger area of contamination than predicted, but it is not a health risk concern because of its location on the base.

Slide 5 detailed the milestones that were left to accomplish before the end of the PRB contract in 2020. Mr. Loucks noted that there is much to do in FY 2017 and it is keeping everyone involved with the PBR contract very busy, including the regulators who review all of the cleanup documents.

Mr. Loucks acknowledged that there have been some challenges with the PBR contract, including:

- Payment of state invoices – After evaluating the issue, Mr. Loucks said inadequate communication led to a misunderstanding about what was required on an invoice. This caused an eight-month delay and a backlog of documents to review by the UDEQ. According to the Federal Facilities Agreement between the Air Foce, the Environmental Protection Agency (EPA) and UDEQ, the Air Force is required to reimburse UDEQ for the labor involved with their review of cleanup documents. Mr. Loucks said the situation has been remedied by defining the invoice requirements and by using a different payment system administered by the U.S. Army Corps of Engineers. Both procedures are working well now.
- What is covered or not covered by the PBR contract – Mr. Loucks said there has been confusion about what is covered or not covered by the PBR contract when issues arise, such as not being

able to fix wells that get broken by snow plows. He said these issues have been fixed by contract modifications when necessary.

Mr. Loucks said overall, PBR contracts do reduce long-term costs to the Air Force and cleanup is progressing at a faster pace than before the PBR contract was in place. He said all the lessons learned will be used in the next round of PBR contracts, which will enter the planning stage in 2019.

Agenda Item #4. Operable Unit 15 (Indoor Air Sampling Program) Proposed Plan

Mr. Mark Roginske and Mr. Corey Schwabenlander provided a presentation about the Operable Unit 15 (Indoor Air Sampling Program) Proposed Plan (Attachment 5). Mr. Roginske reminded RAB members that the proposed plan presents the Air Force's preferred cleanup alternative to the public.

The proposed plan is based on findings summarized in the OU15 Remedial Investigation Report and OU15 Feasibility Study Report (in regulatory review) and details a path forward. The Proposed Plan is issued to seek public participation and comments on the proposed remedial action for OU15 and may be modified based on public comment.

OU15 Background. OU15 focuses on the contaminated indoor air due to vapor intrusion, addressing both on- and off-base areas identified as having potential for vapor intrusion. Mr. Schwabenlander said an important distinction for OU15 is that the single affected environmental medium is indoor air; contaminated groundwater or soil is addressed by other Operable Units. He said the interim remedy in place since 2003 includes monitoring indoor air and mitigating if vapor intrusion is identified.

OU15 Characteristics. The current and future exposure scenarios for both the on- and off-base areas, as identified in the OU15 Remedial Investigation Report, are listed below:

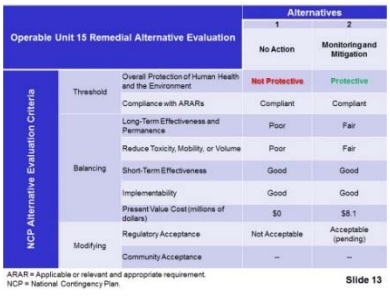
- On-base Exposure Scenarios
  - Current scenario: No complete (confirmed detection by vapor intrusion) and significant (above risk-based action levels) vapor intrusion is occurring; however, additional indoor air monitoring is warranted in Building 265 due to uncertain results
  - Future scenario: New construction in on-base areas with potential for vapor intrusion (OUs 1, 2, 4, 5, 6, 8, 10, 11, 12 – and any new areas that may be identified)
- Off-base Exposure Scenarios
  - Current and future scenarios:
    - Complete and significant vapor intrusion has been observed in OUs 1 (South Weber), 2 (South Weber), 5 (Sunset/Clinton), 6 (Riverdale), 8 (Layton) and 12 (Roy)
    - OUs 1 and 2 only need to address sewer gas intrusion (in some areas, vapors from contaminated water in sewer lines have entered homes)
    - No significant vapor intrusion to be addressed at OUs 4 (Riverdale/South Weber), 9 (Sunset) and 10 (Clearfield)

Summary of Alternatives. There were two alternatives considered in the Feasibility Study:

Alternative 1: No Action
Alternative 2: Monitoring and Mitigation

Mr. Schwabenlander said the No Action alternative was included for baseline comparison only. Alternative 2 is very similar to the interim remedy set forth in 2003 that includes monitoring and mitigation. Once mitigation is installed, monitoring will continue to ensure mitigation efforts are working

properly. Mr. Schwabenlander said Alternative 2 includes a large mitigation component that allows the base to select the most appropriate treatment option to mitigate concentrations that exceed the action levels, making it a very robust alternative.



Operable Unit 15 Remedial Alternative Evaluation			Alternatives	
			1	2
			No Action	Monitoring and Mitigation
NCP Alternative Evaluation Criteria	Threshold	Overall Protection of Human Health and the Environment	Not Protective	Protective
		Compliance with ARARs	Compliant	Compliant
	Balancing	Long-Term Effectiveness and Permanence	Poor	Fair
		Reduce Toxicity, Mobility, or Volume	Poor	Fair
		Short-Term Effectiveness	Good	Good
		Implementability	Good	Good
		Present Value Cost (millions of dollars)	$0	$8.1
	Modifying	Regulatory Acceptance	Not Acceptable	Acceptable (pending)
		Community Acceptance	--	--

ARAR = Applicable or relevant and appropriate requirement.
NCP = National Contingency Plan.

Slide 13

Evaluation of Remedial Alternatives. The National Contingency Plan requires that remedial alternatives developed in the FS be evaluated against nine criteria, as shown on Slide 13.

Preferred Alternative. Alternative 2 (monitoring and mitigation) was selected as the preferred alternative for OU15 and is essentially the interim remedy that was put into action in 2003. Mr. Schwabenlander said the interim remedy has been successful at identifying locations where vapor intrusion is occurring and mitigating vapor intrusion at those locations. Alternative 2 is protective of human health and the environment, is compliant with laws and regulations, creates no adverse risks to the community, is easily implemented (as demonstrated for almost 14 years) and costs are not prohibitive.

Community Participation. Once there is regulatory acceptance of the Proposed Plan, there will be a 30-day public comment period with a public meeting to present the Proposed Plan to the public. Copies of the Proposed Plan will be made available on the Hill AFB website (www.hill.af.mil/iap), at the public meeting and through various channels, such as at the city offices. Public comments will be documented in the responsiveness summary and will be included in the OU15 Record of Decision. Mr. Schwabenlander said the preferred alternative may be modified or another alternative may be selected if public comment warrants it.

The Proposed Plan is currently under regulatory review and is expected to be completed soon. The public comment period is anticipated to begin in early June and the public meeting will take place approximately 10 days after that. Mr. Schwabenlander said the public comment start date is tentatively set for June 10, with two public meetings to be held on June 21 and 22. He said there will be two meetings in order to cover the large geographical area and provide convenient locations for residents to attend. One meeting will be held in Layton, as Layton has the most residences affected, and another meeting to the north in Sunset, Roy or Riverdale.

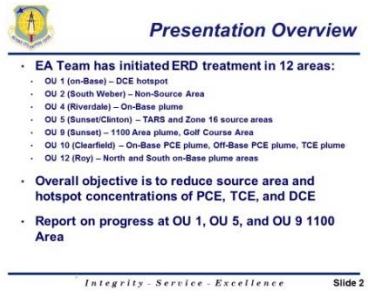
Mr. Sueltenfuss said the RAB is encouraged to be involved at the public meetings. Mr. Schwabenlander said the meetings will be an open house format with poster stations for residents to look through and ask questions one-on-one. The public can submit comments at the meeting in writing on comment cards or verbally to a transcriptionist and further instructions for how to make a comment will be available on the website. Mr. Buck Ekstrom, the Clearfield community representative, suggested providing some of the material in Spanish, as some of the communities have heavy Hispanic populations.

Agenda Item #5. 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 6).

Agenda Item #6. Status of Enhanced Reductive Dechlorination Treatability Studies

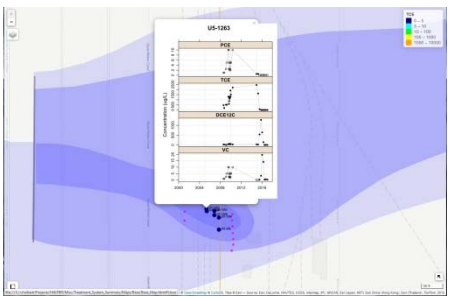
Dr. Holbert provided a status update on several of the enhanced reductive dechlorination (ERD) treatability studies being conducted around the base (Attachment 7). He reminded the RAB that ERD is the addition of organic material (substrate) to enhance biological degradation, or breakdown of contaminants, in the subsurface. Dr. Holbert said emulsified vegetable oil (EVO) has been used at Hill AFB because it is longer lasting (up to five years in the subsurface), allowing for more time to be in contact with contaminants. He said success of ERD is dependent upon the delivery of the substrate to the subsurface, ensuring that it comes into contact with contaminants for an appropriate length of time. Conditions are monitored to ensure they are optimal for breakdown, but if needed, bioaugmentation can be performed, meaning that additional microbes can be added to increase the chance of bioremediation.



The EA Team has initiated ERD treatment in the 12 areas listed on Slide 2. The overall purpose of the treatability studies is to reduce source area and hotspot concentrations (areas with the highest concentrations) of tetrachloroethene (PCE), trichloroethene (TCE) and cis-1,2-dichloroethene (DCE). Dr. Holbert said ERD can accelerate cleanup and reduce overall timeframe to achieve site closeout, and in some cases, the impact on source area and hotspot areas may lead to the consideration of taking active (and costly) cleanup systems offline. Dr. Holbert's presentation reported on progress of the OU1, OU5 and OU9 1100 Area treatability studies; additional reports on the other studies will be provided at future RAB meetings.

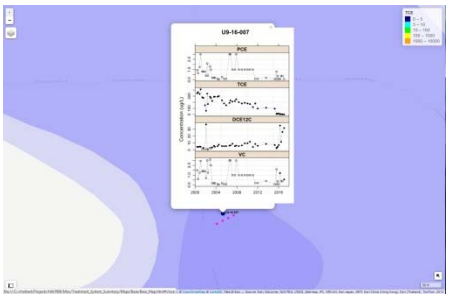
Dr. Holbert said he would be demonstrating a new mapping tool that ties into the database. The tool allows the EA Team to look at any site and pull up well information (depth, screen depth, sampling results, etc.) and time series data showing how concentrations are changing over time.

Operable Unit 1 – DCE Hotspot
Objective: Reduce DCE concentrations by 90 percent in well U1-1602 in the on-base DCE hotspot.
Injection points: 10 injection wells
Performance wells: 1
Injection event: May/June 2015
Substrate volume: 140 gallons
The site was bioaugmented with additional microorganisms to enhance breakdown. DCE concentrations went from above 1,000 micrograms per Liter (µg/L) to less than 29 µg/L.

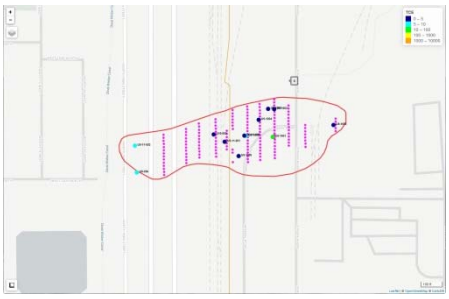


Operable Unit 5 – Tooele Army Rail Shop (TARS)
Objective: Reduce TCE concentrations by 90 percent in the southern OU5 TARS source area.
Injection points: 13 injection wells
Performance wells: 7
Injection event: July 2015
Substrate volume: 2,147 gallons
The site was bioaugmented with additional microorganisms to enhance breakdown. Dr. Holbert noted on the time-series graph showing contaminant concentrations, that TCE was well above 2,000 µg/L prior to the injection of

substrate and is now below the Maximum Contaminant Level (MCL or drinking water standard) of 5 µg/L.



Operable Unit 5 – Zone 16
Objective: Reduce TCE concentrations by 70 percent in well U9-16-007 in northern OU5 Zone 16 source area.
Injection points: 4 injection wells
Performance wells: 1
Injection event: July 2015
Substrate volume: 336 gallons
The site did not require bioaugmentation due to lower concentrations of contaminants. TCE concentrations decreased from approximately 100 µg/L to below the MCL. Dr. Holbert noted an increase in DCE concentrations to approximately 30 µg/L, which is still below the MCL of 70 µg/L for DCE. An increase in daughter products, such as DCE from TCE, is expected as the contaminants break down and is closely monitored.



Operable Unit 9 – 1100 Area
Objective: Achieve Site Closeout in on- and off-base plume area
Injection points: 200 direct push points and six injection wells
Performance wells: 12
Injection events: July 2014, April 2015 and August/November 2016
Substrate volume: 3,198 gallons
Direct push points were used because of the number of injection points that were planned. The direct push points are temporary and allow a quick one-time injection that does not require permanent well installation. The site was bioaugmented with additional microorganisms during the last injection event because the concentrations were resistant to breakdown. Dr. Holbert said that TCE concentrations have decreased to below the MCL of 5 µg/L in all but one performance well. The one performance well with TCE above the MCL was at 80 µg/L and is now below 10 µg/l, so it will continue to be monitored.

Dr. Holbert said that they have encountered challenges throughout these treatability studies and have learned many lessons throughout the process, such as:

- Some sites require higher substrate doses than initially anticipated. He said they tried to be precise and target areas, but have had to reinject more substrate.
- Distribution of the substrate is more challenging at higher permeability sites (OU10 in Clearfield and OU12 in Roy where groundwater moves through the soils easier) than compared with low permeability sites (OU2 in South Weber and OU9 1100 Area where groundwater does not move easily through the soils). Different geology creates issues with the EVO making contact with the contaminants in the subsurface. Higher permeability gravels and sands are harder to treat because of preferential pathways. Lower permeability silts and fine sands have allowed better distribution of the EVO that slowly treats the contaminants.
- Bioaugmentation has accelerated the ERD process at many of the sites.

Agenda Item #7. Environmental Protection Agency Grant Process

Mr. Sisay Ashenafi, the EPA Region 8 technical assistance coordinator, provided a presentation on the technical assistance resources available to communities (Attachment 8). He said there are two ways the

community can request technical assistance through the EPA: Technical Assistance Grant or Technical Assistance Service for Communities.

Technical Assistance Grant (TAG) – Provides funding to a community group to contract its own technical advisor to interpret and explain technical reports, site conditions, and EPA's cleanup proposals and decisions related to a Superfund site, to the community.

TAGs were created out of the Superfund Amendments and Reauthorization Act of 1986 (SARA). They provide money for activities that help the community participate in decision making at eligible Superfund sites, but there is only one per site allowed. Mr. Ashenafi said the Hill AFB TAG was awarded to the South Weber Coalition (SWC) in 1992 in support of the now 15 OUs at Hill AFB and noted that it officially closed at the end of 2016.

For a group to be eligible for the TAG they must live near the Superfund site and must meet minimum administrative and management capability requirements. Mr. Ashenafi said there is a lot of paperwork, such as quarterly and annual reports, that is required to maintain a TAG. Groups that are ineligible were listed on Slide 4.

To apply for a TAG, the group must submit a letter of intent request to the EPA with a clear purpose for establishing the TAG. The EPA would then announce to the community, through a local newspaper notice, that there was interest in a TAG and any others interested should join the group or apply on their own. The EPA site group reviews the application and makes a determination on the TAG. If there is more than one group interested in the TAG, the EPA site team evaluates each group separately to determine which is best organized and has the best representation of the local community.

Most of the funds in a TAG go to a technical advisor (TA) that is selected by the recipient through a competitive process. Mr. Ashenafi said the TA should be an expert that can handle the amount of research that is required at a Superfund site and must understand the concepts in order to present their findings to the group. He said the TA's primary purpose is to help the group, and community, understand the information in the cleanup documents. A portion of the funds from the TAG are for administration and outreach, which is capped around 20 percent.

The TAG cannot pay for the items listed on Slide 7. Mr. Ashenafi said that the TAG cannot be used to research and question past decisions; if a cleanup decision has been made and accepted by the regulators and the public, funds from the TAG cannot be used to challenge those decisions.

All incurred costs are paid for on a reimbursement basis with the EPA, except for a one-time advance payment.

A list of items required to meet TAG compliance was provided on Slide 9. Mr. Ashenafi said TAGs require a lot of administrative work even if there is not much activity, as reports summarizing TAG activities are due each quarter. The group must also contribute 20 percent towards the project, in either cash or in-kind contributions such as volunteering time (i.e., RAB meeting). The grantees are notified about their performance on a quarterly basis. The accumulated grant

compliance history is used to determine if the grantee is eligible for an extension when the grant performance ends.

Technical Assistance Service for Communities (TASC) – A program that provides independent assistance services through an EPA contract to help communities better understand the science, regulations and policies of environmental issues and EPA actions. TASC is delivered under a contract, which is funded, administered and managed by the EPA.

Mr. Ashenafi said the TASC is newer to the EPA and has become a popular choice because it has less programmatic issues and requires less paperwork. When a group, such as the RAB, identifies work that they would like completed, such as interpreting a cleanup document, the EPA selects a TA from a list of independent contractors to help perform that specific action. The TA can review and explain technical information or provide educational presentations, develop informational material for communities or provide community trainings or workshops.

Slide 13 compared TAGs to TASCs so that a group can determine which would be the best fit for their needs. Mr. Ashenafi said the TASC provides a broad focus and the group would just receive an interpretation of the information they requested. A TASC is also implemented faster, as it takes 4-6 months to get a TAG running; however, Mr. Ashenafi said the current funding situation at EPA has pushed funds out to October, but the budget for grants should resume as normal after that. He provided the contact information on Slide 14 if anyone is interested in inquiring about either a TAG or TASC.

Mr. Ekstrom asked about a scenario in which one location can have both a TAG and TASC. Mr. Ashenafi said it is possible, but the EPA will not waste funds to accomplish the same task, such as if both groups ask for interpretation of a particular document.

Ms. Summer Day said the TASC seems as though it would be a good fit to help the RAB in their review of the 2018 Five-Year Review. She recalled that the Five-Year Review Work Group conducted a lot of review that seemed overwhelming and suggested that the RAB tap into this for assistance to understand the Five-Year Review. Ms. Ukena asked about the timeframe for the 2018 Five-Year Review. Mr. Loucks said the contract is being awarded this summer/fall and the contractor will be working on the initial preparations from then until Spring 2018. The 2018 Five-Year Review will be ready for initial review in the Summer/Fall 2018 and will be finished in December 2018.

Mr. Wray asked how many TAGs/TASCs are in EPA Region 8. Mr. Ashenafi said there are over eight TAGs and four or five TASCs, and noted that many of the TAGs are converting over to TASCs.

Agenda Item #8. Public Comment Opportunity

Mr. Sueltenfuss asked if there were any members of the public in the audience who would like an opportunity to comment.

Mr. Brent Poll, President of the SWC, said SWC has held the TAG for the last 24 years because they wanted to be involved and ensure the contamination was cleaned up quickly. He said that the military does not do anything quickly and that there is nothing to compel the Air Force to complete the cleanup because it costs money. The SWC is interested in having the contamination cleaned up fast, but the

projected timeframe to clean up is in the 2040s, which is more than a lifetime since the contamination was first seen on his property in the mid-1960s.

Mr. Poll said it has been difficult to keep people interested in the cleanup. Although the SWC no longer runs the TAG, they will continue warning people about the contamination in the community because the city or state will not, as Utah is a "buyer beware" state. Mr. Poll said the TAG has connected him to a large network of people with the same problems in their communities. He said they are all suffering and frustrated with the slow progress when they all want a speedy remedy.

Mr. Poll said having the TAG has been a positive experience and that he received a lot of education on environmental issues. He said he does not believe in what the base has said about "safe levels" of contaminants, regardless of what the EPA has said about acceptable standards. He said the SWC will be lobbying for stricter standards now that they are not restricted by the TAG and that the SWC plans on doing their own testing because the status quo is not good enough.

Mr. Poll said the Five-Year Review is a complicated and long document and he encouraged the RAB to get the most technical TA they can find.

Mr. Sueltenfuss said it sounds as though the SWC is frustrated with the progress. He said he appreciates the feedback Mr. Poll has provided.

Agenda Item #9. Potential Agenda Items for Next Hill AFB RAB Meeting

Potential Agenda Items for the July 27 Hill AFB RAB Meeting

- 2018 Five-Year Review
- Enhanced Reductive Dechlorination Treatability Study Update
- Operable Unit 14 (On-base) Removal Action
- RAB Website Tutorial
- Roy Community Representative Vote

Agenda Item #10. Adjournment

Mr. Wray said he appreciates RAB members' attendance at the meeting. He said he realizes the cleanup seems slow at times, but the Air Force is working hard to clean up. He noted that more than $500 million has been spent at Hill AFB on the environmental cleanup and while the slow progress may be frustrating, things are better than they were in 1986. He said the Air Force will continue to protect the community and make progress on the cleanup. He said the Air Force genuinely appreciates the RAB's feedback.

Meeting adjourned at 8:40 p.m.

Attachments:

1. Agenda
2. Action Item List
3. RAB Schedule
4. Presentation Slides – Performance-based Remediation Contract Status
5. Presentation Slides – Operable Unit 15 Proposed Plan
6. Breakout Materials
7. Presentation Slides – Status of Enhanced Reductive Dechlorination Treatability Studies
8. Presentation Slides – Environmental Protection Agency Grant Process

Hill AFB
Restoration Advisory Board
Meeting

6:30 p.m., April 27, 2017

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

Pre-RAB Meeting Training Session

6 p.m. **Geology 101** ..... Mark Loucks, AFCEC-Hill

RAB Meeting Agenda

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

6:35 – 6:55 **RAB Business** .....Tim Sueltenfuss, RAB Facilitator

- Action Items
  - Action Item List
  - RAB Schedule
  - RAB Membership
    - Community Co-Chair Position
    - Roy Community Position – Jan Ukena, RAB Community Co-Chair
- Regulatory Review Has Resumed ..... Mark Loucks, AFCEC-Hill
- Fieldwork Update
  - Operable Unit 4 (South Weber/Riverdale) Remedial Action – Mark Loucks
  - Operable Unit 2 (South Weber) - Status of Zero-valent Iron (ZVI) Clay/Soil Mixing Treatability Study – Jarrod Case

6:55 - 7:20 **Performance-based Remediation (PBR) Contract - Status**
..... Mark Loucks, AFCEC-Hill

7:20 – 7:35 **Operable Unit 15 (Indoor Air Sampling Program) Proposed Plan**
.....Mark Roginske (AFCEC-Hill) and Corey Schwabenlander (EA Team)

7:35 – 8:05 **Break/Breakout Sessions**

8:05 – 8:25 **Status of Enhanced Reductive Dechlorination (ERD) Treatability Studies**
.....Dr. Chuck Holbert, EA Team

8:25 – 8:50 **Environmental Protection Agency (EPA) Grant Process**
..... Sisay Ashenafi, U.S.EPA Region 8

8:50 – 8:55 **Public Comment Opportunity**

8:55 – 9:00 **Agenda Items for July 27, 2017 Meeting**

9 p.m. **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
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
VIMS: Vapor Intrusion Mitigation System
VRS: Vapor Removal System
ZVI: Zero-Valent Iron
µg/L: Micrograms per liter

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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
2016-9	Notify RAB once draft Operable Unit 15 Feasibility Study is completed so they can provide input prior to Proposed Plan.	M. Roginske	8/11/2016 RAB Mtg		C. Brown	10/1/2016	In progress
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

Restoration Advisory Board Calendar
April 2017

RAB Meetings

2017	Thursday, April 27	Sunset City Building
	Thursday, July 27	Sunset City Building
	Thursday, Oct. 26	Sunset City Building
2018	Thursday, Jan. 25	Sunset City Building

RAB Training

Potential Future Trainings

- Cleanup Technologies – Pre-meeting Training
- Geology/Hydrogeology
- Five-year Review Overview – Purpose, schedule, RAB's role, etc. – July?

RAB Tours

Potential Future Tours

- Annual Operable Unit Tour – Early Summer
- Industrial Area Tour – Hazardous Material Management

Status of Performance Based Remediation Contract

Mark Loucks
Restoration Lead
AFCEC/CZOM

Overview

- What we have accomplished
- What is left to accomplish
- Challenges faced this year and my observations about PBRs

Background

- Awarded at the beginning of FY 2013
- Contract awarded for $71M to EA Engineering Science and Technology and team
- Contract ends at the end of FY 2020
- Contained 34 Milestones to accomplish
  - Remedy in Place (RIP); complete ROD and install cleanup components
  - Response Complete (RC); All active remediation complete, only Land Use Controls (LUC)s and Long Term Monitoring (LTM) (i.e. sampling) left
  - Site Closure (SC); No more money spent on sites, closed to residential risk levels
  - Site Optimized Strategic Plan (what AF called OES); plan going forward for sites that will remain in the cleanup stage beyond the end of the PBR
- Financial details can't be provided – covered by privacy laws

What Have We Achieved So Far

	RIP	RC	SC	OES
Total Achieved to Date	5	1	6	13

- RIP sites: SS089, SS090, SS108 (OU9), SS109 (OU10), OT097 (OU11)
- RC sites: ST061 (tank farm area)
- SC sites: ST022 (OU6), ST066(UST), ST031(OU7), SD040 (OU9), OW510 & OW529 (oil water separators)
- OES sites: OU1, OU2, OU3, OU4, OU5, OU6, OU7, OU8, OU9, OU10, OU11, OU12, OUA

  - Many of the additional treatment systems spelled out in the OES plans are in place or being constructed now (OU2, ERD multiple OUs, OU4)
  - OES plans are updated throughout the life cycle of the PBR as more is learned and data is evaluated

- One site – SS030 (PCB site) will not be able to reach site closure do to excessive contamination being identified in a much larger area than could reasonably be predicted

Milestones Left

	FY17	FY18	FY19	FY20	TOTAL
RIP	5	0	0	0	5
	OU15 (vapor Intrusion), **OUA** (Lt Mnt) **OU14** (Base munitions sites 3)				
RC	1	0	0	0	0
	OU14 (Base munitions site 1)				
SC	12	0	1	1	12
	OU3 NaOH Tank **OU9** (Pond 1), **OU14** (Base munitions sites 2) **USTs** (6), **OT109** (deferred sites), **WR111** (Thorium site, Lt Mnt)		**OU9** (SS109)	**OU9** (1100 area)	
OES	1	2	0	0	3
	ST061 (Tank Farm Site)	**OU14** (Base munitions site 1) **OU15** (vapor Intrusion)			

Challenges This Last Year and Observations

- **Payment of State invoices (according to our FFA)**
  - **Caused 8 month delay in review by UDEQ**
  - **Evaluation of problem found**
    - **Not enough communication**
    - **Misunderstandings concerning what was required/expected in an invoice**
  - **Now using another payment system called DSMOA**
    - **DOD-wide program, specifically designed to make payments to State agencies for the work that is done**
    - **Administered by US Army Corps of Engineers**
    - **Working very well right now**
- **Determining what is covered or not covered by contract**
  - **Example: Not being able to fix wells that get broken by snow plows**
  - **Fixed by contract mods**
- **Overall, these contracts do reduce long term costs to AF**
- **Cleanup is progressing at a faster pace than before PBR contract**
- **All the lessons learned will be used in the next round of contracts**

QUESTIONS?

Air Force Civil Engineer Center

Integrity-Service-Excellence

Operable Unit 15 – Proposed Plan Summary

Mark Roginske, P.E. – AFCEC/CZOM Hill Section
Corey Schwabenlander, P.G. – EA Team
April 27, 2017

Introduction

Introduction

- The Proposed Plan is based on findings summarized in the:
  - OU 15 Remedial Investigation Report (Final)
  - OU 15 Feasibility Study Report (in regulator review)
- The document is issued to seek public participation on proposed remedial action for OU 15
- The recommended action described in the Proposed Plan may be modified based on public comment.

OU 15 Background

OU 15 Background

- OU 15 focuses on volatile organic compounds (VOCs) in indoor air due to vapor intrusion (VI)
- OU 15 addresses off- and on-Base areas for sites managed under CERCLA with the potential for VI.
- An important distinction for OU 15 is that the single affected environmental medium is indoor air.

OU 15 Characteristics

OU 15 Characteristics

- **On-Base Summary**
  - **Current Scenario:**
    - **No complete and significant VI occurring**
    - **Additional indoor air monitoring for Building 265 (OU 8)**
  - **Future Scenario:**
    - **New construction in on-Base areas with the potential to cause VI**
    - **OUs 1, 2, 4, 5, 6, 8, 10, and 12**

OU 15 Characteristics

- **Off-Base Summary**
  - **Current and Future Scenarios:**
    - **No significant VI to be addressed in OU 4 (Riverdale, South Weber), OU 9 (Sunset), and OU 10 (Clearfield, Sunset)**
    - **Complete and significant VI observed in OUs 1 and 2 (South Weber), OU 5 (Sunset, Clinton), OU 6 (Riverdale), OU 8 (Layton), and OU 12 (Roy).**
    - **OUs 1 and 2 need only be addressed in terms of sewer gas intrusion, not the typical subsurface to indoor air pathway**

Summary of Alternatives

Summary of Alternatives

- Alternative 1: No Action
- Alternative 2: Monitoring and Mitigation
  - Indoor Air Monitoring
  - Mitigation
    - Building/Residence VI Mitigation (subslab depressurization [typical VIMS], floor sealing, vapor barriers, venting layers)
    - Building/Residence Environmental Controls (HVAC mods, air purifiers)
    - Sewer Drain VI Mitigation (venting, modification)
    - Dewatering Measures (French drains, sumps)

Evaluation of Alternatives

Evaluation of Alternatives

- **National Contingency Plan Requirements:** the NCP requires that remedial alternatives developed in the FS be evaluated against nine criteria

Operable Unit 15 Remedial Alternative Evaluation			Alternatives	
			1	2
			No Action	Monitoring and Mitigation
NCP Alternative Evaluation Criteria	Threshold	Overall Protection of Human Health and the Environment	Not Protective	Protective
		Compliance with ARARs	Compliant	Compliant
	Balancing	Long-Term Effectiveness and Permanence	Poor	Fair
		Reduce Toxicity, Mobility, or Volume	Poor	Fair
		Short-Term Effectiveness	Good	Good
		Implementability	Good	Good
		Present Value Cost (millions of dollars)	$0	$8.1
	Modifying	Regulatory Acceptance	Not Acceptable	Acceptable (pending)
		Community Acceptance	--	--

ARAR = Applicable or relevant and appropriate requirement.
NCP = National Contingency Plan.

Preferred Alternative

Preferred Alternative

- **Alternative 2 (Monitoring and Mitigation)**
  - **Protective of human health and the environment**
  - **Compliant with ARARs**
  - **Creates no new adverse risks to the community**
  - **Easily implementable**
  - **Costs are not prohibitive**
  - **Alternative 2 mirrors the current interim remedy**
  - **The interim remedy has been successful at identifying locations where VI is occurring and mitigating VI at those locations**

Community Participation

Community Participation

- **Community Acceptance**
  - **30-day public comment period with a public meeting**
  - **Copies of the Proposed Plan will be available through various channels**
  - **Public comments documented in the responsiveness summary included in the Record of Decision for OU 15.**
  - **The preferred alternative may be modified or different alternatives may be selected on the basis of public comment**

Community Participation

- **Schedule**
  - **Proposed Plan currently under regulatory review**
  - **Public comment period anticipated to begin in early June**
  - **Public meeting approximately 10 days after the start of the public comment period**

Questions?

Air Force Civil Engineer Center

Integrity - Service - Excellence

Restoration Advisory Board

Status of Enhanced Reductive Dechlorination (ERD) Treatability Studies

April 27, 2017

Dr. Chuck Holbert, EA Team

Presentation Overview

- **EA Team has initiated ERD treatment in 12 areas:**
  - **OU 1 (on-Base) – DCE hotspot**
  - **OU 2 (South Weber) – Non-Source Area**
  - **OU 4 (Riverdale) – On-Base plume**
  - **OU 5 (Sunset/Clinton) – TARS and Zone 16 source areas**
  - **OU 9 (Sunset) – 1100 Area plume, Golf Course Area**
  - **OU 10 (Clearfield) – On-Base PCE plume, Off-Base PCE plume, TCE plume**
  - **OU 12 (Roy) – North and South on-Base plume areas**
- **Overall objective is to reduce source area and hotspot concentrations of PCE, TCE, and DCE**
- **Report on progress at OU 1, OU 5, and OU 9 1100 Area**

Operable Unit 1 – DCE Hotspot

- **Objective:** Reduce DCE concentrations by 90 percent in well U1-1602
- **Target Treatment Area:** On-Base in DCE hotspot near well U1-1602
- **Injection Points:** 10 injection wells
- **Performance Well(s):** 1
- **Injection Event(s):** May/June 2015
- **Substrate Volume:** 140 gallons
- **Bioaugmented?** Yes

Operable Unit 5 – TARS

- **Objective:** Reduce TCE concentrations by 90 percent in performance wells
- **Target Treatment Area:** Mid-plume area near Base boundary (On and Off Base)
- **Injection Points:** 13 injection wells
- **Performance Well(s):** 7
- **Injection Event(s):** July 2015
- **Substrate Volume:** 2,147 gallons
- **Bioaugmented?** Yes

Operable Unit 5 – Zone 16

- **Objective:** Reduce TCE concentrations by 70 percent in well U9-16-007
- **Target Treatment Area:** Zone 16 source area near well U9-16-007
- **Injection Points:** 4 injection wells
- **Performance Well(s):** 1
- **Injection Event(s):** July 2015
- **Substrate Volume:** 336 gallons
- **Bioaugmented?** No

Operable Unit 9 – 1100 Area

- **Objective:** Achieve Site Closeout
- **Target Treatment Area:** On- and Off-Base plume area
- **Injection Points:** 200 Direct Push Points and 6 injection wells
- **Performance Well(s):** 12
- **Injection Event(s):** July 2014, April 2015, and August/November 2016
- **Substrate Volume:** 3,198 gallons
- **Bioaugmented?** Yes (during last event)

Challenges/Lessons Learned

- Need higher substrate doses than initially anticipated at some sites
- Distribution more challenging at higher permeability sites (OUs 10 and 12) than compared with low permeability sites (OU 2 and OU 9 1100 Area)
- Bioaugmentation accelerated ERD process

TAG - TASC

Resources Available to Communities

EPA Region 8

Technical Assistance Grant (TAG) provides funding to a community group to contract its own technical advisor to interpret and explain technical reports, site conditions, and EPA's cleanup proposals and decisions related to a Superfund site, to the community.

Technical Assistance Service for Communities (TASC) is a contract program that provides independent assistance services that are delivered under a contract, which is funded, administered and managed by EPA.

Technical Assistance Grant (TAG)

- TAGs were created out of the Superfund Amendments and Reauthorization Act of 1986 (SARA).
- TAG provides money for activities that help your community participate in decision making at eligible Superfund sites.
  - Only one per site

Eligibility for a TAG

- Eligible groups
  - A group that is affected by a site that is listed or proposed for listing on the NPL.
  - A group must meet the minimum administrative and management capability requirements.
- Not eligible groups
  - Potential responsible parties (PRPs), including anyone that receives money or services from a PRP.
  - A group that is not incorporated as a nonprofit organization
  - “Affiliated” with a national organization
  - An academic institution
  - A political subdivision

Applying for a TAG

- Submits Letter of Intent (LOI) request to EPA
  - Group must establish for the purpose of TAG
- EPA announces to community that there is an interest for a TAG and any one that is interested in the grant should join the group or apply on their own.
- EPA site team (RPM, CIC, TAG coordinator, and grants office) will review application and award grant.

How can TAG funds be used?

- Most funds must go for a Technical Advisor (TA):
  - Reviewing preliminary site assessment/site investigation data
  - Participate in public meetings to help interpret site info.
  - Visit site during cleanup to update group
  - Evaluate future land use options based on RI/FS assumptions
- The TA needs to be selected through a competitive process
- Portion of funds for administration & outreach (may include grant administrator) –cap around 20%

What is not permissible?

- Lawsuits, legal actions
- Attorney fees for services
- Political activity or lobbying
- Tuition or training (except TA health/safety training)
- Activities or expenditures for group member travel
- Generating new primary data
- Generating new health data
- Reopening/challenging EPA final decisions

How are incurred costs paid?

- All allowable, allocable, reasonable and necessary incurred costs are paid for on a *reimbursement basis*.
  - EXCEPT one-time advance payment
- No repayment of expenses incurred prior to the award
  - EXCEPT the cost of incorporation.

Grant Compliance

- 40 CFR Part 35 Subpart M - TAGs
- Turn in quarterly reports that summarize TAG activities
  - Reimbursement for allowable costs
- Federal Financial Report (FFR) due annually
  - Overall award based on funding period
- SAM.gov and Nonprofit registrations
- Contribute 20% towards the project
  - Cash or in-kind contributions
- Performance is reviewed by EPA site team at the end of the grant

Technical Assistance Service for Communities (TASC)

- Provides independent assistance through an EPA contract to help communities better understand the science, regulations and policies of environmental issues and EPA actions.

Types of Services Offered

- Reviewing and explaining technical information
  - Educational presentations
- Helping communities form Community Advisory Groups
  - Facilitating community meetings
- Developing information materials for communities
- Community training/Workshop

Who Provides the Technical Assistance?

- The program provides services through a national or regional EPA contract. Under an agreement, a contractor provides scientists, engineers and other professionals to review and explain information to communities.

Which is the Best Fit?

- Broad focus
- Short or long-term
- Any community-based organization eligible
- No matching contribution
- Services by EPA contractor
- Relatively rapid implementation
- EPA manages administrative burden
- Subject to available resources

- Narrow focus
- Long-term
- Non-profit incorporated community groups eligible
- 20% matching required
- Services by community Technical Advisor via a contract.
- Takes 4-6 months to get grant going
- Community group responsible for administrative tasks

For Questions Please Contact:

Sisay Ashenafi

R8 TAG/TASC Coordinator

(303) 312-6138

Toll free: 800-227-8917 (Ext. 6138)

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Lindsay Seeger

R8 Grants Specialist

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Toll free: 800-277-8917 (Ext. 6564)

Seegar.lindsay@epa.gov

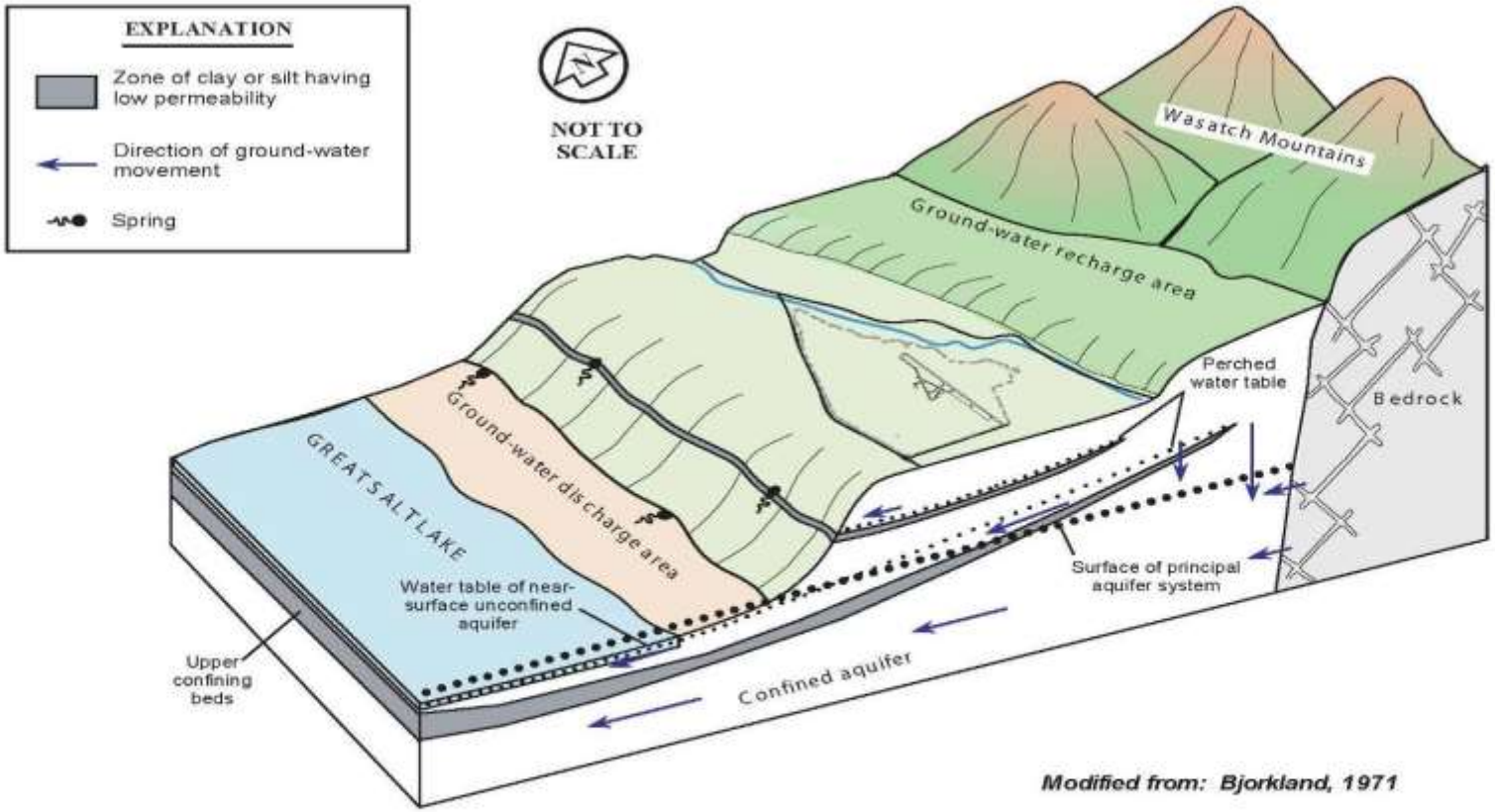
U.S. AIR FORCE

Geology 101

What is Beneath Hill AFB?

27 April 2017

Big Picture



SCHEMATIC REPRESENTATION OF THE HYDROGEOLOGIC CONDITIONS IN THE VICINITY OF HILL AIR FORCE BASE

Ancient Lake Bonneville

The Big Lake!

In Utah about 23,000 to 10,000 years ago

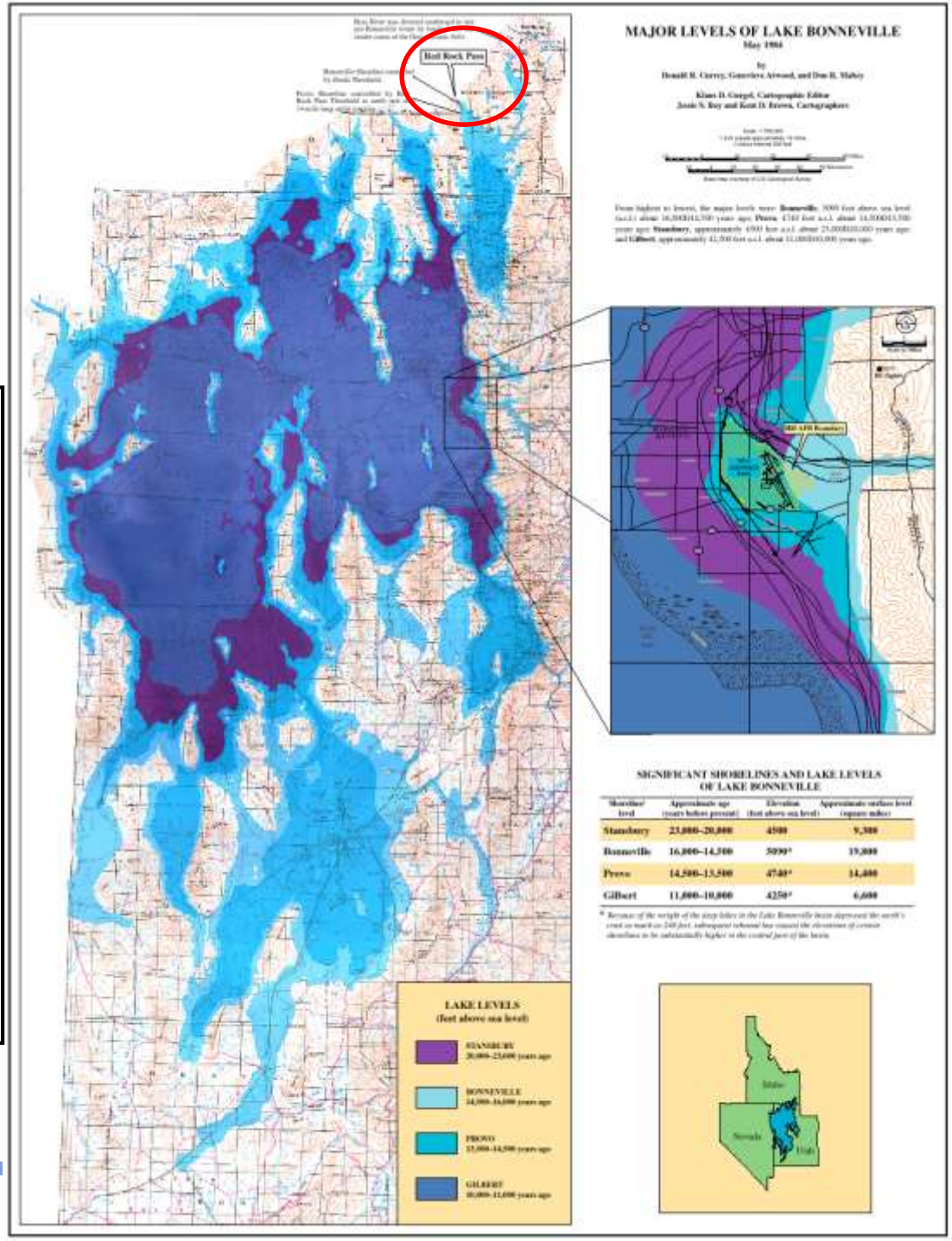
A delta was formed at the mouth of Weber River deltaic depositional environment

river sediments – gravel, sand & silt (thick to very thin layers)

beach sediments – mostly sand (thick layers)

swamp sediments – mostly silt & clay (thin to thick layers)

lake sediments – clay and silt (very very thin layers)

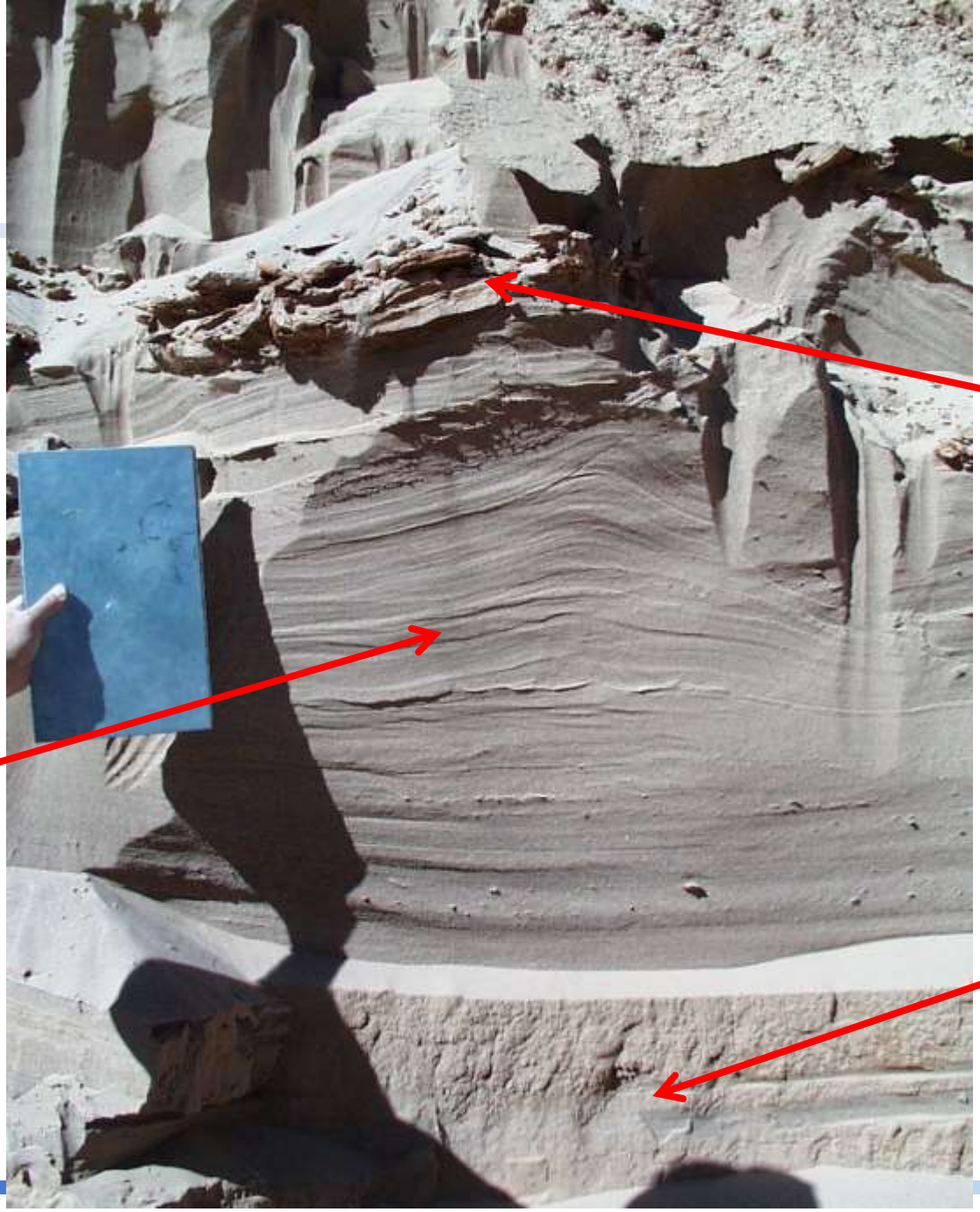


River delta formation

Copper River, Alaska

- Very similar to what the Weber River Delta would have looked like.
- Braided streams (gravel and sand)
- Swampy area (clay and silt)
- Low energy deposition points (sand, silt and clay)
- Very thinly bedded materials


Soil Horizon Layer
Provo Formation
Alpine Formation



RIP UP CLASTS (CLAY) LENSE

SAND LENSE

More Water Flow

CLAY AND SILT LENSES

Less Water Flow

Soil types

75TH AIR BASE WING

Soil types listed by permeability: Most permeable to least permeable.

Soil Type	Description	Permeability (ability of water to move through)
Gravel	Large particle size (marble up to baseballs)	Very High
Sand	Smaller than marbles to visible sized particles	High to Moderate
Silt	Barely visible particles	Low to Very Low
Clay	Smooth, pliable, can't see particles	VERY Low to Nil

Infinite combinations of these types (i.e. silty sand, clayey gravel, gravely sand)

High-Permeability Unit AKA “Sand”

75TH AIR BASE WING

Space between grains allows water to flow through

The bigger the particle the greater the flow

Low-Permeability Unit AKA “Clay”

75TH AIR BASE WING

Clay is made up of very tightly packed, very small particles with microscopic pore spaces.

Water moves through clay VERY slowly, if at all, and almost always finds a less restrictive path in other types of soil.

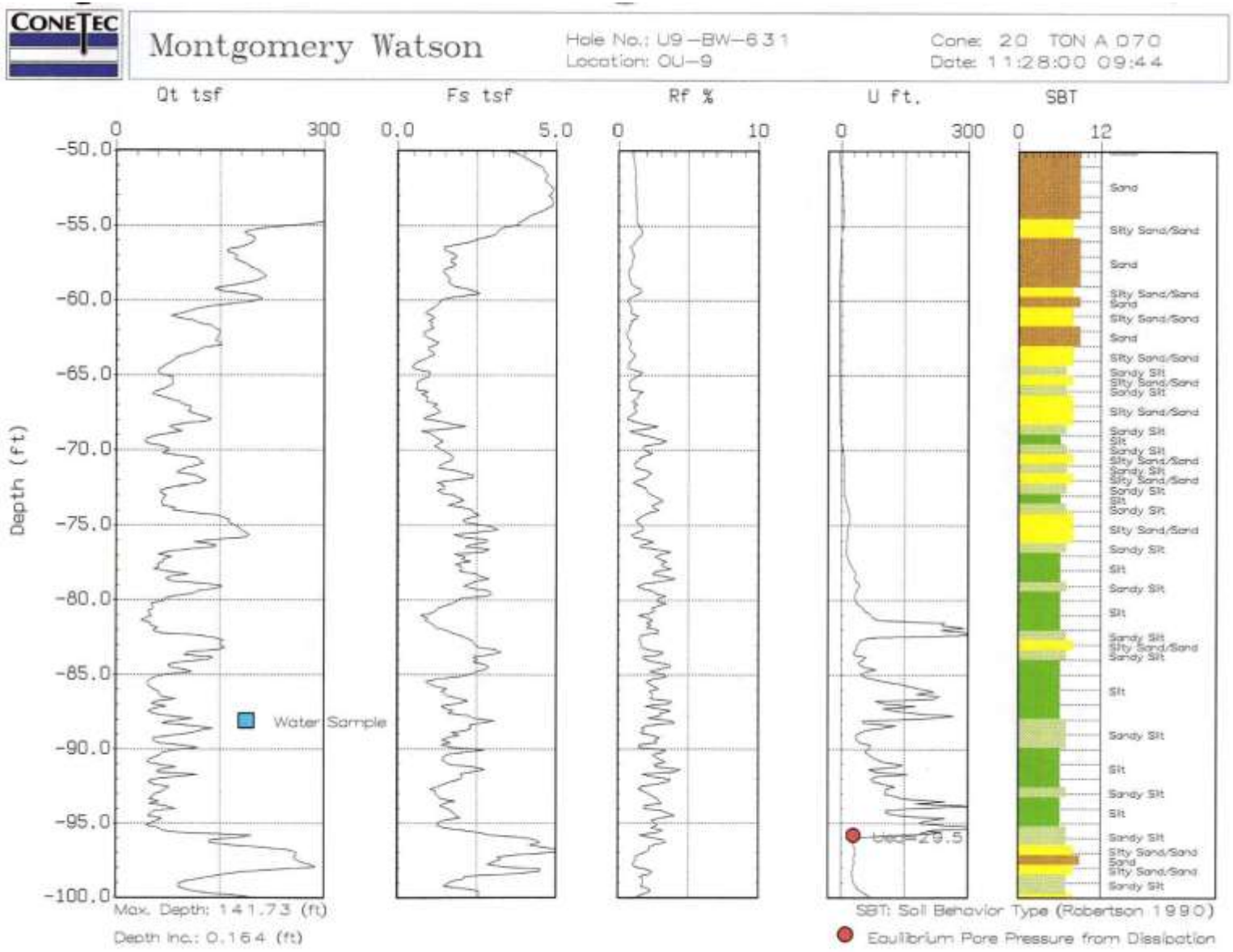
Clay is an effective barrier layer between aquifers.

Interbedded Silty Sand

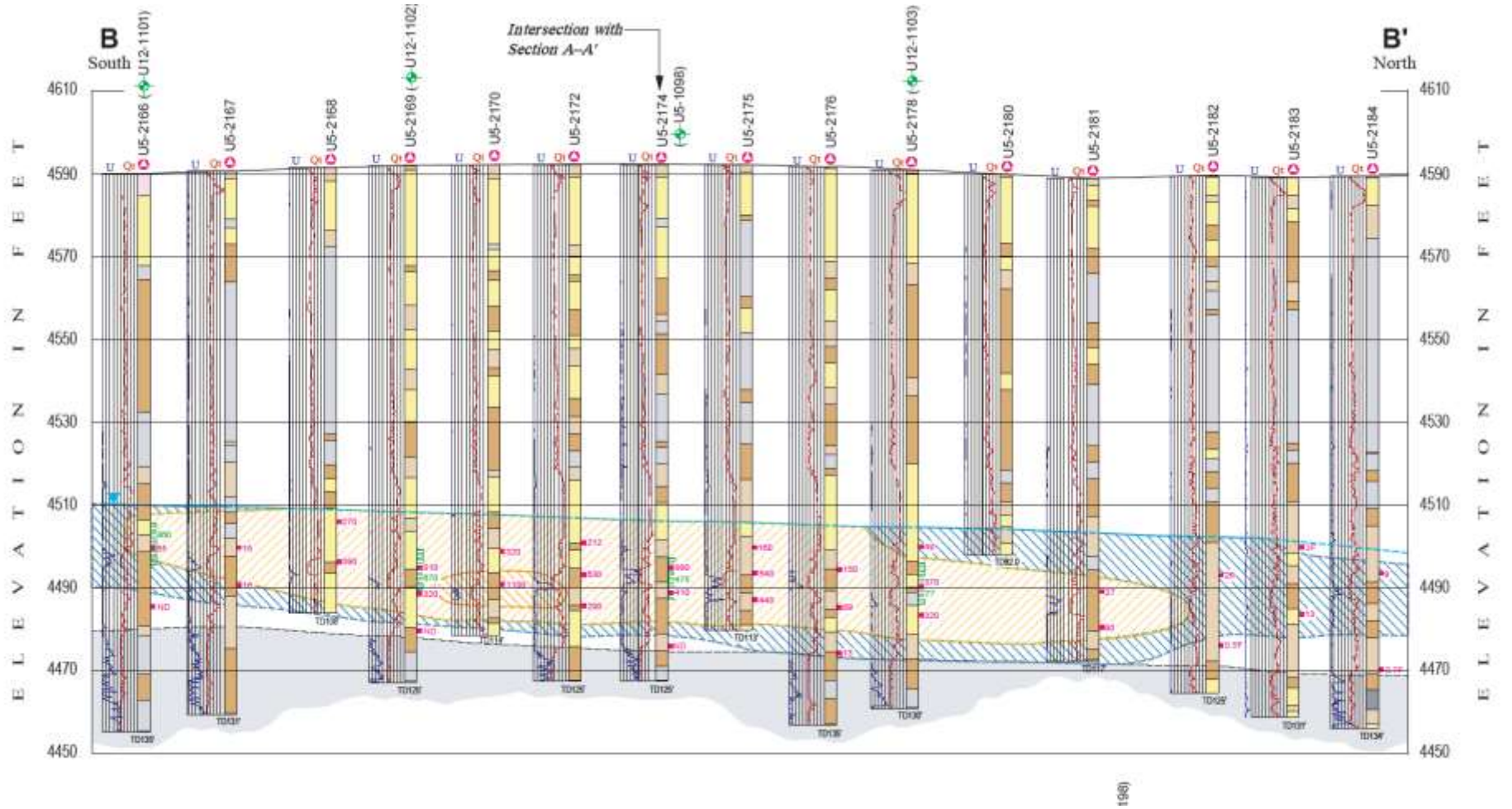
Subsurface in Sunset

Cone Penetrometer Tesing = CPT = Geologic Data Fast

CPT - Geologic Boring Log



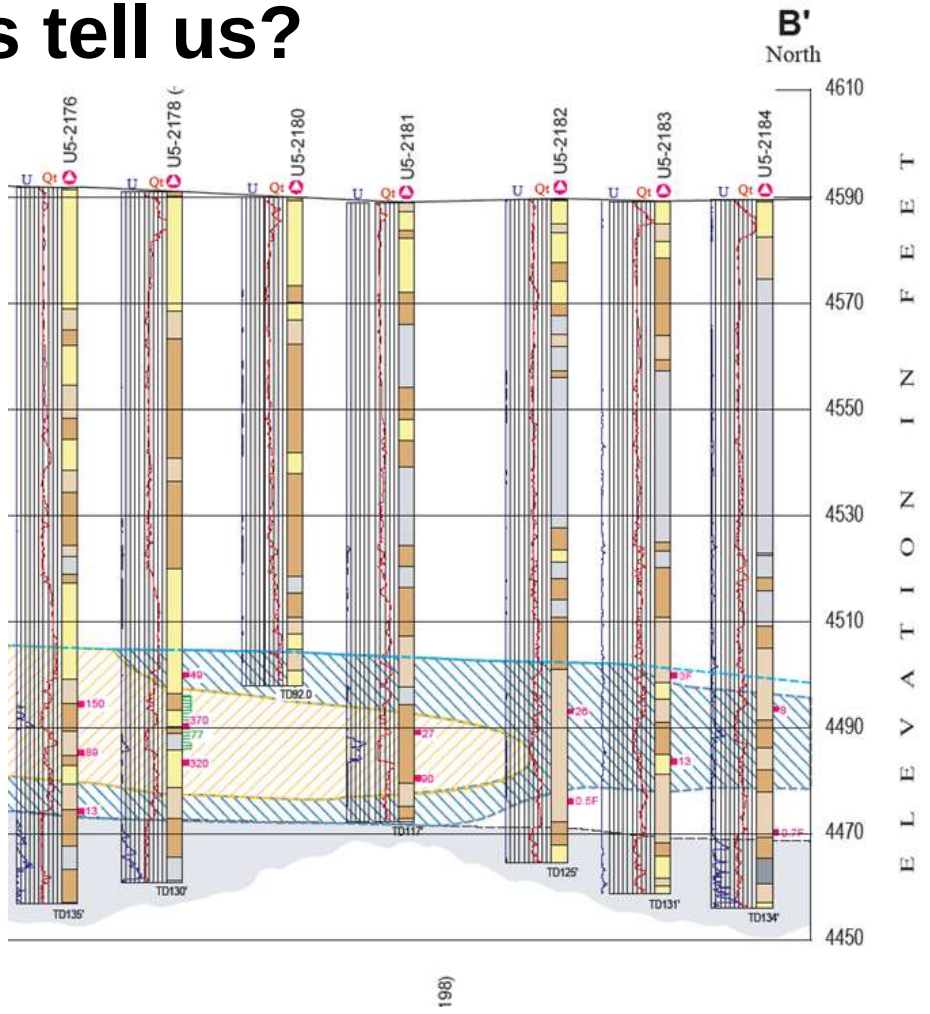
End Product


B
South
B'
North
Intersection with
Section A–A'
ELEVATION IN FEET
4610
4590
4570
4550
4530
4510
4490
4470
4450
U5-2166 (=U12-1101)
U5-2167
U5-2168
U5-2169 (=U12-1102)
U5-2170
U5-2172
U5-2174 (=U5-1098)
U5-2175
U5-2176
U5-2178 (=U12-1103)
U5-2180
U5-2181
U5-2182
U5-2183
U5-2184

What we learn from cross sections

What the cross-sections tell us?

- Areas of contamination
- Where is the water table
- Is there particular types of soil that are carrying most of the contamination
- Define the vertical extent of contamination



How soil type affects cleanup decisions

- Water moves through different types of soil at different rates
  - Most easily through coarse materials (gravels and sands)
  - More difficult through fine materials (silts and clays)
- Certain soil types more/less suitable for particular cleanup methods
  - ERD more effective in homogeneous sandy soils
  - Extraction wells work well in more varied soils
- Geologic logs give us the information needed to apply appropriate remedial actions

Geology 101