



- Mike Wray CH2M HILL
- Bill Cumberland Citizen

## II. Approval of minutes from last meeting

The previous meeting minutes were approved as written.

## III. Additional Agenda Items and Questions

Mr. Smith asked if there were any questions about the agenda or if anyone had any additional items not already on the agenda. He stated that there will also be an opportunity at the end of the meeting to add agenda items or ask questions. Mr. Smith announced that Mr. Duke and Mr. Anderson will be presenting a Case Study in Sustainability with respect to environmental cleanup. Mr. Duke and Mr. Anderson attended an Air Force Center for Engineering and the Environment (AFCEE) workshop earlier this month to talk about how we are incorporating Green and Sustainable Remediation principles into our environmental cleanup program and what it means to Travis. Mr. Smith announced he would also discuss the General Thomas D. White Award that Travis received last year for the restoration program.

## IV. Discussion Topics

### a) Case Study in Sustainability

Mr. Duke presented information on Green and Sustainable Remediation (GSR) and what it means to Travis.

GSR looks at the entire remediation process, including those portions away from the site; the “holistic” approach. GSR uses technologies to effectively clean up contaminants while minimizing or eliminating environmental impacts by using: common sense, best management practices, and low impact remediation. Some of the processes Travis has used in the past and are currently using, or getting ready to implement include: *Phytoremediation, Light Non-Aqueous Phase Liquid (LNAPL) Recovery, Passive In-Situ Treatment, Enhanced Bioremediation, Monitored Natural Attenuation, Biobarriers, Passive Diffusion Bag Sampling, and Solar Powered Extraction Systems*. Some have been accepted by the regulatory agencies and some are still being evaluated to ensure cleanup success. The benefits of using the GSR approach are: *reduced energy costs, reduced air emissions, reduced impacts on water resources, reduced impacts on land and ecosystems, reduced material consumption and waste generated, reduced Cost to Complete (CTC), Remedy in Place (RIP), and Response Complete (RC) in a more sustainable manner.*

The reasons for applying GSR at Travis AFB are many: *out of necessity, reduced energy consumption, improved performance of existing remedial technologies,*

*improved cost effectiveness of treatment technologies, more focus on transition to an exit strategy, and reduced infrastructure maintenance.*

**Mr. Duke presented examples of how Travis has successfully achieved GSR at several sites.**

Two solar power panels were installed as the sole power source used to extract groundwater and to push groundwater through the carbon vessels located at the North Groundwater Treatment Plant (NGWTP). This system was “out of necessity”. A power source was needed to power the extraction wells (EWs) because of the location. The EWs are positioned near a Vernal Pool (seasonal wetland). Due to the location, we could not trench to lay wire for conventional power. The solar panels are mounted 3 feet high and get enough sun during the day to charge batteries to run the EWs at night. This allows us to pump 24/7 when the vernal pools are dry. The pumps are turned off during the wet seasons to protect the wetlands. This GSR solution saves electricity, and reduces CO<sub>2</sub> emissions, while protecting the surrounding wetlands.

The North Groundwater Treatment Plant (NGWTP) before optimization. The treatment technologies employed used a lot of electricity to run transfer pumps and an Air Stripper to treat the groundwater. From 2000 to 2007 the contaminant plumes were larger and more contaminated than they are now. The NGWTP has removed over 500 pounds of VOCs since startup, while treating more than 82 million gallons of groundwater. At this time, the treatment process is costing over \$100K per pound of VOCs removed, over 10,000 kWh of electricity is consumed monthly, and over 13,000 lbs of CO<sub>2</sub> is generated monthly. The extraction systems effectively removed contaminant mass. Over time, the treatment plant influent concentrations and volumes have decreased and maintenance and repair costs have increased. In 2008 it cost almost \$200,000 to remove 1 pound of VOCs. A large amount of electricity was consumed, to remove 1 pound of VOCs. The Remedial Process Optimization (RPO) evaluation helped with the transitioning to a more sustainable technology. The RPO evaluation favored removing the air stripper from the treatment train, and the groundwater is now treated using granular-activated carbon. Further, the EWs are powered by solar panels. Over 80,000 gallons of groundwater can be treated with the optimized system each month. The cost per pound of VOCs removed is now significantly less. No off-the-grid electricity is used for treatment, and no CO<sub>2</sub> is generated. The optimized NGWTP is considered a very successful GSR solution.

The Central Groundwater Treatment Plant (CGWTP) was installed, and started up in 1996. The method of treatment was primarily Ultraviolet Oxidation (UV/Ox), which is very energy-intensive. The UV bulbs cost about \$2,000.00 each and need to be replaced approximately every 4 months. The plant capacity was designed at a flow rate of 300 gallons per minute (gpm). Since the system flow had dropped to about

80 gpm, the treatment capacity was being underutilized. An RPO evaluation was conducted recently, which suggested removing the UV/Ox system and converting to GAC. We utilized two existing 20,000 pound carbon vessels for treatment of the extracted groundwater. The reduction in electricity consumption and O&M costs for the optimized system are significant. The CGWTP optimization is considered another successful GSR solution.

One of the early Travis GSR initiatives was using vegetable oil injection to speed up the cleanup of chlorinated solvents. This was the first attempt on Travis to treat TCE in-situ with a carbon source (the vegetable oil). A total of 162 gallons of soybean oil was injected into the sub-surface at Site SS015. The initial results were promising which led the current thinking on in-situ treatment at Travis. Before the treatment could be completed, however, the base needed the area being treated to construct a new building in the flight line area. The treatment study was ended early, but a lot was learned from this initial injection.

Another current GSR success is using Passive Diffusion Bags (PDBs) to collect groundwater samples. A side-by-side comparison was conducted using the low-flow sampling technique versus PDBs. The PDB sampling method requires less man-hours, and the results are more representative of aquifer conditions. Further, no pump is used for purging, which saves on power consumption. Travis AFB now has 154 wells with PDBs installed.

A future Travis GSR initiative will be utilized for cleanup of an MTBE plume at the AAFES gas station on Base. The three groundwater extraction wells will be solar powered, and the extracted groundwater will be treated using GAC. There are carbon vessels on Travis that have been “moth balled”, and can be used for the new treatment plant at the gas station.

Mr. Marianno asked where the MTBE contaminant came from. Mr. Duke said it was from the AAFES gas station that had some leaks from some old pipes that have since been replaced.

**Mr. Anderson presentation reported on Travis’ steps to successful GSR: which included.**

The perfect groundwater treatment test site. AFCEE Technology Transfer Broad Agency Announcement (BAA) demonstrations/pilot projects. Regulatory coordination and support. Performance Based Contract (PCB). Green specific tools and programs such as EPA primer on green remediation. Partnership with Environmental Restoration Programs Optimization (ERP-O) visit.

The perfect groundwater treatment test site is located at the “Old Battery Shop”, the former Building #755. It is a perfect location because there is not a lot of activity

in that area. Seven different technologies have been used at this one site, including: *Dual-phase extraction, Columnar wall jet grouting and permeable reactive treatment, Direct push sensor for TCE (Haloprobe), Phytoremediation, Monitored Natural Attenuation (MNA), a Bioreactor, and a Biobarrier.*

A permeable treatment wall using jet grout applicator, and zero valent iron slurry was installed across the solvent plume. The idea was that the groundwater would travel through the wall. However, the grout mix stopped the groundwater flow and the groundwater traveled around the wall. We consider this project a “successful failure” – it helped us to learn from the subsurface conditions at Travis.

A solar-powered bioreactor was installed at the source-area of the Old Battery Shop VOC plume. The bioreactor is a biological source area treatment system. The system was constructed using a mix of tree mulch, gravel, iron sand, and gypsum to promote reductive dechlorination and abiotic reduction. This project has been so successful that EPA Region 9 has selected this GSR as a case study. Another bioreactor is going to be installed on the base near the flight line. The site is highly contaminated with TCE. There is a 300 foot horizontal extraction well located 30 feet directly below the future site of the bioreactor installation. The plan is to hook into the horizontal well to re-circulate the groundwater.

A phytoremediation engineered planting of 480 eucalyptus trees was placed across the solvent plume. The evaluation of the impact on the plume is ongoing over a 12 year period. Results support inclusion of trees as part of groundwater treatment plan. This is the ultimate sustainable GSR ever found. If proven successful, this will be the first of its kind. Mr. Marianno asked if any tree would work for this application. Mr. Anderson said there were certain standards needed to adhere to; trees that love water (eucalyptus trees love water) and trees that do not lose their leaves. This technology will only work in selected climates so there are some limitations to this approach.

A biobarrier was installed on the down-gradient end of the VOC plume. Emulsified Oil Substrate (EOS) was injected into a series of injection wells in a line across the solvent plume. The biobarrier was designed to prevent migration of high solvent concentrations into the monitored natural attenuation (MNA) area of the plume. We like to think of this as a “line in the sand” type of approach.

Base-wide MNA assessment is a key part of the exit strategy for all solvent sites. To look at when the pump and treat systems can be turned off and natural attenuation can take over. Travis completed an MNA assessment across the base. Enhanced MNA appears to offer the greatest opportunity for success at Travis.

It is essential to have regulatory coordination and support for promoting GSR. Travis tries to keep the lines of communication open; in particular, we use the “TRIAD” approach. Meetings are held once a month to discuss designs and green

technologies. In June 2008, Mr. Duke began reporting on energy consumption, and the resulting CO<sub>2</sub> generated, from the treatment plant operations at the monthly regulatory meetings. The amount of energy used, the very high costs, and the CO<sub>2</sub> emissions was a surprise to the group. Mr. Duke's reports help us to reinforce our resolve for GSR.

Performance Based Contracting (PBC) is an outstanding way to focus on remedy selection and sustainable alternatives. In the bidding process, the technical proposal that offers the best transition to sustainable cleanups is favored. The Travis contract selection team took six days to select two PBC contractors (CH2M HILL for groundwater and ITSI for soil/sediments). We were in a windowless room, pretty much sequestered, until all the proposals had been read, evaluated, and discussed. Travis told contractors what they wanted to see and chose the contractors that shared their vision. Mr. Anderson also thanked the Army Corps of Engineers, Omaha District, for their contractual and technical support for the two PBCs.

Travis participated in the AFCEE Sustainable Remediation Tool (SRT) beta test. This tool is a great way of comparing "apples to apples", what uses more energy and what uses less energy.

The AFCEE RPO team made a site visit to Travis. They arrived on a Monday, looked at all the potential treatment optimizations, and left on the following Friday. The result of that site visit is that they made suggestions as to what we needed to do to improve our processes. On the following Monday we were on a plane to Omaha to pick the PBC teams.

Travis produces a newsletter called 'The Guardian'. It is a great way to advertise the Base's emphasis on GSR. We also have articles placed in our local newspaper, on the AFCEE website, in the Center Views magazine, and on EPA's Technology News and Trends.

"Think Big Picture": 1) GSR is really just a common sense approach, which utilizes Best Management Practices. 2) Transition to low flow/low concentration is coming. 3) AFCEE BAAs energize the GSR selection process. 4) The regulatory agencies can be very receptive to GSR initiatives.

Mr. Kaiser from the Water Board said that Travis has a treasure trove of information for GSR processes... "what went right and what went wrong". He asked if the Air Force has taken this information and used it at other bases. Mr. Anderson stated he was not aware of any. The information was shared two weeks ago, we don't know if the message is getting across to the other Bases. AFCEE is pushing projects to get Bases to host these different types of projects. Travis was the only base to request in writing that we wanted to participate in the Bioreactor study. This is "free money" for this testing. Mr. Kaiser said he thought it a shame that Travis has this information

and it's not being put into practice at other bases. Mr. Duke said word is starting to spread regarding the solar powered bioreactor. Two other bases are going to install this technology, Beale AFB and Fairchild AFB.

b) General Thomas D. White Award

Mr. Smith talked about the General Thomas D. White Award that Travis AFB won last year. The award is offered every two years, and it recognizes the installation with the best or most improved environmental restoration program in the current year or the previous year. The award is administered by the Air Force, and all Air Force organizations or individuals are eligible for this award. Mr. Smith gave a brief biography of General Thomas D. White who charted the course for Air Force environmental programs. The purpose of the General Thomas D. White award is to recognize and promote excellence in every aspect of Air Force environmental programs. These awards are designed to recognize the efforts of an installation and individuals for environmental quality, restoration, pollution prevention, recycling, and conservation of natural and cultural resources. Travis received the award for Environmental Restoration. Lt. Col Wade Lawrence is the Base Engineer who nominated CES for this award.

This award is a team effort and Mr. Smith thanked Mr. Anderson and Mr. Duke, Project Managers, who believe in "get it done right and get it done right now." Mr. Smith, the Program Manager, also shares that belief. Mr. Smith thanked the office administrative assistant, Ms. Sherry Cassidy (not present) for maintaining the administrative record and Mr. Gregory Parrott, the environmental attorney, for his guidance. He thanked ITSI and CH2M HILL for their efforts, the regulatory agencies for their help, and the US Army Corps of Engineers, Omaha District for their support. All have helped Travis to win this award. Lastly, Mr. Smith thanked Lt. Col Wade Lawrence for nominating Travis for this award. Lt. Col Lawrence said this award is a huge deal and that Travis has a world class restoration team. Mr. Marianno echoed Lt. Col Lawrence's sentiments and thanked the team for their efforts in cleaning up the base.

Mr. Smith said that California is doing pretty good; adding that Beale AFB won the General Thomas D. White Award in 2009 for Air Combat Command.

V. **Cleanup Program Status**

- a) Mr. Anderson talked about the Focused Feasibility Study (FFS), Proposed Plan (PP), and the Record of Decision (ROD) schedule. The path leading to Remedy-in-Place (RIP) focuses on these three documents. The ROD is a public document that selects the cleanup alternative for cleaning up a Superfund site. The draft ROD is scheduled for July 2011. The PP presents the proposed cleanup methods to the public, for comment and input. The draft PP is scheduled for January 2011. The FFS evaluates the possible remedial action alternatives. The draft FFS is scheduled for July 2010.

Mr. Anderson said the schedule is subject to change, due to weather, etc. they will keep RAB members informed.

- b) Mr. Duke reported on 2010 Field Work. A map of Travis was shown with all the Fieldwork locations by site and status.

Site LF007C site characterization requires coordination with US Fish and Wildlife Service as this site is located within a large Vernal Pool.

Site SS015 needs further site characterization.

Site ST018 (POCO). The installation of extraction wells has been completed, and the installation of solar powered treatment system to clean up Methyl Tertiary Butyl Ether (MTBE) will be accomplished this summer.

Site SD036 needs further site characterization.

Site SD037 the Injection Well (IW) installation has been completed. We are now preparing to inject Emulsified Oil Substrate (EOS).

Site DP039 IW installation is nearly completed. The horse pasture needs to dry up before we can finish the well installation, which will then be followed by injection of the EOS.

Site SS016 will have additional monitoring wells installed after an energy intensive Thermal Oxidation Unit is removed to prepare for the solar powered bioreactor installation.

Site FT005 needs further site characterization of the soil.

Rapid Runway Repair (RRR) removal of the asbestos, lead based paint, concrete, asphalt, and clean soil for reuse on base. The crushed up debris (concrete, asphalt, etc) is located on Creed Road.

Mr. Marianno commented on the RRR project and stated that all the debris stored on Creed Road is an eye soar. Mr. Duke said that the debris will be removed and some of it will be reused on base; adding that the debris on Creed Road isn't part of the restoration program. But they decided to clean it up anyway. Travis is in the process of selecting a contractor for the cleanup removal.

Groundwater Sampling and Analysis Program (GSAP) is just getting started. This is the largest sampling event of the year with hundreds of samples and groundwater measurement will be taken.

Mr. Duke ended by saying “the journey has begun to attain the Air Force goal of RIP by 2012”.

**VI. Regulatory Agency Reports**

Mr. Chang congratulated Travis for the General Thomas D. White award which is a reflection of the great efforts the Base is making to clean up the contamination. Mr. Chang also gave kudos to the base for all the GSR initiatives. But, he remarked that the FFS and ROD will be coming out soon, and more time is needed to prove that these remedies will work. Mr. Smith acknowledged Mr. Chang, and stated “we are going to do what we can to meet that goal”.

Mr. Friedman also congratulated Travis for the award. Mr. Friedman appreciates Travis’ very aggressive schedule and likes the different GSR approaches Travis has used. It does put pressure on Travis and the agencies to reach RIP by 2012. He likes the different approaches that are being used and says that the program is getting closer to “the goal”.

Mr. Smith stated that DTSC is not available this evening to comment.

**VII. Focus Group Reports**

Mr. Smith said they have relied on the Focus Groups in the past to help with budget or technical concerns. Mr. Smith thanked Mr. John Foster for providing comments on the Vapor Intrusion report (VI) and included that his comments were very valuable. Mr. Smith thanked the RAB members for their help.

**VIII. RAB/Public Questions**

Mr. Smith said he wanted to take a moment and thank Lt. Col Wade Lawrence for his participation to the RAB, and wished him good fortune in his next assignment in Qatar.

Mr. Smith announced that Mr. Kaiser will be retiring from the Water Board and thanked him for all his help. Mr. Kaiser said that Travis has done good work and that Travis has a very fine reputation in the State. He thanked Travis for the very kind words that were written in the Guardian.

Mr. Smith invited the RAB attendees to Travis AFB to tour the second bioreactor installation going in sometime this summer. A 30 day notice prior to installation will be given to the RAB members.

**IX. Set Time and Place for Next RAB meeting**

The next RAB meeting is scheduled for **21 October 2010** at the Northern Solano County Association of Realtors in Fairfield.

**X. Adjournment**

**Mr. Smith** adjourned the meeting at **9:00 pm**.

Minutes submitted by: Jeannette Cumberland, CH2M HILL

Minutes approved by: Mark Smith