

**United States Army Corps of Engineers – New England District
Cold Regions Research and Engineering Laboratory (CRREL)
Restoration Advisory Board**

Minutes of Meeting #25

**Wednesday, September 11th, 2019
Richmond Middle School (RMS) Library
Hanover, New Hampshire**

Attending: Scott Calkin – Wood E&IS – Scott.Calkin@woodplc.com
Rod Rustad – Wood E&IS – Rod.Rustad@woodplc.com
Darrell Moore (Chair) – USACE - Darrell.A.Moore@usace.army.mil
Robin Mongeon – NHDES – Robin.Mongeon@des.nh.gov
Roelof Versteeg Community Member - Roelof.versteeg@gmail.com absent
Kristine McDevitt – Community Member – Kristinemcd@hotmail.com
Terry Harwood – Cold regions Research and Engineering Lab (CRREL)
Bartlett.Harwood@USACE.army.mil
Chief Martin McMillan – Hanover Fire Dept. Martin.McMillan@hanovernh.org
absent
Laurie Haines-Eklund – Army Environmental Command
Glen Gordon - Wood E&IS glen.Gordon@woodplc.com
Muriel Robinette - Dartmouth/GZA -muriel.robinette@gza.com

Observing: Gary Pasternak – ERDC – gary.A.Pasternak@usace.army.mil
Amy Rosenstein – USACE- Amy.B.Rosenstein@USACE.army.mil
Amy Quintin -Wood E&IS, Inc. Amy.Quintin@woodplc.com
Bryan Ambrust – CRREL – Bryan.R.Ambrust.civ@mail.mil
Steven Lamb – GZA – Steven.Lamb@gza.com
Jeff Pickett – Wood E&IS – Jeffrey.Pickett@woodplc.com

Agenda:

- **Introductions and May Meeting Minutes**
- **Conceptual Model Refresher**
- **June Soil Gas Sampling**
- **Richmond Middle School August Sampling**
- **Norwich Groundwater Sampling**
- **Feasibility Study Report Status**
- **Upcoming Work**
- **Schedule Next Meeting**
- **Adjourn**

Items comments and notes:

Wood personnel hands out draft email note from May 2019 meeting

The September RAB meeting was initiated with a review of the above agenda from the ppt slide package.

Review of the meeting minutes from May 15th.

Moore motions to accept meeting minutes, seconded. The May 15th Meeting Minutes were reviewed and accepted as noted.

Accepted Meeting minutes.

Darrell Moore begins meeting with a general review of the meeting agenda.

General introductions of all attendees follow introductory statements by Darrell Moore.

Rod Rustad from Wood environment & Infrastructure Solutions, Inc. (Wood) begins with overview of the Cold Regions Research & Engineering Lab site (CRREL) conceptual site model, geology, hydrogeology, and highlights the AOC 2 and AOC 9 sites. These are the 2 primary sites at CRREL and responsible for the TCE soil vapor and groundwater contamination. The geology at CRREL is dominated by a very thick unsaturated zones and lacustrine (Lake Deposit Lake Hitchcock) overburden.

Rod reviews the bedrock and overlying OB soils and the depositional sequences at the CRREL site being generally as follows:

Fine grained materials from surface to depths of 30 to 50 feet then more permeable fine sand with increasing permeability with increasing depth of the overburden.

Rod reviews the extraction wells and the withdrawal of up to 1 million gallons of water from the extraction well historically on a daily basis. The extractions wells were/are removing approx. 2 lbs. per day in 2012 with no drop off in the amount of TCE typically removed per day.

Wood E&IS got involved when there was an Remedial Investigation (RI) and Feasibility Study (FS) Proposed for AOC 2 and AOC 9 in late 2011. In late 2012 Wood did number of soils borings, MIP work, and direct push ground water sampling at CRREL Particularly in the areas of AOC 2 and AOC 9 and down gradient of the AOCs. Wood reviewed existing environmental data and included new wells and sampling events and findings and developed a site conceptual model for the site.

Rod reviews the TCE plume that are associated with AOC9 and AOC2.

The additional investigations determined that the plume from AOC 2 was higher in concentration than originally thought and soils and fine sands had much higher permeability than previously assumed.

Wood also installed a number of soil vapor points to try and define the extent of the TCE vapors in the unsaturated soils. Wood personnel shows map of soil vapors with very high concentrations in 2012 and 2014.

Also completed some additional points farther out from the source in 2012 and 2014 map showing the extent for TCE soil vapor.

Soil vapor extraction (SVE) pilot test initiated in 2014. Test continued from 2014 through 2017 and added SVE test at AOC 9. During this period the SVE test removed approximately 600 gallons of TCE from the unsaturated soils at AOC 2 and AOC 9.

AOC 2 was shut down in April 2018 to monitor potential rebound and collect data to monitor the responses in the deep sands vs shallow fine grained soils. AOC 9 shut down in Jan 2019. The SVE system at both AOC 2 and AOC is currently shut down and Wood has been monitoring rebound at both sites. Both sites showing very little rebound after the SVE extracted over 600 gallons of TCE from the subsurface overburden and may have even affected TCE concentrations in groundwater in certain monitoring wells.

System currently shut down for rebound monitoring.

Wood personnel describes how the slits and clays slow down the extraction of the TCE and how the TCE was more easily extracted from the deeper coarser soils.

Wood shows the highest concentration map of TCE before removal in 2014 and 2016 and shows relationship between GW and the TCE in the vapor phase unsaturated soils at CRREL.

Wood personnel note that there were some very low detections of TCE in shallow bedrock areas and no detections in deeper bedrock.

Wood personnel also describes how the SVE system affected concentrations in some of the plume monitoring wells and ground water.

Wood personnel explains how the SVE pilot test was affecting and decreasing very contaminated wells. Most explorations observed decreasing concentrations with depths in the soils and very little to no impact in the bedrock and deep bedrock

Wood personnel also describes the difference of capture from the deeper sand vs the shallow siltier clayey soils.

Remedial area (SVE) in deeper soils up to 200 feet radial and 20 to 25 feet within the shallower finer soils.

Using 15 to 20 inches vacuum in the sands and up to 100 inches of vacuum in the silty zones.

Wood personnel review the latest RMS Middle school event from August 2019. Most all location Indoor Air (IA) samples were less than detects and there were 1 detection at 1 subslab sampling points. The next sampling event will be in the December then Wood and USACE will move to sampling on a 5 year basis. Wood has been sampling over 25 events at RMS

RMS School started out as quarterly events per year then moved to 2 per year and eventually will move to once per 5 years.

Wood explains the additional sampling that was completed over in VT. One well was a dug well and results were non detect and the second residential well was a bedrock well which was also non detect for VOCs

USACE personnel explains the VT regulatory process for reclassifying aquifer in VT once we get reclassification completed the Army will then finish the River RI and comprehensive ROD. for the VT Ground water

Wood personnel describe the FS process and how the pilot test results and GW testing and aquifer tests are affecting the Draft FS. These two pilot testing efforts have changed the focus of the FS there are 2 separate issues. There is soil gas clean up efforts as part of the FS and then focus on ground water remediation. Soil gas may be relatively easy the and be completed before we do the more rigorous groundwater cleanup effort. There does not appear to be a short and easy range of options for groundwater cleanup at CRREL We have been looking at pump and treat options with some additional interim treatments. It may take 60 to 100 years to clean up groundwater contamination at CRREL. The GW clean up will be very complex and lengthy process

Wood Personnel have been doing quite a bit of rebound testing over at the Main Lab we may also be doing some addition shallow soil permeability enhancement testing in the shallow soils at CRREL this fall or next spring depending on subcontractor availability for the enhanced permeability testing.

What is the schedule for the GW reclassification for VT We are fairly along in this process?

Reply maybe the first quarter 2020 say March 2020 for this work. Do the work in VT reclassification, before we do the river RI so we do not have to make some risk assumptions that may not be real in VT.

RAB decided to set the next date for next RAB meeting for January 8, 2020