

# Marine Corps Base Camp Lejeune (MCB Camp Lejeune) Restoration Advisory Board (RAB) Meeting Minutes

**MEETING DATE:** February 6, 2019

**LOCATION:** Coastal Carolina Community College, Business Technology Building, Jacksonville, North Carolina

**ATTENDEES:**

Dave Cleland/NAVFAC Mid-Atlantic	Brian Wheat/RAB Member
Charity Delaney/MCB Camp Lejeune	Thomas Mattison/RAB Member
Randy McElveen/NCDEQ	Richard Mullins/RAB Member
Jennifer Tufts/EPA	Steven Thompson/RAB Member
Laura Bader/RAB Co-Chair	Michael Curtis/RAB Member
Angela Sutherland/Guest	Betsy Collins/CH2M
Monica Fulkerson/CH2M	Matt Louth/CH2M
	Daniel Brown/CH2M

**FROM:** Betsy Collins/CH2M

**DATE:** February 28, 2019

## I. Welcome and Introductions

Ms. Delaney began the meeting and reviewed the agenda.

## II. Greener Clean-Ups

**Objective:** The purpose of this agenda item was to present on the ASTM E2893-16: Standard Guide for Greener Cleanups and how it is being incorporated into the Installation Restoration Program.

**Overview:** A presentation was reviewed by Ms. Collins. ASTM E2893-16: Standard Guide for Greener Cleanups is a standard which provides a process for identifying, evaluating, incorporating, and documenting sustainable best management practices (BMPs) for environmental restoration. The purpose of this standard is to reduce environmental impacts in 5 key categories: energy requirements, air pollution, water use, material production/waste disposal, and land and ecosystem impacts. The process begins by evaluating 114 BMPs as part of the opportunity assessment. Next the BMPs are prioritized and the BMPs to be implemented are selected. The BMPs are implemented and then documented.

The Team decided to use this standard to document the work that had been completed over the past decade at MCB Camp Lejeune. The 114 BMPs were evaluated and 29 were identified as potentially applicable. Of those 29, 18 were implemented including 2 user-defined BMPs. Each of these BMPs complemented the strategy to achieve site objectives and were conducted in all phases of site work. The self-declaration was completed in 2017.

Three examples of BMPs implemented and their impacts were reviewed. The first was in the installation and operation of the solar powered subgrade biogeochemical reactor located at Site 93. BMPs implemented included the using biobased and non-refined materials (locally sourced mulch and soybean

oil), using uncontaminated site soil for backfill, and operating the pump with exclusively solar power. These BMPs reduced landfill waste and greenhouse gas emissions and maximized use of renewable energy while reducing concentrations in source area and potential time to site closure

The second example related to the use of air sparging at multiple sites at MCB Camp Lejeune. BMPs that were implemented including setting milestones for system shutdown and reusing the equipment. These BMPs resulted in a savings of approximately 800,000 kilowatt hours per system per year, reduced cost and greenhouse gas emissions associated with electricity production and avoided vehicle travel for operations and maintenance activities.

The third example was the long-term monitoring program. BMPs that were implemented included utilizing no purge technology for sampling 300 groundwater monitoring wells per year, optimizing the well network, and utilizing existing wells. These BMPs resulted in the avoidance of approximately 1,500 gallons of aqueous waste per year and eliminated the need for an estimated 15,000 feet of tubing per year. The reduced time and cost associated with these BMPs was 600 hours and \$32,000 per year.

A RAB member asked if these practices could have been used or impacted the decisions to use thermal treatments at Site 89 that were conducted in the 2000's. Ms. Collins responded that these BMPs are used in two main ways, to reduce the impacts of traditional technologies and to drive innovation towards new technologies. BMPs were likely included as part of the implementation however if we going to do that work today we could probably identify even more BMPs to be implemented. He asked if solar power was an option for thermal. Ms. Fulkerson responded that this technology is currently being developed but is not yet available since the energy demand is so large.

A RAB member asked if the EPA is pushing the ASTM Standard Guide for Greener Cleanups to their private clients. Ms. Collins confirmed that yes, this standard is being pushed across the industry.

Ms. Collins concluded the presentation by highlighting that, for more than a decade, the MCB Camp Lejeune environmental program has delivered sustainable solutions as documented in the Greener Cleanups Self Declaration. The environmental program will continue to build upon this foundation by evaluating sustainability during all phases of site work.

### **III. Update on Long-Term Monitoring (LTM) Sites Pilot Studies**

**Objective:** The purpose of this agenda item was to provide an update on pilot studies that are ongoing at LTM sites.

**Overview:** This presentation was given by Ms. Collins.

#### Site 3

The Record of Decision (ROD) for Site 3 was signed in the 1990's identifying volatile organic compounds (VOCs) and semi volatile organic compounds (SVOCs) in groundwater and soil. Currently, only SVOCs in groundwater remain in one well and LTM is ongoing. In 2015, a pilot study was implemented to evaluate the effectiveness of using an oxygen releasing compound (ORC) to stimulate the aerobic degradation of SVOCs. ORC socks were installed in an upgradient groundwater monitoring well and the natural groundwater flow was used to move the material downgradient. Although the ORC appeared to increase the dissolved oxygen and pH in the area directly adjacent to installation, concentrations in the impacted well (IR03-MW02IW) remained above cleanups. The pilot study concluded that the ORC material was being consumed before it reached IR03-MW02IW. The second phase of the pilot study was conducted in 2018 to enhance the effectiveness of the ORC socks by extracting groundwater and creating a gradient towards the impacted area. In August 2018, new ORC socks were deployed in IW03-MW14UCH and IR03-MW02. Approximately 800 gallons of water was extracted at 4 to 5 gallons per minute. Extraction stopped when water quality parameters indicated that ORC material had reached

IR03-MW02IW. As of the one month post extraction sampling event, only one SVOC (benzo(a)anthracene) was detected at concentrations exceeding cleanup levels. Preliminary results indicate that groundwater conducive to aerobic degradation has reached the impacted area, ORC will continue to be released from the socks and move downgradient, and benzo(a)anthracene is expected to continue to degrade in these conditions. Two post extraction monitoring events remain.

#### Site 35

The ROD for Site 35 was signed in 2010 identifying VOCs in groundwater and a remedy which included air sparging, monitored natural attenuation (MNA), and land use controls (LUCs). At the southern portion of the site there is an isolated plume near IR35-MW92IW. At this location natural attenuation does not appear to be occurring. The purpose of the study is to evaluate the effectiveness of biostimulation, bioaugmentation, red yeast rice (RYR) injections at reducing VOC concentrations. The approach will include the installation of permanent injection wells screened 30 to 40 feet below ground surface in areas of highest concentrations. 137 gallons of biostimulation substrate (SRS-SD), 4.9 lbs of RYR, 1.8 liters of bioaugmentation culture (TSI-DC), 500 gallons of dilution water, and 4,100 gallons of chase water will be injected into each location. Dilution and chase water will be extracted from clean site monitoring wells saving a potential 27,600 gallons of potable water. Injections are planned for March 2019 and will be followed by three rounds of quarterly groundwater monitoring.

#### Site 73

The ROD for Site 73 was issued in 2010 identifying VOCs in groundwater and polyaromatic hydrocarbons in subsurface soil and a remedy including air sparging, downgradient injections, groundwater MNA, and LUCs. The air sparging system operated from 2010 to 2012 at which point system shut-down criteria were met and the system was turned off and MNA continued in this area. The objective of the pilot study is to evaluate the effectiveness of bioaugmentation at reducing residual vinyl chloride (VC) concentrations in the former air sparging area. Bioaugmentation was chosen using in-well Bio-Traps with three test units: Control (no amendment), Biostimulation (3DMe), Bioaugmentation (SDC-9). Bioaugmentation was chosen because it had the best bio-trap results as well as being easier and cheaper to implement than biostimulation. Six injection wells were installed in the two areas of highest concentration in November 2018. Injections are planned for February 2019 and will include the following at each location: 225 gallons of anaerobic water, 2.7 L of SDC-9, and another 450 gallons of anaerobic water.

#### Site 93

MNA has been ongoing at Site 93 since the late 2000's for VOCs in groundwater. Based on stable concentrations a pilot study was implemented in 2015 to evaluate the effectiveness of a bioreactor to enhance reductive dichlorination. The 25 feet by 25 feet by six feet deep bioreactor was backfilled with mulch, gravel, and soybean oil and a solar powered pump was installed to extract downgradient water and filter into the bioreactor. Monitoring results have indicated that the bioreactor has created conditions conducive for reductive dichlorination and concentrations have decreased within and downgradient of the bioreactor. However, VC continues to be detected at concentrations exceeding cleanup levels in groundwater leaving the bioreactor. In 2018, the second phase of the study was implemented to further enhance reductive dichlorination within the bioreactor, especially to address the persistent VC concentrations. The bioreactor was replenished in August 2018 through the existing distribution piping. A total of 110 gallons of emulsified vegetable oil and 4 liters of bioaugmentation culture were injected. The bioreactor continues to operate and groundwater will be sampled quarterly for three rounds to evaluate the effectiveness.

#### **IV. Site 88 Treatability Study**

**Objective:** The purpose of this agenda item was to provide an overview of the ongoing treatability study at IR Site 88.

**Overview:** This presentation was given by Ms. Fulkerson. A background and timeline of Site 88 (the Former Dry Cleaning Facility – Former Building 25) was reviewed. The remedy proposed in the Proposed Plan was split into three zones to facilitate treatment. Treatability studies in Zones 1 and 3 were initiated in 2018 to refine the Remedial Design.

The objective of the Zone 1 treatability study is to evaluate the effectiveness of enhanced reductive dichlorination (ERD) substrate injections for treatment of VOCs in groundwater. Pre-mobilization field activities were conducted from August 27-29, 2018 and included well layout, utility locating, and fence installation. From September 5, 2018 to January 23, 2018 21 surficial aquifer and 78 upper Castle Hayne (UCH) aquifer vertical injection wells were installed. Baseline soil gas and groundwater sampling was conducted in December 2018 and January and February 2019. The first injection of emulsified vegetable oil (EVO) and bioaugmentation is expected to take two months and will be initiated in February 2019. These injections will be followed by semiannual groundwater and soil gas monitoring and a second injection event after two years.

The objective of the Zone 3 treatability study is to evaluate effectiveness of ERD substrate injections oriented as a biobarrier for treatment of VOCs in downgradient groundwater. Injections of (EVO) and bioaugmentation culture will be conducted in 10 new and 4 existing UCH aquifer injection wells. These injections will be followed by semiannual groundwater monitoring and a second injection event after two years.

Mr. McElveen asked if Zone 3 was the same remedy as Zone 1. Monica stated that the remedies in Zone 1 and 3 were the same with different objectives and clarified that Zone 3 was for polishing groundwater as it migrates downgradient while Zone 1 was mass reduction in the source area.

Mr. McElveen asked if injections were being conducted in the same locations that soil mixing was conducted to treat source area concentrations in soil. Ms. Fulkerson clarified that the injections are not being conducted within the area previously treated by soil mixing. Soil mixing was completed down to the clay layer and the injections are below the clay layer. She also noted that ongoing treatment from soil mixing has been observed.

A RAB member asked if all the rain in 2018 was impacting the remedy. Monica said that it was not at Site 88 because the water table is not particularly high, but other sites have been impacted, such as Site 93.

## **V. RAB Business**

Ms. Delaney stated that a May RAB date has not been scheduled and requested RAB members to send her conflicting dates if applicable. She asked if the RAB would be interested in changing the locations, either permanently or on a rotating basis. The RAB members indicated that they liked the current location. A RAB member suggest a future topic looking back at the history of this organization and the accomplishments we have had over the years. The RAB would like to see some facts including how many wells we have within all the programs.