

MEMORANDUM FOR RECORD

SUBJECT: Fort Detrick Restoration Advisory Board (RAB) Meeting Summary,
18 APRIL 2012

1. Summary Contents

Items addressed at the meeting are listed below, with corresponding section numbers indicated in the column on the right.

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Please note: PowerPoint presentations were utilized during the RAB meeting. A copy of the presentations is attached to these minutes and is incorporated into these minutes by this reference.

Text contained within brackets [] has been added for clarification purposes.

2. Attendees

Members Present:

LTC James St. Angelo, Fort Detrick, Co-Chair
Dr. Gary Pauly, Community RAB Member, Co-Chair
Mr. Robert Craig, Chief, Environmental Management Office, Fort Detrick
Mr. Joseph Gortva, Environmental Restoration Program Manager
Ms. Elisabeth Green, Maryland Department of the Environment
Ms. Alicia Evangelista, Frederick County Health Department
Mr. Roland Clark, Community RAB Member
Dr. Henry E. Erbes, Community RAB Member
Ms. Jennifer Hahn, Community RAB Member
Ms. Laurie Haines-Eklund, Army Environmental Command
Ms. Karen Harbaugh, Community RAB Member
Mr. Barry Kissin, Community RAB Member
Ms. Helen Miller-Scott, Community RAB Member
Mr. Rob Thomson, U.S. Environmental Protection Agency, Region III

Others Present:

Mr. John Buck, US Army Corps of Engineers
Mr. William Hudson, U.S. Environmental Protection Agency, Region III
Mr. Gary Zolyak, Fort Detrick Office of Staff Judge Advocate
Mr. John Cherry, ARCADIS
Ms. Katrina Harris, Bridge Consulting Corp.
Ms. Carolyn Lewis, Community Observer
Ms. Patti Morris, Community Observer
Mr. David Shoemaker, Community Observer
Ms. Laura Pfeiffer, Frederick County Health Department
Dr. Barbara Brookmyer, Frederick County Health Department
Mr. George Rudy, Community Observer

Members Absent:

Mr. Charles Billups, Community RAB Member
Mr. Gerald Toomey, Community RAB Member
Mr. Craig Toussaint, Community RAB Member
Mr. Thomas Wade, Community RAB Member

3. Meeting Opening / Remarks

Mr. Joe Gortva called the meeting to order and turned it over to Dr. Gary Pauly, Community Co-Chair, at 6:34 p.m., on Thursday, April 18, 2012, at the Hampton Inn & Suites, 1565 Opossumtown Pike, Frederick, Maryland.

4. Purpose of RAB Meetings presented by Dr. Gary Pauly, Community Co-Chair

Dr. Pauly discussed the purpose of the RAB noting it was a forum for Fort Detrick to convey information from the Army and its contractors to the community and to foster discussion with

the community. He stated that the Board is made up of community members, Army staff, and regulators. Dr. Pauly noted that meetings are held every couple months to communicate what is going on with the environmental program, as well as provide progress and updates on various studies. He stated that the RAB uses some ground rules to keep the meeting on track, but tries not to be too rigid. He reminded all present that the RAB is involved with environmental restoration projects only and cannot address issues that do not directly affect environmental restoration. Dr. Pauly said that there is no video recording at the meetings. He advised that the Board has a planned agenda and presentations and in order to stay on track he would request limited interruptions from members of the public. He noted that there is a comment period at the end of the meeting where the public is invited to speak and offer concerns or questions.

5. Meeting Minutes presented by Mr. Joseph Gortva, Fort Detrick

Mr. Gortva advised that the January 2012 meeting minutes had been distributed and no comments had been received to date. He stated that he would send one additional e-mail asking for comments, and then consider the minutes final. Mr. Gortva said that the minutes would then be added to the web site.

6. Updates on Archive Search Report and Herbicide Testing Project presented by Mr. Randall Curtis, US Army Corps of Engineers

Mr. Randall Curtis introduced himself and noted that his office specializes in archival searches to assist with investigating environmental issues arising from historic activities.

Mr. Curtis reviewed the topics to be covered in his presentation. He noted that he would briefly talk about what an archive search report is and what it does; the field testing of 2,4,5-T and other herbicides tested at Fort Detrick; differences in the report released today and the preliminary findings released in February 2011; the real estate history to understand where Fort Detrick did testing; the locations and amounts of herbicides based on historical documents and aerial photographs; and, the non-field testing use of 2,4,5-T and the acquisition, storage, disposal, and facility maintenance of herbicides.

Mr. Curtis explained that an archive search report involves gathering documentation such as historical photographs, aerial photographs that show site conditions at different times, maps, and other documents. He said that in the case of Fort Detrick, a large quantity of reports existed as the work was being done by scientists who maintained extensive documentation of their research. He noted that most of the information is no longer at Fort Detrick, but has been moved to government long-term storage records centers, such as the Federal Archives in College Park, which is open to the public. He further explained that at one time Fort Detrick would have had information onsite at a technical library; however, in the early 1970s, when the garrison became more of a landlord, there was no longer a need for an all-encompassing library. Mr. Curtis said that some records were sent to Dugway Proving Ground, some to Aberdeen Proving Ground, and some to records centers.

Mr. Curtis reminded the Board that the Army Environmental Command and Fort Detrick Garrison asked the Corps of Engineers to conduct the Archive Search Report based on concerns from the public about Agent Orange. He advised that 2,4,5-T was part of Agent Orange, but is

not the main driver. The main driver is the dioxin created when Agent Orange is produced. He stated that determining how much 2,4,5-T was used is helpful in determining the potential for dioxin to be present.

Mr. Curtis said that a preliminary findings report was completed in a few months based on reports the Department of Defense had previously identified for testing done at Fort Detrick. He stated that his office quantified amounts used based on those reports and reported those findings in 2011. Mr. Curtis said that they then continued doing massive amounts of research, looking for all other historical activities and reports. He advised that the subsequent research located some better copies of reports and better pictures, as well as laboratory notebooks. He explained that the notebooks were handwritten by the scientists and contained details on specific tests, not all of which would have been published in final reports. He continued explaining that in some cases tests might be invalidated and thus not included in final reports. Mr. Curtis said that the preliminary findings reported 17 pounds of 2,4,5-T being tested outdoors at Detrick; he said based on the additional research and laboratory notebooks, that number has been increased to 22 pounds.

Ms. Jennifer Hahn asked for clarification on the 22 pounds and whether it was used as is or mixed with water. Mr. Curtis stated that the 22 pounds were used in small amounts on small discrete test plots, perhaps the size of a king-size bed or a small room. He said that the herbicide was not applied over acres of land at one time. He noted that the 22 pounds is the cumulative total used from 1944 through 1969. He said that the amount used ranged from a fraction of a gram or a few grams upwards to 100 grams per test, noting a gram is roughly the weight of a dollar bill.

Mr. Curtis stated that the report contained a quantitative analysis of how much arsenical herbicides were used, but did not quantify all the herbicides. He said that the chemical used primarily was 2,4-D, which is still commercially available. He advised that the more recent findings include a discussion of the history of the Crops Division, Chemical Branch at Fort Detrick, which had two missions--an herbicide mission and a biological group which tested biological pathogens such as diseases and fungicides that attack plants.

Mr. Curtis explained that the Archive Search Report is divided into two parts. He said that because there was a request to gather information on 2,4,5-T as quickly as possible, research was done first and focuses on the chemical testing. He advised that the second report will focus on biological pathogens and that the reports will be discussed further in his presentation.

Mr. Curtis said that the scope of the project was fence to fence--Area A, Area B, and Area C Water and Waste Water Treatment Plants. He noted that Area C used to refer to the area between Opossumtown Pike and Ditto Avenue, the former West 7th Street extension, which is now part of Area A.

Mr. Curtis reviewed the real estate discussion from the archives search report and displayed several maps. He stated that in World War II the area outlined in green was Fort Detrick's Area A and was the original Detrick Flying Field. He said that after the War, Detrick was expanded with parcels to the north, with additions added in July 1946 and March 1947. Mr. Curtis said

that in 1952 the area he previously referred to between Opossumtown Pike and Ditto Avenue was added, another 503 acres, which significantly added land available for crop research. He continued explaining that as it became a financial burden to maintain excess acreage, the Army began looking to outlease land. He stated that the out leasing was occurring by 1958 to specific individuals in the community for their own use; the outleasing continued through 1985. Mr. Curtis said that while the shape of Fort Detrick changed over time, tests were always on Fort Detrick as it existed at the time of the testing.

Mr. Curtis next discussed why 2,4,5-T was of interest. He explained that it was one of numerous organic herbicides tested by the Crops Division between 1944 and the early 1970s. He advised that 2,4-D and 2,4,5-T were sold as commercial herbicides in the 1940s, 1950s, and 1960s. He said that the military defoliant or herbicide Agent Orange is a combination of 2,4-D and 2, 4,5-T. Mr. Curtis noted that by the late 1960s it became known that dioxin was a byproduct of the manufacturing of 2,4,5-T and the main health issue associated with Agent Orange. He said that use of 2,4,5-T was halted in the early 1970s for all food crops other than rice and non-food uses, and all uses were terminated in 1985. Mr. Curtis stated that 2,4-D is still in use today commercially and can be bought at places such as Home Depot[®] or Lowe's[®].

Mr. Curtis summarized the World War II research noting the goal was not to kill plants, but to substantially reduce the yield by using the least amount of herbicide as possible. He said that the researchers would spray minute amounts in a laboratory or greenhouse setting to initially screen the chemical. He noted that in World War II, tens of thousands of chemicals were screened in very minute amounts, and most did not make it past the initial screening process. Mr. Curtis said that the researchers also tested commercial products in addition to ones they developed. Mr. Curtis stated that 2,4,-D quickly became the standard that all others were judged against as it was particularly effective, although not as effective as 2,4,5-T on woody growth.

Mr. Curtis explained that the next phase of testing for the more promising compounds was small field trials. He stated that an area approximately 150 feet by 250 feet would be planted with various crops, and then tests would be conducted in small portions of the area. Mr. Curtis said that the test plots were very small and the herbicide was applied with hand sprayers. He showed a pictures of the hand sprayers and noted that the shelter shown in one of the pictures was put over the crops being sprayed to make sure other adjacent plants not part of the test did not get sprayed. Mr. Curtis discussed how the effectiveness of the compound was measured, such as how many potatoes were grown or the height of a crop. He discussed how a test could be invalidated by something like a test where employees were caught stealing lima beans. He stated that this was an example of information that might be contained in a laboratory notebook, but not part of the final published results. Mr. Curtis explained that there was much to be researched on each herbicide, such as different droplet size, different spray nozzles, effectiveness at different stages, and amounts and rates of application.

Mr. Curtis next discussed the third phase of testing, which was the large-scale aerial dissemination tests. He stated that beginning with World War II, these field dissemination trials were conducted at places other than Fort Detrick. He said that this phase of testing for 2,4-D, as a plant growth inhibitor, was contracted out and conducted in Florida; this testing is part of the published results. He noted that Fort Detrick did not have the space or vegetation to conduct

these tests on post and the military had many other suitable places for conducting the tests. He stated that the Department of Defense had acknowledged this testing in the past and the Veterans Administration has had the information on its web site since 2008. He advised that there was one case of doing a truck-mounted spray test using 100 grams of herbicide. He stated that the test was only done once so it may not have been effective.

Mr. Curtis stated that there were no aerial herbicide spray tests at Fort Detrick, but other types of testing at the Area B test grid included aerial munition tests from planes or helicopters. He explained that munitions tested at Area B were weapons, which were meant to be ignited or exploded in the air and poles, airplanes, blimps or helicopters were used to get munitions at the desired height to explode and then have concentric circles to determine how a stimulant was disseminated. Mr. Curtis continued explaining that two agents used were simulants for biological pathogens or spore agents being developed; no real agents were used during these tests at Fort Detrick, but were tested at other locations. Mr. Curtis advised that there was one test [non-herbicide] at Area B that involved aircraft spraying and one test at the area formerly identified as Area C, but is within the Area A fence line, of a truck-mounted stimulant agent dispersal test [non-herbicide].

Ms. Hahn asked about how far the dispersion was from the tests and Mr. Curtis responded that information has been available since 1977 and will be discussed in the next report, but he did not have it with him.

Mr. Robert Craig referred to a comment made in the past by a gentleman who said he saw an orange-colored spray coming from a helicopter. Mr. Curtis said that trace particles are used in tests to help with determining the results. Mr. Curtis advised that he did not have any knowledge of information that would point to the tests he mentioned producing an orange-colored spray.

Mr. Curtis displayed an aerial photograph and discussed the locations identified as the test locations. He stated that areas identified as Fields A through F have good documented histories as to their approximate location, which is supported by aerial imagery. He said that there are other areas not as clearly documented, but their location can be determined from aerial imagery. He noted that a portion of the testing locations are now outside the fence line due to a real estate transaction with the State of Maryland in 1957, but were inside the fence line when the tests were done. Mr. Curtis stated that there are no clear small grid plots on land that is now outside the installation, but they were under cultivation and will be considered in future investigations conducted by the installation.

Mr. Curtis reviewed the total amounts of 2,4,5-T that was able to be quantified and again stated that the amount used for field tests was 22 pounds. He said that this compares to rates determined by the US Department of Agriculture for average use on agricultural land ranging between a quarter to two pounds per acre (a 100-acre farm would use 48 pounds per year). He explained that the estimate of arsenic-related herbicides was about 12.5 pounds. Mr. Curtis showed an excerpt from the USDA report listing the 2,4,5-T use rates for the year 1969. Mr. Curtis confirmed with Mr. Gortva that copies of the USDA report were available as a handout on the front table.

Mr. Curtis next discussed amounts of herbicides that might not be documented. He noted that it is possible additional reports and lab notebooks might exist, which have not been found. He acknowledged that it is not possible to say no large field tests were conducted at Fort Detrick, but that there is consistency as to how tests were conducted in the documents found. He said that all the documents found to date show small amounts, in grams, being applied over small discrete areas. He said that if there are undocumented amounts, it is most likely the amounts are in tens of pounds not thousands of pounds.

Mr. Barry Kissin referred to Mr. Curtis' earlier statement that the experiments focused on the smallest amount of herbicide needed to achieve the intended results. He questioned whether that principle was always applied as the actual usage in Vietnam resulted in thousands of acres being barren. He questioned whether missing laboratory notebooks might show details not guided by that principle. Mr. Curtis stated that there is more information in the full archive search report than what he is summarizing in his presentation. Mr. Curtis said that the plant growth inhibitor mission and the defoliant mission were two separate missions. He stated that not much effort was put into the defoliant mission and that the effort to consider plant growth inhibitors as defoliants did not occur until the mid to late 1950s and not until the missions overseas in the early 1960s is there documentation of numbers at a higher rate.

Mr. Craig added that the initial intent was to inhibit crops, not to kill the crops, so people would not realize until late in harvest season that there was a problem and it would be too late to take action. He stated that if the crops were killed immediately, the problem would be immediately known.

Mr. Gortva stated that the discussion is about differences in how defoliants were tested at Fort Detrick and when they wanted to scale it up, what was done. Mr. Curtis responded that when defoliants needed to be tested, it was done at nearby installations such as Fort Richie and Fort Meade, where spray tests could be done on trees. He advised that his office completed a report on Fort Richie last summer and is currently working on a report for Fort Meade. Mr. Gortva stated a similar process was followed for defoliants in that they started small scale in a laboratory at Fort Detrick and in order to scale up the testing they had to go to another installation. Mr. Curtis further explained that the testing done at these other installations was initially spraying of individual trees by an individual with a wand on top of a truck prior to large dissemination tests.

Mr. Curtis next discussed the acquisition of the herbicides needed for testing activities. He advised that the amounts needed for the initial screening tests were made in-house; sometimes a contractor or university made the small quantity such as when a university did a kidney bean test. He stated that when large quantities were needed, a contract was issued to a chemical firm to produce the amount needed. He advised that Dow[®] produced different varieties of 2,4-D at times to do tests in Florida. Mr. Curtis said that a military specification was developed in March 1953 and used for procurement purposes.

Mr. Curtis said that not all the documentation is available about surplus supplies, but the Crops Division acquired about 200 drums, most for free from the Air Force in 1956, and the drums were stored outside at Fort Detrick. He advised that in 1959 the remaining stock was transferred

to the US Department of Agriculture who kept it for a few months and then used it for testing at another installation.

LTC St. Angelo asked Mr. Curtis if it is true that the military specifications were more potent than the commercial specifications. Mr. Curtis responded that the difference between the Federal use (such as Department of Agriculture) specifications and military specifications has to do with the volatility of the 2,4,5-T. He explained that a very volatile form of it works well for the defoliation of vegetation, while a less volatile version is better when spraying a fence line where you want the product to stay in place. He noted that the byproduct of dioxin is associated with the production of any form of 2,4,5-T.

Mr. Curtis said that Fort Detrick was not part of the standard government supply chain that would be purchasing, acquiring, storing, and distributing herbicides. He advised that there was another military specification for 55 drums in 1963, but it was not until 1965 that there is documentation that they are asking for the two herbicides to be mixed together. He said that this does not preclude the possibility they may have been mixed together when testing, but that it was not until 1965 that it was given the LX designation and began to be produced in large quantities. Mr. Curtis stated, again, that Fort Detrick was not the supply chain; he said that they may have helped with the specifications, but Fort Detrick was not acquiring, storing, and distributing. He said that these activities are being performed by other components of the DoD logistics organization.

Mr. Craig said that he thought in Vietnam the herbicide was mixed with fuel oil before spraying and asked Mr. Curtis if this was correct and, if so, why it was done. Mr. Curtis said that he did not know, but could find out the answer.

Mr. Curtis next discussed the disposal of herbicides. He stated that the disposal of the bulk military stock of Agent Orange by the military was conducted in the summer of 1977 in the South Pacific Ocean.

He stated that Fort Detrick was not a site for bulk or depot storage. He mentioned that an outside storage area, seen in aerial photos in 1958, is most likely where the herbicides were stored. Mr. Curtis said that it is not known what the mixture of herbicides was in the 200 drums. Mr. Craig stated that the storage area is currently where the running track is located.

Mr. Curtis advised that there is limited documentation about disposal from the 1940s through most of the 1960s. He stated that guidance in 1969 specified herbicides should be packaged properly and sent to the Decontamination Branch for burial in Area B. Mr. Curtis advised that a USATHMA (now Army Environmental Command) initial installation report for Fort Detrick identified Pit 14 at Area B as being used for disposal of herbicides, quantified the amounts buried there, and reported the total of 2,4,5-T disposed in 1970 and 1971, when the military's offensive program ended, was 4.18 drums and 100 pounds in granular form. Mr. Curtis said that the site at Area B has been capped and herbicide contamination has not been found in the groundwater.

Ms. Hahn asked if a paper trail existed for the 200 drums. Mr. Curtis said that a paper trail does not exist of what was used. Ms. Hahn asked if a larger quantity could have been buried at Area B. Mr. Curtis responded that the aerial imagery provides information on what was being stored, plus documents exist about quantities being sold back to chemical companies. He said that there would be no reason for the drums to be buried if they had value. Ms. Hahn mentioned a 1967 letter from Dow; Mr. Curtis responded that the timeframe he was discussing was the 1950s. He said that what is known is what was left over at Fort Detrick and was given to the Department of Agriculture at Beltsville and a good portion was used for tests at Fort Drum, although not all 200 drums. He said that they are unable to be one hundred percent certain of the final use or disposal of 152 drums. He said that large-scale dissemination tests were planned for 1956 or 1957 in Florida, but they have not found any records as to whether they occurred. He stated that the Department of Defense decided to stop funding the crop research program in early 1957 and that at the end of December 1957, the organization was downsized to 10% of its original size so they may not have had staff to write the reports. He said that it could be that there is no documentation because the people that did the testing were out of the program before the reports were written.

Ms. Haines stated that in addition to the archives search report and capping the landfills, investigations were done at multiple sites, including soil borings and trenching; she said that those reports are part of the Administrative Record and can be checked to see if drums were found. Mr. Gortva added that the capping prevents water from flowing through the waste. He confirmed Ms. Hahn's statement that the ground water is deeper than the waste. Mr. Gortva said that groundwater had been tested since the 1980s and the levels have never risen to a concentration that indicates an herbicide plume at Area B. Mr. Gortva said that the current work at Area B includes testing for herbicides.

Mr. Curtis next reviewed information regarding use of herbicides for facility maintenance. He noted that groundskeepers used herbicides to control weeds and brush, and since these were not the same people as the crop researchers, they could have ordered from the Federal specifications. He stated that they would have followed existing guidance from the Armed Forces Pest Control Board. Mr. Curtis advised that there are limited specific records for this use as such records were not kept at any installation. He said that there are a couple of maps indicating weed control was going to be done in parts of Area A; there are no specifics as to what that control was, but what is known is that is where it was sprayed. Mr. Curtis stated that records show an incident in August of 1951 where spraying along the fenceline with an arsenical-based herbicide caused cows to die and farmer was paid for the lost cows.

Mr. Curtis summarized the report findings by saying herbicides were used outdoors at Fort Detrick in small amounts totaling 22 pounds and sprayed with hand sprayers and under a shelter to prevent cross-contamination. He stated that large-scale dissemination testing was done by Fort Detrick personnel, but was not done at Fort Detrick. Mr. Curtis said that historic small crop locations were identified from aerial imagery and descriptions. He reiterated that Fort Detrick did not have a mission to acquire and store bulk amounts; they acquired 200 drums because it was given to them for free. He said that the amounts disposed of in 1970 and 1971 were 4.18 drums and 100 pounds.

Mr. Curtis discussed the next steps to be taken. He stated that Fort Detrick and the Army Environmental Command will develop a sampling program to determine if there is any lingering amounts of 2,4,5-T at the identified locations and these plans are in the developmental stage.

Mr. Craig stated that it was clear that action was needed based on the new information. He said that when Mr. Curtis' preliminary report was received last year, it showed a site in Area B where a truck had been used with a spray nozzle on top to disseminate herbicides. He said that Fort Detrick was confident it knew where some of the testing occurred, but also knew it may not have all the information, so it was exciting to receive the final report with the additional information. He noted that in the past year Fort Detrick commissioned a study by the Army Public Health Command to at least look at the one location in Area B that Fort Detrick was confident had been used for the truck-mounted tests and to also develop some background information. He stated that the information has not yet been received, but they are just starting to get unvalidated data. Mr. Craig said that the data should be validated and available for discussion at the next RAB meeting. Mr. Craig said that Fort Detrick will need to do the same thing for the rest of Fort Detrick where activities occurred. He said that the Army is looking at performing a comprehensive site inspection, which would involve some initial sampling. He stated that it may take time to get funding and a contract in place, but they are working as aggressively as possible. Ms. Haines stated that she is working to get a contract in place this fiscal year.

Ms. Helen Miller-Scott asked if the site inspection would be part of Superfund. Mr. Craig said that it would be funded by the Department of Defense, but would follow the CERCLA (Comprehensive Environmental Restoration, Compensation and Liability Act) process.

Mr. Barry Kissin asked that if herbicides were found to be present, how would they impact off-post areas. Mr. Craig responded that herbicides degrade relatively quickly, so after 60 years you may not find much still present; however, dioxins are much more persistent and may still be present in the soil. Mr. Gortva added that dioxins generally are water insoluble so they would stay where sprayed. Ms. Haines said that if dioxin is found in the soil, the extent would be delineated, and if necessary, wells installed to see if the dioxin had moved into the groundwater. Mr. Kissin asked if the groundwater is tested for dioxins now, and Mr. Gortva said groundwater is tested for dioxins in the Area A & B wells, but will also be looking at Area A surface areas.

Mr. Craig stated that Fort Detrick will continue to keep the RAB updated at the quarterly meetings. Mr. Curtis said that they are working on getting the other portion of the archive search report, which will look at other historical activities and document what was done where, and ideally try to quantify amounts used, so if the installation needs to do something it would follow the process just described.

A member of the audience asked for confirmation that Mr. Curtis had said that 152 of 200 drums are unaccounted for. Mr. Curtis said that in 1955 and 1956 Fort Detrick had approximately 200 drums on site that were eventually given to the Department of Agriculture, who then used approximately 42 drums for tests at Fort Drum. He said that it is not known whether the other drums were sold to a chemical company or used in another planned dissemination test. In response to a question as to whether it is known that the drums were removed from Fort Detrick,

Mr. Curtis said that Fort Detrick documentation stated that all remaining stocks were disposed of in 1959 and then a few months later, the tests occurred at Fort Drum.

A member of the audience (Mr. George Rudy) stated that his experience within the nuclear industry showed that capping does not work; he stated that he can provide a report on capping within the nuclear industry. He asked if there has been any radar scanning of the ground to see what is buried. Mr. Gortva responded that the Army has done much geophysical work, such as ground penetrating radar and electromagnetic surveys, over wide portions of Area B to fully delineate the disposal areas. In response to a question if the work would have detected buried canisters or other items of similar nature, Mr. Gortva stated that the work would find any buried metal objects. Mr. George Rudy asked if the reports were available and Mr. Gortva said that the reports are part of the administrative record and are available in the Maryland Room of the C. Burr Artz Library. Mr. Craig added that the staff at the library are very familiar with the administrative record and very helpful to anyone looking to find and review documents.

Ms. Miller-Scott asked if and when the RAB will be kept informed about which sites are selected for investigation and in what order. Mr. Gortva said that before any work is done a sampling plan will be prepared and made available to the regulators and the RAB for review. He noted that the plan may note sites which Fort Detrick thinks are more important than others to investigate first. He said that the public would probably be most interested in land which was sold so that would be given high priority and then areas where it is known the most testing occurred. Mr. Craig noted that the storage area would have a high priority. LTC St. Angelo reminded everyone that the public land would need rights of entry from current landowners to access for sampling, which would add to the time before samples could be collected.

A member of the general public referred to an earlier mention of borings in Area B and asked why that information is not discussed in the presentations at RAB meetings since borings and surveys are critical first steps in collecting information. Mr. Gortva stated that there is a long history of knowing where disposal areas are located based on prior investigations. He said that the current wells being installed are to address data gaps in the monitoring well network. Mr. Gortva said that there are currently over 100 wells in Area B; however, the additional wells will allow better characterization of the ground water and to know the depths of the contamination.

A member of the general public asked if it is possible, with data from the investigations to date, to know whether or not there are drums present. Mr. Craig responded that the caps were installed in response to the question of where the waste is buried. He said that current investigations are looking at what is going on with the groundwater and determining how far contamination may have travelled horizontally and vertically in the ground.

7. Area B Groundwater Workplan Update presented by John Cherry, ARCADIS

Mr. Cherry introduced himself and noted that he is a Project Manager with ARCADIS, similar to Tim Llewellyn, his colleague, who has briefed the RAB at previous meetings. He noted his role in the work at Fort Detrick is to oversee the day-to-day field effort that has been occurring in the implementation of the groundwater work plan. He stated that he is also part of the weekly

discussions with the Army, EPA, and the State regarding the current field work and achieving the plan objectives. Mr. Cherry mentioned that he lives about 15 miles from Fort Detrick.

Mr. Cherry reviewed the topics he would be covering in his presentation, including the background and objectives of the work plan, this phase of current work and the identification of any needed subsequent phases of work, the status of the rights-of-entry for off-site work around Area B, and each of the current tasks being performed. He mentioned that he would not have groundwater data until the next Board meeting, as samples are still being collected or are at the laboratory for analysis and validation. Mr. Cherry said that all the data will be compiled and be used to develop a conceptual site model to answer questions the Army, the public, and the regulators have expressed.

Mr. Cherry displayed an aerial photograph from the 2010 work plan that was prepared by the Army and a contractor working in conjunction with EPA and Maryland Department of the Environment to identify data gaps, and then ARACADIS was hired to conduct the work. He pointed out the TCE and PCE plumes shown on the map, which represents the general understanding of the TCE and PCE contamination at Area B through data collected up until 2010. He noted that there are more than 100 groundwater monitoring wells installed throughout Area B at different depths and elevations.

Mr. Cherry reviewed the objectives of the current work. He advised that the first is further assessing the depth and extent of contamination and noted the drilling of 29 wells had began a year ago and have just been completed. He said that the wells were targeting depths as deep as 300 feet and were spaced throughout the Area B source area and at the property line. He stated that the next objective is to further assess possible groundwater flow directions, including deep groundwater under Carroll Creek. Mr. Cherry said that another objective is to further assess the potential for vapor intrusion into on and off-site buildings. He noted that there are residential, commercial, and municipal property owners off-site so this is an important objective. He said that the last objective is to further assess the full range of possible chemical compounds. He advised that the map had shown the delineation of TCE and PCE plumes, but there are other constituents present, so this comprehensive investigation focuses on a much broader range of compounds than just volatile organic compounds.

Mr. Cherry showed the work schedule and noted completed items were shown in green. He advised that the existing well assessment and repair on Area A and Area B was completed and the new well installation and direct push investigation have also been completed. Mr. Cherry said that the spring and seep surveys were completed in March 2012. He advised that the groundwater and surface water sampling are ongoing and the results will be discussed at the next meeting. Mr. Cherry said that vapor intrusion sampling is planned for the summer, as well as the dye trace study. He added that there will also be another extensive round of groundwater sampling in the fall to have seasonal data for comparison.

Mr. Cherry updated the Board on the off-site rights of entry by showing a map highlighting where access has been granted and where property owners have denied access or been unresponsive. He noted that there has been good success, in general, in obtaining access and most of the shallow direct push investigation has been completed. He said that they had most of

the access desired for the seep and spring sampling. He said that letters had been mailed and meetings had been held with off-post property owners and there had been door-to-door visits over the past year, which were successful in obtaining access to all but a few key properties.

Mr. Cherry displayed photographs of the rig used for the on-site drilling of wells down to 325 feet or more. He advised that the on-site drilling and geophysical work is complete and that the results should be available in a few weeks. Mr. Kissin asked how many wells were 325 feet deep, and Mr. Cherry responded 10 wells are deeper than 150 and four of those are more than 250 feet deep. Mr. Cherry said that the work plan did not call for all to be 325 feet deep; many were planned to be shallower.

Mr. Cherry explained that when the wells were drilled they were not blindly screening, but conducting geophysical logging to look for fractures, identify whether there was flow in a fracture, and then collect samples at various depths. He advised that a general observation early on was that as they got deeper they were not finding fractures that were water bearing nor were they finding fractures with contamination. He said that this was not true in every case and some deeper wells were installed where higher levels were confirmed in a source area. He said that while not all the wells were screened at 325 feet deep, they are confident the wells are screened in zones that technically make sense in terms of providing excellent long-term monitoring points.

Dr. Henry Erbes asked about the depth of the shallow wells installed and why they were installed. Mr. Cherry explained that the scope of the work plan called for shallow wells in one zone, typically 30 to 50 feet deep. He continued explaining that other shallow wells were direct push wells in another area and along the property line and were used to collect samples of groundwater in the shallow zones where there is deeper groundwater emerging in seeps and streams and flowing towards the creek. He said that the purpose was to assess contamination in shallow areas near buildings. Mr. Erbes stated that there were many existing shallow wells in Area B and asked why more were installed. Mr. Cherry responded that many wells at Area B are reasonably shallow, but the scope of the work plan was usually targeting zones where they thought there might be a fracture that could be screened. He said that another reason is to provide good shallow and deep coverage across Area B and to be able to tell if there are any other sources, and having both deep and shallow wells allows for vertical aquifer profiling.

Mr. Gortva referred to the objective mentioned earlier of not just focusing on TCE and PCE and stated that other contamination may show up in shallow wells and not in the deeper wells. He said shallow groundwater may not have DNAPLs [dense non-aqueous phase liquid], but may have other contamination closer to the surface. Mr. Gortva noted that another reason is to make sure there is not a deep plume somewhere else of other contaminants. He said that the next step is sampling for all potential contaminants in all wells to make sure the Army has a good handle on all potential sources.

Dr. Pauly asked why wells were abandoned. Mr. Cherry responded that one well was abandoned based on observations and testing in the field, which showed there was no water flowing in the fracture or no contamination. He said that the other well was so close to another well that it made sense to construct two wells in the one borehole. Mr. Cherry noted that these decisions were made in collaboration with the regulators.

Mr. Cherry summarized the status of the drilling program by stating that with the additional 29 monitoring wells installed there are now more than 100 wells up to 325 feet deep in Area B. He said that almost 4,000 feet of linear drilling was completed, as well as more than 3,000 feet of geophysical logging. He noted that subsurface conditions were consistent with expectations with regard to groundwater flow in fractures and with the highest concentration of TCE and PCE being near B-11.

Mr. Cherry next discussed the shallow direct push sampling. He showed pictures of the equipment used and noted that the rig uses hydraulic pressure to drive steel rods into the ground until there is refusal and bedrock or clay is encountered. He continued explaining that 52 locations were completed on different properties, with many of them done on County property near Area B; there was refusal [shallow bedrock was encountered which would not allow a groundwater sample to be collected] at 13 locations. He said that when refusal was encountered, there were three attempts to offset the location to try to locate groundwater or to reach the desired depth. He said that 39 groundwater samples were collected, submitted to the laboratory for analysis, and validated data will be discussed at the next RAB meeting. Mr. Cherry showed a picture of a pond where bedrock is visible and reiterated that the depth to bedrock is not very deep. Mr. Cherry showed an additional photograph of the work being done on Montevue Lane and the mats used to protect the off-post properties during the work.

Mr. Cherry displayed a map showing the locations where they were successful at collecting direct push samples and the locations where they were not successful after multiple attempts. Mr. Cherry said that some of the locations had small-diameter piping called piezometers installed, which provide the ability to collect water level measurement and groundwater samples again if needed.

Mr. Cherry reviewed the seep and spring survey. He said that the nature of karst geology and a karst environment does lead to groundwater flowing and coming up in seeps and springs so it is important to identify them. He advised that some are known and have been sampled for years, but the objective of the current work is to find others that might be significant to the conceptual site model and future actions at the site. Mr. Cherry explained that 13,000 feet of stream bed (Carroll Creek and tributaries) was surveyed. He advised that an ARCADIS expert in karst environments, who has done karst studies across the country, was flown in for this work. Mr. Cherry stated that water quality parameters were collected as discussed in the work plan and seeps and streams will be sampled for volatile organic compounds in the coming weeks.

Mr. Cherry displayed a graphic showing general groundwater flow in a limestone/karst environment and emerging along a stream bed. He referenced his earlier discussion of direct push sampling locations being in areas of fractured bedrock to look for discharge in the valley or wetland area.

Mr. Cherry displayed an aerial photograph containing the rights of entry information, as well as the stream network. He pointed out sections of Carroll Creek where access was given by the property owner and the sections where access was not provided. He stated that overall, the areas where access was provided, resulted in good coverage.

Mr. Cherry said that about 40 seeps and springs were identified and 18 new elevation gauges were installed, which are helpful for the conceptual site model in determining which way groundwater is flowing. He noted that surface water and sediment sampling is underway.

Mr. Cherry showed a photograph of Robinson Box Spring and stated that it flows out of the ground surface and actually creates Robinson Pond, which is also fed by a few other small streams and eventually flows into Carroll Creek. Mr. Cherry also showed a photograph of a typical possible seep. He stated that the two photographs are examples of what the investigation attempted to identify. He also showed a photograph of a stream gauge, which will be surveyed and measured throughout the study area.

Mr. Cherry discussed the April 2012 sampling, which is underway. He stated that it included collecting elevation data at 157 monitoring wells from all locations on Area A and B and from 20 surface water locations and 27 stream samples, as well as from the piezometers installed during the direct push work. Mr. Kissin asked for an explanation of the use of the elevation data. Mr. Cherry explained that groundwater essentially flows from high head to low head. The elevation data helps figure out where water is flowing from higher to lower and to create a contour or topographic map and to start making determinations about groundwater flow direction. Mr. Cherry said that the groundwater flow direction is more complicated at this site because of the karst environment, but that the science still applies in making determinations about groundwater flow direction and contaminant movement and depth. Mr. Cherry said that current sampling work also includes collecting sediment samples. Mr. Cherry displayed an aerial map showing the groundwater and surface water measurement locations. He advised that it is important that all the measurements be collected within a short time frame so ARCADIS puts many people on the ground at one time to collect the data. He noted that another sampling event will be conducted in September 2012.

Mr. Cherry displayed a list of parameters the samples are analyzed for and noted that it was a very extensive list. He advised that the Army, EPA, and Maryland Department of the Environment worked together to come up with the comprehensive list. He noted that the list includes a library search. He explained that when the laboratory does its analyses, the chemists sometimes identify peaks, which could be other compounds and are referred to as tentatively identified compounds. He said that if requested, they can do a library search and provide whatever other information is available about those compounds. He said that the compounds being analyzed for include pesticides and PCBs, herbicides and picloram, metals, and dioxins/furans. Mr. Cherry showed a picture of the inside of their on-site trailer and the many coolers needed to store the significant number of samples (more than 1,700 vials) collected in order to analyze for all the parameters. In response to a question from Mr. Craig, Mr. Cherry stated that samples are specifically analyzed for 2,4-D and 2,4,5-T.

Mr. Cherry showed a picture of a sample being collected and noted that there is continuous air monitoring during drilling and sampling. He also explained the chain of custody procedures that are in place during sampling.

Mr. Cherry next discussed the anticipated path forward, highlighting the development of a conceptual site model. He stated that the main objective is to take all the information and to be able to answer a lot of questions, but perhaps not all of them. Mr. Cherry said that it is a step toward answering and identifying technical data gaps on which to base future phases of work.

Mr. Cherry said that a conceptual site model integrates all the information gathered into a succinct format allowing clear understanding of groundwater flow and potential contaminant nature and extent. He stated that at this site they are currently in the remedial investigation phase where data is collected to determine the nature and extent of contamination. He referenced that earlier information in his presentation about sampling data stated that there is a large amount of data that has to be reviewed, compiled, and integrated into the model. He said that the model helps the Army move the project forward to future steps in the CERCLA process and those steps may include additional investigation and eventually a Feasibility Study and remedial action.

Mr. Cherry briefly discussed the four elements of a conceptual site model. He said that the first element is the geologic framework. He stated that the drilling program and logging an immense amount of information is an important factor in the model. He said that the next element is groundwater and surface water flow patterns, followed by the groundwater discharge areas, which is part of the seep and spring survey discussed earlier. Mr. Cherry said that the fourth element is the nature and extent of contamination, which is being developed.

Mr. Cherry reviewed the schedule of the remaining activities under the work plan. He said that the dye trace study is scheduled for this summer and will take about six months. He said that there are 46 or more testing locations where non-toxic dye will be injected at a specific location and then locations downgradient will be monitored to see where and if the dye arrives. Mr. Cherry noted that they will be collecting data from 26 different monitoring events over the six months.

Mr. Cherry said that vapor intrusion sampling will be conducted in the summer and a second round of groundwater and surface water sampling will be conducted in the fall. He advised that a draft conceptual site model will be developed by the summer and then continuously updated as more data is collected.

Ms. Hahn asked if the monitoring wells would stay in place after the activities under the work plan are completed. Mr. Cherry responded that the long-term monitoring wells would continue to be in place for some time. Ms. Hahn asked if samples are being analyzed for vinyl chloride as a breakdown product of TCE from the breakdown of PCE. Mr. Cherry said that samples are analyzed for vinyl chloride, but the levels do not indicate degradation. He said that there are some sites where there is the natural degradation of PCE to TCE to vinyl chloride, but can also start with TCE, which was used as a solvent. He stated that degradation of these compounds depend on the type of environment. Mr. Gortva added that in the source area near B-11 there has been some limited natural attenuation occurring and breakdown products even past vinyl chloride have been detected, but it is not completely removing all the PCE and TCE nor is there degradation at a rate that would be considered a successful natural attenuation process.

Mr. Kissin referred to Mr. Cherry's statement that the direct push wells off-post were installed to the depth where bedrock was encountered. He asked if it is true that groundwater could be flowing beneath this depth and thus the data will not answer the question of the extent to which contaminated groundwater is deeper than the direct push wells. Mr. Kissin said that the extent of off-post contamination is what is important to the community. He asked if sampling close to the boundary of Area B has shown levels at three times the maximum contaminant level, could there be contamination 500 feet deep off-post.

Mr. Cherry responded that the purpose of the current scope of work is to identify potential gaps, and Mr. Kissin has asked questions which other stakeholders, Army, regulators, and contractors have asked about where more data needs to be collected. Mr. Cherry pointed out that the maximum contaminant level is a number applicable to public water agencies who are distributing drinking water. He advised that the maximum contaminant levels for TCE and PCE are five parts per billion, so drinking water can contain these compounds up to that level. Mr. Cherry said that it is important to remember that no one is drinking water in the study area and most residential wells are not used for drinking water. He said that these deeper residential well locations are still being sampled when the Army has access to them. He said that other wells, such as those along Kemp Lane, are in a more regular monitoring program even though these wells are upgradient and there is no indication they are at risk. Mr. Cherry noted that these wells were most recently sampled in November 2011.

Mr. Cherry continued explaining that the reason the off-site work focused on a shallow perspective is that there are known springs where contamination is showing up and the purpose of the shallow investigation is to obtain a better idea of the upwelling or flow of the contaminated groundwater from deeper depths up into the shallow areas. Mr. Cherry advised that the work plan provides for the ability to install deeper wells off-site, if needed. Mr. Gortva added that installing deep wells off-post prior to the dye study would be taking a shot in the dark. He said that the dye study will provide helpful information in determining where to install additional wells off-post.

Ms. Miller-Scott said that another factor to be considered is what other sources might be putting chemicals into the groundwater from off-post sources, such as filling stations and car washes. Mr. Cherry said that it is possible they could find other constituents which might be from sources other than Fort Detrick. He said that an example would be PCE, which was used as a solvent at dry cleaning businesses.

Dr. Pauly asked if deep wells on Area A will be part of the dye trace study and Mr. Cherry responded that some deep wells on Area A will be part of the dye trace study, as well as boundary wells along Area B and a few deep interior wells, including one at 500 feet.

A member of the general public asked about the element that would be used for signature in the dye trace study. Mr. Cherry said that the dye trace study is being designed now using recent data and could be discussed in more detail at a future Board meeting.

A member of the general public asked if a particular reason was given when property owners refused access. Mr. John Buck from the Army Corps of Engineers advised that the property owners said they just did not want to participate.

A member of the general public referred to a comment made at a previous meeting as to whether plants could be uptaking contamination and asked if there was any change in the Army's position that this was not occurring at this site. Mr. Cherry said that there was no change in that position.

Mr. Roland Clark asked if the dye trace results could be translated into tracing back the timeline for the contamination and demonstrate whether or not there had been any changes over that time. Mr. Cherry responded that the data is only applicable to the current conditions and cannot be used to work backwards in time.

8. RAB Member Open Discussion

Mr. Gortva invited any comments or questions from the RAB members.

Mr. Kissin said since the last Board meeting, the National Research Council had issued their report which reviewed, among other things, the ATSDR assessment. He noted that Maryland's US Senators, upon issuance of the report in March 2012, had urged accelerated and aggressive cleanup of Area B. Mr. Kissin said that he was impressed with the work performed to date by ARCADIS and the staff who have given presentations, but the contractor does not have control over the resources at their disposal. He suggested that the senators be taken up on their suggestion for an accelerated cleanup and more resources be made available to Fort Detrick to get the work done.

9. General Community Comments

Mr. Gortva invited comments or questions from the general public and none were offered.

Ms. Hahn asked for the email address that the general public could use to communicate with the RAB. Dr. Pauly responded the address he has set up is: detrickrab@gmail.com.

10. Next Meeting

The Board discussed the following dates for meetings in 2012: July 18 and October 10. The Board discussed the following dates for early 2013: January 9 and April 10.

The meeting adjourned at approximately 9:16 p.m.

Reviewed by:

Approved/Disapproved

Enclosures:

Fort Detrick Installation Restoration Program Area B Groundwater Investigation Update

Fort Detrick Installation Restoration Program Arsenic Sampling Data Review

Fort Detrick Installation Restoration Program Program Status Update

Meeting Sign-In Sheet

DISTRIBUTION:

Each RAB Member (w/o enclosure)