

**Joint Base Cape Cod Cleanup Team
Building 1805
Camp Edwards, MA
13 March 2019
6:00 – 8:45 p.m.**

Meeting Minutes

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Handouts Distributed at Meeting:

1. Draft of the 29 August 18 Meeting Minutes and Responses to Action Items
2. Emerging Contaminants Update
 - i. Emerging Contaminants Update MassDEP
 - Cape Cod Today Article on MassDEP Program Removing Stockpiles of AFFF
 - ii. Emerging Contaminants Update EPA
 - USEPA Technical Fact Sheet on 1,4-Dioxane dated November 2017

- USEPA Technical Fact Sheet on Perfluorooctane Sulfonate and Perfluorooctanoic (PFOS/PFOA) dated November 2017
- iii. AFCEC Emerging Contaminants Overview/Update
- 3. Presentation: Military Munitions Response Program (MMRP) Update
- 4. Presentation: Central Impact Area Update UXO Removal Update
- 5. Six Month Look Ahead
 - i. IAGWSP Ongoing and Upcoming Projects
 - ii. AFCEC Six Month Look Ahead
- 6. How to Access the AFCEC/JBCC Administrative Record and Webpage
- 7. How to Access the IAGWSP Webpage
- 8. Final Discussions. Adjourn.

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Agenda Item #1. Introductions, Late-Breaking News, Approval of 29 August 2018 JBCCCT Cleanup Team Meeting Minutes

Ms. Ellie Donovan began the meeting and asked the team members to introduce themselves.

Minutes and responses to action items from the previous JBCCCT meeting were provided in handouts.

Mr. Jonathan Davis, AFCEC, spoke to meeting members regarding his upcoming retirement in June and expressed his gratitude for the many years of working with JBCCCT. He emphasized the importance of the group as they are ambassadors for the program in the community and have done great work.

Mr. Phil Goddard responded to Mr. Davis comments and expressed his thanks for Mr. Davis's professionalism and demeanor at the meetings, his patience with people who aren't engineers or scientists, and with lay people who need to hear common sense and simple explanations in a way so that they can understand a very complex problem.

Agenda Item #2. Presentation: Emerging Contaminants Update – Ms. *Anni Loughlin, USEPA*

Ms. Anni Loughlin, Chief for the Facilities Superfund Section of the USEPA, explained that last month (February) EPA came out with a PFAS Action Plan which can be easily accessed at <https://www.epa.gov/pfas/epas-pfas-action-plan>. Ms. Loughlin said there is a lot about PFAS compounds that EPA doesn't know right now. EPA has a lot of plans which are detailed in some length in the PFAS Action Plan. One of the more relevant ones is that EPA plans to extend toxicity information for all PFAS as currently EPA only has toxicity information for PFOA and PFOS which are just two of the many perfluorinated substances. EPA will be performing more research on avenues of potential exposure to human health. Currently EPA only looks at ingestion from mostly drinking water. EPA currently has no ecological toxicity information so will start looking into that as well. EPA will also be researching into cleanup technologies, method development like how they can better analyze for different PFAS compounds.

Ms. Loughlin continued that in 2019 EPA will be proposing a national drinking water regulatory determination for public comment. This is the first step in getting to an MCL, a drinking water standard, and would only be for PFOS and PFOA. She said the MCL process has several steps in it and can take a long time, but this is the initial step. This is outlined in the action items in the handout. EPA is also hoping to finalize toxicity assessments for some other PFAS compounds beyond PFOS and PFOA – PFBS, GenX and maybe 5 more and perfluorinated substances in the following year. EPA will also be coming out with an interim groundwater cleanup recommendation for PFOS and PFOA as well. Ms. Loughlin restated that there is a lot that the EPA doesn't know about PFAS and a lot of research that needs to be done, but EPA is moving ahead with that.

Mr. George Seaver, Catuamet resident, expressed his concern about the impact emerging contaminants has in other communities, for instance the lawyer community or non-profit organization (NGO) community. He stated it can be hugely expensive to people and you can lose activities. Mr. Seaver gave the example of nitrate. He said he has been measuring nitrate in Squeateague and Buzzards Bay for 30 years and a few years ago nitrate became nitrogen loading then it became nitrogen pollution and then it became pollution. One day Mr. Seaver went down to his harbor and there was a sign that said “This Harbor is Polluted”. He said this had a big affect in the community. There was a camp for children that was there for 60 years and it also greatly affected peoples’ property values. Because there was a long timeline of data, Mr. Seaver said that they were able to refute the claim and the sign was eventually taken down. He stated that these have effects and there is no MCL for nitrate so there is no justification for these kinds of impacts, but it happened. This is why he is concerned about emerging contaminants and asked Ms. Loughlin if EPA has thought of that.

Ms. Loughlin responded that the short answer is that science does evolve and they learn more about new contaminants every year, and there are a lot of different types of contaminants they are talking about today that they never would have thought of 5, 10, 20 years ago. She continued that there is an evolution in the science that leads to an evolution in how the regulatory agencies and everybody else has to deal with these contaminants. She asked Mr. Seaver if she answered his question.

Mr. Seaver replied that maybe she can’t. Maybe the effect these have should be addressed at a selectman’s meeting. He reiterated that there is an effect – just look at lawyers’ advertisements.

Mr. Goddard responded to Mr. Seaver and said that there is a difference between emerging contaminants of concern (COC) with health advisories and what that means versus having fully undergone research. Counter to not doing something early, is you knew it was a risk, but you didn’t help it, so it is an important point that Mr. Seaver makes. Putting up signs, going into neighborhoods and disrupting peoples’ lives, pollution is a scary word with an unknown impact. If there is no MCL, is that the correct course of action? Mr. Goddard suggested that any notices that are going out should be expressed in a manner that doesn’t cause more problems than it solves.

Mr. Seaver replied that maybe they could consider putting another sentence in there that would say “Emerging contaminants is not a legal definition yet” “...it is not an MCL” or something that can disarm the lawyers or some of the more aggressive NGOs.

Ms. Loughlin lightheartedly replied that Mr. Seaver was overstating her powers.

Presentation: Emerging Contaminants Update –Mr. Paul Locke, MassDEP

Mr. Paul Locke, Assistant Commissioner for the MassDEP Bureau of Waste Site Cleanup, stated that if you Google “PFAS in Massachusetts” you will find the per- and polyfluoroalkyl substance page which has all the information that the MassDEP currently has. And, as new things come out, and they may be coming out imminently, this is where that information will be found.

There is a lot of information coming out about PFAS, their toxicity, their persistence in the environment, and the exposures that are associated with it. There is a lot of sampling information coming out as well. MassDEP is quickly learning a lot about PFAS, but there is still a lot they do not know. As Regulators, particularly at the state and local level, they find themselves in the place where they are trying to answer the questions the public has like “What does this mean to me? It is in my drinking water and I am drinking it every day – what is it doing to me? Is it safe? Is it regulated or not regulated? Is it emerging or one of the old classics?” It is very difficult to say to a community that has elevated levels of PFAS in their water,

“We are studying it, keep drinking it, we’ll get back to you”. Mr. Locke said that MassDEP is gathering information from testing of public water supplies.

A couple of years ago EPA included the testing of PFAS in UCMR3, the Unregulated Contaminant Monitoring Rule, which is part of EPA’s process in determining whether to move ahead with MCLs. All of the large public water supplies were sampled in Massachusetts and a statistically significant number of smaller ones, and it was determined that several were above the 70 part per trillion EPA Health Advisory (HA) for PFOS/PFOA. Mr. Locke continued that when they find that the drinking water is contaminated, they look to monitoring to confirm the contamination is present. And, if it is high enough, MassDEP is requiring action to make sure that drinking water that is being supplied to the public is safe. There are a number of towns that have taken wells off-line, towns that have provided bottled water in the interim while they bring in treatment systems, and there are options like using cross-connections to blend the water to keep the levels down. Municipal public water supplies have a number of options to deal with this contamination.

The role of the MassDEP Cleanup Program which is similar to EPA’s Superfund Program picks up when a public water supply has been identified as contaminated and determines what is there, where it coming from, and what else is might be threatened by the contamination that is present.

During that process, MassDEP sends out Requests for Information to local industries and/or local groups in the area that may have used products that contain these contaminants, and then will send out Notices of Responsibility. MassDEP’s goal is to normalize this process. Rather than looking at is as an emerging contaminant, in Massachusetts MassDEP looks at PFAS as hazardous materials. They are regulated as such under MassDEP’s Cleanup Program and Massachusetts General Law Chapter 21-E, and MassDEP wants to bring them into the process of site assessment and eventually clean up if necessary depending on what’s found and at what levels and what exposures. MassDEP wants to normalize that process moving them out of the emerging contaminants arena and into the normal contaminants arena.

Mr. Locke said that they often find private wells contaminated and the same process applies to them. Through 21-E MassDEP will either do the work themselves or work with responsible parties if they are willing and able to conduct the investigation to make sure any private wells that are contaminated are dealt with and addressed in a similar way as the public water supplies are addressed. MassDEP wants to make sure the water being used is safe and potable for the people using it. MassDEP has put out guidance on this process for licensed professionals and private sector consultants to support that process. The regulated community has been put on notice and is aware that these are in fact regulated compounds under the Cleanup Program. If they are doing work at a facility, such as Martha’s Vineyard Airport where the use of aqueous film forming foam (AFFF) had been documented, the work being done there includes sampling for these PFAS since it has been identified as hazardous materials in Massachusetts. PFAS was found at the airfield which brought that site into the process in the normal standard fashion in dealing with other types of contamination in Massachusetts. MassDEP is trying to normalize the process, treat, and address PFAS the same way that they address other contaminants.

Mr. Locke said that MassDEP is trying to eliminate potential sources of PFAS. There are stockpiles of AFFF out there that have older PFAS rich long chain compounds. MassDEP has collected over 130,000 gallons of this material from local firefighters, Joint Base Cape Cod, and from around the state, and have sent them to be burned at high temperature incinerators to make sure they are completely destroyed.

MassDEP’s long term goal is to have standards in place in Massachusetts, promulgated standards, so that everybody is on the same level playing field. There will be regulated compounds across the different Programs. MassDEP’s Drinking Water Program will have Maximum Contaminant Level for PFAS compounds. It will be consistent with MassDEP’s Drinking Water Guidelines that the Office of Research and Standards puts out, and they will be consistent with cleanup standards for groundwater that is used as drinking water under the Massachusetts Contingency Plan.

Mr. Locke said that MassDEP's timeframe will be quicker than EPA's timeframe for Federal MCL, but it is still not a quick and immediate process. MassDEP is trying to strike a balance between moving quickly but also need to make sure they are moving ahead in a thoughtful manner and not rushing to judgment (addressing Mr. Seaver). The decisions that need to be made go through all the necessary steps. Mr. Locke said he couldn't say what the numbers are for standards, but they will be coming out in the very near term. But what is out there now? They know that EPA has the HA of 70 parts per trillion for two of the thousands of compounds that are out there. Massachusetts currently has a drinking water guideline of 75 parts per trillion applied to five compounds. They have the same structure, general type of chemistry, the same long residence time in the body, structural relationship activity that they rely upon, and there is some other toxicity information out there for additional chemicals, enough so that MassDEP's toxicologists say they have enough credible evidence to regulate the additional compounds the same way they regulate those two.

Connecticut does the same thing as Massachusetts. Vermont takes a more conservative view of interpreting the data. They look at the same five compounds but uses a standard/guideline of 20. There are other states that look at it in slightly other ways by looking at chemical specific values. MassDEP published 70 parts per trillion, and immediately afterward Agency for Toxic Substances and Disease Registry (ATSDR) came out with some draft toxicity levels indicating that chemical specific values may be appropriately set in the teens parts per trillion on a chemical by chemical basis which is significantly lower than MassDEP's 75 parts per trillion depending upon what you have. Other states – New York, New Jersey, and California are looking at numbers in the same general area. Minnesota uses numbers in the low 20s and 30s. New Hampshire recently came out with proposed MCLs that expand the range from around 20 up to 85, although they have said they may revise those standards as they move through the MCL process in response to the new information they have been receiving. There are other states that use the 70 parts per trillion that the EPA uses, but that is generally by default. States that have actively looked at the toxicity and have independently evaluated them, tend to do something different whether it is adding more chemicals or setting the numbers lower. Mr. Locke continued and said there is a wide range of interpreting the numbers that are out there.

MassDEP and all New England states recently received a petition from the Conservation Law Foundation (CLF) and Toxics Act Campaign (TAC) to set an MCL based on treatment technologies and try to get below 1 or 2 parts per trillion for all measurable PFAS compounds. Mr. Locke said that in about the next couple of weeks, MassDEP expects to have a proposal. MassDEP will put out and promulgate cleanup standards in soil and groundwater and promulgate notification criteria for PFAS compounds. During that time there will be ample time for public comment and MassDEP will be actively seeking input on what those numbers should be. MassDEP will be putting out proposed values and a long note to reviewers that specify questions that they are seeking answers for and seeking more input to. Mr. Locke said he would not be surprised if the process works the same way it does in New Hampshire. The public comment period is to gather more information, to gather people's perspective to have a broader way of looking at this. New Hampshire is in the middle of that process and is already seeing changes based on the input they are getting. MassDEP will put out numbers, seek input, and critically evaluate that input, and if necessary and indicated, MassDEP will change those numbers. At the same time MassDEP's Office of Research and Standards (ORS) will be meeting with their external group of toxicologists and they will revise their ORS Guideline which is the Drinking Water Guideline. There will be interaction back and forth between the two groups. The comments received by the Cleanup Group will be shared with ORSG and the comments and input ORSG gets from their group will be shared with the Cleanup Group and will feed back into their standards setting process. The promulgated MCP standard is expected have about a 2-3 month public comment period. So, after it goes out and public can see it on the web, there will be a series of public hearings including one in the Southeast Region, and then soon after that MassDEP will put out the final recommendation.

Mr. Locke continued and said that about the time a final MCP is decided on, an MCL will be promulgated for drinking water supplies. They will have the benefit of the Cleanup Group having gone through a public

comment period and the ORS Guidelines will be revised so that their starting point will be better informed as a result of that public comment. That MCL process will have its own public comment period. There are things for the Public Water Supply Regulations that differ from the Cleanup Regulations. There will be a different group of people, different perspective, and different input. By statute, at that point they will have to look at technical feasibility of public water supplies, costs, and a number of other issues beyond just toxicology. When they come out at the end with a final MCL, the Cleanup Group will work on a revised MCP standard, GW-1 number if necessary, and revise the ORS Guidelines if necessary to make sure MassDEP has a consistent approach to water that is used as drinking water regardless of which program they are in. Mr. Locke said that MassDEP is committed to making sure the numbers line up and working in a consistent fashion. But all of that takes time and coordination, so MassDEP is not rushing into things.

Mr. Bill Winters referred to Mr. Locke's chart that showed standards of concentrations at different states and asked if the international community has done any studies we can use as a guideline for a starting point or are we inventing the wheel for the first time here? Mr. Locke replied that there are other international groups out there, and in Massachusetts they are not reinventing the wheel. MassDEP is looking at what other people have done including the other states. EPA, ATDSR, and MassDEP's toxicologists will also be looking at the World Health Organization, the European Union, and other sources for information.

Mr. Dan DiNardo referred to the legacy on the take-back program, which he said is extremely impressive as they all know how much contamination can come out of 150,000 pounds of AFFF, and asked if there is any parallel legislation or legal action that prohibits the use of material produced prior to 2003? Mr. DiNardo continued and said that it is one thing to take it back if there is an economic incentive if fire departments and other users do not have to pay for that, but is there currently parallel law that prohibits the use of that material which could still be out there? Mr. Locke responded that a lot of work done in the 2000's was the EPA working with manufacturers of PFAS compounds to eliminate the use of the longer chain compounds in things like fire-fighting foam. However, there isn't a law that prohibits their manufacture, and there is not a law that prohibits the use but there are these stockpiles out there that are in the hands of the local firefighters. Some of the firefighters have been given their stocks by larger corporations - petroleum companies - that were divesting of the longer chain "bad stuff" by giving it to the local firefighters and that is what MassDEP is trying to get. MassDEP has also worked with larger units as well - to swap their AFFF out so they have the opportunity to use newer, better material, which is not PFAS free, but uses shorter chain compounds. Ms. Loughlin added that she is not aware of a national regulation or program that precludes the use of PFOS-containing AFFF foam. She added that DoD is revising a MilSpec for firefighting foam for their own use and is struggling with trying to find an adequate substitution because unfortunately these perfluorinated compounds do a good job at putting out fires and if you are on a submarine or out in the middle of the ocean, that is going to be your primary goal as opposed to worrying about the contamination later. Mr. Locke added that US manufacturers stopped using PFOS in the mid to late 2000's. The problem is that there are foreign manufacturers and it is not clear, with products being imported, if they contain a wide range of these compounds. With AFFF, manufacturers stopped using PFOS, and the biggest problem now is the stockpiles that MassDEP has taken steps to address. From an exposure point of view it might depend on where the product is manufactured as overseas manufacturers may still include these compounds for instance in waterproofing. But, that is less related to the environmental contamination they are dealing with here in Massachusetts.

Mr. Goddard stated that the town of Bourne has switched out to a plant-based foam so there are questions as to how effective it is and striking that balance. Mr. Goddard asked, "What is MassDEP's view on looking at wastewater treatment facilities and discharge permits, and is MassDEP going to look at those facilities and modify their limits for discharge?" Mr. Locke responded that MassDEP's priority at this time is dealing with drinking water exposures and making sure they are expanding the sampling of drinking water supplies across the state and addressing those. There is a laundry list of potential exposures, which in terms of magnitude, are probably less than drinking water exposures when you have drinking water contamination, but in the long-term, MassDEP does want to address things like wastewater discharges, the residuals associated with wastewater treatment plants, leaking landfills, food exposures that might be a concern,

potential air discharges – there is one PRP that has potential air discharge that may then be felt in groundwater contamination, so there are a number of things that MassDEP is following up on at a slower pace because a lot of their resources are directed towards the drinking water.

Mr. Tom Cambareri asked Mr. Locke what the numbers are related to aquatic toxicity regarding surface waters and fish and how long before those numbers are issued. Mr. Locke replied that as Ms. Loughlin mentioned there is less information about the environmental toxicology on the PFAS compounds. There is some information out there and one of the things MassDEP will be proposing in this round for the MCP is a GW-3 standard for groundwater which is groundwater that is being protected for its eventual discharge to surface water. The number will be based upon what available information they have and MassDEP will be looking for public comment on that.

Mr. James Hawking, Mashpee resident, said he was going to ask Mr. Locke if they are sharing the science related to PFAS, but stated he got his answer in the handout graph provided in his presentation.

Mr. Seaver referred to Mr. Locke's Health-Based Levels graph and asked if the Y axis refers to nanograms per liter. Mr. Locke confirmed that it is nanograms per liter. Mr. Seaver said that is a millionth of a part per million. Mr. Locke responded that Mr. Seaver is correct. Mr. Seaver said he has never seen that and do you have to invent the science to measure that? Mr. Locke responded that the analytical capabilities are a challenge but they are coming along. Even though it is a millionth of a million, when these compounds enter your body they are not dissimilar to concentrations of other active chemicals in your body like proteins and enzymes. It does not take a lot to have health effects.

Ms. Forbes, gave a follow up response to Mr. Seaver's question. She stated that ethylene dibromide (EDB) has an MMCL of 0.2 µg/l which is 20 nanograms per liter. To put it in perspective, they have been dealing with nanograms all along with EDB. Mr. Seaver asked Ms. Forbes what the MMCL was for contaminants in the past. Ms. Forbes responded that TCE is 5 µg/l which is 500 nanograms per liter. Mr. Locke added that benzene, TCE, and PCE are all 5 µg/l because in the 1980s analytical abilities only allowed them to measure down to 5 parts per billion. In a way they are looking at this in a similar way they looked at chemicals - they all have stretched the limits of the analytical capabilities.

Presentation: Emerging Contaminants Update – Ms. Rose Forbes, AFCEC

Ms. Forbes presented an overview of the work AFCEC has been performing on emerging contaminants. She said if anyone has suggestions of a topic from this presentation for future meetings or a neighborhood meeting to let her know at the end of the presentation. AFCEC started looking at emerging contaminants in 2013 and initiated sampling in mid-2014. Since then AFCEC has been working on a number of investigations which have generated several documents along with mitigation. Mitigation was the first step when AFCEC started looking at emerging contaminants. AFCEC looked to answer about emerging contaminants: "Where are they? Are there any exposures? If there are exposures, how can we mitigate them?"

Ms. Forbes continued and said 102 private wells were sampled and 4 of those private wells currently have PFOS/PFOA detections above the HA. None of the wells were above the GW-1 standard for 1,4-dioxane.

Eight public wells in the area of outreach have been sampled. Two public wells had PFOS/PFOA detections above the HA. One of those wells, the Mashpee Village Public Water Supply Well, was shut down and wellhead carbon treatment construction has begun. The other well, which serves 93 trailers in Lakeside Estates, was connected to the municipal water supply.

Four residents are receiving bottled water, 13 filtration systems were installed and four systems removed once connected to municipal water. A total of 107 connections have been made to the municipal water supply including the one public well at Lakeside Estates. There is one more connection scheduled.

AFCEC has been working on the Remedial Investigation (RI) at Ashumet Valley which includes direct push work and sampling several wells. It was assumed that since PFOS/PFOA and 1,4-dioxane were so soluble, that they would be long gone from the source area. Ms. Forbes said that was true for 1,4-dioxane but not for PFOS/PFOA where the highest concentrations have been found at the source areas. AFCEC has moved on to the Expanded RI to investigate the source areas and the infiltration trenches on Currier Road and Sandwich Road in Falmouth along with Ashumet and Johns Ponds. Referring to Figure 1. Ashumet Valley Cleanup Progression, Ms. Forbes pointed out that the plume in the figure is based on legacy contaminants PCE and TCE.

AFCEC is re-investigating the source area which is the former fire training area where fire fighters would practice putting out fires with water and foam. In 1995 at this site AFCEC was treating for volatile organic compounds (VOCs) by thermal adsorption and treating the soil at a temperature that was high enough to destroy the VOCs but not high enough to destroy PFOS/PFOA. There was no knowledge of PFOS/PFOA at the time so the treatment system was homogenizing the soil and putting it back in the ground. There was also a fire at the treatment system and when the fire department responded, they sprayed AFFF on it. So, there are two different sources of PFOS/PFOA at the former fire training area site.

Over a year and a half to two year period, carbon was not changed out at the Ashumet Valley system because VOCs were decreasing, so PFOS/PFOA likely went through the effluent. Even though carbon does work on PFAS and PFOA, it needs to be exchanged more frequently. As soon as the Currier Road trench came up positive for PFOS/PFOA, the water was redirected to the Sandwich Road trench, and since then a carbon exchange has been done for PFOS/PFOA. Ms. Forbes said that over time since the water was redirected away from the Currier Road trench, PFOS/PFOA have flushed through and all of the private wells in that area are below the HA.

Ms. Forbes referred to Figure 4. Conceptual Site Model and pointed out that the red dots are above the HA for PFOS/PFOA. It was tracked down the historical VOC plume and was found by the Currier Road and Sandwich Road infiltration trenches and investigation continues in that area. Ms. Forbes said that when the ponds were sampled, they found samples were above the HA so more sampling had to be done downgradient of the ponds because they now know the ponds are kettle hole ponds. Since the ponds recharge the groundwater, if the ponds are above the HA, wells downgradient of the ponds are also, and sampling confirmed this. AFCEC connected every private well in the area of the ponds above the HA to municipal water except for one on Old Barnstable Road which will be connected soon.

At the leading edge, sampling results are below the HA, however, the limitations of the GeoProbe have been exhausted, and they are not sure they were able to sample deep enough. A sonic rig may be needed to confirm appropriate depth for sampling and to be able to fully define the plume.

In referencing the LF-1 plume, Ms. Forbes showed that the plume is cleaning up VOCs, but now that there is PFOS/PFOA and 1,4-dioxane. Fortunately PFOS/PFOA are within the footprint of the LF-1 plume so when the system was installed in 1999, a series of extraction wells were not only removing VOCs, they were also removing PFOS/PFOA and preventing them from flowing downgradient. Almost within the same footprint at LF-1 is the 1,4-dioxane plume. Concentrations are a little lower overall, and there is only one detection downgradient above the GW-1 standard.

Ms. Forbes stated that these plumes were defined as a part of the investigation and now AFCEC is working on the Feasibility Study (FS). However, it is difficult to work on an FS without promulgated standards as addressed earlier by MassDEP and EPA presenters. AFCEC, MassDEP, and EPA agreed to wait on the FS

until MassDEP comes out with promulgated standards for PFOS compounds. It may be the end of the year before an FS is submitted to determine treatment options.

CS-10 plume was sampled for 1,4-dioxane and an area within the plume was found where the 1,4-dioxane was above the GW-1 standard of 0.3 µg/l. Since it is within the plume and won't affect the restoration timeframe, an FS was completed which suggested adding 1,4-dioxane as a COC for CS-10 plume and the remedy proposed as a monitored natural attenuation. CS-10 has extraction wells pumping at such a high rate to remove VOCs, that it is diluting 1,4-dioxane. Even though carbon doesn't remove 1,4-dioxane, the sampling results are non-detect. An Explanation of Significant Differences is currently being worked on to add 1,4-dioxane as a COC.

Between the treatment system and natural attenuation, CS-20 is cleaned up. Some 1,4-dioxane was found when sampled at CS-20 but only one or two samples taken were above the GW-1 standard and over time they decreased below that standard. Ms. Forbes said they were working on an RI at CS-20, but the conclusion is that 1,4-dioxane is not an issue as long as the next final round of sampling results stay the same, and site closure procedures can then begin at CS-20.

Ms. Forbes referenced photos of the two Tanker Truck Rollover sites (TTRS) where AFFF was used. There are two sites at the source area. AFCEC is investigating the downgradient part and mapping the plume. Figure 15 shows the outreach area for PFOS/PFOA related to the TTRS. Some detections were found on Valley Farm Road. There are currently filtration systems on three of the homes and one home is receiving bottled water. The other wells on Valley Farm Road are not impacted but sampling is continuing to monitor all of the wells. PFOS contamination above the HA of 0.07 µg/l extends from the source areas near the Otis Rotary to the harbor. PFOA contamination was not prevalent and concentrations exceeding the HA were only detected in two samples collected from the water table at source area borings where the highest concentration was 0.28 µg/l. An RI/FS will be completed for the TTRS.

The Flight Line Area Sites are proceeding to an Expanded Site Inspection (SI). There are seven sites within the flight line area where they are sampling for AFFF: the Former Building 118 Release Area, ANG Motor Pool, Building 122 Release Area, Hangars 3170 and 3172, JBCC Wastewater Treatment Plant, Lower 40 Ramp Area and Hangar 2816, and Fuel Spill-1 (FS-1).

FS-1 is a success story for ethylene dibromide (EDB) and the last extraction well will be turned off within a year. However, PFAS has been detected, so the system will likely stay on but more investigation into the source area and to see if it is connected to other main Flight Line Site source areas needs to be completed before that is decided.

A No Further Action Required Document is being prepared for the Otis Target Butt site and language will be added to exclude PFAS from the determination per EPA/MassDEP so it will be closed as a Military Munitions Response Program (MMRP) site and not for groundwater. FS-29 is another success story for EDB and carbon tetrachloride which are no longer present, but before closing the site EPA/MassDEP are requiring PFAS sampling to ensure there is no contamination associated with that area.

Mr. Goddard asked that there was a period of time where the Ashumet Valley GAC was treating the original COCs, but then PFAS was breaking through because AFCEC wasn't aware of it, so the presumption is there is a system-wide plan to address that at all of the treatment facilities and what they are discharging where, are the change out rates based on PFOS/PFOA only or is AFCEC looking at the COCs too? Ms. Forbes responded that the only plants affected are Ashumet Valley, LF-1, and FS-1. She continued that all of the COCs and PFOS/PFOA are sampled for and looked at for determining carbon change-outs. Mr. Goddard asked if all of the compounds have different breakthrough rates. Ms. Forbes responded that yes, there are different breakthrough rates. For example carbon tetrachloride usually breaks through first. For all of the different PFAS compounds, the lower, smaller chains break through faster, but AFCEC is only sampling for PFOS/PFOA. In the Currier Road wells there was more PFOA than PFOS because the PFOS

was adsorbed better to the carbon so PFOA broke through first. Water from the ponds is higher in PFOS because it came from the source area. There are a couple of private wells by the Sandwich Road trench but they are outside the realm of hydraulic influence so even if it breaks through again, it is going to the groundwater so no one will be impacted by it directly.

Mr. Cambareri commented that he was very impressed with all of the work that AFCEC has done referring to the legacy slides. He added that the work to uncover, discover, and identify contaminants at all of the Flight Line sites is outstanding as well. Mr. Cambareri asked about the types of detections that were found in the Flight Line Area and the range of concentrations. Ms. Forbes sent Mr. Cambareri the requested information in an email on 03 Apr 19. Mr. Cambareri also asked if AFCEC was collecting soil samples at the Flight Line sites. Ms. Forbes responded, yes. She said that Building 122, which is the former fire department building, was going to be demolished but they had anecdotal evidence that the concrete absorbed PFOS/PFOA, so it was sampled and was detected. Ms. Forbes said it is also in the sediments to the storm drain. Mr. Cambareri asked the range of concentrations in the ponds. Ms. Forbes replied that the highest is 0.2 µg/l for PFOS/PFOA.

Mr. Donald McCarthy, resident of McCarthy Lane near Currier Road, stated that of the four houses on McCarthy Lane, and two have filtration systems and two have bottled water. He continued that his filtration system is working well for PFOS/PFOA, but he is concerned about the 1,4-dioxane. He said that the last three samples taken were not tested for 1,4-dioxane and asked why. Ms. Forbes responded that there are no detections above the GW-1 standard in the area and in the letters sent to Mr. McCarthy it says they are not sampling for 1,4-dioxane in this round of sampling. Mr. Mark Hilyard, CH2M, added that they do sample on an annual basis for 1,4-dioxane. Mr. McCarthy said the last time it was sampled was February 2018. Mr. Hilyard responded that the next round of sampling will include 1,4-dioxane, and Ms. Forbes added that they do not have any reason to be concerned because they are no longer discharging to the Currier Road trench and it has already flushed through.

Mr. Cambareri asked Ms. Forbes to further explain the reason the concentrations are highest near the source areas. Ms. Forbes explained that PFOS/PFOA likes to stick to carbon including carbon in soil. It leeches out over time. It also does not degrade. With VOCs in soils, there is always some degradation occurring, but PFOS/PFOA does not do that.

Agenda Item #3. Presentation: Military Munitions Response Program (MMRP) Update– Ms. Jennifer Martin Bouchard, EA Engineering, Science, and Technology, Inc., PBC

Ms. Bouchard started the presentation with the background of the MMRP. AFCEC is conducting investigation/remediation at ten Munitions Response Areas (MRAs) under the MMRP. This program is different than the IRP and Impact Area Program in that these are Department of Defense sites that may contain munitions and explosives of concern (MEC), discarded military munitions (DMM), and/or munitions constituents (MC). MMRP sites follow the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and National Contingency Plan thus fall under the JBCC Federal Facility Agreement. MMRP differs from the Impact Area work because the sites were formerly used sites for MMRP where the Impact Area sites are still in use.

Ten sites are part of the MMRP and nine of them are mapped on page 4 of the presentation handout. The MMRP process follows the traditional CERCLA process and is explained on page 5 of the handout. Ms. Bouchard referred to figures in the handout to point out where the MMRP sites along with a brief description of each. Eight site investigations were performed at the same time with a sampling approach that depended on the type of site. Investigations were tailored depending on whether the site was a formerly operational range where it was expected to have MEC, whether it was a storage area where there was a low potential for MEC, and sites where there was no expectation of finding MEC where MCs were primarily looked for.

A visual survey with a magnetometer was performed at the sites where MEC were expected to be. The sites where no MEC were expected, lead was the primary COC that was being looked for.

No Further Action Decision Documents will be developed for sites that have no evidence of munitions and will include PFAS statements. The sites include storage sites that were significantly redeveloped and where stakeholders agreed that there is very likely that no munitions are at those sites and/or sites where the only munitions use would have been small arms – where the primary COC of lead was not found. There are two sites directly following that path – the Otis Target Butt site and the Former Otis Bomb Storage Magazines site. Ms. Bouchard referred to the figures on page 7 of the handout which compare a 1955 aerial photograph to the current sampling plan at the Former Otis Bomb Storage Magazines MRA where soil data was collected. Otis Target Butt MRA is inside the I Gate and was used for test firing aircraft machine guns in the 1940s to 1950s. There is no sand left in the building but the soil around the berm was sampled. A No Further Action Decision Document will be prepared for both sites this year and will include a public comment period.

Other sites fall into the same realm as the Former Ammunition Supply Point. These sites may have been redeveloped enough to confirm the absence of remaining munitions. They are following a streamlined remedial investigation process with a presumptive remedy of land use control. A streamlined remedial action feasibility study process is recommended prior to deciding on a final remediation plan for the Mock Village MRA and the Old Grenade Courts sites with a presumptive remedy of Land Use Control.

Based on historical information and the Comprehensive Site Evaluation (CSE) Phase II, there are two sites that had MECs or MCs. One is the Old K Range which is adjacent to the Impact Area and was used as a small arms and rocket range. In 2016 and 2017 an extensive munitions investigation was done at the site. Several rockets were discovered. The rockets were x-rayed and a very low percentage of explosives were detected. The munitions portion of the investigation has been completed, and outstanding questions on the constituents investigation are being resolved. To date there have been no significant impacts found in soil or groundwater. A traditional Remedial Investigation (RI) is almost complete for the Old K Range. The other site, the Otis Gun Club Skeet Range, is where there was known lead in the soil and additional data was collected in the CSE Phase II work. The RI for that site is almost complete.

There is another Skeet Range site within the I Gate. There is very little historical information for this site. It was examined in the CSE Phase II and very little impact to soil was found. However, a small amount of lead was found but it is mostly below residential screening levels. A small area of soil with lead above the screening criteria was identified and further determination is required to see if it is an isolated hot spot and an Interim Remedial Action can be done or if a traditional RI/FS needs to be done. An Interim Removal Action is being discussed with site closure after the removal action.

Ms. Forbes added that ongoing discussions are being held by the Air Force and Regulators above project manager level to resolve investigation requirements for supply point and storage areas with potential for future residential use at the two storage sites at the Former Ammunition Supply Point and Ordinance Area 1. If No Further Action is not achieved, the next steps will include RI/FS, decision document, and LUC Implementation Plan.

Agenda Item #4. Presentation: Central Impact Area Update UXO Removal Update – Benjamin Gregson, IAGWSP

Mr. Gregson referred to the figure on page 2 of the handout to show the location of the Central Impact Area. There is a groundwater remedy in place. There are two wells on Burgoyne Road pumping a total of 750 gallons per minute. The EPA decision document that was signed 6 - 7 years ago requires source removal of 75-95% UXO in the source area during the first phase. The first two phases - 30 acres and 28 acres were completed in 2018. Phase III Area 1 which consisted of 10 acres was completed in 2018 for a total of 68

acres of UXO removal conducted in the Impact Area. Some of the areas completed need to be re-dug which Mr. Gregson will discuss later in the presentation.

The UXO Removal Team and technical experts consist of USACE personnel: Gina Kaso and Elbert Caraballo at JBCC and Amy Walker, John Younghans, and Donna Davis at the Huntsville Center. Primary contractors included Dawson and Parsons (current UXO contractor).

Mr. Gregson referred to the Figures 1-2 and 1-3 of the handout. He said that Phase I, covering the first 30 acres of the project, initially started out as a demonstration project with the Environmental Security Technology Certification Program (ESTCP). Phase II added another 28 acres to the project, and Phase III added the final 10 acres. Also included in Figure 1-3 are areas that have had some degree of UXO removal including the Sub-Caliber Aircraft Rocket (SCAR) site, Eastern Test Area, and transects where UXO removal was done at each well pad and access road. Figure 1.2 depicts Phases I, II, and III.

The equipment used is called a MetalMapper which is a geophysical remote sensing tool which distinguishes between scrap metal and munitions. The traditional electro-magnetic survey of the ground shows hot spots which higher concentrations of metals and the light colors which show lower concentrations. The MetalMapper is set down on the highest peaks, takes a reading, then sees if the hot spot is a munition or a piece of scrap metal. Traditional metal detectors give the same response for all metals, but the MetalMapper distinguishes between the different metals because it takes readings in three planes and dimensions. The MetalMapper is needed because geophysicists aim to classify 95% of the targets of interest which includes 91% non-hazardous (scrap) metal, 8% empty shells that look like UXO but don't contain explosives, and 1% actual UXO. Once the MetalMapper indicates that a spot should be dug, the UXO technicians remove the object. Mr. Gregson referred to a photo in the handout of artillery rounds and mortars that were removed, and a photo of munitions debris to be recycled.

In Phase I, the MetalMapper investigated 30 acres and detected 47,648 anomalies. 22,918 anomalies were excavated, 646 UXO items were recovered, 2,856 UXO-like items were recovered, and 1,828 pounds of explosives were recovered. In Phase II, the MetalMapper investigated 28 acres and detected 106,980 anomalies. 47,912 anomalies were excavated, 1,409 UXO items were recovered, 7,058 UXO-like items were recovered, and 3,944 pounds of explosives were recovered. In Phase III, the MetalMapper investigated 10 acres and detected 24,208 anomalies. 8,167 anomalies were excavated, 182 UXO items were recovered, 1,819 UXO-like items were recovered, and 471 pounds of explosives were recovered. The combined total of Phase I, II, and III resulted in 131,188 anomalies, 56,087 anomalies excavated, 8,877 UXO-like items recovered, and 4,415 pounds of explosives recovered.

Every 6 acres a 100% dig on a grid is done to see if the metal that was left behind is ok to leave behind. Last year 100% dig was performed on two grids – one north and one south. Grid 39_35 resulted in 529 anomaly locations with MetalMapper cued data collection. 223 met the dig criteria, and two had multiple dig locations resulting in 255 likely targets of interest (TOI) digs. The recommended dig rate was 42.1% and the remaining 306 were dug for quality assurance (QA). 45 TOI were recovered and two were missed. Grid 48_57 resulted in 561 anomaly locations with MetalMapper cued data collection. 248 met the dig criteria with a recommended dig rate of 44%. The remaining 316 were dug for QA. 32 TOI were recovered and six UXO items were missed. These six items were all 81mm mortars and deeper than consistent detection depth. They were recovered incidentally when clearing 1m radius holes around other items.

USACE instructed Parsons to perform a root cause analysis (RCA) to determine how the items were missed. Parsons RCA reported that there was incomplete hole clearance, it was a higher metal density grid next to Tank Alley, misinterpretation of “stop-dig” criteria in high density grids, inadequate documentation of dig results and inadequate review for anomaly resolution, and the UXO was deeper than consistent detection depth for 81mm mortars.

The corrective actions (CA) from the RCA by Parsons was to re-dig adjacent grids (47_57 & 49_57) to see if anything was missed in those adjacent grids. Three additional UXO were recovered: 81mm at 18cm, 81mm at 61cm, and a 60mm at 95cm.

Also during this time, 22 of 175 seeded items, which are items planted with only a few people knowing their exact whereabouts, were not recovered during a one meter clearance of their seeded locations. This was not noticed until the end of the season so this QA information could not be used to make adjustments as the work went along. During the 100% dig and coercive action, UXO was recovered from holes that were previously declared clear. Thus, initial intrusive results cannot be trusted as complete. The USACE Contracting Officer issued a Letter of Concern to the contractor. The causes of failure were determined to be inadequate hole clearance which means while the contractor was digging they weren't doing a good enough job moving the anomalies, inadequate geophysicists review of dig results to make sure what they thought was going to be removed was actually what the UXO technicians found, and failure to recognize the problems until the end of the season.

The CA is for the contractor to re-dig all Phase 3 Area 1 MetalMapper classified dig locations and polygons except for the first 100% grid and two sites already re-dug. There are 8000 locations that will need to be re-dug for the CA. There will be additional seeds placed at some of the re-dig locations, an additional Quality Assurance Process Plan (QAPP) and Standard Operating Procedures (SOPs) will be put in place, and the USACE Quality Assurance Surveillance Plan (QASP) will be updated with defined tasks and schedule for review.

Currently, the Phase III Area 1-EM61 and MetalMapper 2x2 data collection and analysis are complete, the QAPP, SOP, and Dig Procedures are being revised, and the Draft 2018 Annual Report was submitted and will note remaining work for resolution.

For Phase III Area 2, up to 15 acres will be completed in 2019. The light detection and ranging (LiDAR) survey showed extensive cratering beyond Phase I, II, and II removal areas, thus the goal is to identify and define boundaries of the future source removal area. The approach that will be used is a series of 50-foot wide transects (10 transects-12,000 linear feet) to look for UXO density drop off.

Mr. Winters asked Mr. Gregson if the MetalMapper is capable of telling if a shell is empty. Mr. Gregson answered no, and added that oftentimes they can't tell if a shell is empty even after they take it out of the ground because the casing is too rusted. So, they can't tell until they destroy the item if it is empty. Mr. Winters further asked if the UXO technicians treat everything as live. Mr. Gregson responded that there is a wide range of items and the technicians can dig up something that they find immediately to be dangerous that have to be blown in place, and there are also items that may not have a fuse any longer but may be full of explosives that are safe to move. Mr. Winters asked if there was a machine that could dig the items up remotely. Mr. Gregson responded that there are very brave people that dig the items up very carefully.

Mr. Goddard referred to the picture of the MetalMapper and asked if there are inaccessible areas due to its size. Mr. Gregson responded that it has been able to access all spots and that vegetation may be cut down to help with access. Mr. Goddard asked if the MetalMapper has future applications like being put on a low-flying drone or a helicopter to make detections. Mr. Gregson replied that with today's technology the MetalMapper needs to be sitting directly on the ground to get the data needed. Mr. Goddard stated that he believes that subscribed burns have been delayed for these areas, so as these areas are closed out by UXO, will the areas be cleaned out of vegetation as well. Mr. Gregson said the vegetation is cut to the ground in the areas they work in and chipped on site, but that the areas in between those spots could be subject to burn and that they will be cooperating with the base about that.

Mr. Cambareri referred to the LiDAR figure on the wall and asked Mr. Gregson to talk about it. Mr. Gregson said it is a large depression in the northern part above the Impact Area. He pointed out the

depressions in the lower left which are related to the Succonsette Pond deep kettle depression. The middle is a flat plane in the impact area, the upper left is the moraine.

Agenda Item #5. Presentation: Six Month Look-Ahead – *Mr. Benjamin Gregson, IAGWSP*

Mr. Gregson reported that the Decision Document on the Training Areas has been finalized. There is some additional post-Decision Document work required in a few of the Training Areas. More UXO source work will be done in the Central Impact Area (CIA). New monitoring wells will be drilled in the J-1 South Area, the CIA, and Demolition Area 1 (Demo 1), at the leading edge of the plume. A Work Plan is almost complete for IAGWSP to do PFAS sampling in the open burn/open detonation areas, which were used in the past on the base. Soil removal work continues at the Small Arms Ranges with two grids remaining. IAGWSP plans to provide individual plume updates throughout the year. The Demo 1 plume has decreased significantly in size, the Western Boundary plume has dissipated, the Northwest Corner plume is almost entirely gone, and the J Range plumes are significantly smaller than they used to be.

Mr. Goddard asked if there were concerns about PFAS in the CIA. Mr. Gregson said that it is not being focused on at this time because it was an artillery and explosives site, not a disposal area.

Presentation: Six Month Look-Ahead – *Ms. Rose Forbes and Mr. Douglas Karson, AFCEC*

Ms. Forbes stated that the AFCEC work is represented by 3 types of sites: the traditional IRP sites, PFOS PFOA sites, and MMRP sites. Field investigations will continue as part of field efforts. Specifics are in the first page of the handout or have previously been covered.

For MMRP sites, the Draft Old K range RI Report is with Regulators and additional sampling is being discussed. The Old K Range FS is planned for June 2019 and will include a public comment period on the Proposed Plan and JBCCCT update. The Draft Mock Village MRA Streamlined RI/FS was submitted to Regulators in January 2019 and comments area pending. There will be a public comment period on the Proposed Plan and JBCCCT update. The Draft Otis Gun Club MRA RI was submitted to Regulators in January 2019 and comments area pending. There will be a JBCCCT update on the Final RI Report. The Draft Otis Gun Club MRA FS is planned to be submitted to Regulators in May 2019 and will follow with a public comment period on the Proposed Plan and JBCCCT update. The Draft Otis Target Butt MRA No Further Response Action Planned Decision Document (NFRAP DD) was submitted to Regulators in August 2018 and comments are pending. This report will require a news release, paid advertisement, public comment period, and JBCCCT update. The Former Otis Bomb Storage Magazines MRA NFRAP DD will be submitted pending the approval of the Otis Target Butt MRA NFRAP DD. This report will require a news release, paid advertisement, public comment period, and JBCCCT update.

For PFAS and 1,4-dioxane sites, the Draft Supplemental FS for 1,4-Dioxane and PFAS at LF-1 has been delayed due to MassDEP's plan to promulgate PFAS standards. Once completed, a public comment period on the proposed plan for RI/FS and a JBCCCT update will be held. The Final CS-20 Supplemental RI Report on 1,4-Dioxane is planned to be submitted to Regulators and will follow with an update to JBCCCT on the Final Report. The Draft CS-10 Explanation of Significant Differences (ESD) for 1,4-Dioxane was submitted to Regulators in December 2018, and EPA comments are pending. This will be followed with a news release, advertisement, neighborhood notice, Fact Sheet/Proposed Plan, public comment period and JBCCCT update.

For IRP sites, the Draft FS-29 Three Step Process Step 1 and 2 Report was submitted to Regulators in October 2018. MassDEP requested PFAS sampling in February 2019; AFCEC requesting approval for sampling. The 2018 Annual Summary Letter Reports for active sites are near completion and will be uploaded to the Admin. Record when completed.

Mr. Karson stated there are a lot of community involvement opportunities coming up. The Community Involvement Plan is being updated which will include Regulatory review followed by a JBCCCT presentation and a public comment period likely this summer. JBCC Cleanup Update, which includes the Army and Air Force programs, is an eight page document which should be finalized soon. The IRP Plume Booklet is also being revised and is approximately 30 pages and will be coming out this year. Risk Fact Sheets will be resurrected per discussion with Regulators. The 2018 IRP Land Use Control Letter Report, which is required to be submitted to Regulators on a yearly basis and summarizes efforts in mitigation of exposure to traditional/legacy and emerging contaminants, was recently submitted to Regulators for review and should be finalized over the next month. In December 2018 a poster session was held in Pocasset which included approximately 25 residents in attendance, and a follow-up session will be scheduled for early summer after the release of the updated MassDPH Recreational Use of Water Bodies Fact Sheet for 2019. An off-base poster session is also being planned for Mashpee/Falmouth residents off-base due to all of the work being performed in those towns. There is a handout available explaining how to get to the AFCEC IRP and Admin. Record website. Mr. Karson said that work will continue with stakeholders including the JBCCCT team, towns, homeowners, realtors, etc... Sampling, supplying bottled water, filtration system installations, and municipal conversions are ongoing. Any off-base intrusive work that requires equipment and/or noise requires notification to homeowners within 500 ft of that work, and Mr. Karson is continuing to make those notifications as needed.

Mr. Goddard asked if the team would get to review the Draft CIP. Mr. Karson said yes, it will be sent to the team before it goes out for public comment. He will be discussing with MassDEP and EPA in the coming weeks about how to update, by addendum or more in depth.

Mr. Goddard asked Mr. Karson to explain the difference between the JBCC Update and IRP Plume Update. Mr. Karson responded that the JBCC Update is a combination of IAGWSP and IRP programs and is only eight pages while the IRP Plume Update is only the IRP program and is 30 pages. Mr. Goddard asked if PFAS would be identified on the maps in the updates. Mr. Karson said yes, there will be as much information that is ready at the time of publication.

Mr. Goddard recommended that IRP attends a Bourne Board of Selectman meeting this summer as it is watched by a lot of people and is a good way to get information out. Mr. Karson agreed.

Agenda Item #6: Final Discussions. Adjourn.

Ms. Donovan asked if anyone had comments from the minutes from the August 2018 meeting. The next JBCCCT meeting will likely be in the summer. Meeting was adjourned at 8:30pm.

Action Item from 13 Mar 19 Meeting:

1. Mr. Goddard recommended that IRP attends a Bourne Board of Selectman meeting during the summer as it is an opportunity to get information out to a large number of people.

- a. May 14, 2019 IRP will be attending the Bourne Selectman meeting in support of the Commanders JOG Brief. On May 23, 2019 and June 22, 2019 IRP will be holding off-base poster sessions in Pocasset.