

**Massachusetts Military Reservation Cleanup Team
 Building 1805
 Camp Edwards, MA
 September 12, 2012
 6:00 – 8:00 p.m.**

Meeting Minutes

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Action Items:

1. Mr. Goddard requested that the regulatory agencies provide criteria for the highest risk UXO with regards to future UXO removal actions at the CIA.
2. Mr. Goddard asked the IAGWSP to look into whether any NATO countries are utilizing/developing cutting-edge UXO identification & removal technologies like those at MMR.
3. Mr. Dinardo suggested the development of a simplified method for presenting cleanup progress to community members.
4. Mr. Dinardo requested a future MMRCT presentation on the use of alternative/renewable energy on MMR.
5. Mr. Goddard asked the project managers to discuss future MMRCT meeting frequency and strategy to present to team members for discussion at the next meeting.

Handouts Distributed at Meeting:

1. Responses to Action Items from the June 20, 2012 MMRCT Meeting

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2. EPA News Release: EPA and Mass National Guard Reach Agreement on 2011 Firing Range Training Violation Allegations at Camp Edwards
 3. Presentation handout: J-1 Range Southern and Northern Plumes Groundwater Monitoring Update
 4. Presentation handout: Introduction to Geophysical Techniques – Central Impact Area
 5. Presentation handout: Central Impact Area Groundwater Monitoring Update
 6. MMR Cleanup Team Meeting Evaluation form
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**Agenda Item #1. Introductions, Agenda Review, Approval of March 14, 2012
MMRCT Meeting Minutes**

Ms. Boghdan convened the meeting of the Massachusetts Military Reservation Cleanup Team (MMRCT) at 6:01 p.m., reviewed the agenda, and asked if there were any changes or additions to the June 20, 2012 MMRCT meeting minutes. No changes were offered and the minutes were approved as written.

Agenda Item #2. Late-Breaking News

Agreement Reached on 2011 Firing Range Training Violation Allegations at Camp Edwards

Ms. Jennings announced that the U.S. Environmental Protection Agency (EPA) recently issued a news release regarding a consent agreement with the Massachusetts Army National Guard (the Guard) concerning operation of Tango, Juliet, and Kilo Ranges at the Massachusetts Military Reservation (MMR). She noted that EPA became aware of the violation about a year ago and the settlement involves a penalty payment of \$27,500 and a supplemental environmental project (SEP). The SEP is an impervious surface removal project, which will enhance a sensitive grasslands habitat that is home to some endangered bird species, and will also minimize potential leaching from the pavement into the groundwater.

Ms. Jennings also reported that the actual violation had to do with water collection at the bullet capture systems. She explained that there's an approved operation, maintenance, and monitoring plan in place that requires the Guard to periodically measure the water that collects and pump it out within a certain period of time to prevent spillover. The Guard, however, was not pumping within the specified timeframes, and the violation was compounded by a lack of meeting notification requirements.

Mr. LoGiudice asked if the endangered bird species were harmed because of the violation. Ms. Jennings clarified that the violation didn't pertain to endangerment of birds; however, the SEP will benefit the birds. The violation dealt with one issue – training on the ranges. She further explained that the Guard could settle that violation either by monetary payment or by money payment and a SEP. In this case, the SEP is worth about \$100,000 and the Guard is making an additional cash payment of \$27,500.

Mr. LoGiudice then asked how it could happen that the Guard's commanding officers weren't aware of the rules and regulations they needed to follow. Ms. Jennings replied that the Guard expressed to EPA that the plans were too complicated and the metric not as clear as the Guard would have liked. Therefore, over the past year work has been done to revise the plan and make it very clear, including standard operating procedures that the staff has readily available. Ms. Jennings further noted that when the issue first arose, the Guard implemented some quick mitigation measures, and has been doing a fine job of operating the ranges since that time. In fact, the fix for the water collection problem was simple – covering the STAPP (bullet capture) systems with a tarp when not in use so that high rains won't infiltrate and collect in the systems.

Mr. Dinardo asked if the failure to pump caused a release. Ms. Jennings replied that it's not 100% certain that there was no release, and explained that one of the first times it was noted that the measurement was above the actual capacity of the system, the Guard believed that the measurement wasn't right – so there were questions as to whether the person who did the measuring did so correctly. She said that EPA doesn't think there was a release, but if there was, EPA doesn't think any significant environmental impact would be associated with it. She also said that it happened multiple times that the water would reach above the action level and then the Guard would pump it down a little bit. The Guard explained that this happened to be when Hurricane Irene was hitting, so the excess of water was not normal, and the Guard also ran out of barrels to store the water, both of which contributed to multiple violations.

Mr. Dinardo inquired about the basis for the fine, if in fact no release occurred. Ms. Jennings replied that whenever there's a violation of any statute, EPA has a policy and guidelines to calculate a penalty. In the case of a Safe Drinking Water Act (SDWA) violation, the payment could have been as much as \$25,000 per day. However, in this case EPA ended up leaning on Resource Conservation and Recovery Act (RCRA) guidance, which pertains to a number of factors, including how long the violation occurred, the severity of the actions, and harm to the regulatory environment from not following established protocols. Ms. Jennings stated that there are actually metrics that dictate how much to charge per day with respect to significant violations that harm the environment and significant violations that harm the regulatory program environment. Some pretty complex matrices are developed to arrive at a number, and then the number is adjusted, up or down, depending on a number of other factors, such as how the Guard responded once informed about the violation, whether it was the first violation, and so forth. Ms. Jennings noted that, in this case, EPA took the action that it did because of problems having to do with monitoring, which occurred the previous year. She added that calculating the actual number was truly a negotiation using established guidance and matrices.

Mr. Dinardo remarked that the amount, \$27,500 seems very reasonable, all things considered. Ms. Jennings added that the value of the SEP also needs to be included; however, it actually could have been millions.

Mr. Saucier asked who regulates or monitors the implementation of the SEP. Ms. Jennings replied that the Guard has submitted a plan to remove 14 acres of blacktop and EPA will oversee the project much as it does other activities at the base, but this case will involve some of EPA's environmental habitat staff. Mr. Saucier asked how and why 14 acres were selected. Ms. Jennings replied that the number of acres was selected in order to get to a certain cost in order to ensure the value of the penalty to be paid, and a construction cost analysis was done. She also noted that the Guard requested a project that could be used as a training venue for its staff and proposed several different projects; EPA agreed to this one because it's a concise project, can be implemented within a reasonable period of time, and will benefit the Guard as a training venue. Mr. Saucier asked about the location of the 14 acres. Ms. Jennings replied that the acreage is on state land, within MMR, not far from tonight's meeting location.

New Air Force Trustee Representative on MMR Natural Resource Trustee Council (NRTC)

Mr. Davis announced that Tom Simms, who served as the Air Force's trustee representative on the NRTC, has retired from the Air Force, and he (Mr. Davis) has been appointed to take Mr. Simms' place. Mr. Davis also reported that the NRTC is in the process of awarding a facilitation contract to the Consensus Building Institute, after which the trustees will reconvene and decide how to go forward from here.

Mr. Goddard asked when NRTC meetings are expected to occur and whether the public will be notified. Mr. Davis replied that meetings will begin this fall; however, they will be internal meetings. He also said that the occurrence of public meetings will be determined based on the internal meetings this fall, which will establish a Memorandum of Agreement on how to move forward. Mr. Goddard

requested that the NRTC hold a public meeting this fall/winter to solicit public feedback on the council's next steps/way forward.

Agenda Item #3. J-1 Range Groundwater Monitoring Update

Mr. Gregson showed a map of the base and pointed out the J-1 Range, Sandwich's Forestdale neighborhood, Grand Oak Road, the J-1 Southern plume, the J-1 Northern plume, and the direction of groundwater flow. He then reported that the contaminant at the J-1 Southern plume is RDX, and the treatment system currently operating there, which involves one extraction well operating at 45 gallons per minute (gpm), has treated 138 million gallons to date. He also showed a graph entitled "System Influent Concentrations" and noted that in 2007 RDX concentrations were relatively high, about 10 parts per billion (ppb), but are now down to the less-than-1 ppb range. He then showed a "Contaminant Mass Removal" graph and noted that to date about two pounds of RDX has been removed from the groundwater.

Mr. Gregson stated that two RDX sampling rounds were conducted at the J-1 Southern plume in 2011. RDX was detected in nine of 30 well screens sampled. Six samples contained RDX at concentrations above 0.6 ppb, and one sample contained RDX above 20 ppb, at 76.1 ppb. Mr. Gregson reported that the EPA Health Advisory for RDX is 2 ppb, the EPA one-in-a-million cancer risk level is 0.6 ppb; and the Massachusetts Department of Environmental Protection (MassDEP) groundwater cleanup standard is 1 ppb. The maximum RDX concentration in 2011 was 76.1 ppb, the current maximum is 15.5 ppb, and the farthest downgradient RDX detection occurred in monitoring well 403 (MW-403) at 0.47 ppb.

Mr. Gregson showed a figure entitled "J-1 Range Southern Trend-Plots for RDX" and pointed out the various trends at key monitoring wells, including a relatively new well downgradient where a spike of contamination was seen. He noted that a new off-base extraction well is going to be installed to catch that lobe of higher concentrations. He also pointed out that monitoring wells farther downgradient have shown only very low levels of RDX. Mr. Gregson also displayed a couple of cross-section figures of the J-1 Southern plume and pointed out the existing extraction well at the base boundary and the site of the planned off-base extraction well.

Mr. Gregson reviewed the "Recommendations" slide by noting: the treatment system is operating as intended and therefore no changes in the pumping rates are proposed; the new treatment system startup is scheduled for December 2012; and sampling frequency will be increased from annual to semiannual at the following wells – MW-400M1/M2, MW-402M1, and MW-403M1. He also noted that construction of the off-base portion of the project is scheduled to begin September 24, 2012, and the next monitoring report will be produced in June 2013. Mr. Gregson then showed a figure depicting the layout of the new treatment system, pointing out that the new well will be located on Grand Oak Road, and noting that a directional drill rig will be used to install the pipe along the roadway, then cutting across private property to bring the water back to the existing treatment system. He also pointed out the location of the existing infiltration trench on the base boundary.

Mr. Goddard asked if the Impact Area Groundwater Restoration Program (IAGWSP) has obtained permission from the neighborhood. Mr. Gregson replied that the IAGWSP has been working with the town and has sent out community notices to the residents. Mr. Goddard asked if the system was going to be installed in the road or on private property. Mr. Gregson clarified that most of the infrastructure will be in the right-of-way along the road, but there is also an easement in place with the property owner to run the pipeline underneath private property and onto the base.

Mr. Saucier inquired about the existence of any private wells in the area that could be pulling in contaminated water. Mr. Gregson replied that the IAGWSP has surveyed the neighborhood and found no private drinking water wells or irrigation wells in the area.

Mr. Gregson then continued his presentation by discussing the J-1 Northern plume, for which there's currently no active treatment system. He also reminded the team, however, that there is a Decision Document (DD) in place for this plume, and the plan is to construct a treatment system next year that involves two extraction wells. He then reported that the J-1 Northern plume contains both perchlorate and RDX. Two sampling rounds were conducted in 2011, and 12 of the 47 well screens tested had perchlorate detections. The maximum perchlorate detection in 2011 was 43.9 ppb, this past year the current maximum detection was 41.6 ppb, but a new well installed near the center of the plume (MW-245) had a detection of 111 ppb. Mr. Gregson also reported that 16 of the 47 well screens had RDX detections. The maximum RDX detection in 2011 was 33.9 ppb, the maximum this past year was 33.7 ppb, but the maximum in newly-installed MW-245 was 63.6 ppb. He further noted that additional monitoring wells installed downgradient of Wood Road have shown no significant detections.

Mr. Gregson showed a map of perchlorate concentrations and a map of RDX concentrations at the J-1 Northern plume. He noted that the source area for the contaminants is located in the middle of the J-1 Range at the inter-berm area and that the plumes are migrating slightly west of north, into the Impact Area. He also showed a perchlorate trend-plot figure and noted that the wells near the source area are seeing decreasing concentrations, while some in the middle of the plume are seeing increases as the higher concentrations migrate through. He also mentioned that recent drilling is focused on defining the extent of contamination at the toe of the plume in order to identify the proper location for an extraction well. He then displayed a line graph entitled "Perchlorate Trends – 2011."

Mr. Gregson showed an RDX trend-plot figure and noted that RDX concentrations are decreasing in upgradient monitoring wells, with some increasing concentrations in downgradient wells. He also noted that it appears that the RDX contamination hasn't migrated as far as the perchlorate, and he displayed a line graph entitled "RDX Trends – 2011."

Mr. Gregson then reviewed the J-1 Northern plume "Recommendations" slide: based on historical results, perchlorate sampling at MW-166M3 should be discontinued; sampling frequency at MW-220M1, MW-253M1, MW-326M1, and MW-369M1 should be decreased from semiannual to annual; MW-220M1 and MW-253M1 are west of the plume perimeter and perchlorate and RDX detections there are nondetect or sub-ppb; and MW-369M2 should be removed from the chemical monitoring network. Additional recommendations included: new wells MW-563M1, MW-566M1, and MW-567M1 should be sampled semiannually for perchlorate and explosives; MW-205M1 should be removed from the chemical monitoring network; and new wells to be installed along Wood Road (MW-401M2, MW-548M1/M2, and MW-590M1/M2) will be part of future sampling of the plume.

Mr. Gregson reported that next steps for J-1 Northern are to determine the extraction well location, construct the treatment system in 2013, and submit the next monitoring report in June 2013.

Mr. Dinardo inquired about the depth of sampling screens relative to the plume's location. Mr. Gregson replied that a plume generally gets deeper as it moves downgradient; however, the IAGWSP takes that into account when placing well screens to ensure detection as the plume migrates.

Mr. Dinardo asked if it's correct that two pounds of contaminant has been extracted from the J-1 Southern plume since the system began operating in 2007. Mr. Gregson confirmed that that's correct. Mr. Dinardo noted, "That goes to show you what two pounds can do." Mr. Gregson agreed, and noted that it doesn't take much mass to contaminate the groundwater to a 0.6 ppb level.

Agenda Item #4. Introduction to Geophysical Techniques – Central Impact Area

Mr. Gregson reminded the team that the Central Impact Area DD issued last year included a groundwater pump-and-treat remedy as well as a requirement for the development and implementation of a long-term source area response plan for unexploded ordnance (UXO). The plan involves two phases: Phase 1, which is UXO clearance at 30 acres over a three-year period, and Phase 2, which is

UXO clearance at an additional 20 acres over a two-year period. The proposal is to minimize habitat destruction while maximizing the reduction of UXO, with the goal to remove 75% to 95% of the UXO.

Mr. Gregson reported that the Central Impact Area, a restricted area with limited access, is a 330-acre area in the middle of the Impact Area, the primary location for targets and firing activities. From the 1930s to 1997 it was the main target area for artillery and mortar fire. High explosive (HE) artillery fire ended in 1988, at which point the Guard switched over to using Low-Intensity Training Rounds (LITR) with a charge that contained perchlorate. All live firing of mortars ceased in 1997. Mr. Gregson also described the environmental setting at the Central Impact Area as pitch pine and scrub oak barrens, which is a threatened habitat. He noted that geologically the area is located on the Mashpee Pitted Plain, which means that it's relatively flat, although a significant amount of cratering has occurred there due to years of artillery firing. Mr. Gregson stated that groundwater flow in the area is generally from southeast to northwest, and UXO are considered a long-term source to groundwater.

Mr. Gregson explained that the future source of groundwater contamination from UXO would be exposed filler from corroded casings leaching to groundwater. He also noted that based on work conducted by the IAGWSP in the past, test plots showed that there are 12 to 35 UXO per acre, with an overall average of 27 per acre. A UXO density model, based on air-mag signals, aerial photos, and historic target locations, predicted about 23 UXO per acre. Based on these numbers, the IAGWSP came up with an overall estimate of potentially 4,000 to 9,000 UXO in the Central Impact Area.

Mr. Gregson reported that 30% of the UXO found at the Central Impact Area are 81mm mortars, 20% are 105mm artillery shells, and 18% are 155mm artillery shells. Others include 60mm mortars, 4.2-inch mortars, and 37mm projectiles. About 26% are on the surface, 59% within one foot, 76% within two feet, 90% within three feet, and 97% within four feet. In general, most UXO are clustered around targets, and generally there's a higher density along Tank Alley and Turpentine Road. Mr. Gregson displayed a figure illustrating UXO density in the Central Impact Area, noting that the blue area indicate high UXO density, based on the model. He then pointed out Tank Alley and Turpentine Road, where most of the firing occurred.

Mr. Gregson stated that one way to remove UXO is to scrape up a foot of soil with a remote-controlled bulldozer, which was done at some small high-concentration source areas. That method, however, does not accomplish the goal of protecting habitat. Therefore, the IAGWSP is looking at remote sensing/geophysics to try and safely remove UXO while leaving metal scraps behind, particularly electro-magnetic (EM) induction devices that send a current into the ground and measure what comes back. Innovative technologies being considered are Metal Mapper and TEMTADS, which are essentially more advanced versions of an EM system. Mr. Gregson noted that the question at hand is whether these EM tools can be adjusted in some way in order to distinguish between UXO and scrap metal. He further noted that fragmentation within the top foot of soil in the Central Impact Area has presented challenges in collecting useful geophysical data using a standard EM61 device. This issue was a significant cost driver at the test plots, which required surface soil removal before useful EM61 data could be collected. The IAGWSP's goal now is to determine whether geophysical data can be collected or processed in a way that reduces the effect of fragmentation.

Mr. Gregson reported that the IAGWSP tried two electro-magnetic tools, the EM63 and the modified EM61-MK2. He noted that the EM63 measures the secondary magnetic field decay over a longer period of time than the EM61-MK2, and a longer measurement time provides better information to distinguish fragmentation from larger munitions. He also noted, however, that neither method can distinguish inert projectiles from UXO. He then showed photos of the EM63 and EM61-MK, noting that the EM63 weighs about 100 pounds and measures the response that comes back from the item 26 times, while the EM61 weighs about 40 pounds and measures the response only four times.

Mr. Gregson stated that in 2009 the IAGWSP conducted EM63 surveys at two quarter-acre grids at the Central Impact Area. The UXO technicians carried the device on a litter, or stretcher (to keep it as level as possible across cratering), in areas cleared of vegetation by robotic equipment. Mr. Gregson displayed a figure depicting the two grid locations and pointed out Turpentine Road, Tank Alley, and the High-Use Target Area (HUTA) investigation area where four large test pits were dug to a depth of about six feet in order to understand the depth of UXO penetration.

Mr. Gregson then showed a slide entitled “EM63 Data Processing” and pointed out the difference between the signal from a 155mm practice round and that from a small bundle of wire, or scrap metal. He explained that the signal from the 155mm round maintains its strength as time goes on and doesn’t decay as quickly as the signal from the bundle of wire, as the wire has less mass.

Mr. LoGiudice asked if the devices can be used in any weather conditions. Mr. Gregson replied that while it’s not much fun to be working out in the Central Impact Area in the middle of winter, frozen ground does not affect the devices’ performance.

Mr. Gregson continued by reviewing the “EM63 Processing Results” slide: measurement of the transient response provides more information; the EM63 has a longer data collection period and nearly linear decay for both the 155mm and 105mm items; and non-munition items like the wire bundle did not have a continuous linear shape for the EM63 decay response. The recommendation from the EM63 analysis was to modify the EM61-MK2 time gates to collect data over a longer period of time and emulate the results of the EM63. Mr. Gregson explained that a modified EM61-MK2 is much easier to use in the field and requires less data processing while providing similar information.

Mr. Gregson reported that the IAGWSP then conducted a modified EM61-MK2 survey at the test grids. He said that survey lines were established at 2.5 feet along parallel tracks, positional data were collected using a GPS for centimeter accuracy, and the instrument was carried in litter mode. He also reviewed the “Data Processing” slide: geophysical anomalies (targets) were picked with the help of a software program; signal response over time was evaluated by using ratios (T15/T1 Ratio); and a ranked dig list was generated for intrusive investigation.

Mr. Gregson stated that 153 targets were excavated and ordnance data were recorded on dig sheets for evaluation. He also noted that 10% of the targets that were not prioritized were dug for quality assurance/quality control (QA/QC). Mr. Gregson then showed a graph entitled “ROC (Receiver Operating Characteristic) Graph of EM61-MK2 Excavation at CIA Grid 002(48_55)” and said that the MMRCT will see many more of this type of graph at future meetings. He explained that the graph basically shows the number of UXO items excavated and the type being sought at a particular grid. He added that a steeper curve in the beginning means bigger UXO are being found, making it possible to prioritize digs in order to find UXO first, while towards the end only scrap metal is being found.

Mr. Gregson then reviewed results from the test grid. Regarding the top 33%, or first 51 targets: 16 were munitions-like items and five of these contained HE; 36 were identifiable inert munitions or munitions parts; four were target debris (tank parts); 37 included some fragmentation; and three were control seeds. Regarding the remaining 67%, or 102 targets: five were munitions-like item and two of these contained HE; 50 were identifiable inert or munitions parts; 87 included some fragmentation. Mr. Gregson stated that at that particular grid 76% of munitions-like targets were identified in the top 33% of the ranked list. Based on these results, the recommendation was made to try the approach over a larger area.

Mr. Gregson reported that eight acres were then surveyed and 5,631 targets (about 678 targets per acre) were identified. Using a ratio of the signal as a cutoff, 1,399, or about 25%, were recommended for intrusive investigation. Also, three additional ¼-acre grids were excavated to 100% for QA/QC purposes. Mr. Gregson stated that the intrusive investigation was conducted in three phases: the first phase involved investigating 500 targets, the second phase involved investigating 899 targets, and the

third phase involved the three ¼-acre test grids. A report, generated and submitted to the agencies in July, is currently under review, after which next steps will be assessed and it will be determined whether the modified EM61 is a viable tool for identifying UXO.

Mr. Dinardo asked if the IAGSP had ever considered other means of ground analysis, such as ground-penetrating radar or sonic testing. Mr. Gregson replied that other methods were evaluated but found to be ineffective, and he mentioned that ground-penetrating radar has the potential to set off fuses on buried UXO. He also referred to the Five-Year Review period associated with the project and said that the IAGWSP will be monitoring for new technologies and approaches over time.

Mr. LoGiudice commended the IAGSWP for the work that's been done. He also suggested that it would be good to issue a news release to let the public know about these activities occurring on the base.

Ms. Jennings asked Mr. Gregson how many targets would have been investigated intrusively had "R" equaled 0.013 rather than 0.028. Mr. Gregson observed that Ms. Jennings is saying that the cutoff that was used didn't reach the Central Impact Area DD goal of 75% to 95% UXO removal. So the IAGWSP has to adjust the ratio or use a different cutoff. Ms. Jennings said that she is curious how close to 5,000 targets it would come if the ratio were changed. She added that one of EPA's comments on the report is a request for the IAGWSP to do additional calculation based on different R values.

Mr. Dinardo asked if there's ever been any thought to excavate massive areas to four feet and include a restoration process as part of the remedy, rather than taking years to removal multiple targets and still only get 75% of them. Ms. Jennings replied that this approach had been considered. In fact, there are two areas, which were chosen based on nearby residual groundwater contamination, where robotic equipment was used to excavate and sift the soil. This created other problems, however, because what remains after the soil was sifted out is a mixture of rocks and munitions, and the effort to pick through the pile to find the UXO is still ongoing. Therefore, this method did not prove cost-effective. In addition, the excavations did wreak havoc on the overall environment, so it would take a fairly significant restoration effort to bring those areas back.

Ms. Jennings further noted, for example, that of the 5,000 items in the eight-acre area, only a fraction of them are actually munitions, and of those that are actually munitions, only a fraction contain HE, and of those, only a fraction contain a lot of HE. Consequently, the goal really is to cherry-pick for items that could cause contamination issues. She said that considering the different angles – cost, impacts to the habitat, impact to the groundwater – cherry-picking probably is the best way to do it, over a long period of time. She further noted that it would be great to have a technology – "and they're getting pretty close" – that could distinguish between munitions containing explosives and practice rounds that don't contain enough explosive to be a problem.

Mr. Dinardo then asked if any thought has been given to ground-sniffing for explosives. Ms. Jennings replied that in the past explosive-sniffing dogs were brought to the J Ranges on the base and, unfortunately, they were so hypersensitive that they reacted to even the smallest amount of explosives. She also said that it's refreshing to have people come to the table with ideas because it is a tough problem to solve.

Mr. Goddard requested that at the next MMRCT meeting the regulatory agencies provide criteria for the highest risk UXO at the Central Impact Area. Ms. Jennings replied that this matter is already being discussed. She also noted that the 155mm rounds contain the most explosive – about 15 pounds – but there are also inert 155mm rounds that just contain cement, and there's really no way to distinguish one from the other. Nevertheless, just going after 155mm rounds would be one way of narrowing it down. Ms. Jennings stated that the current thought, which is still being evaluated, is to look for anything 60mm or greater in size. She explained that while there may be a lot of smaller munitions at the Central Impact Area, there just doesn't seem to be enough explosives in them to present a problem.

Mr. Goddard then asked if the IAGWSP had looked into the possibility of creating electronic profiles of the various types of munitions and using artificial sniffers to detect them. Mr. Gregson replied that it has not, but will keep looking into possibilities of that type.

Mr. Gregson then informed the MMRCT that the method the IAGWSP uses when employing geophysical techniques like the EM61 involves using robotic equipment to cut the vegetation flush prior to conducting the surveys and digging small holes to find the munitions. He said that it's been found that this really doesn't harm the vegetation; rather it helps because pine trees are also cut down, and that allows the scrub oak to "really come back," which is a benefit to this particular method.

ESTCP Classification Information

Mr. Gregson stated that the Department of Defense (DoD) environmental technology programs are the SERDP (Strategic Environmental Research and Development Program), which develops technologies, and the ESTCP (Environmental Security Technology Certification Program), which is responsible for demonstration/validation.

Mr. Gregson then displayed a graph illustrating an example from Camp Butner, North Carolina, where of more than 500,000 digs, only 146 of the items, or 0.03%, turned out to be UXO. About 80% of the cost of the effort ended up being spent on scrap metal removal, with much smaller percentages pertaining to site assessment, surveying and mapping, vegetation removal, and UXO removal. He explained that from an email standpoint, the question that needs to be answered is "Is it spam or not-spam?" while from the IAGWSP's standpoint the question is "Are we looking at UXO or not-UXO?" He said that a regular metal detector gives off roughly the same signal for a mortar or a piece of scrap metal, so it's important to come up with an approach that provides more information about the shape of an item. Mr. Gregson also showed a timeline entitled "Research and Development in this Area" and noted that the effort to distinguish buried UXO has been ongoing for more than 20 years.

Mr. Gregson then stated that some of the more advanced sensors that ESTCP has been looking at involve digital electronics and multi-access/multi-coil data to more completely define targets. He explained that the EM61 and EM63 had two rectangles in a horizontal plane, while advanced sensors, like the Metal Mapper or TEMTADS, both of which have been used on the base, have sensors in three orientations and so obtain their data from three dimensions. He then noted that symmetry is a factor when trying to identify munitions, displayed a slide, and pointed out that the munition shown has a long axis in one direction, and two short axes of the same symmetry, and so the curves that represent its signal responses on a line graph appear a particular way. The other item, which appears to be a tractor muffler, is not symmetrical, and therefore its signal responses produce different curves on a line graph. Mr. Gregson displayed another slide that demonstrated the difference in curves associated with a 105mm round and those associated with a piece of junk.

Mr. Gregson said that as of today, some of these more advanced sensors are commercially available, as are analysis tools, and contractors/geophysicists are becoming trained in their use. And the regulators and contract managers such as the IAGWSP are looking at the results to see if they can be used in the future at a base such as MMR.

Mr. Gregson reported that this past June ESTCP staff came to MMR and conducted surveys using the Metal Mapper and TEMTADS devices at about four acres total of land in the Central Impact Area, with some of the areas seeded with known items for QA/QC purposes. An initial geophysical survey was conducted to identify anomalies, and the Metal Mapper or TEMTADS device was placed over the anomalies to try to determine whether it was a munitions-like object or scrap metal. Mr. Gregson noted that the analysts look at the data to extract the parameters, use the parameters to classify the anomalies, construct a ranked anomaly list, and determine some kind of threshold used to determine whether an

item is a UXO-like object or scrap metal. The parallel component is to dig these anomalies in order to check their work.

Mr. Gregson then showed a chart entitled “Ranked Anomaly List – First Pass” and noted that, based on their signal, the analysts have high confidence that some of the items are munitions, uncertainty about some of the items, and high confidence that some of the items are not munitions. He also showed a chart entitled “Ranked Anomaly List – Final” and noted that as the data are analyzed farther, a threshold is developed, which the IAGWSP can determine is or is not appropriate for the work it’s doing. He also showed a best-case scenario ROC curve and said that in a perfect world one would dig all the UXO right off the bat. In a worst-case scenario, it would be purely random, with the instruments not indicating whether an item is UXO or scrap. Mr. Gregson then showed a graph representing a real-world Metal Mapper case from Camp Beale, California, noting that 120 of the first 200 or so digs were munitions, “a pretty good ratio.”

Mr. Gregson stated that the ESTCP is reviewing the data, about 1,500 of 2,500 identified anomalies have been dug, and pending the results on those, a decision will be made as to what to do with the next remaining 1,000. He also noted that at future MMRCT meetings the IAGWSP will be discussing results from the ESTCP and modified EM61 work.

Mr. Dinardo asked if the IAGWSP would be represented at the upcoming MMR open house. Ms. Boghdan replied that it would.

Mr. Taylor referred to the habitat issue and indicated that he thinks it’s a misconception the way the soil is “sort of sanctified,” when it’s been shot at. Mr. Gregson replied that interestingly enough, the scrub oak habitat on the base has been maintained by the artillery firing, in that it has caused fires to occur, which maintain the scrub oak vegetation. Now, decades after those fires occurred, the habitat that was established has been identified as rare and unique, and it supports species that are threatened. And the decision has been made to try to preserve that habitat going forward.

Mr. LoGiudice added that without the cleanup, the land would be useless, “nobody could go out there.” Mr. Taylor remarked that he thinks the approach has been tedious with very little being accomplished. Mr. LoGiudice countered that he doesn’t think the effort is for naught.

Ms. Jennings asked if Mr. Taylor is suggesting that it would be better to excavate everything – and then truck it away. Mr. Taylor replied that it would have to be sifted. He also remarked that after 20 years of “fussing around” the land still won’t be usable. Ms. Jennings reminded him of the problem of being left with a lot of rocks with some munitions after sifting. She noted that it’s dangerous for UXO personnel to work that way, and easier and safer for them to work as proposed.

Major Cody confirmed that the aftermath of the areas that were “demined” down to four feet is having to deal with the result of the sifting, which is time-consuming, costly, and exceedingly dangerous, as the UXO literally start to camouflage with the rocks and can’t be seen. He also said that he hopes that the decision will be to use Metal Mapper, which is easier and safer than demining, with a collateral benefit for the habitat and the species.

Mr. Pinaud recommended that it would be helpful if the next MMRCT meeting included a presentation about why the habitat in the Central Impact Area is valuable and why it needs to be protected. Major Cody noted that Natural Resources staff will have a setup at the open house to talk about the habitat – specifically the New England cottontail, a candidate species to be listed, along with the 37 other listed species at the base. Ms. Boghdan added that the MMR open house is scheduled for September 22 and September 23, 2012.

Mr. Saucier asked why it would be a bad thing if ground-penetrating radar exploded UXO. Major Cody explained that it would be safety issue for the one holding the radar, as that person would have to be

right over the UXO. He also said that the Metal Mapper provides very good fidelity, should distinguish between different rounds, making it possible to go after mass, and is safer than ground-penetrating radar.

Mr. Saucier then inquired about the future use of the base. Major Cody replied that it will be military use at least through the 2050s, when the lease runs out. And whether or not the military obtains a lease extension, it will always be a wildlife habitat, and will never be residential. Mr. Goddard added that the existence of the Upper Cape Water Supply Reserve in the northern part of the base would prevent any development from ever happening there.

Mr. Dinardo said that he recalls from previous MMRCT meetings that the degradation rate of the UXO is unknown, as is its potential impact. In other words, it's possible that the UXO could be left where they are for the next 50 years and nothing would happen. He then said that he thinks that the work that's being done has to be done because that's the way to learn how to "narrow down on solutions," although it happens to be a lengthy and expensive process. He further noted that he's certain that the base land will never be returned to "general purpose" use, even if 75% to 95% of the UXO are removed, given the remaining risk. Mr. Dinardo also said that it ought to be considered at which point in the process a decision should be made to just put a fence around the Central Impact Area instead of "pigeonholing" it for the next 30 years. He further noted that with all the groundwater monitoring that's in place at the base it would become known in the future whether decaying UXO actually present a problem. And if that's the case, the existing treatment systems would probably be the most effective way to deal with it.

Ms. Jennings said that she thinks the approach Mr. Dinardo is suggesting is actually built into the process, in that it's a phased approach with a series of evaluation points, including Five-Year Reviews to assess the state and knowledge at that time. Rather than dig up the 300 acres right now, the idea is to "learn and do, learn and do." Ms. Jennings also stated that eventually the 155mm rounds are going to corrode, and the 15 pounds of explosive they contain are going to be a problem. She also mentioned that the Upper Cape's drinking water comes from the sole-source aquifer that underlies the base, and that the UXO problem exists throughout the country and throughout the world – therefore, it's an environmental issue that needs to be solved for a number of reasons.

Ms. Jennings also said that the way the Central Impact Area DD is structured, if five years from now it's determined that the UXO removal effort is just too expensive and inefficient, the groundwater treatment system that's in place will be a capture zone, and the next phase can be postponed until the technology evolves. She further stated that, as Major Cody pointed out, the Metal Mapper technology is really almost a three-dimensional look below ground. Although it cannot differentiate density, if it means digging 200 items to find the 51 that you want, rather than digging 5,000 items, it's a huge win. Ms. Jennings then agreed that with today's known technology, residential use will never be achieved at the base. The hope, however, is to preserve the environmental habitat and protect the groundwater, which is why the UXO removal work is being done the way it's being done.

Major Cody agreed that that monitoring network and groundwater treatment system at the Central Impact Area will be a failsafe if it's not possible to remove all the UXO, and it won't be possible to do that. He also noted, however, that he has a great deal of faith in the Metal Mapper system and its ability to identify the 155mm and 105mm rounds.

Mr. Goddard asked if MMR's Camp Edwards is the epicenter of the ESTCP's research. Major Cody replied that MMR is one of many bases where the new technologies are being tested. He also noted, however, that there are geographic issues at MMR that don't exist in the deserts of Nevada; therefore, MMR is a good representative sample for the Northeast and the type of terrain that exists here. Mr. Goddard suggested, "this is cutting-edge stuff," and Major Cody agreed. Mr. Goddard then asked if the

NATO allies, such as the Germans or British, are doing similar research. Major Cody said that he could check into that.

Agenda Item #5. Central Impact Area Groundwater Monitoring Update

Mr. Gregson showed a map of the Central Impact Area plumes and pointed out the RDX contamination, the perchlorate contamination, the triangle shape that defines the Central Impact Area, and the direction of groundwater flow, from southeast to northwest. He also showed a figure depicting just the RDX plume and pointed out: the Central Impact Area boundary; Chemical Spill 19 (CS-19), which is being addressed by the Air Force's Installation Restoration Program (IRP); the part of the CS-19 plume that the IAGWSP has been monitoring; and the area where the plumes originated before migrating northwest. Mr. Gregson then showed a figure depicting the portion of the Central Impact Area where perchlorate detections exceed 2 ppb, noting that the area has shrunk significantly over the years due to natural attenuation and plume migration. He pointed out that the RDX plume is much larger.

Mr. Gregson reported that two sampling rounds were conducted in 2011. In May/June, 81 samples were collected and analyzed for RDX. Of those, 46 had RDX concentrations ranging from 0.2 ppb to 15.5 ppb, 33 had concentrations above the one-in-a-million cancer risk level of 0.6 ppb, and 15 were above 2 ppb. For the November/December sampling event, 46 samples were collected. Of those, 31 had RDX detections ranging from 0.21 ppb to 17.4 ppb, and 23 samples were above the 0.6 ppb standard. The maximum concentration during the reporting period was 17.4 ppb, and the current maximum is 14.4 ppb. Historically, the highest RDX concentration was about 45 ppb.

Mr. Gregson then showed a figure depicting RDX trend-plots and pointed out the declining RDX concentrations at wells near the source area, believed to be the result of soil removal efforts and natural attenuation. He also noted, however, that other monitoring wells have had increasing concentrations as the plume migrates through. Mr. Gregson then pointed out the locations for the planned extraction wells, and added that there's flexibility to drill additional extraction wells on Burgoyne Road should there be another part of the plume migrating north. He also displayed another figure and pointed out some farther upgradient wells in a small plumelet where concentrations have decreased or remain flat. An additional figure, depicting wells closer to the toe of the plume, showed only small blips of contaminant at the wells, with concentrations there now decreasing.

Mr. Gregson also spoke about the perchlorate contamination, believed to be the result of spotting charges in LITR rounds. He reported that the May/June sampling event, which involved 49 perchlorate samples, yielded 25 detections ranging from 0.21 ppb to 9.8 ppb. Three of the samples had concentrations above the 2 ppb state maximum contaminant level (MCL), and no samples were greater than 15 ppb. The November/December sampling involved 32 samples, and showed 27 detections ranging from 0.2 ppb to about 10 ppb, with three of the samples above 2 ppb. The maximum perchlorate concentration during the 2011 reporting period was 9.98 ppb; the current maximum is 10 ppb. Mr. Gregson then displayed a figure showing perchlorate trend-plots and pointed out the monitoring wells where increasing concentrations have been seen. He also noted that the extraction wells will be located downgradient of the perchlorate contamination so it will be captured if it doesn't dissipate first.

Mr. Gregson stated that based on historical trends in RDX and perchlorate sampling results, the IAGWSP has recommended a number of reductions in the sampling program from semiannual to annual. The IAGWSP also recommended focusing on source, mid-plume, and downgradient areas. Mr. Gregson then displayed figures indicating the proposed RDX and perchlorate sampling locations. He noted that the proposed sampling locations have been submitted to the regulatory agencies, and the IAGWSP is awaiting their feedback. He also reported that construction of the Central Impact Area

groundwater treatment system is scheduled to begin next year and be completed by next December. The next monitoring report will be issued in June 2013.

Mr. Goddard noted that it appears that some of the RDX contamination has already migrated beyond one of the proposed extraction wells. Mr. Gregson replied that the modeling shows that that contamination will dissipate to below the standard before reaching the base boundary. Mr. Goddard also asked where the extracted groundwater will be treated. Mr. Gregson said that the plan is to pipe the water to the Demolition Area 1 treatment plant, which has excess capacity, after which it will be discharged into a reinjection well. Mr. Goddard then asked for confirmation that all the contamination will be below MCL before it reaches Canal View Road. Mr. Gregson confirmed that that is the expectation.

Mr. Dinardo said that he is amazed by all the work that's being done. He also remarked, however, that he'd like to see a more palatable way to present this kind of information to the public. He said that many people ask him, as a member of the MMRCT, if things are better/cleaner at the base, and it's difficult to answer that question in a simple way. He also requested a future MMRCT presentation on the use of alternative/renewable energy on MMR. Mr. Dinardo also said that he'd like clarification on whether it's truly an accurate statement that there's a lack of drinking water available on the Upper Cape, as it's his understanding that the Sagamore Lens is one of the largest single-source aquifers in the Northeast.

Mr. Goddard stated that when he was a member of the former Public Information Team (PIT), a citizens' advisory team that was associated with the IRP, the PIT took on the issue of communicating information about the cleanup to the public. He noted that one of the solutions was to issue an annual report, which has since become a combined IRP/IAGWSP document that's distributed at various venues, such as town halls, and posted on the programs' websites. Mr. Goddard also mentioned that the IRP made announcements regarding its total number of sites, the number of sites that were administratively closed, that had treatment systems being built, and so forth. He suggested that the IAGWSP might be able to apply a similar metric. Mr. Goddard said that he thinks Mr. Dinardo is right that the public wants a simple answer, although it is a big and complicated issue. He also noted that members of the public tend to look at the base as a whole, without distinguishing among the Army, the Air Force, or the Coast Guard, which can be confusing for them.

Ms. Boghdan said that she could provide Mr. Dinardo with copies of the current program fact sheet, if he'd like to have some to distribute. She also noted that they are available at the local libraries.

Mr. Dinardo said that while he thinks everyone's doing a great job with the information that exists, he's asking the group to consider coming up with a more simplified way to express it. He also mentioned, for example, past discussions about describing amounts of contaminant by the number of Olympic-sized pools that would be affected by it. Mr. Dinardo further noted that in light of future potential Base Realignment & Closure (BRAC) actions, he thinks it's particularly important for the public to understand the improvements at the base. He explained that what he's talking about is "more of a simplified public campaign that's in the paper" to communicate the progress being made.

Mr. Saucier referred to Mr. Dinardo's request for an update on alternative energy and said that he wonders why the use of geothermal energy isn't being explored at the base. Mr. Goddard said that he thinks the Air Force is considering a 60-acre photovoltaic array at the landfill, which could also be part of a future IRP presentation.

Ms. Jennings referred to Mr. Dinardo's comments about the drinking water supply on the Upper Cape and noted that some fairly involved analyses were done early on. The question hasn't really been revisited, however, because there's general agreement that something needed to be done. She also acknowledged that questions about the aquifer – it's value, how badly it's needed, when it will be

needed, when it should be cleaned up – are definitely debated. She said that there are a lot of tricky questions around this issue, and she'd be happy to talk about it in the future.

Ms. Jennings also referred to Mr. Dinardo's remarks about communicating progress and noted that the Air Force's IRP is already in a cycle of conducting Five-Year Reviews, which include a list of all sites and the status of the sites. The IAGWSP has just submitted its first Five-Year Review and EPA is in the process of generating comments on it, one of which is to include a list of sites. She indicated that she thinks this exercise will be conducive to developing a fairly simple fact sheet that looks at the source areas and the groundwater, making it somewhat easy to summarize the progress towards achieving the goals at each of the plumes.

Ms. Jennings then said that tonight's meeting is not at all the meeting she expected. She explained that attendance at MMRCT meetings has really fluctuated and oftentimes very few questions come out of the presentations that are given – so the program managers have been questioning whether the team has been meeting at the right frequency, or if the number of meetings should be reduced to twice a year. She also said that perhaps tonight's great attendance has to do with not having met in a long while, and then asked team members what they think of the idea of meeting twice a year, at specific times, perhaps in April at the beginning of the construction season, and then in October, at the end of it. She further noted that the thought would be to have somewhat structured agendas at those meetings, focusing not only on the work that's coming up, but on specific groups of plumes. Ms. Jennings said that she is looking for ideas because the cost to hold these meetings is phenomenal, but if they are working as the best venue, then they should continue. She also said that she'd asked Ms. Boghdan to put together some statistic on attendance at the last few meetings. Ms. Boghdan provided these statistics to Ms. Jennings, while noting that there were four MMRCT meetings in 2011, and tonight's is the fourth in 2012. Ms. Jennings referred to the information from Ms. Boghdan and noted that the number of citizen team members who attended meetings in 2011 was 5, 5, 8, and 6, and in 2012 was 5, 3, 3, and 8 at tonight's meeting. She also mentioned that she was very concerned when attendance was low at the meeting when the Central Impact Area DD presentation was given, and asked again if team members think meeting four times a year makes sense.

Mr. Goddard agreed that attendance has tapered off, and he suggested that in part this might be because people feel confident that the major issues have been addressed and the regulators and the military are committing the resources to do what needs to be done. He said that there isn't the need for great concern like there was during very intense periods like the late 1990s. Mr. Goddard then said that he is not in favor of meeting for meeting's sake. He also asked the project managers to discuss future MMRCT meeting frequency and strategy to present to team members for discussion at the next meeting. He also mentioned that if there were to be a meeting in the spring and another in the fall, it might be a good idea to have one of them in one of the towns and invite the media so they can report on the progress being made. He further noted that there are still important things to discuss, such as the UXO removal issue, which is huge. Mr. Goddard then said if any hot issues were to arise in a neighborhood, he would want to reserve the right for the team to reconvene around that issue so members can stay informed and represent their communities.

Ms. Jennings said that the project managers would have more dialogue amongst ourselves and probably come back at the next MMRCT meeting with something more specific.

Mr. Dinardo said that he thinks the reason for having formed the committee in the first place is still valid. He also noted, however, that he is opposed to meeting just for the sake of meeting, but doesn't think it would be unreasonable to meet once a quarter. He further noted that he'd like to see more "audience participation," and added that he understands that historical information is repeated in presentations in order to take in a general wide audience. Mr. Dinardo also said that he thinks it's important to meet at least once a quarter, in order to maintain enthusiasm and a sense of involvement.

He then said that as the coordinator for Falmouth's Community Emergency Response Team, he understands the struggle to achieve better participation.

Mr. Goddard said that he believes a requirement for a Restoration Advisory Board is in the regulations; therefore, the regulators will probably say that there has to be some sort of team meetings. He also remarked that he would not advise "it to be going away any time soon" as issues arise all the time. Mr. Goddard also referred to the numerous resources and expertise at MMRCT meetings and noted that the citizen team members are sometimes outnumbered three to one.

Ms. Boghdan noted that it would be helpful if team members provided feedback on the topics and types of presentations they prefer. She reminded them that evaluation sheets are available and encouraged them to write down any ideas about future agenda items and thoughts on tonight's meeting.

Ms. Jennings stated that she thinks the real purpose of the team is for citizen members to attend meetings, provide feedback, ask questions, and communicate with their constituents – which is why she was concerned when the past few meetings, which she considered very important, had low attendance.

Agenda Item #6. Review Next Meeting Schedule and Adjourn

Mr. Goddard asked when the team is scheduled to meet next. Ms. Jennings replied that the next meeting date hasn't been determined. It will depend on topics, but she hopes there'll be another meeting before the end of the calendar year.

Mr. Dinardo said that there's no doubt in his mind that success does have the effect of diminished community involvement – as things get better, people don't feel that "red-button furor" that they felt in the past – although that isn't true for everyone. He also mentioned his concept of having a simple way to keep the constituents involved, even if they're no longer feeling that high level of concern.

Ms. Boghdan adjourned the meeting at 8:20 p.m.