

**Massachusetts Military Reservation Cleanup Team (MMRCT)**  
**Building 1805**  
**Camp Edwards, MA**  
**September 8, 2010**  
**6:00 – 7:45 p.m.**

**Meeting Minutes**

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**Action Item:**

- 1) The IAGWSP will provide the MMRCT with a Six-Month Look-Ahead.

**Handouts Distributed at Meeting:**

1. Responses to Action Items from the July 14, 2010 MMRCT Meeting
2. Presentation handout: Remediation & Investigation Update
3. Presentation handout: Wind Turbine II Project Update
4. Presentation handout: Ashumet Pond Phosphorus Inactivation – 2010
5. Presentation handout: Sierra Range Update
6. Presentation handout: Sierra Range LOS Phase II Projectile Disposition Analysis

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## 7. MMR Cleanup Team Meeting Evaluation Form

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### **Agenda Item #1. Introductions, Agenda Review, Action Items Review, Approval of July 14, 2010 MMRCT Meeting Minutes**

Mr. Karson convened the meeting at 6:03 p.m., reviewed the agenda, and asked for any comments on the Responses to Action Items from the July 14, 2010 Massachusetts Military Reservation Cleanup Team (MMRCT) meeting. No comments were offered. Mr. Karson then asked if there were any changes or additions to the July 14, 2010 MMRCT meeting minutes. No changes were offered and the minutes were approved as written.

### **Agenda Item #2. Remediation & Investigation Update**

Mr. Gregson showed a map of the Demolition Area 1 (Demo 1) plume, pointed out the source area to the east, and noted that the plume is migrating to the west. He reported that based on investigation at the toe of the plume, a series of four monitoring wells has been proposed in order to determine whether any perchlorate contamination has migrated to that area. Mr. Gregson explained that the proposed monitoring wells, which will be in place in fall 2010, will satisfy the requirement in the Demo 1 Decision Document (DD) to track the progress of the plume near the base boundary, and take action if it should reach that far.

Mr. Gregson reminded the group that the L Range DD is in the process of being completed. He also noted that as part of that wrap-up work, 2,700 cubic yards of soil containing explosives has been removed, screened, and treated via alkaline hydrolysis. The soil tested nondetect after treatment and is currently in a stockpile waiting to be used as backfill at the L Range. Mr. Gregson further noted that the one remaining unexcavated grid, located in the mid-range target area, is currently undergoing anomaly/munitions removal.

Mr. Gregson stated that the public meeting on the J-1 Range Remedy Selection Plan (RSP) was held in June. He also reported that soil removal work at the range has been completed, the soil is currently being treated via alkaline hydrolysis, and once clean the soil will be used as backfill in excavated areas on the range. Additional field work included collecting soil samples at two tank targets, as well as excavating some anomalies at grid K4, near the Southern J-1 Plume source area. Mr. Gregson then noted that the Northern J-1 Plume remedy is in the final design process, with three new monitoring wells being installed in order to determine the best location for an extraction well.

Mr. Gregson then showed a map of the J-1 Range and pointed out the Northern J-1 Plume, which contains both perchlorate and RDX, and the Northern J-1 Plume source area, located at the interberm area in the middle of the range. He also pointed out the general locations for the two extraction wells, and explained that information from the new monitoring wells is needed in order to complete the design for the second extraction well.

Mr. Gregson continued his presentation by discussing the J-2 Range, where approximately 1,100 cubic yards of explosives-contaminated soil was removed and is being treated, along with J-1 Range and K Range soil, via alkaline hydrolysis. He also showed a map and pointed out the J-2 Range extension, which is located within the Impact Area at the very end of the J-2 Range, and referred to another area where soil was excavated.

Mr. Gregson also spoke about the Former A Range, a gravity anti-tank range located in the northwest part of the base. He reported that 2,500 cubic yards of soil was removed from the target berms there, most of which tested clean and is available for reuse. Approximately 100 cubic yards of the soil was found to be contaminated, however, and will likely be treated via alkaline hydrolysis. Mr. Gregson also reported that an EM-61 geophysical survey of the excavated areas is being conducted, as well as a

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meandering path survey of the range floor. He then showed a map and pointed out the excavation areas, the firing point, the target area, and the yellow line representing the meandering path survey.

Mr. Gregson noted that approximately 123 cubic yards of RDX-contaminated soil was removed from Area E at the Former K Range, and post-excavation sampling results were clean. The excavated soil is being treated via alkaline hydrolysis and will be used to backfill excavations. He also mentioned that the cleanup plans for the Former K Range, Former A Range, and the Gun & Mortar positions will be packaged together in one DD, scheduled to be issued later this fall. He then showed a map of the Former K Range and pointed out the excavation area.

Mr. Gregson also discussed investigations at the Small Arms Ranges. He noted that the first part of the tungsten investigation at Bravo Range is complete. Soil samples were collected and several monitoring wells were installed, and it seems that the excavation of tungsten-contaminated soils conducted by the Massachusetts National Guard has greatly reduced the tungsten concentration at the range, with the depth of migration appearing to be less than eight feet below the berm. Mr. Gregson also noted that the tungsten detection in monitoring well 72S (MW-72S) was not seen in an adjacent duplicate well. He added that more soil sampling is planned to confirm the presence and depth of tungsten beneath the berm, and groundwater wells will be redeveloped to remove sediments so they can be resampled in the fall.

Mr. Gregson then reported that approximately 4,000 cubic yards of soil was excavated from Former B, Former D, and M-2 Ranges and sifted to remove bullets. The excavation reduced lead concentrations remaining in the soil on the ranges, and a limited amount of additional excavation is going to be completed this fall. The sifted soil will be reused at berms on active Small Arms Ranges and the recovered lead bullets will be recycled. Mr. Gregson also noted that a draft investigation report on Former B, Former D, and M-2 Ranges is expected to be submitted to the regulators in a few weeks, and an RSP will likely be issued later this fall. He then showed maps of the ranges and pointed out the completed and planned excavation areas.

Mr. Gregson also stated that at the Central Impact Area, 4,500 cubic yards of soil was removed to a depth of two feet at the northern two-acre site, and 2,700 cubic yards of soil was removed to a depth of one foot at the southern site. Some of the excavated soil has been characterized, and although no RDX was found, some TNT was detected. Additional sampling of the stockpiled soil will be conducted, and if significant contamination is found, the soil will be treated via alkaline hydrolysis. Mr. Gregson noted that an additional one-foot lift is planned for the southern site this fall, based on geophysical investigation. He also mentioned that the soil excavation/screening is being conducted remotely, by the Air Force Research Lab. He then showed a map and pointed out the excavation areas in the northern and southern sites at the Central Impact Area.

Mr. Gregson began discussing the Gun & Mortar positions by noting that an intrusive investigation of subsurface anomalies is being conducted at Gun Position 9 (GP-9), and the findings will be used to help estimate the likelihood of munitions and range debris at gun positions. He also noted that soil removal actions are planned at GP-7, GP-10, and GP-11. He then showed a map of GP-9 and mentioned that the area is also known as Chemical Spill 18 (CS-18), under the Installation Restoration Program (IRP).

Mr. Gregson concluded his presentation by displaying a slide showing the status of DD, which noted the following: the BA-4 and Demolition Area 1 DDs were completed in September 2009; the Demolition Area 2/Northwest Corner/Western Boundary DD was completed in June 2010; the L Range DD is in process, with the draft undergoing final reviews/approvals, and the document expected to be signed in September/October; the J-1 Range DD is in process, with the draft having been sent to the regulators for review, and the document expected to be finalized in October/November; the Former K Range/Former A Range, and Gun & Mortar Positions DD is upcoming, with feasibility studies in the

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process of being finalized; the Small Arms Range DD is upcoming, with the feasibility study to be submitted this fall; and the Central Impact Area/J-2 Range DD and Training Areas/J-3 Range DDs are also upcoming, with feasibility studies to be submitted this fall and winter respectively.

Mr. Dinardo asked if it's correct that all of the proposed monitoring wells that Mr. Gregson mentioned during his presentation are within the base boundary. Mr. Gregson confirmed that they are. Mr. Dinardo then noted that not all of the actions that were discussed included a timeframe, and asked if that is because timeframes aren't yet defined, or if perhaps there's a spot where that information can be found. Mr. Gregson replied that many of the actions are tied to final decisions on the sites, which will each have separate Completion of Work reports that document the actions. Mr. Gonsler added that the goal is to complete all of the work this fall, within the next two months – including excavating soil, transporting soil, investigating anomalies, and so forth – before the winter weather sets in. Mr. Dinardo remarked that that's an impressive amount of work to be done. Ms. Donovan said that there had been some discussion earlier today about having the Impact Area Groundwater Study Program (IAGWSP) produce a Six-Month Look-Ahead schedule. She said that she thinks that this is really good idea, and would answer Mr. Dinardo's questions.

Mr. Goddard asked if the soils that have undergone alkaline hydrolysis treatment are centrally stockpiled, to be used as backfill later. Mr. Gregson stated that the alkaline hydrolysis treatment cell is located at L Range, and the L Range soil that's been treated is stockpiled right next to the cell. He also said that the treatment cell currently contains soil from J-1 Range, J-2 Range, and Former K Range, and once treated that soil will either be used as backfill at L Range, or wherever it's needed, such as at J-2 Range or the Former K Range. Mr. Goddard asked if it's correct that excavated soils are stockpiled at the source areas until they're moved to the central alkaline hydrolysis treatment location at L Range. Mr. Gregson confirmed that this is the case, and noted that a small amount of soil is currently stockpiled at J-2 Range, and some at the Central Impact Area. He also noted that approximately 3,000 cubic yards of soils is currently in the treatment cell. Mr. Goddard then asked if the treatment cell has precautions for containment. Mr. Gregson replied that it does, and mentioned a liner and a cover. Mr. Goddard inquired whether the remote stockpiles are expected to be moved to the treatment cell location soon, and Mr. Gregson confirmed that they are. Mr. Gonsler added that the first batch of soil has been treated, and the second batch, which is currently in the treatment cell, includes just about everything except for a small amount of soil left to be transported from J-2 Range. Mr. Goddard asked if it's correct then that there are not huge quantities of stockpiled soil outside the treatment cell area. Mr. Gonsler confirmed that that is correct.

Ms. Jennings asked Mr. Gonsler to clarify again which areas have been treated and where there are stockpiles. Mr. Gonsler replied that there are 100 cubic yards of soil at Former A Range that will probably go to the alkaline hydrolysis treatment cell to be ultra-conservative, even though it tested clean. He also noted that there's soil at the Central Impact Area that's been excavated but hasn't been tested yet to determine whether treatment is required. He further noted that the soil that's currently in the treatment cell has been there for a good period of time, with additional time having been added after testing showed that the reductions in concentrations, although significant, were not quite enough. Mr. Gregson added that the soil in the treatment cell was sampled again today, and Mr. Gonsler said that it may be then that the second treatment batch is done.

### **Agenda Item #3. Wind Turbine II Update**

Ms. Forbes stated that the Air Force Center for Engineering and the Environment's (AFCEE's) first wind turbine is located in the southwest corner of the base, but the new wind energy project will be located in the northern part of the base, just north of PAVE PAWS. She then reviewed the goals of the new project: to be compatible with the existing purposes of the northern 15,000 acres of the base, or the Upper Cape Water Supply Reserve (groundwater supply, wildlife habitat, and military and training missions at MMR); to be a good neighbor to both on-base and off-base entities; to be fiscally

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responsible and economically beneficial to the taxpayers; and to help meet the clean energy goals set by federal and state governments. Ms. Forbes noted that federal clean energy goals are outlined in Executive Orders 13514 and 13423, and that Governor Patrick set a goal of 2,000 megawatts of renewable energy by wind by the year 2020.

Ms. Forbes then displayed a map of the PAVE PAWS area and pointed out the access road and four wind turbine locations, which, she noted, were selected for Federal Aviation Administration (FAA) purposes only, and all of which ultimately received FAA approval. She further noted, however, that the Draft Environmental Assessment (EA) mentions three wind turbine locations, and this has to do with the amount of electric load that AFCEE's pump-and-treat systems use. She then explained that when the project first began, electric loads from both cleanup programs (AFCEE's and the IAGWSP) were being considered, as there had been some discussion that the IAGWSP would be receiving Defense Environmental Restoration Account (DERA) funding – in which case AFCEE could have combined its DERA funds with the IAGWSP's DERA funds and justified up to three wind turbines, taking into account the electrical usage of both programs. As it turns out, there was a change of plan and the IAGWSP is not going to DERA funding; therefore, AFCEE is now looking at two wind turbine locations, based on its energy consumption.

Mr. Goddard observed that AFCEE selected the two southern sites. Ms. Forbes confirmed that it did, and explained that these sites are farthest away from residences, they provide a good wind resource, and they're closest to the electrical interconnection point. She also stated that a Basis of Design was completed, that the public comment period on the Draft EA ran from August 6 through September 7, 2010, and that seven sets of comments were submitted.

Ms. Forbes reviewed the reasons why the new wind turbine location was chosen: the Reserve is mentioned in the Community Working Group's Master Plan as a possible location for wind energy; the location is compatible with the goal of protection of the groundwater supply; it's compatible with the goal of protection of wildlife habitat; it's in a no-fly zone so aviation training concerns are minimal; it's located behind the PAVE PAWS radar (out of the beam); it provides an adequate wind resource; it's close to existing power lines for interconnection; it's in an area with other man-made visual features like power lines, substations, PAVE PAWS, and so forth; and it's more than 3,000 feet away from the nearest residences. Ms. Forbes also explained that AFCEE is looking at the northern part of the base because its existing wind turbine, which is located in the southern part of the base, would not receive FAA approval today, since the U.S. Coast Guard took over control of the airfield when the 102<sup>nd</sup> Fighter Wing realigned to become the 102<sup>nd</sup> Intelligence Wing and changed some of the flight patterns.

Ms. Forbes showed a photo of the PAVE PAWS access road and another of existing infrastructure (a transmission line) in the area. She also showed another figure, and stated again that two of the locations will be used, each of which will involve a clearing of just under two acres. She explained that locations with the flattest possible access routes were selected in order to minimize the amount of cut-and-fill that has to occur. She noted that the access roads will be about 35 wide, and the edges will be flush-cut, leaving the root structure in place in order to allow re-growth. She also noted, however, that it will be necessary to maintain a 16-foot wide gravel roadway for future access purposes. And she mentioned that utilities will follow the access roads and the road to PAVE PAWS (Flat Rock Hill Road).

Ms. Forbes then showed a slide entitled "Notifications and/or Approvals," which listed 18 entities that have been notified about the wind turbine project and/or whose approval has been granted. She also reported that aspects of the EA include: the purpose and need for the wind turbines; development of alternatives; comparison and evaluation of alternatives; selection of the preferred alternative; and public and agency review (August 6 through September 7, 2010). She further noted that the potential decisions that can come from an EA are: a Finding of No Significant Impact (FONSI), an Environmental Impact Statement (EIS), or a decision not to proceed. She also showed a slide listing the

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resource categories evaluated in the EA: land-use classifications; aviation/radar; geology and soils; groundwater; air quality; vegetation; fish, wildlife, and rare, threatened, and endangered species; cultural resources; noise; hazardous materials, hazardous waste, and solid waste; utility and infrastructure; socioeconomics and environmental justice; and visual resources. Ms. Forbes stated that no significant impacts were identified in any of the categories that were evaluated.

Mr. Goddard inquired about the size of AFCEE's existing turbine and the ones planned for the new project. Ms. Forbes replied that the existing turbine is 1.5 megawatts, and the new ones will be the same size. Mr. Goddard then asked why larger turbines aren't being pursued, like those proposed for the town of Bourne. Ms. Forbes replied that in part the reason has to do with funding, but it's primarily because of load and net-metering. She explained that turbines greater than 2 megawatts are not eligible for net-metering, and she said that AFCEE wants to balance its load and needs to "be careful that we offset it with the budget we have." Mr. Goddard remarked "so you're going to carry more than you need." Ms. Forbes replied that that wouldn't occur for the first six or eight years, and added that AFCEE will get a return on investment on all of its turbines before they start producing excess energy. Mr. Goddard said that net-metering has to factor in then, and Ms. Forbes agreed. Mr. Goddard then said that AFCEE doesn't have to net-meter if it's using all the energy behind the meter, and Ms. Forbes agreed again. She also noted, however, that AFCEE doesn't have one big aggregated meter. Rather, the energy that's generated goes out to the grid and NStar credits AFCEE's account for it. Mr. Goddard stated that the main reason for not pursuing larger turbines then is net-metering, and the additional cost. He then inquired about the height of the wind turbines being proposed in Bourne. Ms. Forbes replied that AFCEE's turbines will be about 390 to 395 feet tall, while the ones in Bourne would be nearly 500 feet tall.

Ms. Donovan inquired about the types of comments about the EA that were made at public meetings. Ms. Forbes noted that during the EA public comment period the project was presented at the Environmental Management Commission's (EMC's) Community Advisory Council (CAC)/Science Advisory Council (SAC) meeting. She also said that the comments received early on, and even recently, pertain to concerns about what happens to the turbines after their 25-year life is over, whether AFCEE will remove them, and so forth. In addition, some concern has been expressed about secondary containment of any hazardous materials, and about minimizing habitat impacts (turtle protection plans, invasive species plans, re-vegetation plans). Ms. Forbes then noted that AFCEE is working through the Massachusetts Historical Commission, Natural Heritage & Endangered Species, and the US Fisheries & Wildlife on bird/bat surveys that will be conducted both pre- and post-construction, as well as surveys associated with turtle protection. Ms. Donovan remarked that the concerns were basically minor. Ms. Forbes agreed that they were minor concerns, which can be addressed.

Mr. Dinardo inquired about AFCEE's contractual agreement with the power company, and noted that kilowatt charges change all the time. Ms. Forbes replied that AFCEE has an interconnection agreement with the utility, and given the Green Communities Act, and because AFCEE is a government entity, the utility will buy the power and credit AFCEE at nearly the rate it's currently paying, which is 17 cents per kilowatt hour. She also noted, however, that there are a couple line items for which AFCEE won't receive credit – a renewable energy line item that goes into the state fund and is used for awarding grants, and an energy conservation line item, which Cape Light Compact uses to do energy audits. Ms. Forbes further noted that it's important to remember that reimbursement is based on the account rate structure, "so by putting it behind a 10 kilowatt meter, that's your highest rate structure, so you get reimbursed the highest rate; whereas if you're behind a large load that might get reimbursed for a lower rate, you actually get less money back." Mr. Dinardo asked if the contract continues into perpetuity, based on what the net is charging at the time. Ms. Forbes confirmed that it does.

Mr. Dinardo also inquired about the performance of the existing wind turbine. Ms. Forbes replied that it is not performing as well as AFCEE had hoped; however, the current issue is close to being resolved and she heard today that Garrad Hassan, a well-known consultancy firm in wind energy, says that

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maximum power production cannot be expected from a new wind turbine during its first year of operation because startup issues are going to occur. She said that AFCEE has been dealing with startup issues and is hopeful that the turbine's performance will improve. Mr. Dinardo said that he is really wondering whether AFCEE doesn't need three new turbines, and mentioned load versus payback on actual power generated. Ms. Forbes acknowledged Mr. Dinardo's comment, but explained that AFCEE can only go with its current estimates, and ultimately it will be producing more power than it uses – not only because of its optimization program, but also because the main goal is to eventually shut down the treatment plants, and do so “smartly and cleanly.” Mr. Dinardo also asked if the 50 kilowatt turbine at the National Cemetery is part of AFCEE's calculation. Ms. Forbes replied that that turbine is behind its own meter, and the National Cemetery will just offset whatever it produces.

Mr. Reif informed the group that an article written by Ms. Forbes was recently published in a U.S. Environmental Protection Agency (EPA) newsletter that he receives. He also said that he has a copy of the newsletter with him for anyone interested in looking at it.

Mr. Goddard referred to the concern about the ultimate fate of the wind turbines, and asked if a closure/decommissioning/financial assurance mechanism is required as part of the permit to operate. Ms. Forbes replied that this is not required. She also explained that because the government operates on a year to year budget, it's not possible to obligate future sessions of Congress and make promises about decommissioning the turbines. What AFCEE can do, however, is put it into its programming documentation, which includes a 30-year cost to complete. Ms. Forbes also mentioned that Virginia Valiela (of the CAC) had offered an excellent suggestion to develop a decommissioning plan, which would demonstrate that AFCEE is trying to do “due diligence” despite being constrained by the fiscal laws. Mr. Goddard suggested the idea of some sort of enterprise fund, but Ms. Forbes clarified that the federal government doesn't have that option.

Ms. Sanderson asked Mr. Gonser to explain why the wind turbine project doesn't take into account the IAGWSP demand, as originally formulated. Mr. Gonser explained that there was a plan to transition IAGWSP sites over to Defense Environmental Restoration Program (DERP) funding, in compliance with recent changes in Department of Defense (DoD) regulations. However, some attorneys took issue with that and did away with the plan at the last minute. Therefore the IAGWSP was unable to use DERP funds for its cleanup program, even though it's clearly eligible, and instead has to use Operations & Maintenance Army (OMA) funds and comply with the constraints for Military Construction (MILCON), which limit projects to \$750 thousand. Nevertheless, the IAGWSP has recently submitted a MILCON project for a 1.5 megawatt turbine, and depending on the Army's priorities, it's conceivable that the IAGWSP could get funding through the MILCON program. He added that the IAGWSP is still pushing the DERP issue as well.

Ms. Forbes then concluded her presentation by reviewing next steps: a presentation at the EMC meeting on October 7, 2010; road and foundation construction in fall/winter 2010; bird and bat monitoring pre- and post-construction; turbine installation in early fall 2011; operation and monitoring of the project; and reports back to the stakeholders and federal and state governments.

#### **Agenda Item #4. Ashumet Pond Alum Treatment**

Mr. Smith reminded the group that actions have been taken over the years to address the point sources (eastern infiltration beds closed in 1984 and the old MMR wastewater treatment plant/infiltration beds closed in 1995) and non-point sources (Storm Drain 1 [SD-1] and SD-2 runoff contained) that have affected Ashumet Pond. He also spoke about remediation efforts – the September 2001 phosphorus inactivation treatment of 28 acres at the pond, which involved the use of aluminum sulfate (AS) and sodium aluminate (SA), as well as the August 2004 installation of a geochemical barrier (iron hydroxide) to reduce groundwater phosphorus seepage to the pond.

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Mr. Smith noted that the goal of the remediation efforts was to improve the trophic health of Ashumet Pond, with improvement defined by: lower phosphorus levels in the epilimnion; lower phosphorus levels in the hypolimnion; reduced production of algae; increased water clarity; increased oxygen in the epilimnion; lower ammonium in the hypolimnion; and improvements in the Trophic State Index. He noted that ongoing studies have been conducted to evaluate various indicators, and showed a graph entitled “Average Total Phosphorus in Epilimnion (Trophogenic Zone) 0 - 26 feet” and pointed out the downward trends following the alum treatment and then the installation of the geochemical barrier, as well as the slight “uptick” over the past few years.

Mr. Smith then showed a graph entitled “Anaerobic Sediment Release of Phosphorus” underneath which it was noted that “laboratory tests of 2008 pond sediment core samples produced the highest release of phosphorus observed since the phosphorus inactivation treatment.” Mr. Smith noted that over the years UMass Dartmouth has been collecting sediment cores from the deep basin of Ashumet Pond, where the phosphorus inactivation treatment was done in 2001. He explained that the cores are put in the lab where they’re allowed to go anoxic and the phosphorus that comes off the sediment (which would be available to support algae growth in the next season) is measured. Mr. Smith referred to the graph and pointed out that in the last couple of years the cores have been indicating that regeneration is beginning, so whatever effect the alum had in the deep basin is starting to wear off. He also mentioned that this is expected over time, as the alum can start to move down through the sediment.

Mr. Smith displayed another graph, entitled “Water Clarity Trends Over Time,” and pointed out that water clarity improved after the alum treatment and installation of the geochemical barrier, but has started to decline over the past couple years. He then showed a graph entitled “Summer DO (Dissolved Oxygen) Depletion Trends” and noted that the pattern there is similar to the other graphs. He also showed a graph entitled “Carlson’s Trophic State Index (TSI)” and explained that TSI classifies whether a pond is oligotrophic, mesotrophic, or eutrophic. He said that in 1999 Ashumet Pond was mesotrophic or lower eutrophic, depending on the particular indicator being considered. AFCEE tried to manage the pond back into the mesotrophic range, which is where it has been, but, again depending on the indicator, in particular chlorophyll a (a measurement of algae growth), the state of the pond now seems to be trending up, toward eutrophic.

Mr. Smith displayed a slide listing the findings of the recent trophic health evaluation at Ashumet Pond, as well as a slide that included the recommendation that came out of those findings: “a new phosphorus inactivation treatment should be considered for the summer of 2010.” He then noted that before beginning the project, however, it was determined that several studies should be done, which pertained to the bathymetry of the pond, the tidewater mucket that inhabit the pond, and the collection/incubation of sediment cores for additional phosphorus regenerations studies. Mr. Smith reported that because water levels at the pond are currently at a record high, with this past April seeing the highest measured level since 1972, it made sense to take a look at the bathymetry of the pond. He also explained that the effort was made to identify where the tidewater mucket, a species of special concern, lived in the pond in order to minimize any impacts to their habitat. He then reported that the mucket generally live in the 0- to-25-foot zone of the pond, where it remains oxic throughout the year. He also explained that the additional sediment core study looked at cores from the 25-to-40-foot depth in the pond, the area before the drop to the deep hole, which is where the original alum application was done. He noted that UMass Dartmouth also went back and looked at all the cores and the data collected over the past 10 years and assessed phosphorus regeneration rates in the deep zone of the pond, in the “bench” before the deep zone (25 to 40 feet), and in the shallow zone. Mr. Smith then displayed a slide showing Ashumet Pond water levels over the past ten years, and since 1972.

Mr. Goddard mentioned that high water levels affect the effectiveness of the geochemical barrier. Mr. Smith explained that the overall hydrograph was considered when the geochemical barrier was



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designed, as was a couple of species of plant along the shoreline. He noted that the barrier was installed where it was believed to have the maximum benefit with what was known about the hydrologic cycle, and although it might be a bit less effective with high water levels, “it’s still in a pretty broad zone there.” Mr. Goddard asked if this is the main contributing factor to the recent uptick in phosphorus. Mr. Smith replied that he doesn’t believe so; rather, he thinks it’s due to the regeneration from the sediments, because internal regeneration is “a really significant number.” Mr. Goddard suggested that additional alum treatments would probably have to be done every five or ten years. Mr. Smith replied that the good news is that a reduction of phosphorus levels has been observed over the past ten years; phosphorus concentrations in the plume were as high as 5 milligrams per liter (mg/L), but are now between 2 to 3 mg/L, and levels at the shoreline have dropped by half. He added that the hope is that this downward trend will continue over the next ten years. Mr. Goddard said that in that case there’ll be less need for alum treatment in the future. Mr. Smith agreed, and also noted that sediment regeneration has always been an important parameter to manage, and added that the 2001 treatment was “fairly focused in deep water.”

Mr. Smith then displayed a slide pertaining to the UMass Dartmouth regeneration studies, with a table entitled “Annual Flux of Phosphorus from Sediments and Aluminum Dosages” and a figure entitled “Ashumet Pond Sediment Phosphorus Release.” He noted that the 30-to-45-foot zone is a big producer of phosphorus, rivaling the deep basin that was originally treated.

Mr. Smith stated that to protect habitat, particularly for sensitive species like the tidewater mucket, and to maximize treatment to reduce the phosphorus load, it was determined that the phosphorus inactivation treatment would be applied to an area 56.5 acres in size, at a depth greater than 35 feet, which is approximately 25% of the pond. Injection would occur at a depth of 10 feet, which has been shown at other locations to work very successfully, and the dosage would be about 40 grams per meter squared ( $\text{g/m}^2$ ). He noted that the treatment would be a combination of aluminum sulfate and sodium aluminate (at a ratio of 1.8:1), and he explained that this mix is appropriate for treatment in low alkalinity ponds like those on Cape Cod. He also mentioned that a jar test conducted on August 17, 2010 with pond water from the zone to be treated indicated that the 1.8:1 ratio was the best mix.

Mr. Smith said that treatment is scheduled to begin tomorrow with a great deal of real-time pH and alkalinity measurements, and full treatment is expected to begin next week. He explained that the purpose behind collecting the aluminum data before full treatment is to ensure that the aluminum hydroxide ( $\text{Al}(\text{OH})_3$ ), floc, remains in its inert form, which binds to phosphorus, and does not become free  $\text{Al}^{+3}$ , which can be toxic to fish. He also said that he is confident that it will be possible to balance the chemistry successfully, and added that there will be heavy monitoring involved throughout, including observing to ensure that there are no fish kills. He further noted that the tidewater mucket will be monitored before and after treatment to ensure that they don’t become stressed.

Mr. Smith then showed a map of the pond and pointed out the area that was treated in 2001 and the area where treatment will begin tomorrow. He also reported that another protection factor is to apply in half doses, in other words applying in one direction, and then coming back a day or two later and applying the other half in the other direction, all the while taking chemistry measurements and obtaining real-time feedback. He further noted that titrations will be done right in the parking lot at Fishermen’s Cove so that good data are available immediately. Mr. Smith then showed a photograph of the vessel that will be used to apply the treatment. He also displayed a figure showing some preliminary work conducted by UMass Dartmouth with an autonomous underwater vehicle for the bathymetry work and to evaluate the mussel population in the pond. Mr. Smith noted that it’s hoped that after the trophic health of the pond improves, it will be possible to document expansion of habitat for mussels and other species. He also showed photographs that demonstrated that the highest number of mussels exists in the 10-to-20-foot depth range, and that no mussels were present in the below-30-foot range.

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Mr. Smith then displayed a slide entitled “Regulatory Framework/Permits” and noted that AFCEE worked primarily with the Mashpee Conservation Commission because the project is located in Mashpee, although it’s being staged in Falmouth. He also said that there had been a presentation for the Town of Falmouth, which approved of having the Town of Mashpee issue the Order of Conditions, which occurred in early August. Mr. Smith also mentioned having received a license to apply chemicals, as well as a public access special use permit from the Division of Fisheries & Wildlife, and from the Natural Heritage Endangered Species Program (NHESP) an exemption from review because the whole purpose of the project is to improve habitat for all species, as long as AFCEE meets requirements established in a “Habitat Management Plan” developed with the agency and is able to document that the tidewater mucket do in fact see the benefits of treatment. Mr. Smith also mentioned that Massachusetts Environmental Policy Act (MEPA), Chapter 91, U.S. Army Corps of Engineers (USACE) 404, and Section 401 permits were not required, as had been the case previously.

Mr. Smith then showed a figure entitled “Flow Chart of Ashumet Phosphorus Inactivation Program” and another figure entitled “Pond Monitoring During Phosphorus Inactivation.” He also noted that monitoring will occur at five stations – the deep basin, three stations around the perimeter of the treatment area, and in a control station to the west – to measure for temperature, DO, conductivity, pH, alkalinity, and total and dissolved aluminum. Mr. Smith concluded his presentation by showing the schedule slide: mobilize and start five-acre pilot area on September 9, 2010; evaluate data on September 9 and recommendation; remaining 51.5 acres the week of September 13: and follow-up monitoring and report. He also mentioned that AFCEE will work closely with Mashpee’s conservation agent to ensure that he’s comfortable with moving forward after the pilot area treatment.

Mr. Reif asked Mr. Smith to help him identify a trend on the “Summer DO Depletion Trends” figure. Mr. Smith pointed out what appears to be a trend down, and another “possibly coming back up.” Mr. Reif asked if it’s correct that Mr. Smith infers that there’s a slope from the peak or the trough. Mr. Smith confirmed that that’s correct and noted that the figure shows multiple measurements over the year.

Mr. Goddard asked if the neighborhood has been informed about the project. He also recommended posting a sign at the site to explain the activity that’s occurring. Mr. Smith replied that abutters’ notices were sent to all of the residents around Ashumet Pond to notify them of the public hearing/meeting. He also noted that AFCEE has been in contact with the Mashpee Environmental Coalition (MEC) regarding the project, and that there’ll be a sign in the parking lot with the Massachusetts Department of Environmental Protection (MassDEP) wetlands number as well as information summarizing the project. Mr. Goddard suggested including a contact phone number on the sign. Mr. Karson added that a news release about the project was issued today. He also said that a reporter from the Mashpee Enterprise will be meeting with him and Mr. Smith at the boat ramp tomorrow, and a story about the project will be published in Friday’s Mashpee Enterprise and Falmouth Enterprise newspapers.

#### **Agenda Item #5. Sierra Range Update**

MSG Mauk introduced himself as the Range Operations NCO for Camp Edwards and a designated project officer for the Sierra Range project. He noted that Sierra Range, which is located in the northern part of the complex, was formerly two ranges (Sierra East and Sierra West), but around 2005 a modernization project was undertaken to convert the two existing ranges from machinegun multipurpose ranges to a single 10-lane modified record fire (MRF) range, used for M16/M4 qualification for soldiers.

MSG Mauk reviewed some information about the MRF range: it’s for individual qualification on M16/M4 series weapons; nine targets per lane, ten lanes, with targets arrayed from 50 to 300 meters; soldiers fire from the prone and kneeling positions only; each soldier fires 40 rounds for a qualification table; it can be used for night-fire and CBRN (chemical, biological, radiological, and nuclear)

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qualifications, which involves the soldiers wearing a mask; and it has an additional set of targets at 75 meters and 175 meters, which allows the range to be used for an additional course of fire known as Field Fire I/II, for advanced marksmanship training, also from the prone or kneeling positions.

MSG Mauk then showed a slide outlining the qualification requirements for the Massachusetts National Guard (MANG) to have this MRF range: all soldiers must qualify yearly on primary weapons; it is a mobilization/deployment requirement to qualify on an MRF/Automated Record Fire live-fire range; the use of 25-m Alternate Course or virtual training on a computer simulation is not authorized if the unit is mobilizing; Camp Edwards is a regional training platform for MANG and other New England National Guard soldiers; an MRF live-fire range on Camp Edwards is critical to meeting individual soldier readiness and Army mobilization requirements; and having the range at Camp Edwards reduces travel time, costs, and other environmental impacts when soldiers must go to other training sites solely for weapons qualification.

MSG Mauk discussed the MANG process to meet the requirements of Administrative Order #2 (AO2) for returning to live-fire at Sierra Range. He explained that the MANG is working from the 2007 Small Arms Range Pollution Prevention Plan (SAR P2) Overview document, which provided an overview of range configurations across the installation, proposed some generic ideas on how best manage practices (BMPs) would be implemented at different ranges, and noted that range-specific plans would be completed before returning to firing on the ranges, including Operations, Maintenance, and Management Plans (OMMPs). MSG Mauk also stated that a draft Alternatives Analysis for Sierra Range was submitted in December 2009, and then the MANG proposed a Range Adaptive Management Process (RAMP) that started off with baseline BMPs, on which approval would be sought in order to use the range. The MANG is now involved in the line-of-sight (LOS) analysis piece of the process, which is essentially determining where bullets fired on the range are going in order to determine which BMPs should be applied. Once the LOS analysis has been completed, the plan is to develop very specific BMPs for the range and then move into the OMMP.

MSG Mauk stated that the MANG is currently involved in Phase II of the LOS analysis, now has a very good idea of where the projectiles will go within the range, and knows that a secondary berm will be needed at 17 individual target locations in order to prevent bullets from impacting the range floor. The MANG is also proposing four or five stand-alone berms that would act as collection points and prevent rounds from impacting the range floor, and now has the data to be able to size the wing walls (perimeter areas that would stop rounds from exiting the range to the left or right).

MSG Mauk stated that traditionally an LOS analysis is done in order to determine whether a soldier can see the target to be engaged and apply the fundamentals of marksmanship (a minimum of 90% of the target must be visible). In this case, however, the analysis also involves determining whether something can be placed behind a target without obscuring targets farther downrange. He also mentioned that the USACE in Huntsville, Alabama provides assistance for traditional LOS analysis, but at much larger ranges such as tank gunnery ranges. For Sierra Range, however, the USACE said that it is up to the range designer to use site-specific conditions to ensure target visibility. MSG Mauk then stated that the training goals at Sierra Range are to locate the targets, estimate distance to the targets, apply fundamentals of marksmanship, and effectively engage the target(s), with target exposures between three and ten seconds per target.

MSG Mauk began reviewing some of the findings from the LOS analysis by noting that the range is narrow, which is an advantage in that it's possible to combine some of the secondary berms so that different lanes are firing into the same berm, but a disadvantage in that care must be taken to avoid building the berms so large that they cause LOS issues for other lanes. He also said that the rolling topography of the range is an advantage with respect to projectile trajectory (rounds travel up and eventually come down, and a terrain drop-off provides some run-out space for the rounds to impact a 300m berm without impacting the range floor). The disadvantage of the rolling topography, however,

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is that it makes it necessary to customize individual structures so that they fit and catch the bullets effectively. MSG Mauk also noted that all of the target locations are on the same flat plane, which is a little different than other standard military ranges of the same kind. This is advantageous with respect to the flight path of rounds (to travel up and then come down), but it's a disadvantage in terms of target structures impeding LOS.

MSG Mauk then showed a photograph of Sierra Range's Lane 6 and pointed out the various targets, as seen from the soldier's perspective. He also referred to an example of a secondary berm that would be placed behind the target and pointed out the gun-target line, which demonstrated that the width of the structure has a potential to impact the LOS. He then showed the view with additional berms and pointed out that adding those types of structures on every single target location per lane could create impacts to the quality of training. However, "these types of structures as they are sized right there" would not impact training and could be used quite effectively to capture the rounds being fired "at these locations" without having to worry about them impacting the range floor.

MSG Mauk then stated that Phase I of the LOS analysis was a paper-based phase that used a computer system called the Range Manager's Toolkit (RMTK), a Geographic Imaging System (GIS)-based application. This involved taking a large photograph of the range, applying some knowledge of marksmanship training to determine where rounds would be expected to impact the range floor, and using the RMTK to develop "sheets like this," making a total of 90 sheets. He then showed a GIS photograph and explained that for each target the gun-target line (or flight path that the projectile would take when a soldier fires from the firing position) was identified and applied to the "paperwork" that was done to determine whether or not the locations where impacts to the range floor were expected were logical. He noted that the worksheets were created for the purposes of data collection using a laser to determine the potential impacts of the rounds. MSG Mauk also noted that the worksheets included data on the probability of hit, which came from the Army. He said that in less-experience soldiers the probability of hit is about 80%, while with a more highly-skilled soldier it's expected that 98% of the round would strike within the perimeter of the target – which is important in terms of designing and sizing the structures that might be needed to capture the rounds.

MSG Mauk then stated that Phase II of the LOS analysis involved the use of a very high-powered laser (called a GBD III laser) that can shoot a laser beam six kilometers at night, and Plexiglas targets to demonstrate that the target was hit by the laser beam and where a round would travel downrange from the target. The worksheets created in Phase I were used to take some very detailed field notes. MSG Mauk then showed the group the actual sheet for the 50m target in Lane 6 and said that it was found that if a secondary berm (45 inches tall from the base floor of the target location) were to be constructed it would capture all the rounds that would be hitting the target. And if a round traveled higher than 45 inches above the target, it's expected that the round would travel all the way back to the 200m target location and ultimately to the 300m target location. MSG Mauk said that the laser beam would either strike "here or here," depending on the elevation where it was being held. He also referred to the rolling topography of the range, and said that it was found that at about the 150m target the terrain is dropping off, providing "great run-out room" for the rounds on the range. MSG Mauk then clarified that he is not suggesting that bullets travel like a laser beam; rather, the laser beam was used as a notional flight path because it's point-of-aim/point-of-impact, meaning that if it's possible to point at it with a laser, it's possible to hit it with a round. He added that rounds do not travel in a straight line, but in an arc parabola.

MSG Mauk then showed a photograph of a target setup at the range for Phase II, noted that it was a 50m target with a type "S" silhouette, and mentioned that full-size type "E" silhouettes were also used at appropriate target locations. He also explained that blue painter's tape was used on the Plexiglas backstop to mark the laser strikes so that a secondary berm could be properly sized, if found to be necessary. He further noted that for a 50m target, a 6-inch probability of miss was taken into consideration as far as building some kind of structure, for a 100m target a 12-inch probability of miss

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was considered, and so on. MSG Mauk also spoke about the effort to determine how wide a structure could be built behind the 100m target without impeding the 175m target. He then showed an example of a type “E” silhouette and pointed out the green spots on the Plexiglas, which were reflections from the laser in the grass right at the top of the target location. He said that this demonstrates that those low rounds would be captured in the front location, but if rounds travel minimally above that location, they would continue downrange, and in this case, strike the 250m berm.

MSG Mauk stated that information from all the field work was boiled down into the spreadsheet that MMRCT members have in front of them. He noted that the spreadsheet indicates how projectiles at specific targets would be managed, pointed out a few specific examples, and mentioned that because he is so familiar with the information he is able to see the topography of the range based on reading the spreadsheet. He then reviewed a slide entitled “Phase II Conclusions,” which noted the following: it’s now known where the projectiles will go along the flight path at each individual lane and target location; 17 target locations require a secondary berm to avoid impacting the range floor; based on Phase II results the proposed sizing of secondary berm(s) can avoid LOS impact on downrange targets; the construction of four to five new stand-alone berms or the connection of existing target berms at several locations is being proposed, rather than constructing individual secondary berms at those locations (Lanes 1 through 4); the size of the end berm and wing walls can be designed to further maximize containment of projectiles.

MSG Mauk then stated that Phase III of the LOS analysis is a live-fire demonstration. He said that the proposal is to use Lane 6 for the demonstration; the lane will be set up to an acceptable standard for what’s been proposed as the minimum baseline necessary to get the range up and running. The plan is to use 5,000 rounds for the demonstration (125 iterations of 40 rounds), with statistical samples for each target location – for example only 375 rounds would be fired at the 50m target, but 1,100 would be fired at the 150m target because of the firing table. He also reported that the MANG is working on obtaining for the demonstration copper bullets that were developed by the Army and are now being produced and eventually will be available for use in training. If copper bullets are used for the demonstration, there will be no concern about introducing lead to the environment, as the new round has a copper jacket, steel penetrator, and a copper slug. MSG Mauk also mentioned that because this new bullet, which is actually called an enhanced performance round (EPR), was developed for better combat capability (“more punch”), there is some concern about how it might impact the STAPP system, and so a STAPP mock-up is going to be built to test the rounds and ensure that they can be used with a STAPP system. He also noted that a draft Project Note has been submitted to the agencies and comments have been received.

Mr. LoGiudice remarked that he’s very impressed with the work that’s being done, and wishes the MANG well.

Mr. Goddard said that MSG Mauk’s presentation was excellent. He then asked if the work is being done because of a need to modify an older range. MSG Mauk clarified that there’s always been a requirement for a pop-up range, which does exist at Camp Edwards, but it became necessary to come up with a plan for firing lead on a pop-up range. Mr. Goddard asked if this type of training is currently being conducted elsewhere. MSG Mauk replied that it is, and added that units that are not mobilizing can fire on what’s known as an alternative qualifications course. Mr. Goddard said that the point of the Sierra Range effort then is that when mobilizing, soldiers need “the real thing.” MSG Mauk agreed.

Mr. Goddard then asked if copper bullets are the wave of the future, or if it will be necessary to clean out the lead from the berms periodically. MSG Mauk replied that all of the work that’s been done and all of the BMPs have pertained to being able to fire lead at the range. He also said that copper is not the wave of the future, but is in fact being used now in theater, and is in production for use on Army ranges. A negative to the new copper round, however, is that because it’s a better combat-effective round, meaning it’s more lethal, it’s expected to be very costly with respect to the impact it will have

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on training ranges. He said that there are existing ranges that can't handle the round because of its performance, and it exceeds the safety limitations of some of the lanes on some of the ranges, although that's not the case at Camp Edwards, where the round could theoretically be implemented immediately. Mr. Goddard noted that his point was that if lead is used, it will be necessary to maintain the berms at some point, although this won't be such a big concern if copper is used. MSG Mauk clarified that copper would be managed too, as it's also a concern because it's a resource.

Mr. Goddard then asked if it's correct that a STAPP system cannot be used on a pop-up range. MSG Mauk replied that a STAPP system, which is an enhanced berm, is a form of a BMP, and parts of it probably could be put on a pop-up range. Mr. Goddard questioned whether the berms planned for Sierra Range are just basically dirt or sand. MSG Mauk replied that the final BMP to be applied at the range has not yet been decided, but is still being negotiated.

Mr. Goddard also mentioned that this summer he heard some heavy gunfire at the base on a Saturday in July or August, which sounded like 50-caliber rounds. MSG Mauk clarified that that was not live-firing that Mr. Goddard heard, but 50-cal blank ammunition, which sounds very much like live-fire. Mr. Goddard said that it was really very loud.

Mr. Dinardo said that MSG Mauk's presentation was fabulous, and noted that he is very supportive of having appropriate training fields, which are environmentally managed, for the military. He then said that he thinks it would be less of an impact, considering the trajectory, to use the range for standing or sniper fire, and therefore it wouldn't be prohibitive to do that. MSG Mauk said that initially his concern pertained to how various soldier sizes – from very small to big people – “would change the elevation of the weapon, and how that would engage a target farther away.” He said that he then thought about that “up and down change” and the fact that not all soldiers sit with their weapons directly in the same line, ending up in a kind of “oval” from which the rounds would leave the firing line, but ending up in a wide area. What the laser told him, however, was that he didn't need to worry about those things, because the range is flat, “the lower I go like this, the better that round travels to the back of the range.” He added that it's better with a big soldier firing from a kneeling position because it “drops those rounds into the frontal covers or to the secondaries right behind the target.” Mr. Dinardo asked if MSG Mauk is saying that if a soldier were standing it would be less of a problem. MSG Mauk agreed, but indicated that there might be other concerns to consider.

Mr. Dinardo then remarked that four or five seems to be a small amount of secondary berms. MSG Mauk clarified that 17 targets will have some sort of structure immediately behind them, plus there will be four or five brand new berms. Mr. Dinardo pointed out that it's not the case that 90 new structures will be needed. MSG Mauk agreed. Mr. Dinardo then inquired about the parabolic drop of an M16 or M4 at 300m, and he asked if the EPR is a combat round. MSG Mauk replied that when firing a weapon that's been “zeroed in,” at 50m there's a 2-inch rise in the flight of the projectile. He said that it “comes out of the muzzle of the weapon, it actually drops, and then the twists on the round cause the round to come up, and as it's coming up at 50 meters it's risen two inches above this baseline.” He added that at 100m it has risen six inches, and goes all the way up to eight inches of total rise at the apex at 175m, and back at 300m it's at zero. MSG Mauk said that this means that a soldier aiming at center mass with a zeroed weapon at 300m will have a round that's going to go and come down. He further noted that in terms of applying fundamentals of marksmanship, “a soldier needs to be estimating distance to the target when it's exposed,” and then if a soldier is “aiming here all the time” there's a greater chance of missing because the round “could be going up there or above the target.” He said that this is why a 25m range is not really optimal, because one can't estimate the distance. Mr. Dinardo added that based on where the soldier is shooting and the parabolic path of the bullet, “you don't have to think that it's going to go off somewhere else, or it's more likely not to be out of the berm or strike the floor.” MSG Mauk said “right” and added that he did a great deal of analysis on that, which he offered to show Mr. Dinardo. Mr. Dinardo declined the offer.

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Ms. Jennings reminded the group that AO2 stated that there would be no firing of lead bullets unless BMPs were proposed. She said that what EPA considered a “Cadillac” bullet-catcher system, the STAPP system, was proposed and the design was fairly straightforward because it involved shooting at one target at a fixed distance, and required building a “very sophisticated berm.” With regard to Sierra Range, EPA started off saying that a STAPP system was needed on every one of the berms, and hasn’t completely put that idea aside. She said that the goal is to really find out where most of the bullets go, and those are the areas where more intense bullet-catcher systems would be wanted. Ms. Jennings noted that the LOS analysis will help with that determination. She explained that the MANG’s presentation of the LOS analysis is really a first step. The next step will be to reach agreement on which of the berms need more enhanced capture, and then move forward with design and amend the Order to give approval for firing lead at Sierra Range. Ms. Jennings added that she doesn’t think future ranges will be as complicated; although Echo Range is also a pop-range, it’s smaller and more straightforward. In response to Mr. Goddard’s earlier question, Ms. Jennings said that yes, the MANG could put STAPP systems behind the targets at Sierra Range; however, it probably wouldn’t be practical to do so – although it’s still not out of the question.

**Agenda Item #6. Next Meeting Schedule and Adjourn**

Mr. Karson stated that the next MMRCT meeting is scheduled for October 13, 2010. He then adjourned the meeting at 8:12 p.m.