

**Massachusetts Military Reservation Cleanup Team
&
Senior Management Board meeting
Building 1805
Camp Edwards, MA
July 13, 2011
6:00 – 8:45 p.m.**

Meeting Minutes

Member:	Organization:	Telephone:	E-mail:
Jon Davis	AFCEE/MMR	508-968-4670	mike.minior@us.af.mil
Hap Gonser	IAGWSP	508-968-5107	kent.gonser1@us.army.mil
Ben Gregson	IAGWSP	508-968-5821	Benjamin.p.gregson@us.army.mil
Mary Sanderson	US EPA	617-918-1381	sanderson.mary@epa.gov
Robert Lim	US EPA	617-285-6153	lim.robert@epa.gov
Lynne Jennings	US EPA	617-918-1210	Jennings.lynne@epa.gov
Millie Garcia-Serrano	MassDEP	508-946-2727	millie.garcia-serrano@state.ma.us
Mark Panni (sitting in for Len Pinaud)	MassDEP	508-946-2898	Mark.panni@state.ma.us
Martha Steele	MDPH		
Maj Michael Koski (sitting in for Col Crivella)	HQ CPED	508-968-5888	Michael.koski@us.army.mil
Harold Foster	MMRCT/Falmouth	508-564-4818	
Ron Reif	MMRCT/Falmouth	508-289-3788	rreif@whoi.edu
Dan Dinardo	MMRCT/Falmouth	508-547-1659	ravensnests1@live.com
Phil Goddard	MMRCT/Bourne	508-759-3043	pgoddard@aol.com
Dana Barrette	SMB/Sandwich	508-737-2518	info@danabarrette.com
Chuckie Green	SMB/Mashpee	508-419-1760	cgreen@mwtribe.com
Virginia Valiela	SMB/Falmouth	508-563-9028	Valiela@hotmail.com
Earl Baldwin	SMB/Bourne	508-989-3703	ebaldwin@townofbourne.com
Facilitator:	Organization:	Telephone:	E-mail:
Ellie Donovan	MassDEP	508-946-2866	ellie.donovan@state.ma.us
Attendee:	Organization:	Telephone:	E-mail:
Rose Forbes	AFCEE/MMR	508-978-4670	Forbes.rose@us.af.mil
Melvin Alli	AFCEE	210-395-8560	Melvin.alli@us.af.mil
Lori Boghdan	IAGWSP	508-968-5635	lori.boghdan1@us.army.mil
Pamela Richardson	IAGWSP	508-968-5630	Pamela.j.richardson@us.army.mil
Dave Hill	IAGWSP	508-968-5621	dave.hill@us.army.mil
Paul Nixon	IAGWSP	508-968-9620	Paul.nixon@us.army.mil
Sally Hartmann	E&RC	508-968-5145	Sally.a.hartmann@us.army.mil
Emily Derbyshire	E&RC	508-968-5146	Emily.derbyshire@us.army.mil
Mike Ciaranca	MAARNG	508-968-5154	Mike.ciaranca@us.army.mil
Mike Speth	ARNG-ILE	508-968-5936	mike.speth@us.army.mil
Mark Begley	EMC	508-968-5127	
Larry Cole	CAC	508-432-2464	Coleslaw1@verizon.net
Shawn Cody	MANG	508-233-6520	
Denis LeBlanc	USGS	508-470-5030	dleblanc@usgs.gov
Jeanethe Falvey	US EPA	617-918-1020	Falvey.jeanethe@epa.gov

Brian Olson	US EPA	617-918-1365	Olson.bryan@epa.gov
Desiree Moyer	US EPA	617-918-1257	moyer.desiree@epa.gov
E. Turkington	Falmouth	508-540-4854	
Peter Dillon	TetraTech	617-443-7518	Peter.dillon@tetrattech.com
Diana Barth	Enterprise Newspapers	508-548-4700	barth@capenews.net
Jane Gasper	Innovar Environmental	508-759-9114	jgasper@innovar-env.com

Action Items:

1. Mr. Goddard requests that the MMRCT be kept informed of future NRTC meetings and actions.

Handouts Distributed at Meeting:

1. Responses to Action Items from the May 11, 2011 MMRCT Meeting
2. Presentation handout: Update on Wind Turbines
3. Figure: Demolition Area 1 Potential Drilling Locations
4. Presentation handout: Central Impact Area Feasibility Study
5. Remedy Selection Plan for the Central Impact Area
6. AEC IAGWSP Groundwater Plume Maps & Information Booklet 2011
7. MMR Cleanup Team Meeting Evaluation form

**Agenda Item #1. Introductions, Agenda Review, Approval of May 11, 2011
MMRCT Meeting Minutes**

Ms. Donovan convened the meeting at 6:02 p.m. and the Massachusetts Military Reservation Cleanup Team (MMRCT) and Senior Management Board (SMB) members introduced themselves. Ms. Donovan asked if there were any changes or additions to the March 11, 2011 MMRCT meeting minutes. No changes were offered and the minutes were approved as written.

Agenda Item #2. Update on Wind Turbines

Ms. Forbes stated that the existing Air Force Center for Engineering & the Environment (AFCEE) wind turbine is a Fuhlraender 1.5 megawatt (MW) turbine with an 80 meter hub height and a 77 meter rotor diameter. She also noted that, based on a 29% capacity factor, the wind turbine was expected to produce 3,810 megawatt hours (MWh) per year, or 25% to 30% of the electricity required to run AFCEE’s pump-and-treat systems at MMR. Likewise, the use of the turbine also would reduce electricity costs and offset air emissions by 25% to 30%. When the wind turbine began operating, on December 2, 2009, AFCEE was looking at a return on investment (ROI) of six to eight years, but the ROI is currently being recalculated now that a year’s worth of cost data is available. Ms. Forbes then reported that from startup through June 30, 2011, the wind turbine actually produced only 3,943 MWh, which was due to a number of issues that decreased the estimated production.

Ms. Forbes then showed a graph entitled “Wind Turbine Energy Analysis” and noted that since January 20, 2011, when the last of the mechanical issues was resolved, the wind turbine has been operating well over the 29% capacity factor, although the wind resource is stronger in wintertime. She also noted that the turbine’s production will continue to be watched and analyzed.

Ms. Forbes displayed a recent NStar check in the amount of nearly \$52,000 and explained that because of net-metering AFCEE receives payments from NStar. She also reported that from startup through May 25, 2011, NStar has made more than \$530,000 in payments. She then mentioned a \$60,000 availability guarantee, which AFCEE purchased with its service agreement, which was added to the

total value because of the mechanical issues that weren't resolved immediately and so affected performance.

Ms. Forbes stated that AFCEE is building two new wind turbines in the northern part of the base, near PAVE PAWS. These are GE 1.5 MW turbines and are the same size as the existing turbine. She also noted that construction has begun, and prior to that all of the permitting and approval processes were completed. She also mentioned that: the project is in compliance with Natural Heritage & Endangered Species; eastern box turtle surveys, invasive species surveys, and pre-construction bird/bat surveys have been conducted; and post-construction surveys will be conducted as well.

Ms. Forbes then showed a series of photographs of the turbine components in transport, including the blades being delivered from Texas and the tower sections from Iowa. She also showed a photo of the machine head (a nacelle containing a generator) being lifted into place and noted that it weighs 65 tons. She also mentioned that the machine head was assembled in Florida. She reported that the first of the two new turbines has been installed and AFCEE is working on the second. She also showed a photo of the new turbine and the crane used to erect it, taken from across the Cape Cod Canal.

Ms. Forbes reviewed the remaining schedule for the wind turbine project: installation of second wind turbine anticipated to start the week of July 18, 2001; substation construction to occur July-August 2011; NStar interconnection in mid-September; and a ribbon-cutting ceremony in October, as part of Energy Awareness Month. She also reported that Congressman Keating and the Environmental Business Council have already visited the site, and concluded her presentation by showing a photo of the wind turbine being constructed, taken from a boat in the canal.

Mr. Goddard asked why AFCEE is net-metering, since it seems that all of the energy would be used behind the meter. Ms. Forbes explained that AFCEE has many small meters at various locations, but doesn't have a master meter, so the electricity is just sent right out to the grid.

Mr. Reif asked what Ms. Forbes anticipates will be the calculated ROI on the existing wind turbine, based on what's known now. Ms. Forbes replied that she thinks the ROI might be a little bit longer if it accounts for all the study costs. She noted that the original ROI estimate only looked at construction costs. She further noted that there's a new method for calculating ROIs for renewable energy projects, which is a sustainable ROI where sales of Renewable Energy Certificates are factored in. Mr. Reif said that he expects that the ROI on the two new turbines would be less, based on what was learned from the existing turbine. Ms. Forbes agreed that the costs should have gone down, although the new project requires more studies and connection through a substation.

Mr. Foster asked Ms. Forbes to describe the technical difficulties associated with the existing wind turbine. Ms. Forbes noted the following: the turbine didn't ramp up to 100% power within the first couple months of operation, as it was supposed to, which was a programming issue that wasn't resolved immediately; wind gusts caused issues that were ultimately traced back to a faulty encoder (the incorrect model) that reported excessive generator speeds that caused the turbine to shut down – a month-long problem that was corrected in four hours, once the manufacturer's sub-contractor finally came over from Germany to fix it; some brushes inside the generator wore earlier than they should have because they were not properly set; and the backup batteries were draining very quickly, which was reported only as a general error by the SCADA system, so it took some time to identify the problem. Ms. Forbes stated that all of these problems were easily corrected, but it did take a while to figure them out.

Agenda Item #3. Demolition Area 1 Update

Mr. Gregson displayed a figure depicting the area where the Demolition Area 1 (Demo 1) plume is migrating off base. He pointed out the base boundary, the Otis Rotary, Route 28, Williams Avenue, Lily Pond, the location where the plume was first detected at the base boundary, and the location of the

treatment system that went on line last month. He noted that the system, which includes an extraction well and an infiltration gallery, uses granular activated carbon (GAC) to treat RDX and ion exchange resin to treat perchlorate.

Mr. Gregson stated that the Impact Area Groundwater Study Program (IAGWSP) has been conducting an investigation in the neighborhood to collect valuable information on the configuration of the plume. He referred to the figure and pointed out monitoring wells and their associated maximum perchlorate concentrations, including a 12 ppb detection at the base boundary, a 7 ppb detection on Route 28, and two 9.8 ppb detections at other locations. He also pointed out what's believed to be the core of the plume in that area and the direction in which it's migrating.

Mr. Gregson noted that the next steps are to drill at location 7W to delineate the flank of the plume and continue to try to obtain access for additional drilling. He referred to the figure and pointed out the trailer park on Barlows Landing Road. He then explained that access has been problematic there because the trailer park has septic system issues, the property has been put under receivership, and the same entity owns the nearby parcels. The IAGWSP is trying to get in touch with the receiver to obtain permission for access to the property and at least install some drive-points there to see if the plume can be detected on the other side of the pond. Mr. Gregson also pointed out another large parcel, which he noted is completely undeveloped and therefore would involve the cutting of roads in order to gain access. He further noted that the owner of that parcel recently died and the property is in probate. Mr. Gregson said that the IAGWSP will continue to try to obtain access to these locations.

Ms. Donovan mentioned that the IAGWSP has been sending out neighborhood notices to the residents to advise them of investigation and construction activities, and to invite them to attend tonight's meeting. She added that residents will continue to receive regular updates.

Mr. Dinardo asked if recent data indicate that the plume is still well below the pond. Mr. Gregson replied that that's correct and noted that the pond is relatively shallow, perhaps around 8 to 10 feet deep, while the plume is about 60 feet below the ground surface at that location. If the plume has traveled as far as the pond, it's believed that it would be entirely underneath the pond bottom.

Ms. Valiela inquired about the possibility of conducting investigative work from a barge. She also asked if the modeling is good enough to project downgradient and install a monitoring well beyond the problematic parcels. Mr. Gregson replied that the IAGWSP has not yet considered drilling from a barge or gaining access to the shore from a barge. He said that getting permission to drill would still be an issue; however, that is something that could be looked at further. He also noted that the IAGWSP has looked at potential drilling locations farther downgradient, but some problems exist there as well. He pointed out what would probably be the next best location is on the edge of Barlows Landing Road, but traffic would be an issue there because it's a fairly busy road.

Mr. Gonser added that some difficult geological issues in the area are also a concern. He said, "It's right at the end of the glacier, pushing up everything, so there are big drop-offs," and "the water has the potential to make some turns." He said that this is why the approach is to step out "in little steps."

Mr. Gregson then reported that the pumping rate on the extraction well started out at 50 gallons per minute (gpm), some hydraulic measurements were taken to look at drawdown, and the rate was recently reduced to 30 gpm to see drawdown at that rate. He said that the information will be provided to the groundwater modelers to determine the optimum rate, which is expected to be somewhere between 30 to 50 gpm.

Mr. Goddard asked where the mobile treatment unit (MTU) will be located. Mr. Gregson replied that the MTU is already in place and he pointed out its location, as well as the location of the infiltration gallery and the pipeline. Mr. Gonser added that the IAGWSP had been working with the NStar easement, which is why it was necessary to "put the well there and come vertically across the power

line.” He also noted that there were some natural resources issues that had to be accommodated, which also affected the configuration of the treatment system.

Agenda Item #4. Central Impact Area – Feasibility Study Alternatives

Mr. Gregson reminded the team that his last presentation on the Central Impact Area Feasibility Study (FS) covered information on groundwater characterization, soil characterization, the nature, extent, and depth of the plume, response actions, including soil and munitions removal, and risk screening and characterization. He then noted that his presentation tonight will focus on the alternatives that were evaluated as part of the FS.

Mr. Gregson showed a slide listing the seven alternatives that were evaluated: Alternative 1 – No Further Action; Alternative 2 – Monitored Natural Attenuation (MNA) and Land-Use Controls (LUCs); Alternative 3 – Focused Extraction with One Well, MNA, and LUCs; Alternative 4 – Focused Extraction with Two Wells, MNA, and LUCs; Alternative 4 (Modified) – Focused Extraction with Three Wells, MNA, and LUCs; Alternative 5 – Focused Extraction with Three Wells, MNA, and LUCs; and Alternative 6 – Focused Extraction with 31 wells, MNA, and LUCs (which would clean up the plume in ten years).

Mr. Gregson stated that under Alternative 1: ongoing long-term groundwater monitoring would be discontinued; no LUCs would be implemented; the plume would be allowed to migrate; and the cost would be \$325,000. He also mentioned that under each of the alternatives, natural process would address certain portions of the plume, and some of the plume would be allowed to migrate without treatment.

Mr. Gregson then reported that under Alternative 2: groundwater contamination would be reduced through natural processes; long-term monitoring would continue; LUCs would be implemented to protect against the use of groundwater during remediation; RDX is predicted to dissipate to below 2 parts per billion (ppb) by 2053 and below 0.6 ppb (the 10^{-6} cancer risk) after 2090; and the cost would be \$7.8 million. He then ran an animation to show how the plume is expected to behave over time under this scenario, and pointed out the Impact Area boundary, the Central Impact Area (about 330 acres in size, and the main target area for artillery and mortars when they were used at MMR), the plume contours (0.6 ppb to 2 ppb, 2 ppb to 6 ppb, and 6 ppb to 20 ppb), the base boundary, the Cape Cod Canal, and the town of Bourne. Mr. Gregson also mentioned that all of the alternatives assume that there’s no continuing source.

Mr. Gregson stated that under Alternative 3: groundwater contamination would be remediated through natural processes and one extraction well (on Spruce Swamp Road), pumping at 300 gpm; an MTU and about 2,500 feet of pipeline along Spruce Swamp Road would be required; long-term monitoring would continue and LUCs would be implemented; and RDX is predicted to dissipate to below 2 ppb by 2053 and to below 0.6 ppb after 2084.

Ms. Steele asked if the cost estimates account for the entire duration of treatment. Mr. Gregson replied that the estimates include capital costs for construction, long-term monitoring, operations & maintenance of the system, and decommissioning of the system. He then ran the animation for Alternative 3 and explained that the goal is to capture the higher contaminant concentrations “in this portion of the plume.”

Mr. Gonser added that while there are no public water supply wells in the path of the plume, it’s believed that there might be one or two homes that aren’t currently hooked up to town water, but would have to be hooked up in order to eliminate any kind of potential impact. Mr. Gregson stated that the relatively high cost of Alternative 3 (\$22.9 million) has to do with having to work on the edge of the Impact Area, where there are unexploded ordnance (UXO), and the fairly long monitoring period, which extends to 2084.

Mr. Gregson then stated that under Alternative 4: groundwater contamination would be remediated through natural processes and two extraction wells (on Burgoyne Road); the extracted groundwater would be treated at the existing Demo 1 treatment plant, which currently has about 500 gpm of capacity available; about 13,200 feet of piping down Burgoyne Road would be required; long-term monitoring would continue and LUCs would be implemented; RDX is predicted to dissipate to below 2 ppb by 2049 and to below 0.6 ppb by 2077; and the cost would be \$17.2 million. He also ran the animation for Alternative 4 and pointed out the extraction well locations and the modeled capture zone, noted that portions to the east, west, and downgradient would be allowed to attenuate naturally, and the combined pumping rate would be 550 gpm. He also said that the alternative does a fairly good job of capturing a large area of contamination upgradient, although a portion “scoots by to the north,” but is addressed in Alternative 4 (Modified).

Mr. Gregson noted that Alternative 4 (Modified) is a three-well system, but only two wells would be functioning at any one time, depending on the plume configuration. Under Alternative 4 (Modified): groundwater contamination would be remediated through natural processes and three extraction wells (on Burgoyne Road); the extracted groundwater would be treated at the existing Demo 1 treatment plant; about 13,200 feet of piping would be required; long-term monitoring would continue and LUCs would be implemented; RDX is predicted to dissipate to below 2 ppb by 2047 and to below 0.6 ppb by 2055; and the cost would be \$18.2 million. He also ran the animation for Alternative 4 (Modified) and pointed out the two extraction wells that would be running at the start of system operation, and the one that would be turned off when the third one was turned to capture the small piece of plume that went by to the north. He further noted that the combined flow rate at any time would be 550 gpm, the same as Alternative 4.

Mr. Gregson also spoke about Alternative 5: groundwater contamination would be remediated through natural processes and three extraction wells (two on Burgoyne Road and one on Spruce Swamp Road); an MTU and about 2,500 feet of pipeline along Spruce Swamp Road would be required, plus the piping along Burgoyne Road to the Demo 1 treatment plant; long-term monitoring would continue and LUCs would be implemented; RDX is predicted to dissipate to below 2 ppb by 2049 and to below 0.6 ppb by 2077 (lesser performance than with Alternative 4 [Modified]); and the cost would be \$36 million. Mr. Gregson then ran the animation for Alternative 5 and pointed out a portion of the plume that gets by one of the extraction wells and takes some time to reach the next extraction well, which is part of the reason why the cleanup timeframe is longer.

Mr. Gregson noted that Alternative 6 is a ten-year cleanup alternative, as required in the U.S. Environmental Protection Agency (EPA) Administrative Order. Under Alternative 6: groundwater contamination would be remediated using 31 extraction wells; three treatment facilities would be constructed, and one MTU and 40,710 feet of pipeline would be required; long-term monitoring would continue and LUCs would be implemented; RDX is predicted to dissipate to below 2 ppb and 0.6 ppb within ten years; and the cost would be \$132.9 million. The combined flow rate for Alternative 6 would be 6,500 gpm, or 9.4 million gallons per day (mgd) – four times the current pumping rate for all the other IAGWSP plumes combined. Mr. Gregson then ran the animation for Alternative 6.

Mr. Gregson showed a summary table of the alternatives and noted that it includes columns pertaining to risk to workers (because of UXO in the Impact Area) and risk to the environment (because the area is valuable from a natural habitat standpoint). He noted that for Alternatives 1 and 2, the risk to workers and the environment is low; for Alternatives 3 and 5, with an extraction well at the edge of the Impact Area, the risk is medium; for Alternatives 4 and 4 (Modified), with the extraction wells outside of the Impact Area, the risk is low; and for Alternative 6, which requires a great deal of activity in the Impact Area, the risk is high.

Mr. Gregson then stated that, working with the regulatory agencies, agreement has been reached on a preferred alternative, Alternative 4 (Modified), which Ms. Jennings of EPA will discuss in more detail. He also noted that the alternatives include a long-term plan to address UXO items. Finally, Mr. Gregson reviewed next steps: a four-week public comment period on the Remedy Selection Plan (RSP) will begin on July 27, 2011; the Central Impact Area FS and Source Report will be finalized and available for public review by July 25, 2011; a public meeting will be held on July 27, 2011 to review the entire FS, the RSP, and the preferred alternative; and after the public comment period closes, the IAGWSP will prepare responses to comments and plans to issue the final Decision Document (DD) in September 2011.

Mr. Goddard asked if the pipeline run is a significant portion of the cost of Alternative 4 (Modified). Mr. Gregson replied that it is, but added that because the work is outside of the Impact Area, costs to deal with UXO are lower. Mr. Goddard then asked if the pipeline would run down the existing road, and Mr. Gregson confirmed that it would. Mr. Goddard also noted that with some alternatives it appears that a portion of the plume heads straight for the landfill, but that's not the case with Alternative 4 (Modified). Mr. Gregson replied that it appears that even though the contamination isn't drawn right into the extraction wells, the capture zone has some influence and probably deflects the contamination a little to the north.

Mr. Reif inquired about the radius of influence between the extraction wells in Alternative 4 (Modified), as far as distance. Mr. Gregson replied that it's about 1,000 feet across, and someone from the audience stated that the radius is about 750 feet. Mr. Reif then asked if the distance between the wells might be modified, and whether it might make sense to shift them to the south slightly, given the lobe of contamination that Mr. Goddard just mentioned. Mr. Gregson replied that optimizing the extraction well locations could be considered in the design phase. Mr. Gonser reminded the team that that southern portion is the Chemical Spill 19 (CS-19) plume, which is really part of the AFCEE cleanup program. He also clarified that the current well layout is conceptual in nature, and much subsequent work will be done to determine the best locations. He also noted that the extraction wells are meant to capture the high mass areas, and reiterated that a lot of work will be done to find the best locations.

Ms. Steele asked Mr. Gregson to discuss the differences between the different alternatives in terms of any projected potential impacts on any public water supply or private wells. Mr. Gregson confirmed that there are no public water supply wells in the area downgradient, nor is he aware of any plans for supply wells there. He also noted, however, that there are a couple private wells and those residences would be hooked up to town water as part of the preferred alternative.

Ms. Sanderson asked Mr. Gregson to point out Bourne wells 2 and 5. Mr. Gregson replied that they are off the map, to the south, farther south than the Monument Beach well field. Ms. Barth asked Mr. Gregson to point out the location of the Upper Cape Regional Technical School, which he did.

Mr. Panni asked if steady-state pumping conditions are assumed when determining the time and cost of cleanup for active remedies. Mr. Gregson replied that they are. Mr. Panni then suggested that realistically the time and cost could be less than projected, given that the system will be optimized as time goes on. Mr. Gregson confirmed that that's correct.

Agenda Item #5. Central Impact Area – Unexploded Ordnance

Mr. Gonser noted that despite numerous studies and significant amounts of data, there are so many variables and so much uncertainty that it's very difficult to determine how many UXO exist and how to deal with them. He said, "There aren't any real good numbers."

Mr. Gonser then stated that UXO can present a potential future groundwater source, as the rounds contain Composition B (60% RDX and 40% TNT) and their casings could corrode over time, exposing the filler. He also said that the IAGWSP feels comfortable (based on sampling, excavations, and removals) that the current sources have been addressed, and he added that the idea of dealing with a potential future source is a very new one. Mr. Gonser further noted that UXO, as a potential future source, would be expected to be located at the same places as the current contamination – that is, the duds would have landed around the same target areas where ordnance exploded successfully.

Mr. Gonser reported that as part of the effort to determine the number of UXO at the Central Impact Area, quarter-acre test plots were dug up and the UXO counted. This work showed a range of 12 to 35 UXO per acre, with an overall average of 27 per acre. He also noted that UXO density modeling was conducted based on the examination of aerial photographs to identify craters and areas where trees were missing, consideration of proximity to targets, and aerial magnetometry (air mag) survey results. The UXO density model predicted 23 UXO per acre. Mr. Gonser further noted, however, that recent removal actions indicate 20 UXO per acre in high-density areas, where the model would have predicted 60 to 80 UXO. He also said that no one would dispute that there are easily several thousands of UXO in the Central Impact Area.

Mr. Gonser showed a slide listing the types of UXO that were found: 81mm mortars (30%), 105mm artillery shells (20%), and 155mm artillery shells (18%), all with big, thick shells – and other UXO types, including 60mm mortars, 4.2-inch mortars, and 37mm projectiles. The slide also noted that 26% of the UXO were found on the surface, 59% within a one foot depth, 76% within two feet, 90% within three feet, and 97% within four feet. Mr. Gonser noted that it makes sense that the ordnance – whether or not it explodes – would tend to stay toward the surface. He also said that it makes sense that UXO would be clustered around targets.

Mr. Gonser showed a figure of the UXO density model, with different colors representing higher and lower density areas. He said that the higher and lower density areas were found where expected, and he pointed out Tank Alley and Turpentine Road. Mr. Gonser also reported that to date, of the UXO items dug up at the Central Impact Area, 5% were breached (broken open) and 6% were cracked. For those items that are intact, the potential exists for them to corrode. He further noted that the corrosion rate is extremely variable, depending on the orientation of the item, how long it's been there, the size of the item, and soil conditions. For the most part, people talk in terms of 200 to 300 years for larger items to corrode, and 70 to 100 years for smaller items. The predicted time to the first perforation is highly variable, and no corrosion perforations were observed on UXO at MMR despite more than 70 years of exposure in some cases. And should there be a perforation, the leaching potential would probably be restricted by the narrow passage. Mr. Gonser also referred to the dissolution rate and said that a number of studies have been conducted, and these have indicated that it takes decades to centuries for a block of filler to dissolve. He also said that the rate depends on the surface area that's exposed, the orientation of the UXO, and the nature of the surrounding soil, which means there's a great deal of uncertainty.

Mr. Gonser then stated that given the number of variables and the high level of uncertainty, it's difficult to predict aquifer impacts from UXO. He also noted that it's expensive, and it's hazardous to just pick up UXO and examine them. Mr. Gonser also spoke about a modeling effort in which it was assumed, based on studies conducted at installations throughout the country, that 6% of UXO were perforated. This was put into the density estimation model at MMR, and it was predicted that no plume above 0.6 ppb would be generated. A sensitivity analysis was then done, which assumed 10 times the leaching rate, and this had the potential to create a 2 ppb RDX plume. Mr. Gonser stated that these numbers could be way off, however, and although there is a potential for impact, how big that impact could be is hard to determine at this point.

Mr. Gonser reported that UXO removal has been conducted to some level over 57 acres at MMR, and approximately 800 UXO were removed. He then showed a figure entitled “Source Clearance and Excavation Areas” and noted that it depicts areas with 25%, 75%, 85%, and nearly 100% of UXO cleared. He explained that areas with nearly 100% removal were dug up to about three feet and the soil was sifted, while at areas with 25% removal, only a surface clearance was done.

Mr. Gonser then stated that the cost to remove the 800 UXO items was about \$22.4 million, or about \$20,000 to \$30,000 per UXO item. He also reviewed estimated costs for additional removal work: about \$190,000 per acre for surface clearance (25% removal), \$570,000 per acre for selected geophysical targets (75% removal), and \$610,000 per acre for a two-foot+ clearance (85% removal), and \$1.32 million per acre (using robotics) or \$1.49 million per acre (manual) for clearance to depth (100% removal). He also mentioned that in addition to economic costs, there are safety costs (risk to UXO workers) and environmental costs (risk to habitat) as well.

Mr. Reif asked how many years it took to remove the 800 UXO items. Mr. Gonser replied that the removals occurred over the past decade. He also explained, however, that much of the removal work was conducted as part of particular investigations. Only in the past three years was the robotics work conducted to specifically remove UXO items, which is probably when most of the items were found.

Mr. Goddard asked what will be done to minimize impacts to the habitat during future UXO removal work. Mr. Gonser referred to the UXO density figure and pointed out where UXO would be cleared 50 to 100 feet along each side of a road, which would create a firebreak – a very positive thing for the environment. He noted that the base would be able to maintain the firebreak because the UXO will have been removed. He also said that surface clearance is not very disruptive to the environment, although digging down three feet could cause problems for the habitat – therefore it’s important to choose the right techniques and balance environment with value added.

Mr. Goddard noted that there had been a fire-adapted habitat in the area (low scrub oak) that was unique in New England, and it seems that’s been allowed to recede, and he’s wondering whether it will be possible to return to that fire-adapted habitat or whether it will be absorbed into the greater environment. Mr. Gonser replied that the ability to cut firebreaks will be a benefit to maintaining a fire-adapted habitat, as the controlled fires can keep the pines from overcoming the scrub oak. He also noted that the IAGWSP has paid the base to hire people to develop a fire plan. Mr. Goddard asked if that type of activity is now off limits because of removal work. Mr. Gonser explained that controlled fires are a positive for both programs – they allow for UXO to be more easily found, and they help preserve the habitat. He added that the IAGWSP has been working closely with the Massachusetts Department of Environmental Protection (MassDEP) to get some special provisions to burn at times when it wasn’t previously allowed, and right now it’s just a matter of waiting for the right weather conditions.

Mr. Goddard also asked if part of the long-term solution would be to install fencing around UXO areas. Mr. Gonser said that he believes that part of the plan would be to enhance security measures around the Central Impact Area, and added that Ms. Jennings will discuss the details of the remedy.

Mr. Dinardo said that depending on the UXO remedy, there could be a dramatic impact on LUCs in the Central Impact Area. Mr. Gonser replied that from a security standpoint, the base is a military installation and therefore already has pretty good controls in place. Nevertheless, it’s thought that perhaps a bit more can be done to keep trespassers out of the area, which was one of MassDEP’s concerns.

Mr. Cole asked if it’s correct that the heavier ordnance, with the thicker casings, is apt to be found deeper. Mr. Gonser agreed that bigger rounds have the potential to go deeper, but that’s not a sure thing, depending on how it hits, what it hits, and how it goes up. He also noted that rounds could only be fired so far at MMR, so everything is apt to reach the same height and come down with the same

velocity – although there is a little more momentum with a bigger round, so they do tend to be found farther down. He also said that it makes sense to try to pull out the maximum amount of mass of explosives in order to minimize potential impact on groundwater, which is why the IAGWSP has been looking at techniques to focus on the bigger rounds, not the surface clutter, even though they might be as much as four feet deep.

Mr. LeBlanc noted that Mr. Gregson showed a series of scenarios that assume no current source, and Mr. Gonser's presentation would argue that UXO (except in the extreme x10 case) is not the source, because it could only create a plume of less than 0.6 ppb. Mr. LeBlanc asked what actually caused the Central Impact Area plume, whether the source of the plume is being sustained, and whether the removal of UXO would affect that at all. Mr. Gonser replied that the current source would be the small particles that land on the ground after a detonation, are readily dissolved, and create a plume – and it's believed that all of these sources are gone. The IAGWSP feels comfortable that nothing is currently contributing to the plume, but UXO are considered a potential future source, and perhaps in a sense the future is now if there's a small round that's predicted to get pinhole perforations after 70 to 100 years and it's been out at the Central Impact Area for 70 years. He also said that the release rate to the environment is unknown so it's not understood whether the contaminant would dribble out slowly so that's not even detectable, or whether it would dribble out fast enough that it becomes a problem. Mr. Goddard asked if the planned treatment system could handle such a problem, should it arise. Mr. Gonser noted that Ms. Jennings will be discussing this topic, and added that this is why he mentioned that UXO are located in the same places as the sources that were removed.

Mr. Dinardo mentioned that the national modeling indicated that even if all the contaminant leached out of the larger rounds, "it would never get to the threshold." Mr. Gonser clarified that that's if it leaches out very slowly, but the leaching rate isn't known. Mr. Dinardo asked if that hasn't been the case in the investigative modeling. Mr. Gonser replied that that point hasn't been reached yet; the rounds have only been in the area for 70 years so there are no hard data to indicate what will actually happen – only corrosion studies and the like.

Mr. Dinardo also asked if there's any understanding of what percentage the estimated 4,000 to 9,000 UXO represents of the total rounds that were potentially fired at the base and caused the Central Impact Area plume. Mr. Gonser replied that those kinds of records weren't kept in the past. However, when the Army does testing now, it comes up with a dud rate of approximately 3% to 4%.

Ms. Garcia-Serrano asked if the IAGWSP plans to provide pre- and post-removal UXO density mapping. Ms. Gonser replied yes, and added that as more work is being done, it's becoming better understood what type of information is useful, and it's expected that there'll be a better idea of where the density is, where the rounds are, what their condition is, and so forth. He also noted that from a military land-use perspective, it's important to keep track of what's done in each area (and create good maps) so that areas considered safe for driving, walking, training, and so forth can be clearly identified.

Agenda Item #6. Central Impact Area – Preferred Alternative

Ms. Jennings stated that the Central Impact Area RSP document, provided to the team members tonight, fleshes out some details, but there are many more details that will be fleshed out over the coming years. She also said that the good news is that agreement has been reached, and as long as that is the case, the plan is to "keep plodding forward, even though we don't have all the answers."

Ms. Jennings then stated that the selection of Alternative 4 (Modified) was really a process of elimination. She explained that the Central Impact Area FS has been going on for many years and at one point there were about 100 alternatives on the table, most of which were eliminated over time. She then said that the preferred alternative consists of many components and many safety nets to deal with much uncertainty.

Ms. Jennings reviewed the groundwater component, noting that it involves three extraction wells located on Burgoyne Road, pumping at a rate of 550 gpm, designed to contain the plume at the road and minimize the portion of the plume that's allowed to naturally attenuate (with long-term monitoring). She also mentioned that because of the size of the area, the monitoring network is probably going to have to be expanded. She further noted that the remedy will contain options to modify the system, including the addition of another extraction well to ensure that sufficient containment is being achieved. Ms. Jennings also said that the preferred remedy makes technical sense because of being able to use the Demo 1 treatment plant, and she noted that the pipeline will be larger than what's needed right now in order to build extra capacity into the remedy, in case it's needed in the future. In addition, she remarked that the containment system will serve as "catch basin" and prevent migration until the source work is complete, and it's unknown when that will be.

Ms. Jennings reported that the enhanced groundwater monitoring network will be used to: evaluate performance of the groundwater treatment system; evaluate downgradient impacts (some sentinel wells may be installed); and evaluate impacts from the remaining source (cracked and leaking items that corrode and act as a future source). She said that everyone agrees that there are many UXO items out there, and in fact she thinks there are probably more than 9,000. She then explained that the drawing of the Central Impact Area boundary line didn't actually involve a lot of science, which means that UXO also exist beyond that 330-acre area. Regarding LUCs, Ms. Jennings noted that the primary focus is to prevent people from drinking the groundwater, so the effort will be made to ensure that no public supply wells or private wells are installed in the area until the groundwater has been restored. And, although outside of EPA's purview, the IAGWSP understands that there's good reason to implement better security measures to ensure that no one is exposed to UXO items on the surface at the Central Impact Area.

Ms. Jennings reiterated that the remedy is supposed to achieve the 2 ppb RDX standard by 2047 and the 0.6 ppb standard by 2055. However, as was pointed out, the model assumes no additional source, and it's actually not known how a future source will affect the cleanup timeframe.

Regarding the source component, Ms. Jennings stated that it was agreed that a long-term plan for dealing with UXO is needed. And it was agreed that the plan should be implemented in a phased approach. The first phase will involve 30 acres over three years, and the second phase will involve an additional 20 acres, but that's not to say that the effort will be complete at that point. Ms. Jennings noted that the source work will focus on high-density areas, using techniques that minimize habitat destruction and maximize mass removal. Details of the source work will be spelled out in work plans that will be issued after the Central Impact Area DD, which "really memorializes an agreement that we're going to move forward and do more work." In addition, Five-Year Reviews, modeled after Superfund Five-Year Reviews, will be conducted in order to: evaluate the effectiveness of the groundwater treatment system; ensure that the source control measures are working; and evaluate new source removal technologies. Ms. Jennings said that the cost of the source component is truly dependent on the degree of removal and the techniques that are used. She also said that perhaps there'll be better ways of characterizing UXO items in the future, which would eliminate some uncertainty.

Ms. Jennings concluded her presentation by reviewing "Next Steps" slides: public comment period on the RSP from July 25 through August 25, 2011 (after the FS and Source Investigation report are finalized); public information meeting/hearing on July 27, 2011; and response to comments on the RSP and DD issued September/October 2011. Ms. Jennings added that written comments can be sent to Jeanethe Falvey (EPA's public relations coordinator) and she provided her own contact information for anyone who wants to talk to her.

Mr. Reif referred to the Five-Year Reviews, said that that seems like a long interval, and asked about the reasoning behind it. Ms. Jennings replied that Superfund had set up a formal review process in five-year increments, but in this case the review process will probably be more continuous – for example, in

about three years, at the end of Phase I, the effects of what happened at those 30 acres will be evaluated. She added that the five years is a kind of stopping point to determine whether it makes sense to keep going or to change direction. Ms. Garcia-Serrano added that the Massachusetts Contingency Plan (MCP), which is the state's Superfund law, also has a Five-Year Review process built into it. She also said that it's consistent in terms of ensuring that, if new technologies are available, an attempt is made to see if it's technologically and economically feasible to implement a new technology to address the issues at hand.

Mr. Goddard noted that Alternative 6 mentions an additional 12 acres or 87,000 tons of soil removal. He then asked if it's correct that the preferred remedy pertains only to the plume, and not to the source area. Ms. Jennings replied that at one point in the FS varying amounts of source removal, based on where shallow groundwater contamination existed, were being considered – and to date, much of that has been addressed. She also said that Alternative 6 is somewhat special in that it's a ten-year alternative (as required by the Administrative Order) and in order to do that numerous extraction wells would have to be installed and additional source removal would have to be done. However, all of alternatives included the long-term component of source removal. Mr. Goddard remarked that the source removal plan is unspecified in the preferred remedy. Ms. Jennings clarified that its size and timeframe are specified – 30 acres in three years (for the first phase). Ms. Sanderson referred Mr. Goddard to page 11 of the RSP document to read about the source component. Mr. Goddard suggested that information about the source component should be included in the presentation at the upcoming public meeting.

Mr. Goddard then said that it sounds like the fire-adapted habitat is gone for the most part, and won't return. Ms. Jennings replied that she's not so certain that it's gone. She agreed that the habitat along Tank Alley and Turpentine Road is not what it once was, but there are still many other acres at the base. Mr. Goddard said that he remembers there being a unique habitat, "like a prairie" and now the same area is completely changed and he wonders how that's affected the species that lived there. Dr. Ciaranca assured Mr. Goddard, "It will always remain a fire-adapted ecosystem." He then said that Mr. Goddard's concern is warranted; however, great strides are being made. He also noted that over the past 20 years perhaps one-fifth of the habitat has been lost, but it's still probably the world's largest scrub oak barren, and is certainly the country's largest. He further noted that there's also a federal, state, and local grant to work on preserving that habitat. Ms. Jennings added that the plan is to use UXO removal techniques that don't destroy the root mass. Ms. Donovan reminded Mr. Goddard that details of the source component will be fleshed out in the work plans that follow the DD.

Ms. Valiela agreed that it should be stated at the public meeting that the preferred alternative deals with both groundwater and the potential future source. She also said that it's clear to her that the agencies and the responsible party have really "worked through" the groundwater portion, and the UXO removal is still very much work in progress. She further noted that she likes the idea of the phased approach, and she said that she thinks information about the firebreak road should be part of the public presentation since it has multiple benefits for multiple parties and is where the highest density of UXO appears to be. Ms. Valiela also mentioned that Alternative 4 (Modified) is estimated to take until 2055, the same decade when the base lease expires, which leaves a good amount of time to be dealing with the source while the groundwater is being cleaned up.

Mr. Barrette said that with respect to presenting the plan to the public, he thinks it would be wise to try to at least put forth some numbers relating to the source component, so that it's understood that the cost is being recognized – for example, use the mid-range figure of \$600,000 per acre, which would equate to \$3 million in the first five years. He also said that the public needs to know that this is subject to "lots of change and lots of learning." Mr. Goddard added that the presentation should also let the public know that the treatment system could handle any future contamination from leaking UXO that aren't removed.

Ms. Barth inquired about the time and place of the July 27, 2011 public meeting. Ms. Jennings replied that the meeting would take place in this same room (Building 1805, Camp Edwards), at 5:30 p.m.

Ms. Garcia-Serrano informed the group that MassDEP is in general agreement with Alternative 4 (Modified). However, as with past decisions, the agency is holding off on issuing a comment letter on the RSP until after the public comment period is over and comments have been reviewed. She also said that MassDEP, EPA, and all the parties have worked very cooperatively to ensure arrival at a very responsible and effective approach to addressing the groundwater and source area issues.

Agenda Item #7. Decision Document for Gun & Mortar Positions, Former A Range, and Former K Range

Mr. Gregson reported that the IAGWSP is wrapping up its investigations at the Former A Range (where soldiers fired at targets rolling down a railroad track), the Former K Range (an old rocket range), and the Gun & Mortar Positions (a series of 35 locations around the Impact Area from which artillery shells were fired), and is preparing to issue a draft DD later this year. He also showed maps of the ranges and one of the Gun & Mortar Positions.

Mr. Gregson then reviewed a slide entitled “Project Status,” which noted the following: investigations and source removal is complete; investigation reports are being finalized; no groundwater impacts were identified; no further source actions are necessary; technical information was presented in December 2010; a draft DD is being prepared; and a public meeting and public comment period are slated to occur in late summer or early fall.

Mr. Goddard remarked that the UXO matter is going to be a major issue for the Pentagon, given the hundreds of training sites worldwide. He then asked if perhaps the Pentagon has formed a special task force or taken other steps to help MMR deal with the issue, and said that he’s interested in hearing about that perspective. Mr. Gonser said that in the past two weeks he’s been to the Pentagon twice to talk to Army senior leadership about this matter. He noted that they are very concerned, but recognize that there are some issues here. He further stated that he thinks all of the agencies have come to a way that they can achieve their objectives, while at the same time doing what’s best for the environment. Mr. Gonser then said that he thinks that much of what will be done is research and technology development. Mr. Goddard suggested that MMR is a test bed, and Mr. Gonser agreed.

Mr. Goddard also mentioned sharing information with our NATO allies, as there are bases all over. Mr. Gonser replied that the Canadians in particular have been working very closely with the Army Environmental Command (AEC), the Cold Regions Research & Engineering Laboratory (CRREL), and others to look at munitions and explosives, and their ranges in particular – although all of the countries participate to some extent.

Mr. Dinardo asked if UXO might be an issue at any of the ranges outside of the military reservation, and mentioned that it would be good if the MMRCT had an update on the programs that deal with those sites. Mr. Gonser said that a program called the Military Munitions Response Program (MMRP) looks at closed, transferred, or transferring ranges, many of which are off post. The off-post ranges (such as those at Martha’s Vineyard and Wellfleet) are handled by the Formerly Used Defense Sites (FUDS) program, while the others are handled by the MMRP. He also noted that the Installation Restoration Program’s (IRP’s) Jon Davis is dealing with the MMRP sites at MMR. Mr. Davis added that a write-up in the Cape Cod Times soliciting feedback about these off-post sites generated a response from the U.S. Army Corps of Engineers (USACE) and the Army National Guard that it’s believed that there’s nothing of concern at off-post sites, since there were no issues during development at the sites, in Mashpee and Sandwich, for example. He also said that Congress doesn’t designate a lot of money for the FUDS program, which therefore has to prioritize, and these are probably not very high-priority sites.

Ms. Valiela asked if Natural Resource Damages (NRD) applies in the case of a piece of real estate that has UXO on it. Mr. Gonser said that over the years this matter has been discussed at length with the Natural Resource Trustee Council (NRTC), and the Army's position is that it would not apply because it views munitions as a pollutant/contaminant (not covered under NRD) as opposed to a hazardous substance (covered under NRD). Mr. Gonser also said that he thinks EPA's and the state's position might be different in terms of classifying UXO as a pollutant/contaminant versus a hazardous substance. Mr. Gonser then stated that the current thought with the NRTC is to try to move past these legal issues and "come to grips with what's the best overall settlement."

Ms. Valiela said that she certainly thinks that time is better spent focusing on research and cleanup of UXO than on arguing legalese, but she does think "NRD is an issue that's still out there." Mr. Gonser agreed, and added that in his view NRD shouldn't be a process where cleanup is done and then damages are assessed; rather, it should be part of the decision-making from the beginning. In other words, every cleanup-related decision should consider the possible ecological impacts, and they should be addressed (either avoided or mitigated) as the cleanup goes along.

Mr. Green noted that he is the Tribal Historic Preservation authority for the Wampanoag tribe, which is actively working through the FUDS program in areas that are in close proximity. He said that it is an active program and it's going forward. He also said that he thinks the phased approach to UXO removal at the base is the best method for now, because no matter what's done, more will always be found – and there's a plan in place to handle any leakage that occurs.

Ms. Garcia-Serrano agreed with Mr. Green that there's a lot of involvement with the FUDS program, particularly from the tribes. She also spoke about a USACE- and Army-sponsored FUDS forum that took place in Chicago this spring, which focused on the identification of all issues surrounding the UXO problem. She then explained that basically the Army is the designated component to address FUDS issues for all the military components. She further noted that is a severely under-funded program, and MassDEP and EPA are actively working to ensure that the limited dollars New England receives are maximized. The list of sites is long and "the dollars are short," so all the states and territories are facing a very real challenge. Ms. Garcia-Serrano also noted that the minutes from the FUDS forum are available through MassDEP's website, and she reported that the next path forward is to categorize all the FUDS-related issues that exist, whether policy issues, technical issues, economic issues, or impasse issues stemming from regulatory interpretation.

Mr. Goddard asked when the MMRCT could expect another update on the Textron settlement, which he thinks should be viewed as a model for reinvesting settlement money back into the base to prevent problems in the future. Mr. Gonser replied that all of the monies from the Textron settlement have been distributed and the projects are under way. He also said that based on the success of the Textron settlement, during a teleconference a couple weeks ago the Trustee representatives have decided to move forward and set up a meeting in the early fall to begin the process of determining next steps. Mr. Goddard said that he'd like to have an update on that at the MMRCT early next year.

Agenda Item #7. Announcement of Mr. Gonser's Departure

Mr. Gregson announced that tonight would be Mr. Gonser's last MMRCT/SMB meeting as he has accepted a position with AEC's technology branch in Texas. He wished him well and said that Mr. Gonser leaves the IAGWSP with a vision and a plan, and his leadership, willingness, and drive to get things done will be most missed. Ms. Donovan, Ms. Sanderson, and Ms. Garcia-Surette also wished him well and expressed their appreciation for Mr. Gonser's work at MMR.

Mr. Gonser thanked everyone for their kind words and said that his time at MMR was "probably one of the most exciting assignments of my career." He also thanked the "extraordinary team" he's worked with over the years, and said that a lot of people took a lot of personal risk, going out beyond the limits, in order to "do the right thing" no matter what the hurdles were. Mr. Gonser extended his appreciation

to everyone who took chances in order to get the job done and said that he'll certainly keep in touch from San Antonio, where he'll be in charge of the Technology Support Division.

Agenda Item #8. Next Meeting Schedule and Adjourn

The MMRCT will meet next on Wednesday, October 12, 2011. Ms. Donovan adjourned the meeting at 8:35 p.m.