

Massachusetts Military Reservation Cleanup Team (MMRCT)
Building 1805, Camp Edwards, MA
January 14, 2009
6:00 – 8:35 p.m.

Meeting Minutes

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Action Items:

1. Mr. Goddard requested that the RPMs review treated water reuse practices/policy and schedule as a future agenda item, if deemed necessary.

Handouts Distributed at Meeting:

1. Responses to Action Items from the December 10, 2008 MMRCT Meeting
2. Draft December 10, 2008 MMRCT Meeting Minutes
3. 2009 MMRCT Six-Month Look-Ahead
4. Map: CS-10 Preferred Remedy
5. Proposed Plan for Groundwater at Chemical Spill 10
6. Presentation handout: Remedial Investigation/Feasibility Study for Demo 2 – Northwest Corner – Western Boundary – Introduction
7. Presentation handout: Demolition Area 2 Remedial Investigation/Feasibility Study
8. Presentation handout: Northwest Corner Remedial Investigation/Feasibility Study

Agenda Item #1. Introduction, Agenda Review, Approval of 11/19/08 SMB/MMRCT Meeting Minutes

Mr. Field convened the meeting at 6:07 p.m. and reviewed the agenda. He asked if there were any additions or corrections to the November 19, 2008 Senior Management Board (SMB)/Massachusetts Military Reservation Cleanup Team (MMRCT) meeting minutes. No comments were offered and the MMRCT approved the minutes as written. The MMRCT members introduced themselves, after which Ms. Boghdan noted that the December 10, 2008 MMRCT meeting minutes are included in tonight's handouts for the team's review and then approval at the February meeting.

Agenda Item #2. Brief Updates

Mr. Pinaud informed the team that in reference to a request for responses (RFR) for Natural Resource Damages (NRD) groundwater restoration projects associated with the Textron Systems MMR Superfund NRD settlement, the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) has announced that a bidders' conference will take place on Monday, January 26, 2009, at 1:00 p.m. at the Bridge Bourne Hotel on Trowbridge Road in Bourne. Responses are due March 11, 2009, and the RFR can be viewed on the Massachusetts COM-PASS website. Mr. Pinaud also noted that he has with him a limited number of copies of the RFR documents for interested team members.

Mr. Field added that although the RFR appears to be soliciting response from contractors, it's actually looking for responses from any citizens, organizations, towns, water districts, and the like, which have a suggestion for a natural resource project, including budget and details that meet the criteria in the RFR.

Agenda Item #3. Six-Month Look-Ahead

Mr. Karson referred to tonight's agenda and noted that hard copies of the Chemical Spill 10 (CS-10) Proposed Plan are available at the meeting. He also reported that the public comment period on the CS-10 Proposed Plan, which is ongoing, closes on February 6, 2009, and that a public hearing on the plan is scheduled for February 5, 2009 at the Barnstable County Fairgrounds Administration Building.

Mr. Karson then reviewed upcoming MMRCT agenda items for February: Community Involvement Update; Ashumet Valley Decision Update; Ashumet Pond Phosphorus Update; Post- Record of Decision (ROD) Community Involvement (to create a framework with the team for community involvement after all of the Installation Restoration Program [IRP] RODs have been finalized); CS-20 Leading Edge Update; CS-10 and Ashumet Valley Construction Update; and Small Arms Ranges Update.

Mr. Karson also reviewed agenda items for March: CS-18 Engineering Evaluation/Cost Analysis (EE/CA) and Schedule, with a public comment period that runs from March 12 through March 25, 2009; J-1 Range Remedial Investigation/Feasibility Study (RI/FS); L Range RI/FS; Demolition Area 1 (Demo 1) Decision Document Addendum – Announcement; and Bivouac Area 4 (BA-4) Decision Document – Announcement.

Mr. Karson then reviewed agenda items for April: MMRCT Team Check-in, on the combined Plume Cleanup Team (PCT)/Impact Area Review Team (IART)'s one-year anniversary, when it would be appropriate to discuss the idea of possibly merging the MMRCT with the SMB; a CS-19 Feasibility Study/Proposed Plan presentation, which will serve as the kickoff meeting for the public comment period on the CS-19 Proposed Plan that will run from April 10 through May 10, 2009, although the MMRCT will have an opportunity to review the document for readability prior to that; CS-19 Source

Area Update; Post-ROD Community Involvement Follow-up; and Central Impact Area Update. Agenda items for May include: Demo Area 2, Northwest Corner, and Western Boundary Remedy Selection Plan; Fuel Spill 12 (FS-12) Update; CS-10 In-Situ Chemical Oxidation; Environmental Restoration Program Optimization Results (pertaining to an Air Force review of the Air Force Center for Engineering and the Environment (AFCEE) IRP at MMR; and Wellfield Optimization/Plume Metrics, which will look at how the plumes will be addressed in the future.

Mr. Karson noted that there's no MMRCT meeting scheduled for June and then reviewed agenda items for the July meeting: Residential Wells/Ponds/Harbors Sampling Results; Plans for AFCEE All-Remedies-in-Place Ceremony; Wind Turbine Update; Land-Use Controls Update (pertaining to AFCEE's effort to identify and validate the existence and operability of residential wells and irrigation wells in the Ashumet Valley, Landfill 1(LF-1)/CS-23, and Southwest plumes areas); FS-1 Update; and J-1 Range, L Range Remedy Selection Plan. Mr. Karson also mentioned that the Six-Month Look-Ahead document includes other possible topics (Wellhead Treatment vs. Aquifer Restoration, and Five-Year Review Follow-up).

Mr. Goddard asked if, along with AFCEE, the Impact Area Groundwater Study Program (IAGWSP) would be involved in the Community Involvement Update. Mr. Karson replied that that is the intention. Mr. Goddard said that he's interested in that "overarching viewpoint," which would dictate how future annual reports, plans, and so forth, are developed. He also questioned whether reuse of treated water, a matter that was discussed many years ago, should be added to the list of other possible topics, and whether a policy or some kind of guidance was ever issued. Mr. Davis noted that the reuse of treated water is happening in some instances, such as at the Veterans Affairs (VA) cemetery. Mr. Pinaud said that he vaguely remembers that there was a document pertaining to the reuse of treated water, but he's not certain whether it was ever finalized. He also confirmed that treated water is or will be reused for irrigation purposes at the VA cemetery at MMR. Mr. Davis added that water from a plume is also being used at the Ballymeade golf course, at Camp Good News, and at a tree farm in Hatchville. Mr. Goddard said that as the IRP winds down, it might be nice to have a documented procedure for reusing treated water.

Mr. Pinaud asked Mr. Goddard to clarify whether he's requesting that this topic be added as a future MMRCT agenda item. Mr. Goddard explained that his request is that the Remedial Project Managers (RPMs) review the treated water reuse practices/policy and schedule it as a future agenda item, if deemed necessary.

Mr. Dow asked if there's a plan to discuss the Aquifer Restoration vs. Wellhead Treatment topic with regard to any particular plumes. Ms. Jennings replied that the idea of this topic came about long ago when a former IART member requested that the project managers consider and calculate costs for wellhead treatment as an alternative for, she believes, the Central Impact Area. She also said that she thinks that this topic will probably be addressed in FSs that are coming out in the near future, especially on the IAGWSP side. Mr. Dow acknowledged that, as a safety measure, wellhead treatment was installed on the Coonamessett supply well, even though the plume is deeper than the zone of contribution to the well. He also said that although in the past he, along with other citizens, was strongly opposed to wellhead treatment as an alternative to cleanup, he thinks that putting wellhead treatment on a public water supply "might have been a safe thing to do."

Agenda Item #4. Installation Restoration Program – CS-10 Proposed Plan & MMRCT Input

Mr. Minior stated that AFCEE's preferred remedy for CS-10 involves: operating the current treatment system and continuing the monitoring program; installing a new reinjection well in the vicinity of the southern reinjection trench; installing a new extraction well on Currier Road, south of Sandwich Road, to capture the small lobe of contamination that's coming from the Southern Trench area and migrating off base; continuing operation of the northern lobe extraction well on Hooppole Road; continuing to

monitor the leading edge plume lobes, especially the north-central lobe; implementing land-use controls; and conducting Five-Year Reviews to ensure that the remedy continues to be protective.

Ms. Rielinger said that she recalls that more wells were going to be sampled to confirm the direction of groundwater flow before determining the location of the Southern Trench extraction well, and asked if that had been completed. Mr. Minior suggested that Ms. Rielinger might be referring to some additional work that was done on the eastern side of Johns Pond and between Ashumet and Johns Pond, in response to a request from the Massachusetts Department of Environmental Protection (MassDEP). Ms. Rielinger then asked if it's correct that the current groundwater model still shows that the southern part of the plume is heading toward the Southern Trench extraction well, and Mr. Minior confirmed that is it.

Mr. Goddard asked if it's correct that the southern and north-central leading edge lobes are being left to naturally attenuate. Mr. Minior confirmed that they are not being actively remediated. Mr. Goddard also asked if it's correct that the remedy for the main body of the plume is status quo with optimization. Mr. Minior confirmed that it is. Mr. Goddard then asked the regulators to comment on AFCEE's preferred remedy.

Mr. Pinaud said that MassDEP agrees with the status quo plan for the main body of the plume, the new Southern Trench extraction well, and long-term monitoring of the natural attenuation of the southern leading edge lobe. He also noted that MassDEP's biggest concern was the north-central lobe, which is why AFCEE was asked to resample many of the monitoring wells between Ashumet and Johns Ponds, install some drive-points in that area to confirm that the plume was where it was thought to be, and install an additional monitoring well and a couple drive-points on the eastern edge of Johns Pond to alleviate concerns about the possibility of the plume under-flowing Johns Pond and potentially affecting the zones of contribution of some downgradient water supply wells. Mr. Pinaud stated that the results of these sampling efforts showed that in fact the plume has not migrated east of Johns Pond; however, it could be underneath the pond. He also noted that current contaminant concentrations between the ponds are in the 15 to 17 parts per billion (ppb) range, although he believes they were as high as 50 ppb in the past. He said that while the recent sampling confirmed that concentrations are fairly low and it's believed that the north-central lobe will continue to attenuate, MassDEP wants AFCEE to implement a robust long-term monitoring program there. Ms. Jennings noted that the U.S. Environmental Protection Agency (EPA) concurs with MassDEP, and had the same concerns; EPA wants AFCEE to pay particular attention to the monitoring of the north-central lobe and the Southern Trench area.

Mr. Davis told Ms. Rielinger that he remembered what she had referenced earlier, and that was the installation of piezometers to measure vertical gradients to help understand whether the plume might possibly be upwelling, which was one of MassDEP's concerns. He said that he recalls that AFCEE had told the team that that work was going to be done, and then reported that no vertical upwelling was seen.

Mr. Goddard inquired about the cost of the preferred remedy and Mr. Minior was provided with a copy of the CS-10 Proposed Plan in order to look up that information.

Mr. Goddard asked if it's correct that the north-central lobe is currently known to have trichloroethylene (TCE) concentrations of 15 ppb. Mr. Pinaud spoke about the on-pond (Ashumet Pond) drilling program that was conducted many years ago, when a 100 ppb concentration was detected, and there was concern that it might migrate downgradient. He noted that concentrations between the ponds were as high as 50 ppb in one monitoring well, but those concentrations have decreased over the years. He said that MassDEP just wants to ensure that the higher concentration doesn't come up from underneath Ashumet Pond, migrate under Johns Pond, and reach the eastern side of the pond where it could potentially impact water supply wells.

Mr. Goddard questioned whether the residences east of Johns Pond are on private water. Mr. Pinaud replied that there are some private wells there. Mr. Goddard asked about some kind of sentinel system to warn of potential future impacts. Mr. Pinaud replied that AFCEE samples the wells as part of its residential sampling program. Mr. Davis added that the residential wells are shallow, and noted that the U.S. Geological Survey (USGS) has shown that water in those wells comes out of Johns Pond. He said that the water under the pond is much deeper. He also reminded the group that a sub-maximum contaminant level (MCL) detection was found in one of the residential wells a couple years ago, but it was determined that it couldn't have come from under Johns Pond. Mr. Goddard then inquired about any public water supply wells in the area. Mr. Davis noted that there is a public water supply well "way downgradient", the Mashpee Village well. Mr. Goddard asked if the regulators are comfortable that there's sufficient warning for the private wells. Mr. Pinaud replied yes, and explained that the warning system is the frequency at which AFCEE samples the private wells. He also noted that the public water supply wells have sentinel wells that are five years upgradient of them.

In response to Mr. Goddard's earlier question about the cost of the preferred remedy, Mr. Minior informed him that the cost, which includes operating the existing system, installing and operating the Southern Trench system, and implementing land-use controls and monitoring, is \$30 million. Mr. Goddard said that AFCEE's preferred remedy "sounds like a good plan" to him.

Mr. Field noted that MMRCT members could make a recommendation on the CS-10 Proposed Plan either individually, or collectively, in which case he would document the comment and submit it on behalf of the team. Mr. Davis said that AFCEE's preference is to have a team recommendation, which would stay in the CS-10 ROD. Mr. LoGiudice questioned the necessity of having a team recommendation. Mr. Davis explained that it's better to be able to say in the ROD that the cleanup team preferred the proposed remedy than to say that the cleanup team had no comment at all on it. Mr. LoGiudice remarked that he thinks AFCEE is "on top of it, and that's my recommendation."

Mr. Field then checked with the other MMRCT members at the meeting. Mr. Bostwick said that based on the available information, he thinks AFCEE is doing the correct thing. Ms. Rielinger said that she is comfortable with the proposed remedy, but also encourages a robust sampling plan for the portions of the plume that are going to left to natural attenuation.

Mr. Goddard asked if it's correct that Alternative 10, the preferred alternative, is inclusive of Alternative 3. Mr. Field confirmed that it is. Mr. Goddard then said that he concurs with the other team members on the CS-10 Proposed Plan, but doesn't recall the team voting on the Ashumet Valley Proposed Plan, or ever having team comments written up by the facilitator and entered into the public record. Mr. Field reminded him that for many decisions in the past the cleanup team came up with a collective recommendation, or a recommendation with caveats, that he would write up and email out to team members for review, after which he would submit the recommendation into the public record on behalf of the team. He also acknowledged, however, that this wasn't done for the Ashumet Valley Proposed Plan or some of the other more recent proposed plans. Mr. Goddard said that he is comfortable with AFCEE's proposed remedy for CS-10, and is also encouraging robust long-term monitoring, especially for the north-central lobe. Mr. Field noted that he would write up the team's recommendation and email it out to all team members for review, including those not present at tonight's meeting.

Mr. Goddard asked if CS-10 is the last Interim Record of Decision (IROD)-to-ROD plume. Mr. Davis clarified that CS-19 will be the last plume to go through the IROD-to-ROD process.

Mr. Dow asked if AFCEE had calculated how long it will take for contamination trapped in impermeable sedimentary layers at the northern and north-central lobes to leak out, and whether it will be at above-MCL concentrations at that time. Mr. Davis replied that the groundwater models do those calculations based on their stratigraphic information; therefore, the animations that have been shown at

past meetings account for the contamination in low-conductivity units. He also said that right now the model doesn't indicate that the plume would reach the other side of Johns Pond before attenuating to below-MCL concentrations. Mr. Davis also acknowledged, however, that there is uncertainty associated with models, and unknowns about what contamination might be coming from under Ashumet Pond. He further noted that the northern lobe was definitely found to be discharging into Johns Pond before the treatment system was installed there, and monitoring indicates that the plume has since been cut off totally and is not upwelling into or under-flowing the pond. Mr. Minior added that the northern lobe is projected to achieve the MCL around 2025.

Agenda Item #5. Impact Area Groundwater Study Program Updates

Introduction

Mr. Gregson stated that tonight's IAGWSP topics are Demolition Area 2 (Demo 2), the Northwest Corner, and the Western Boundary – three sites that have been grouped together for tonight's presentation and will be grouped together in a Remedy Selection Plan (RSP) and Decision Document. He then pointed out on the map the Western Boundary area, where the contaminant of concern (COC) is perchlorate, the Northwest Corner plume, where the COCs are perchlorate and RDX, and the Demo 2 plume, where the COC is RDX.

Mr. Gregson explained that these sites are grouped together because they have similar attributes: none of them has an active source (either the source was removed or has depleted through natural processes); none of them has any current receptors (either potential receptors are on town water or there are no receptors in the vicinity); and all of them have relatively low levels of contamination (either near or below the state MCL for perchlorate, which is 2 ppb, or the risk-based number of 0.6 ppb for RDX or the EPA health advisory of 2 ppb for RDX). Mr. Gregson also noted that because of the low levels of contamination, the proposed remedies are also similar.

Mr. Gregson then reviewed the schedule for the three sites: MMRCT presentation on the RI/FSs tonight; develop the combined RSP; hold a public comment period on the RSP in May/June 2009; and issue the final combined Decision Document/Response to Comments in August 2009.

Demolition Area 2 Feasibility Study

Mr. Nixon noted that the Demo 2 source area, which is located in the upper northern portion of the base, was used in the 1970s and 1980s for demolition training with explosives under 10 pounds. He also reported that RDX, the COC in Demo 2 soil and groundwater, was detected at three locations at the site – the u-shaped berm, a 30-foot central area, and the soil pile. He then mentioned that no perchlorate has been detected at the site, and noted that as a 2004 Rapid Response Action (RRA), 750 cubic yards of soil was removed from the source area and treated in the low-temperature thermal desorption unit. He also showed a photograph of the Demo 2 source area and pointed out a white stick indicating the presence of monitoring well 16 (MW-16). Mr. Nixon further noted that the RRA removed contamination down to below detectable levels, and then unexploded ordnance (UXO) sweeps were conducted but no UXO was found. He also mentioned that RDX that already entered the vadose zone (the dissolved phase beneath the ground surface) prior to the RRA has been dissipating and is now below detectable levels in the source area. Mr. Nixon then showed a photograph of the site post-excavation, noting that native seed was put down to help restore the natural habitat.

Mr. Nixon showed depictions of the Demo 2 plume from 2006, 2007, and 2008, noting that the maximum RDX detection in 2006 was 6.7 ppb, and the maximum detection in 2007/2008 was 1.7 ppb. He also noted that the RDX health advisory is 2 ppb, the state standard is 1 ppb, and the risk-based level is 0.6 ppb.

Mr. Nixon reported that in 2006 the Demo 2 plume was about 3,500 feet long (about half the length of the Demo 1 plume, and with much lower concentrations), 850 feet wide, and extended 40 feet down into the aquifer. In 2008, the plume was 3,200 feet long, 500 feet wide, and extended 30 feet down in the aquifer. He also noted that before the start of any remedial actions the Demo 1 plume contained about 50 pounds of RDX, while the Demo 2 plume contains only about 1.7 pounds of RDX. The Demo 2 plume also contains a small amount of HMX, near the source area, with the highest concentration detected being 0.91 ppb, and no HMX was detected at all in the last couple of sampling rounds.

Mr. Nixon displayed a figure of the plume that included concentration trends over time at key monitoring wells. He noted that the maximum concentration at the source area well, MW-16, was about 2.7 ppb, and has since dropped to below detectable levels. He also pointed out the yellow dashed lines that indicate the average trend over time, and noted that concentrations in each of the wells is decreasing and the plume is going away. Mr. Nixon then pointed out the maximum contaminant concentration, 6.7 ppb in MW-404, where the concentration has since decreased, and noted that the maximum RDX concentration in the Demo 1 plume was around 300 ppb.

Mr. Nixon also displayed a time-series figure showing modeled Demo 2 plume conditions (mapped to the 0.6 ppb contour) for the years 2007 through 2012. He noted that the maximum concentration predicted to migrate beyond the base boundary is 0.4 ppb, which is less than the risk-based level. He also made a point of noting that the time series shows ambient plume migration – meaning without treatment of any kind.

Mr. Nixon continued by explaining that the purpose of a feasibility study is to evaluate different options for managing and possibly treating a plume. He also reviewed the response action objectives, which he noted were developed to mitigate and prevent existing and future risks to human health: prevent or reduce residential exposure to water containing unacceptable concentrations of RDX (with the 0.6 ppb value being used for the FS), and return usable groundwaters to their beneficial use wherever practicable within a timeframe that is reasonable given the particular circumstances of the site.

Mr. Nixon stated that three different alternatives were evaluated: Alternative 1 – No Action; Alternative 2 – Long-term Management (monitoring and land-use controls); and Alternative 3 – Active Treatment with Monitoring. Under Alternative 1, which relies on natural processes (attenuation, dispersion, dilution) to take care of the plume, monitoring would be discontinued, there would be no institutional or access restrictions, the RDX contamination would dissipate to below 2 ppb by 2011 and below 0.6 ppb by 2013, and the cost would be about \$140,000 (for well abandonment and site closure documentation).

Mr. Nixon also noted that under Alternative 2, which also relies on natural processes to take care of the plume, the existing long-term monitoring program would continue, an additional well cluster would be installed at the base boundary, institutional controls would be implemented to protect against the use of groundwater until risk-based levels were achieved, the RDX contamination would dissipate to below 2 ppb by 2011 and below 0.6 ppb by 2013, and the cost would be about \$800,000 (for the additional well cluster, monitoring, and reporting). Alternative 3 adds to Alternative 2 a groundwater pump-and-treat system that includes an extraction well pumping at 100 gallons per minute and a mobile treatment unit (MTU), the installation of piezometers near the extraction well to measure hydraulics, and 5,600 feet of electric lines to constantly draw the approximately 10 kilowatts needed to power the system over the three years it would be expected to operate. Mr. Nixon noted that the electrical demand for the active treatment would be equivalent to about 10 to 15 single family homes in this area. He also reported that under Alternative 3, which costs \$3.7 million, remediation goals would be met one year sooner than under Alternatives 1 and 2. He also showed a table entitled “Comparison of Alternatives” that included all the information he’d already reviewed about each alternative plus the predicted year to achieve background (0.25 ppb) for each alternative (2022 for Alternatives 1 and 2, and 2018 for Alternative 3).

Mr. Nixon concluded his presentation by reviewing next steps: resolve agency comments on the Demo 2 RI/FS; prepare the RSP; hold a public comment period on the RSP in May/June 2009; and prepare the Decision Document/Response to Comments in July 2009.

Mr. Goddard asked if there's anything downgradient of the plume that could potentially be impacted. Mr. Nixon replied that the only thing downgradient is Shawme State Forest, and the campground there is on town water. Mr. Goddard then asked where on the base boundary the new well cluster would be placed. Mr. Nixon pointed out the location on the map, noting that it would be fairly close to an existing gas line. Mr. Goddard also asked if Mr. Nixon is confident that the plume is fully detached from its source. Mr. Nixon replied that he wouldn't say that there's no chance that it is not. Mr. Goddard asked if there are wells that would detect if the plume was still attached to its source. Mr. Nixon referred to MW-16, at the source area, and also pointed out wells downgradient of the source area. Mr. Goddard then inquired about continuing the monitoring at those wells. Mr. Nixon indicated that the wells would continue to be monitored for some time, although the idea of discontinuing monitoring would be discussed if they tested nondetect repeatedly. Mr. Goddard said that his recommendation would be an alternative that's less costly, but involves more frequent monitoring of wells near the source area in order to ensure that any potential leftover slug of contamination is detected. Mr. Nixon said that the IAGWSP thinks that monitoring those wells twice a year is working out quite well, and he noted that the maximum concentrations aren't very high. Mr. Gonser added that the long-term monitoring program would be optimized as appropriate. He also indicated that it's important to monitor to ensure that contamination is not migrating off base.

Ms. Jennings said that while she agrees with Mr. Goddard that monitoring the source is important, EPA would not accept that as the only monitoring of the plume, as there are still some exceedances of the risk-based number. Mr. Goddard mentioned the modeling and Ms. Jennings noted that there's never a guarantee with modeling. Mr. Nixon described it as a "trust-but-verify" situation, where one trusts the model but verifies it.

Mr. LoGiudice remarked that the cost difference between Alternatives 2 and 3 is tremendous. Mr. Nixon confirmed that the difference is nearly \$3 million. Mr. LoGiudice said that he would be in favor of Alternative 2, with continued monitoring as Ms. Jennings suggested. Mr. Field reminded the group that the official public comment period will occur in May of this year.

Mr. Dow asked if there are any future potential drinking water resources north of the Demo 2 plume, as defined in the water resource study at the northern part of the base. Mr. Gonser replied that the closest potential resource would be long-range water supply well 1, but that is farther east. He also noted that there are no potential water resources to the west because that area gets into the confluence of the two moraines, which is a difficult area in which to drill, and therefore an unlikely place for a water supply well.

Mr. Dow then inquired about the monitoring plan that will be used to decide whether or not to have active treatment at the leading edge (which is near the moraine, where it would be difficult to predict whether the contamination would dilute or retract into impermeable sediments). Mr. Nixon replied that the existing monitoring network provides the information needed to make a decision among the three alternatives. He also noted that the network is made up of 22 well screens, most of which are sampled twice a year, with the ones outside the plume sampled once a year. He also said that if for some reason conditions changed, an active remedy could be implemented.

Northwest Corner Feasibility Study

Mr. Gallagher showed a map of the Northwest Corner study area, which includes both Camp Edwards and town of Bourne property. He then reviewed activities that occurred in the Camp Edwards portion of the Northwest Corner: small unit maneuvers with small arms blank rounds, smoke grenades, and

various forms of perchlorate-containing pyrotechnics (including artillery simulators, illumination signals, and flares); small arms firing at the L-3 Range (a former infantry squad and platoon combat firing range used in the 1940s and possibly the early 1950s); artillery firing from Gun Position 12 (GP-12), GP-14, GP-26, and GP-19 into the Impact Area. The most commonly used rounds at the gun positions were 105mm and 155mm howitzer rounds, both high explosive (HE) and inert. Mr. Gallagher also mentioned that GP-19 was also used for training by military engineers to practice operating heavy equipment. He further noted that activities at sites located upgradient of the Northwest Corner included artillery and small arms firing at former A Range, an anti-tank range where 37mm and 40mm (both HE and practice rounds), as well as rocket rounds, were fired. Later the range was used as a 50-caliber machinegun range. Farther upgradient is the Central Impact Area, which received firing from artillery and mortar positions throughout Camp Edwards. Mr. Gallagher further noted that, unrelated to the military was an annual fireworks display conducted from 1996 in an area approximately 650 feet northeast of GP-19. He explained that fireworks contain as much as 70% potassium perchlorate.

Mr. Gallagher reported that soil investigations at the Northwest Corner showed perchlorate concentrations from very low ppb levels up to about 64 ppb, exclusive of data collected after the 2003 fireworks display. Perchlorate concentrations detected the day after the 2003 fireworks display, however, ranged from 4.5 ppb to 7,560 ppb, with the soil samples generally having been collected as discrete samples along Canal View Road. Results from multi-increment sampling (MIS) conducted in 2008 at some of the locations where high concentrations of perchlorate were previously detected, however, indicated that the perchlorate in soil is depleting rapidly – with results showing only two perchlorate detections in nine MIS grids, with a maximum concentrations of 1.1 ppb. Mr. Gallagher also mentioned that metals detected in the soil were generally consistent with background concentrations.

Mr. Gallagher continued by discussing the perchlorate concentrations in groundwater at the Northwest Corner, noting that they ranged from around the method detection limit up to 26 ppb. He also noted that the EPA drinking water equivalent level (DWEL) for perchlorate is 24.5 ppb, while the state's MCL is 2 ppb (the level used when considering alternatives in the RI/FS). He further noted that the current maximum perchlorate detection in groundwater is 14.3 ppb. Mr. Gallagher then reported that RDX concentrations in groundwater have ranged from the reporting limit up to 15 ppb. He also reminded the group that the EPA health advisory for RDX is 2 ppb, the risk-based level is 0.6 ppb, the state Groundwater 1 standard is 1 ppb, and the current maximum RDX detection is 5.6 ppb.

Mr. Gallagher noted that the Northwest Corner perchlorate plume is quite large, extending over a large part of the study area, while the RDX plume is very narrow. He also mentioned that generally the higher RDX concentrations are co-located within the perchlorate plume, but deeper in the aquifer, while the lower concentrations (between 0.6 and 2 ppb) are located upgradient of GP-19. Mr. Gallagher then showed cross-sections of the Northwest Corner and pointed out the shallow perchlorate plume and the “rather complex” RDX plume, which has concentrations varying with depth and appears to be discontinuous at its upgradient lower-concentration edge. He also said that the RDX plume is believed to be detached from its source and possibly had multiple sources – one perhaps at the former A Range, with the deeper concentrations tracking back all the way to the Impact Area.

Ms. Jennings said that there have been many discussions about that “sliver of an RDX plume” and EPA had thought that the IAGWSP was in agreement that it should be drawn as a series of plumelets that run “more perpendicular to the gradient of flow” rather than the way it is drawn, which she believes doesn't make sense technically. She further noted that as it's currently drawn, the RDX plume is essentially going cross-gradient, which isn't something that's seen anywhere else on the base. Mr. Gregson replied that drawing the plume as Ms. Jennings suggested is something that's still being considered. He also said that he's had several conversations with the USGS's Denis LeBlanc about this issue, and he said that the plume contours could be redrawn a little bit more parallel to the canal, and mentioned the possibility of a higher permeability unit, or preferential flow path, which could explain

the plume's orientation. Mr. Gregson also said although a decision hasn't been reached on which is the "most likely case at this point," he doesn't think that it would change the alternatives, and added that he thinks the current depiction indicates fairly well "where the source might be coming from."

Mr. Gallagher added that the plume drawing honors the data. He already noted that the IAGWSP has had lengthy discussions with Mr. LeBlanc about the RDX plume, and one of his thoughts was that perhaps there just isn't a lot of hydrologic control in that area – that it isn't known exactly how the water table is oriented there, and perhaps the plume would be perfectly logical if there were some piezometers or wells that could be used to redraw the contours. Mr. Gallagher stated that the IAGWSP has been trying to figure out why the plume is at a strange angle with the groundwater contour lines. He also noted that he'd failed to mention earlier that the IAGWSP had provided town water hookups to the three residences with private wells in the Northwest Corner area, and the two commercial supply wells in the area were decommissioned and are no longer in operation.

Ms. Jennings indicated that it would be beneficial to have Mr. LeBlanc in the same room with everyone at the same time. She also said that she's sure that a resolution will be reached on how to draw the plume, which is something that will need to be done before a final decision is made. She also reported that EPA just announced a 15 ppb health advisory for perchlorate and is seeking advice on the need to create a drinking water standard for perchlorate that's different than the DWEL, which was originally put out by the National Academy of Sciences. She also noted, however, that EPA chooses cleanup levels for evaluating alternatives by determining which of the federal, state, or risk-based numbers is most stringent, which in the case of perchlorate is 2 ppb, and in the case of RDX is 0.6 ppb.

Mr. Gregson then made a point of noting that the groundwater contours in the Northwest Corner study area are very close together, which indicates an increase in groundwater flow, such that the water and the contaminants that travel with it move much more rapidly toward the canal than plumes migrate on other parts of the base. Ms. Rielinger asked if it's correct that both the RDX and perchlorate plumes are discharging into the canal. Mr. Gallagher replied that it's believed that both are discharging into the canal, but some natural attenuation processes could also be occurring.

Mr. Pinaud noted that MassDEP has not yet received the RI/FS report and so hasn't had the chance to look at the details. He then asked if it's correct that the skating rink that's located along the canal, on Route 6A, had two wells that were used for making ice. Mr. Gallagher clarified that the rink had one well for making ice, which to his knowledge has been decommissioned, and three environmental monitoring wells. Mr. Pinaud asked if the rink is now on town water for making ice and for potable use. Mr. Gallagher confirmed that it is. Mr. Pinaud also referred to the Army Corps of Engineers rest stop along the canal, which has a private well, and asked if that is within the boundaries of the Northwest Corner study area. Mr. Gonser replied that it is north of the study area.

Mr. Pinaud then asked if the groundwater contours on the other side of the canal also move toward it. Mr. Gallagher replied that they do, and added that the canal is a divide on both sides. Mr. Pinaud noted that this wouldn't be a case then where the plumes might be under-flowing the canal; rather the canal would be the ultimate discharge point. Mr. Gallagher confirmed that it is.

Mr. Dow suggested that the shallow RDX contamination might be from burning of excess propellant bags at the gun positions, rather than from the Central Impact Area. He also said that he's never understood why the RDX plume is so thick. Mr. Gallagher clarified that while 2,4-DNT is a constituent of artillery propellant, RDX is not. He also said that he would speculate that the thickness of the plume might be the result of multiple sources of RDX, given that the concentrations vary with depth and "it doesn't seem to be uniform and it is pretty thick."

Mr. Dow asked if 2,4-DNT was ever detected in the area. Mr. Gallagher replied that it was detected at the gun positions "specifically up here" but not in the groundwater. Mr. Dow noted that 2,4-DNT has been detected in groundwater at some locations on the base. Mr. Gallagher said that it has been

detected at a handful of locations, but he doesn't think concentrations ever exceeded 1 ppb. Mr. Gregson confirmed that that is correct, but not in groundwater at the gun positions. He also noted that the gun positions are being investigated as a separate operable unit, including the gun positions in the Northwest Corner area.

Mr. Gallagher then continued with his presentation by showing time series figures depicting groundwater model simulations for the Northwest Corner perchlorate plume. He noted that the entire perchlorate plume is predicted to dissipate to below 2 ppb by 2012. He also showed similar figures for the RDX plume and noted that it is predicted to dissipate to below 2 ppb by 2012 and to below 0.6 ppb by 2022.

Mr. Gallagher noted that four potential remedial alternatives were identified: Alternative 1 – No Action; Alternative 2 – Long-term Management (monitoring and institutional controls); Alternative 3 – Focused Extraction; and Alternative 4 – Plume-Wide Extraction. He reviewed Alternative 1 – No Action: groundwater contamination would be reduced through natural processes; monitoring would be discontinued; no institutional or access restrictions would be implemented; perchlorate would dissipate to below 2 ppb by 2012; RDX would dissipate to below 2 ppb by 2012 and to below 0.6 ppb by 2022; and the cost would be \$193,000 (for well abandonment and site closeout documentation). He also reviewed Alternative 2 – Long-term Management: groundwater contamination would be reduced through natural attenuation processes; long-term groundwater monitoring would continue; institutional controls would be implemented to protect against use of the groundwater; cleanup levels would be achieved in the same timeframes as Alternative 1; and the cost would be \$636,000 (for monitoring, reporting, well abandonment, and site closeout documentation).

Mr. Gallagher then reviewed Alternative 3 – Focused Extraction: groundwater contamination would be remediated using two extraction wells installed to intercept the plume at the base boundary (treatment would occur at an on-base ex-situ facility using carbon and ion exchange resin); long-term groundwater monitoring would continue; institutional controls would be implemented to protect against use of the groundwater; perchlorate would dissipate to below 2 ppb by 2012; and RDX would dissipate to below 2 ppb by 2012 and to below 0.6 ppb by 2016. Mr. Gallagher noted that the only improvement in cleanup time is that RDX would dissipate to 0.6 ppb six years sooner than with Alternatives 1 or 2, which, he explained, is primarily due to the high groundwater velocities in the area caused by the steep gradient. He also reported that the cost of Alternative 3 would be \$5.4 million, including well installation, treatment system construction, and operation & maintenance. Mr. Gallagher also spoke about Alternative 4 – Plume-Wide Extraction, noting that it has all the same components as Alternative 3, but involves active treatment within the entire plume using four to six extraction wells, at a cost of \$8 to \$9.1 million. He also noted that the cleanup timeframes are the same for Alternative 4 as they are for Alternative 3.

Mr. Gallagher then showed a slide entitled "Comparison of Alternatives" and noted that while there is a six-year acceleration in RDX cleanup to 0.6 ppb with the active treatment alternatives, the cost difference between the active treatment alternatives and the long-term management alternative is very significant. He concluded his presentation by reviewing next steps: prepare the RSP; hold a public comment period in May/June 2009; and prepare the Decision Document/Response to Comments in August 2009.

Ms. Rielinger asked if Alternative 4 would require access in the neighborhood for the installation of extraction and reinjection wells. Mr. Gallagher replied yes, there would be some implemental issues associated with that alternative.

Mr. Goddard asked if the town water hookups provided by the IAGWSP are to the Bourne Water District. Mr. Gallagher confirmed that they are. Mr. Goddard then asked if the Bourne Board of Health has a copy of the plume shell in its records to ensure that no private wells are installed or reinstated in

that area. Mr. Gallagher replied that the IAGWSP has shared such documents with the Board of Health in the past. Mr. Gonser added that part of the implementing institutional controls is to make sure that the right parties have the right information and check on that periodically, which is part of Alternatives 2, 3, and 4. Mr. Gallagher further noted that the IAGWSP had sent fliers out to everyone in that neighborhood to inquire about existing wells, sampled all the known wells, and hooked up some residences to town water.

Mr. Goddard then asked whether Mr. Gallagher means that the perchlorate is degrading when he says that it's depleting. Mr. Gallagher clarified that perchlorate will not degrade unless in anaerobic conditions; rather, for the most part it is migrating downgradient. Mr. Goddard also asked if the IAGWSP is confident that the shallow perchlorate contamination is from the fireworks and not anything upgradient. Mr. Gallagher replied that there's been much discussion about whether the perchlorate is from fireworks vs. military training, but at this point it doesn't really matter – the IAGWSP is looking at alternatives to address the plume regardless of the source.

Mr. Goddard also asked what is meant by multi-increment sampling. Mr. Gallagher explained that MIS, a sampling technique developed by the Cold Regions Research and Engineering Laboratory and specifically designed for explosives analysis, involves the collection of many sub-samples from what's called a decision unit. He noted that previously five- to nine-point composite samples would be collected from a sampling grid, while the MIS technique uses a minimum 30-point composite. Mr. Gallagher also said that the MIS work at the Northwest Corner involved collecting both shallow and deeper samples to see if there were detectable concentrations at depth.

Mr. Bostwick inquired about the location of the second commercial well in the Northwest Corner area. Mr. Gallagher replied that that well was in a condominium complex; however, two or three years ago a developer paid to abandon that well and the entire condominium complex is now hooked up to town water. Mr. Bostwick asked if that had any impact on the data collected by the IAGWSP. Mr. Gallagher replied that the IAGWSP had been sampling that well periodically but can no longer do so now that it's been abandoned. He also noted, however, that that data point was not absolutely necessary.

Mr. Bostwick then questioned why the perchlorate and RDX plumes are wrapped together, when the RDX plume is "kind of a mystery" and there's a six-year difference in cleanup time in the alternatives. Mr. Gallagher acknowledged the six-year difference, but said that he would stress that the RDX plume would fall below the 2 ppb health advisory within the same timeframe that the perchlorate plume would fall to below the 2 ppb state MCL. He also noted that concentrations below 2 ppb are very low concentrations, which might not even be detectable in the influent. Mr. Bostwick said that he thinks that more study should be done on the RDX plume, since there don't seem to be many answers to why it's doing what it's doing.

Mr. LoGiudice asked if there's any evidence that the plume discharging into the canal is harming the fish or crustaceans. Mr. Gallagher replied that he has no data on that, but also indicated that the contaminant would not be detectable once it discharges into the canal. Mr. LoGiudice asked if there's no harm then in just allowing it to discharge into the canal. Mr. Gallagher replied that he wouldn't make an absolute statement like that; however, the contaminant concentrations are very low and a huge volume of water washes through the canal daily. Mr. LoGiudice asked if it's correct that there's no evidence of fish being harmed. Mr. Gallagher replied that there is not.

Mr. Minior asked if the IAGWSP has numbers for the amount of mass captured and uncaptured by the various alternatives. Mr. Gallagher replied that the IAGWSP did not do modeling runs for the two active treatment alternatives, but instead did travel time analysis, given that the No-Action alternative modeling indicated that it wouldn't make much sense to model active treatments. He also reported, however, that the perchlorate plume contains approximately 29 pounds of perchlorate and the RDX plume approximately three pounds of RDX. Mr. Minior suggested that it's important to present

information about mass captured/mass uncaptured in order to properly evaluate the cost/benefit of the alternatives. He also said that if the IAGWSP can conceptually determine how much mass is in the plume, it should be able to talk about how much mass is captured and uncaptured, in order to help people understand the costs associated with the alternatives.

Mr. Minior then said that it appears that the majority of the perchlorate contamination is associated with the fireworks, and so he's questioning whether there's another potentially responsible party (i.e. the proponent of the fireworks) who may have some financial liability for the cleanup, which the IAGWSP could recover.

Ms. Jennings stated that it's known that once perchlorate is on the soil it dissipates very quickly; and unfortunately, soil data from the time when military training was occurring is not available to prove how much that might have contributed to the plume. She also said that it was "just by chance, without even telling the agencies" that the IAGWSP conducted pre- and post-fireworks sampling that helped demonstrate that fireworks were contributing to the source – but how much they were contributing and whether military activities contributed more or less will never be known. She then commended the IAGWSP for not worrying about responsibility parties and instead moving on toward evaluating and implementing alternatives.

Ms. Jennings then said that she is in complete agreement that information about the benefit of mass capture vs. natural attenuation is important to making a decision, as was the case with the Ashumet Valley plume decision. She also noted that this is the kind of information that needs to be presented to senior managers at the regulatory agencies in order to justify a decision. Ms. Jennings said that the IAGWSP needs to find some way to calculate that information and include it in the FS, before a decision is made.

Ms. Jennings reminded the group that the regulatory agencies hadn't yet seen the draft RI/FS, and also noted that sometimes, when working through an FS, a different alternative comes to mind than those that have already been put forth. She then said that she wants to put a new option on the table, but first she referred to Alternative 3, noting that by the time the two base boundary extraction wells are installed, the contamination will already have passed that point, which doesn't make sense. Instead she recommended developing and evaluating an option that involves installing two extraction wells along Route 6A, with one of the wells right in line with the RDX plume. She noted that this alternative would probably cost around \$5 million. Ms. Jennings said that she thinks that conceptually this option makes more sense than Alternative 3, or for that matter, Alternative 4. She added that she'd rather fully analyze one active treatment alternative by identifying mass capture, time to achieve cleanup, and cost of cleanup, and use that analysis to bring back to senior management and make a decision on whether it's worthwhile to have active treatment vs. monitored natural attenuation.

Mr. Davis stated that he sees no comparison at all between the Northwest Corner and Ashumet Valley plumes. He noted that the Ashumet Valley remedy was installed because of the effects of uncertainty, because of the residents in the area, the large downgradient area that was a concern, and the cranberry bogs in that area. He further noted that the cleanup timeframe for the Ashumet Valley plume is a lot longer than three years. Mr. Davis then said that he knows of no other plume in his entire time with the cleanup program that warrants less time spent on it than the Northwest Corner plume.

Ms. Jennings clarified that she's not saying that an active treatment remedy should be chosen based on what was done at Ashumet Valley. Rather, she's saying that the right pieces of information are needed in order to support any decision that's made, and unfortunately, she thinks that the alternatives currently on the table "just frankly don't make sense." She explained that she is just asking the IAGWSP to make a correction by providing the right information in the FS so the same facts can be evaluated as with any other plume, and a decision can be made.

Mr. Gonser stated that these three sites are being handled together rather than individually because they are all “pretty easy ones.” Therefore, the IAGWSP has put them in one package that can be moved through the process without spending a lot of effort on review times.

Mr. Dow said that he doesn’t understand why the plume is the same size now as it was in 2003, if the groundwater is moving so rapidly and perchlorate concentrations in soil have diminished so tremendously since then. Mr. Gallagher replied that the plume is not the same size, as the FS, once available, will show. He also noted, however, that it has taken more time than expected for the perchlorate go to into solution and entirely discharge into the water table – nevertheless, clear trends in the data suggest that the plume is migrating downgradient. Mr. Dow then said that perchlorate, which is a salt, has a geochemical behavior like nitrate, which moves rapidly from surface soil into the groundwater, especially in an area where there’s a steep hydraulic gradient and rapid flow. He said that it’s not clear to him why the perchlorate wouldn’t move at the same pace as nitrate from surface soil to groundwater. Mr. Gallagher replied that although perchlorate is very soluble, it still takes time (and multiple rain events) to flush completely through the vadose zone and into the water table. He noted that some of the unsaturated zone modeling that was done indicates that it could take as long as three years to flush through entirely. Mr. Dow said that the same argument could be made for nitrate, based on studies conducted at Woods Hole that indicate that nitrate moves quite rapidly from the atmosphere to the surface soil to the groundwater. Mr. Gallagher said that it’s important to remember that the water table in this area is more than 100 feet deep. He also reiterated that the data support that the plume is moving downgradient and attenuating.

Western Boundary Feasibility Study

Mr. Gallagher stated that, similar to the Northwest Corner, the Western Boundary is not so much a discrete site, but a general area where relatively low levels of perchlorate have been detected. He also noted that the Western Boundary includes part of Camp Edwards and a downgradient area in the town of Bourne. He then reported: that the source of the perchlorate is potentially from the deposition of particles from perchlorate-containing pyrotechnics; that the maximum perchlorate concentration detected in soil was 5.8 ppb, with the state standard being 100 ppb; and that the source is likely depleted, although other potential source investigations (gun and mortar positions and Small Arms Ranges) are still ongoing. Mr. Gallagher then named the investigation sites in the vicinity of the Western Boundary study area: GP-2, GP-24, Mortar Position 1 (MP-1) MP-4, MP-5, MP-6, MP-7, and MP-8, and the former D Range.)

Mr. Gallagher reported that the IAGWSP has been monitoring groundwater in the Western Boundary area since 1999, with sampling for perchlorate beginning in 2000. He noted that 164 well screens at 79 well clusters have been sampled for perchlorate, with results showing perchlorate concentrations ranging from less than 1 ppb to 2.89 ppb. He also reminded the group that presently the DWEL for perchlorate is 24.5 ppb and the state MCL for perchlorate is 2 ppb. Mr. Gallagher then noted that currently all concentrations are below 2 ppb, although a small area at MW-233 and MW-267 tested slightly above 2 ppb in the past (most recent data show a 0.37 ppb detection at MW-233 and nondetect at MW-268).

Mr. Gallagher stated that, using 2007 data, the model predicted that the plume would drop to below 2 ppb by 2008, which is consistent with data from MW-233. However, it is possible that the plume has moved beyond MW-233 but has not yet encountered the MW-268 well screen. To be cautious, the IAGWSP conducted an FS to determine potential remedial actions to address this small plume: Alternative 1 – No Action, and Alternative 2 – Long-term Management.

Mr. Gallagher noted that under Alternative 1: groundwater contamination would be reduced through natural processes; long-term monitoring would be discontinued; no institutional controls would be implemented; and the cost would be \$278,000 (for well abandonment and site closeout

documentation). With Alternative 2: groundwater contamination would be reduced through natural processes; long-term monitoring would continue; institutional controls would be implemented as appropriate; and the cost would be \$343,000 (for groundwater monitoring, well abandonment, and site closeout documentation). Mr. Gallagher reiterated that the model predicted that the plume would already have dropped to below the 2 ppb state MCL. He then reviewed the schedule: prepare the RSP; hold a public comment period in May/June 2009; and prepare the Decision Document/Response to Comments in August 2009.

Agenda Item #5. Adjourn

Mr. Field noted that the MMRCT would meet next on Wednesday, February 11, 2009 and then adjourned the meeting at 8:35 p.m.