Massachusetts Military Reservation Cleanup Team (MMRCT)
Building 1805, Camp Edwards, MA
February 11, 2009
6:00 – 8:10 p.m.

Meeting Minutes

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Action Items:

1. Mr. Davis will see that Denis LeBlanc includes in his March MMRCT presentation an explanation for the changing shape of the phosphorus plume at Ashumet Pond.

2. AFCEE will provide Ed Baker with an electronic version of the 2/11/09 Ashumet Pond presentation handout.

3. Dr. Blount will look into answering David Schlesinger's question about whether the 2007 phosphorus plume correlates with the chlorophyll-a time series data.

4. A discussion on Community Involvement Plan(s) will be included in the March MMRCT agenda.

Handouts Distributed at Meeting:

1. Responses to Action Item from the January 14, 2009 MMRCT Meeting
2. Presentation handout: Camp Edwards Training Update
3. 1/28/09 EPA letter to Shawn Cody, MANG, re: Training Range and Impact Area, MMR
4. 1/28/09 EOEEA letter to Shawn Cody, MANG, re: Upper Cape Water Supply Reserve; Environmental Management Commission, Small Arms Range Plan Approval
5. Fact sheet: Camp Edwards/ Massachusetts Military Reservation Small Arms Range Working Group State Update 3, Fall 2008
6. CD: J Range, K Range, and T Range BMP Operations, Maintenance, and Monitoring Plans – 1/23/09
7. Presentation handout: 2008 Ashumet Pond Update
8. Presentation handout: Construction Update
9. Presentation handout: CS-20 Leading Edge Update
10. Map: 11/08 Massachusetts Military Reservation Groundwater Findings

Agenda Item #1. Introduction, Agenda Review, Action Item Review, Approval of 12/10/08 and 1/14/09 MMRCT Meeting Minutes

Mr. Field convened the meeting at 6:03 p.m., reviewed the agenda, and noted that a written response to the action item from the January 14, 2009 Massachusetts Military Reservation Cleanup Team (MMRCT) meeting had been provided. He also reviewed the March 11, 2009 MMRCT agenda topics and noted that the meeting is expected to be fairly brief. Mr. Field then asked if there were any corrections or additions to the December 10, 2008 or January 14, 2009 MMRCT minutes. No comments were offered and both sets of minutes were approved as written.

Agenda Item #2. Small Arms Ranges Update

Mr. Cody reminded the group that Massachusetts Army National Guard (the Guard) received approval from the U.S. Environmental Protection Agency (EPA) and the Environmental Management Commission (EMC) to operate Tango Range, which has a STAPP bullet-catcher system. During the time period of the Tango Range pilot program, which ran through December 31, 2008, the Guard received congressional money to build two more STAPP systems, at Juliet and Kilo Ranges, and worked with the Small Arms Ranges Working Group (SARWG) on preparing those ranges and gaining approval for their use. Because of the gap between the completion of the Tango Range pilot program and the submittal of the final report, while petitioning EPA and the EMC for approval to utilize Juliet and Kilo Ranges, the Guard also requested an extension of the Tango Range pilot program, which was granted. Mr. Cody noted that currently the Guard is working on finalizing a punch-list before utilizing Juliet and Kilo Ranges, and is looking to submit the Tango Range pilot program final report on April 2, 2009. The final report will include information on the number of bullets fired per lane, the type of bullets fired, mass balance, operation and maintenance (O&M) issues, successes, and lessons learned.

Mr. Cody reminded the group of the problems with the gluing of the seams of the cover of the Tango Range STAPP system and the incident last fall when the contractor conducted a mass balance (sifting) operation and spilled granules on the ground. He then noted that Dr. Mike Ciaranca and Camp Edwards Range Control worked with the contractor, which has agreed to provide a completely new top cover for the system, with the Guard having to pay only for delivery and labor costs. It's hoped that the new

cover, which will be installed sometime in the spring, will resolve the water issues in the Tango Range STAPP system. Mr. Cody also mentioned that there is some water in the Juliet and Kilo Range STAPP systems, but very little compared to what was seen at the Tango Range system. He then showed a slide detailing the punch-list items at Juliet Range (a 17-lane range) and Kilo Range (a 29-lane range), noted that the items are either completed or under way, and said that the plan is to begin utilizing these ranges in March 2009.

Mr. Cody also spoke about the Supplemental Environmental Impact Report (SEIR), noting that is has not been submitted yet because the Guard wanted to first complete its work at Juliet, Kilo, and Tango Ranges, as well as make additional progress on some other training issues, such as simunitions. He noted that the projected SEIR filing date is March 2009, after which the document will be published in the Environmental Monitor for a public comment period that runs through April.

Mr. Cody concluded his presentation by providing an update on pyrotechnics. He noted that in large part in response to the identification of perchlorate as a problem at MMR, the Army has reformulated its pyrotechnics. The Army determined that the munitions that contained the greatest amount of perchlorate, percentage-wise, were grenade and artillery simulators, and so reformulated a "perchlorate-free" grenade simulator and an artillery simulator containing only a small amount of perchlorate associated with the whistle sound that occurs before detonation, which the manufacturer says is entirely consumed as long as the whistle goes off as designed. Mr. Cody noted that over the next several months the Guard will be working with the Army Corps of Engineers to conduct some testing of the new simulators to ensure that no perchlorate or other contaminants of concern (COCs) are released through their use.

Ms. Grillo asked if the Guard has identified the COCs for which the simulators will be tested. Mr. Cody replied that the only known COC at this time is perchlorate; however, the Guard is working with the regulatory agencies to review the complete list of the simulators' makeup and identify any other COCs.

Mr. Dow asked about the status of sampling the soil and groundwater for dinitrotoluene (DNT) at the former howitzer mortar sites. Mr. Gregson replied that groundwater sampling results for the six DNT isomers yielded all nondetects except for 2,4-DNT in one of the wells. And based on the fact that none of the other isomers was seen in groundwater, the Impact Area Groundwater Study Program (IAGWSP) doesn't think it's necessary to do the soil sampling.

Agenda Item #3. IRP Ashumet Valley Phosphorus Annual Update

Dr. Blount stated that this update on the health of Ashumet Pond focuses on data from 2008 as well as historical data that have been collected since 1999 as part of the Installation Restoration Program's (IRP's) monitoring plan. He then noted that the tropic health of Ashumet Pond declined from 1960s to 2000 as evidenced by a general reduction in the water clarity of the pond, increased frequency and intensity of algae blooms, and decreased oxygen levels in the deep part of the pond (the hypolimnion) during the summer. He also explained that these changes were largely driven by an increase in the amount of phosphorus entering the pond, some of which came from an increase in housing development in the area, but with a substantial amount of the phosphorus loading coming from the discharge into the pond of a treated-wastewater groundwater plume from the former MMR wastewater treatment plant.

Dr. Blount then reviewed the conclusions/findings pertaining to the pond, noting that he would review them again at the end of his presentation: the alum treatment that was instituted in 2001 produced substantial and steady improvement in the pond's trophic health between 1999 and 2008; preliminary results from a limited barrier performance monitoring event are mixed, suggesting the possibility that the effectiveness of the barrier that was installed to keep the plume from reaching the pond may be declining; expanded performance monitoring of the barrier will be conducted in the spring or summer

of 2009; an unusually large algae bloom occurred in the fall of 2007 (during the fall turnover when the pond mixes, commonly producing algae blooms), and likely resulted in the observed reduction of oxygen and increased total phosphorus and ammonium in the hypolimnion during the summer of 2008; and pond monitoring data collected in 2009 will be used to determine if the lower oxygen and increased total phosphorus and ammonium in the hypolimnion is temporary, or is an indicator that the health of the pond is starting to decline.

Dr. Blount then showed a figure of the phosphorus plume as it was drawn in 1999 and pointed out the 5 milligrams per liter (mg/L), 4 mg/L, and 3 mg/L contours. He also showed a figure of the plume as it was drawn in 2007, noting that the plume appears to have started to dissipate and that the concentrations discharging into the pond had decreased notably – generally around 1.5 mg/L, as opposed to the 3 to 4 mg/L in 1999.

Dr. Blount stated that in response to the problems that developed at the pond over the years, the Air Force Center for Engineering and the Environment (AFCEE) developed a remedial strategy to treat the phosphorus plume and protect the pond, which consisted of: shutting down the wastewater treatment plant in 1995 to terminate the source of the problem; conducting long-term monitoring of the pond and the phosphorus plume, beginning in 1999; applying an alum treatment at a depth of 35 feet (to prevent fish-kills) over a 28-acre area in the central deep part of the pond in the summer of 2001 to reduce phosphorus levels and prevent further degradation of the pond (as a result of the alum treatment, phosphorus levels in the pond declined steadily from 2002 through 2006); and, in late August 2004, installing a geochemical barrier containing zero valent iron (ZVI) to intercept the phosphorus plume before it discharges to the pond, thereby reducing the phosphorus load.

Dr. Blount then noted that the ZVI barrier, which is about 300 feet long, 40 feet wide, and 2.5 to 3 feet thick, was created by mixing native sandy pond sediments with about 3% by weight ZVI and is located along the part of the pond bottom where the highest concentrations of phosphorus were known to be discharging. He also mentioned that the barrier was not intended to intercept the entire plume, but just the highest-concentration portion that was discharging into the pond. Dr. Blount stated that the barrier removes phosphorus from the plume, thereby reducing the levels entering the pond and helping to prevent levels from returning to the higher levels observed prior to the alum treatment. He also noted that the lifespan of the barrier was estimated to be 20 to 25 years.

Dr. Blount also displayed a figure depicting the drive-points that were installed prior to installation of the barrier to show where the highest phosphorus concentrations were discharging and where the barrier should be located, and he pointed out the areas of 3 mg/L, 2 mg/L, and 1 mg/L concentrations. He then displayed photographs of the pond shore prior to and after installation of the barrier, noting that the pond level was lower prior to installation and that the sediments took on a slightly orange tint from the iron after the installation.

Dr. Blount then showed schematic drawings of the barrier at high water levels and average water levels and explained that, as expected when the barrier was designed, a narrow band of the discharging phosphorus plume is not intercepted by the barrier when water levels are high, although a substantial amount of the plume is still being captured.

Mr. LoGiudice asked if the pond's fish population is bothered by the phosphorus plume. Dr. Blount replied that to the best of his knowledge, the fish are not bothered by it.

Dr. Blount continued by displaying a figure depicting temporary drive-points that were installed in July 2006 at 3 feet (below the barrier), 1.5 feet (in the middle of the barrier), and 0.5 feet (at the top of the barrier). He noted that, as indicated by the colors on the figure, a lot of phosphorus is coming up through the sediments below the barrier, but only a narrow band (that part between the shoreline and the barrier) remains by the time it reaches the top of the barrier.

Dr. Blount displayed a figure that showed the permanent monitoring network, which was sampled as part of the barrier performance monitoring conducted by the U.S. Geological Survey (USGS) in summer of 2008. He reported that most of the lab data are not yet available, and the limited field data that are available show mixed results. [NOTE: AFCEE was mistaken regarding lab data for the 2008 USGS barrier sampling. This event had field data only; the 2009 barrier sampling event will include laboratory data.] He then noted that an expanded monitoring event will be conducted this spring and summer, which will involve the installation of drive-points over much more of the barrier. Dr. Blount also pointed out the USGS diffusion chamber samplers (which extend into the bottom of the pond about 2.5 feet and take samples every few inches) and the USGS horizontal multiport samplers (which go across the barrier at two different depths – just below the barrier and near the top of the barrier).

Dr. Blount then displayed a series of line graphs representing phosphorus concentrations at diffusion chamber 4 (DC4), DC5, and DC6, and noted that each shows that the drop-off in concentrations at the barrier is fairly abrupt, but slightly less abrupt at DC 5 and DC6, which are farther offshore. Mr. Davis added that the thickest blue lines on the graphs represent data from August 2008, the thick blue line represents data from August 2006, and the thin blue line represents data from July 2005. He also noted that the other line represents specific conductance. Dr. Blount explained that specific conductance measurements pertain to the natural salt content of the water, and these lines on the graphs show that basically the water is not changing in quality, other than the phosphorus being removed.

Dr. Blount also displayed line graphs for a pair of horizontal multiport samplers – one at the bottom of the barrier, and the other near the top. He explained that the samplers are essentially two PVC pipes with sampling holes, which go from near-shore to off-shore. He also pointed out that the 2008 data from the deep sampler indicate a climb, then a dip, another climb, and then a decline in phosphorus concentrations at about 20 feet offshore. He then pointed out that the 2007 data from the shallow sampler indicate that the phosphorus was "removed pretty substantially," while the 2008 data indicate that although some phosphorus was removed, a lot was still getting through. Dr. Blount then noted that these permanent monitoring devices have been in place since 2004, so there's some question as to whether their integrity may be starting to fail. The upcoming drive-point program will seek to determine if that is the case, or if there is some problem with the barrier.

Mr. Goddard asked if the barrier works by adsorption. Dr. Blount replied that it does. Mr. Goddard asked if there's a holding capacity or if the phosphorus breaks down over time. Dr. Blount replied that once the phosphorus is locked up it remains, and does not break down. He also noted that the barrier improves as it gets older because the iron develops a very high adsorption capacity as it oxidizes. He then suggested that if there is a problem with the barrier it could be due to the iron in the barrier "converting more slowly than the phosphorus is coming through." Mr. Goddard asked if it's correct that the barrier improves as the iron rusts over time, and whether this was factored in to the 20- to 25-year lifespan of the barrier. Dr. Blount replied that these statements are correct. Mr. Goddard then asked if 20 to 25 years are enough to address the entire plume that's discharging. Dr. Blount replied that it's believed to be. He also noted that the plume is breaking up and if that trend continues it will be a much smaller plume 20 years from now. Mr. Goddard then asked for confirmation that there's a goal to determine whether the sampling devices are faulty, and Dr. Blount confirmed that there is.

Ms. Jennings asked if it's correct that the DC4, DC5, and DC6 line graphs generally indicate that phosphorus concentrations are lower where it's shallow and increase with depth. Dr. Blount confirmed that this is correct. Ms. Jennings then asked Dr. Blount to explain the "weird anomalies" that the graphs show. Dr. Blount replied that these anomalies are seen in different spots each time. He also noted that these are field data and are not as precise or accurate as laboratory data, which are not yet available. Ms. Jennings remarked that it's interesting that in some instances peaks in the graph lines, which represent different years, correspond (for example, at DC4, two peaks occurred at two different years). She then questioned whether that might indicate some kind of breach in the barrier. Dr. Blount said that he doesn't think so because the water is coming almost straight up at that point, and coming through

quite quickly. He said that he thinks it's more likely that there's a condition in the chemistry of the barrier itself that affects the water quality so that the detections run higher and give a false positive. Ms. Jennings then asked if anomalies were seen in both field data and lab data from previous years. Dr. Blount replied "quite often we don't see that," but this doesn't mean that blips aren't occasionally seen, although the field data and lab data correlate fairly well. He also noted, however, that the lab data are definitely better quality.

Mr. Pinaud said that based on looking at the 1999 and 2007 plume depictions it seems that the plume is beginning to change directions, moving farther south. Dr. Blount agreed that the plume has that appearance and said that it may be partly due to flow or to the plume cleaning up and starting to break up. He also noted that one of the maps has fewer data points. Ms. Jennings pointed out the difference in the two plume depictions in relation to a road shown on the map. Dr. Blount acknowledged that there appears to have been some smearing of the plume, but also noted that it's important to remember that the phosphorus concentrations discharging into the pond were much lower in 2007 than in 1999. He also said that the USGS used different sampling points for the two plume depictions. Mr. Davis said that he would ensure that the USGS presentation on the wastewater plume (which also includes nitrate, ammonium, and other contaminants), scheduled for the March MMRCT meeting, includes an explanation for the changing shape of the plume. He also noted that the wastewater plume contains much different contaminants than the IRP is accustomed to addressing.

Mr. Dow said that it's his understanding that phosphorus levels in the 30 part per billion (ppb) range cause problems with eutrophic conditions, therefore phosphorus at 250 ppb in a section of pore water that mixes up into the pond could be a serious source of phosphorus pollution. Mr. Field asked what would be considered a healthy concentration of phosphorus in pond water. Dr. Blount replied that it would be very low, probably around 3 ppb. He also said that the point of the barrier is to stop the phosphorus from coming into Ashumet Pond.

Mr. Dow then asked if the higher total phosphorus concentrations in the alum area are attributed to the algae bloom in 2007. Dr. Blount replied that as part of the pond cycle, phosphorus buildup in the deep part of the pond eventually works its way into the shallow part. Mr. Dow also mentioned that when the algae die more carbon accumulates in the sediment, making it more anaerobic "and have a positive feedback from the phosphorus being released from the sediment." He then asked if when measuring total phosphorus in the pond, whether there's been any differentiation made between the total phosphorus in the dissolved component that's available to the algae versus the organic fraction, which is less available. Dr. Blount replied that the program looks at total phosphorus and at dissolved phosphorus, and the assumption is that total phosphorus includes organic and inorganic, while dissolved phosphorus is mostly inorganic. Mr. Dow inquired about the percentage of total phosphorus that is dissolved phosphorus. Dr. Blount replied that it's generally a relatively small fraction of the total phosphorus. He then said that total phosphorus includes phosphorus in the algae itself, and some algae can use particulate phosphorus. In general, however, the more sensitive indicator of what phosphorus is available for the algae is the dissolved phosphorus, rather than total phosphorus.

Mr. Dow also asked whether an estimate has been made of the inorganic phosphorus loading from the alum-treated area versus from the phosphorus plume. Dr. Blount replied that such an estimate has been made in the past, but not recently. He also said that the phosphorus released from the deep sediments doesn't get into the pond entirely; rather, some of it gets re-adsorbed and taken back down to the sediments. However, there isn't a method to estimate what fraction gets mixed into the pond and what fraction goes back to the sediments.

Dr. Blount then continued with his presentation by reviewing a slide entitled "Pond Remediation Goals and Metrics," noting that improvements in the health of the pond are defined by lower phosphorus levels, reduced production of algae (as indicated by chlorophyll a), increased water clarity, and increased oxygen in the hypolimnion during the summer. He also showed a figure entitled "Typical

Seasonal Changes in Ashumet Pond," pointed out the dissolved oxygen (DO) levels portion, and noted that as the pond mixes in the fall, oxygen is mixed into the deep part of the pond, causing the iron – along with most of the phosphorus – to go back to the sediments; however, some of the phosphorus makes it to the upper part of the pond where the algae can get to it.

Dr. Blount then referred to a line graph entitled "Average Total Phosphorus in Epilimnion (0 to 26 feet)," noting that most algae growth occurs in the epilimnion, or shallow part of the pond. He then pointed out that a very substantial drop in total phosphorus in the epilimnion occurred after the alum treatment, it stayed flat after the installation of the barrier, and it looks like there may be a slight increase in 2007/2008. He said that it's not known whether this is a significant trend, and added that overall phosphorus has dropped dramatically. Mr. Davis made a point of noting that the total phosphorus levels shown in the graph are expressed as micrograms per liter (µg/L). Dr. Blount added that prior to the alum treatment the average was 30 µg/L for much of the year, but that average has since dropped to around 10 to 12 µg/L, "which is a big improvement."

Dr. Blount then showed a line graph entitled "Average Total Phosphorus in the Hypolimnion (32 to 63 feet)," pointing out the big phosphorus buildup in summer before the alum treatment, the decrease after the alum treatment, the subsequent drop and then slight increase, and then improvement after installation of the barrier. He also noted, however, that the average total phosphorus went up quite a bit in 2008, which may be a result of the big algae bloom in the fall of 2007.

Dr. Blount displayed a line graph entitled "Anaerobic Sediment Release of Phosphorus," noting that the data were gathered by the School of Marine Science and Technology at Dartmouth, which sent divers to the deep part of the pond to collect a 6-inch core from the very bottom of the pond. The core is taken back and incubated (basically allowed to sit in a cylindrical device, with water over the top of the core) and the organic material in the core uses up the oxygen. Once the oxygen is used up, the measurement of phosphorus concentrations begins. Dr. Blount noted that in 2000 (pre-alum treatment) the water had gone anoxic in 10 days and phosphorus began to be released at a tremendously high rate of speed, which flattened out with time. In 2003, after the alum treatment, the phosphorus release is much less, but then overall increases, with a big increase in 2008. Dr. Blount said that this generally matches what was seen in previous plots, particularly with regard to 2008.

Dr. Blount showed a line graph entitled "Average Epilimnion Chlorophyll a (0 to 26 feet)" and explained that chlorophyll a is a pigment in the algae used to analyze how much algae is in the pond. He noted that there were spikes in algae growth prior to the alum treatment, and that concentrations started to decline after the treatment, continued to decline after installation of the barrier, and spiked significantly in fall of 2007, which correlates to the big fall turnover algae bloom at that time. Dr. Blount said that the phosphorous probably started to build up in 2007, causing growth of the algae, which then died and began sinking to the bottom of the pond. The next year the effect in the deep part of the pond began to be seen, but was not seen in the shallow part of the pond.

Dr. Blount also showed a line graph entitled "Water Clarity" and explained that water clarity is measured using a sechhi disk, which is a black and white disk that's lowered into the water – the clearer the water, the greater the depth at which the disk can be seen. Prior to the alum treatment, the secchi disk disappeared at a depth of 10 feet, so the water was quite cloudy. Dr. Blount also mentioned that in spring and early summer the pond naturally becomes very clear, adding that overall secchi depths continue to improve until 2008, when the secchi depth decreased somewhat, although it was still much better than it was prior to the alum treatment. In addition, Dr. Blount showed a line graph that illustrated the correlation between sunlight penetration and secchi depth, noting that the amount of light that penetrates the water is important to algae growth. He also showed a line graph entitled "Average Hypolimnion Ammonium-N" and pointed out the decreasing trend until 2007 and the small jump in 2008, which he noted is probably due to the big algae bloom in 2007.

Dr. Blount then showed a graph entitled "Summer DO Depletion Trends," noting that the first quarter-inch of water above the bottom of the pond is the first to go anoxic, and that in winter there's oxygen all way down to the bottom of the pond, but in summer, only down to a depth of about 20 to 22 feet. He also said that the graph shows general improvement in DO after the alum treatment and installation of the barrier, with the best conditions in 2006. He then displayed another graph, entitled "Carlson's Trophic Classification Index for Ashumet Pond," and explained that the index pertains to the trophic state of the pond: eutrophic describes a very algae-rich pond, oligotrophic describes a very clear pond, and mesotrophic describes a pond somewhere in the middle. Dr. Blount noted that mesotrophic ponds make the best fisheries, and are also clean enough for swimming. He also explained that based on clarity (secchi disk), total phosphorus, and chlorophyll a, Ashumet Pond moved from upper mesotrophic/lower eutrophic to lower mesotrophic/upper oligotrophic (for clarity). He noted that the overall clarity of the pond and chlorophyll a levels have continued to improve through 2008; however, the increase in total phosphorus may be a leading indicator of future clarity and chlorophyll a results.

Dr. Blount then reviewed the following summary statements: phosphorus concentrations in the epilimnion (where most of the algae growth occurs) have decreased substantially and remain low, despite slight phosphorus increases in the last year or two; phosphorus and ammonium concentrations in the hypolimnion increased in the summer of 2008; overall chlorophyll a concentrations have remained low although a major algae bloom may have occurred in November of 2007; early summer secchi depths decreased in 2008, reversing a five-year trend toward clearer water; and the summer oxygen depletion reached a minimum in 2006 (which is good), but has increased slightly and progressively in 2007 and 2008.

Dr. Blount also reviewed findings: the alum treatment and the geochemical barrier have produced substantial and steady improvement in the trophic health of the pond between 1999 and 2008; preliminary results from a limited barrier monitoring event suggest that the effectiveness of the barrier may be declining; expanded performance monitoring of the barrier will be conducted in spring 2009 to confirm or deny that the barrier's effectiveness is declining; the 2007 fall algae bloom likely resulted in the observed reduction of oxygen and the increased total phosphorus and ammonium in the hypolimnion during summer of 2008; and pond monitoring data collected in 2009 will be used to determine if the lower oxygen and increased total phosphorus and ammonium in the hypolimnion is temporary, or an indicator that the health of the pond is starting to decline.

Mr. Goddard asked if it's possible to take a core from the barrier to determine its state. Dr. Blount replied that some cores from the barrier were collected a few months ago, not all the data are available yet, and a barrier report will be issued, probably this summer.

Mr. Foster asked if drive-points are installed directly through the barrier. Dr. Blount replied that they are, and explained that the sandy material collapses back in on itself, as the drive-points are small, only about a half- to a quarter-inch in size.

Ms. Jennings remarked that the Ashumet Pond phosphorus situation really involves two unique issues – the discharge of the wastewater plume, which the barrier is supposed to address, and the phosphorus in the sediments in the deep part of the pond. She then questioned the cause of the high level of phosphorus in the deep part of the pond, and suggested that perhaps there's nothing wrong with the barrier, it's just that the deep part of the pond requires another alum treatment. She also asked why Dr. Blount keeps tying what's happening in the deep part of the pond back to the barrier. Dr. Blount replied that they are related. He explained that there are two sources of phosphorus to the pond – the internal load (which is regenerated from the sediments) and the external load from the plume discharging (which is heavier than it should be). If the external load had never occurred, the internal load would be at a much lower level. Therefore, both must be addressed. Dr. Blount also reiterated that the barrier was never intended to cut off all the phosphorus coming into the pond, as that would have been much too intrusive and expensive. Rather, the hope was that the barrier would cut off enough of the

phosphorus that it would take a very long time for the alum treatment to be reversed. Dr. Blount noted that a lot of good progress has been seen, but perhaps a slow decline is ahead, which may mean having to go back and apply another alum treatment.

Mr. Marchessault asked if, after the work is completed this spring, it will be possible to definitively determine the cause of the problem. Dr. Blount replied that a dramatic backslide over the next year would likely indicate that the current alum treatment has run its course. However, if conditions improve or remain about the same, the idea would be to wait to see what happens the following year and determine whether there is some kind of trend.

Mr. Dow suggested measuring the sediment oxygen demand where the alum treatment was applied, because a buildup of carbon in the sediment could make the problem worse. Dr. Blount replied that there's some evidence that that could be the case, but it's too early to say definitively.

Mr. Baker, president of the Mashpee Environmental Coalition, requested to be provided with an electronic version of the presentation handout so he could enlarge the figures and view them more easily. Dr. Blount agreed to fulfill his request. Mr. Baker also said that although he hasn't always been "a fan of the activities on the base in past years," he is very pleased with current activities and would like to say thank you.

Mr. Schlesinger asked if there was a correlation between the 2007 phosphorus levels and the chlorophyll a levels in the pond. Dr. Blount replied that he cannot recall at this time. Mr. Schlesinger also asked about the frequency of data collection. Dr. Blount replied that chemistry data and algae data were collected once a month. Mr. Schlesinger then asked if the deeper depths of oxygen depletion correlated to the lower pycnocline. Dr. Blount replied yes, around 1999/2000 "the anoxic conditions actually penetrated through the pycnocline for a short distance," but during the steady improvement that was seen after the alum treatment, by 2006 had dropped well below what he would call the thermocline. Mr. Schlesinger remarked, "So it's not physical control; it's biological." Dr. Blount agreed. Ms. Grillo noted that providing an answer to Mr. Schlesinger's first question should be noted as an action item, and Mr. Field assured her that it would be.

Mr. Field asked if it's understood why the large algae bloom occurred in 2007. Dr. Blount clarified that he thinks that this is what happened. He also noted that there's always an algae bloom in the fall, but a relatively large one may have occurred due to perfect conditions. He also mentioned that a major blue/green algae bloom occurred the summer after the alum treatment was applied, and that was due to an abrupt hot spell that heated the upper part of the pond so quickly that it became sealed off from the nutrients that were coming off the pond bottom.

Agenda Item #4. Brief Installation Restoration Program (IRP) Updates

Ashumet Valley Decision Update

Mr. Davis stated that AFCEE and the regulators have reached concurrence on the language in the Ashumet Valley Record of Decision (ROD), which involves the installation of an extraction well in the southern part of the plume. He noted that the final draft ROD will be submitted to the agencies by March 9, 2009, and the final ROD will be signed in May 2009. Mr. Davis also said that whichever comes last – the signing of the ROD or the completion of the construction of the new extraction well – will constitute Remedy-in-Place for Ashumet Valley.

CS-10/Ashumet Valley Construction Update

Mr. Davis reported that AFCEE has two construction projects under way – one for the Ashumet Valley plume and another for the Chemical Spill 10 (CS-10) plume. He showed a map of the southern end of the Ashumet Valley plume and pointed out the location of the new extraction well, pipeline run, mobile

treatment unit (MTU), and the discharge bubbler in the Backus River. He also noted that the MTU and bubbler are planned to be located on private property and that AFCEE is awaiting the property owner's response to an easement offer. Mr. Davis also said that if the offer is not accepted, there are some more distant vacant lots that could serve as alternative locations, in which case the treated water would probably be returned to the aquifer via a reinjection well. He further noted that construction work will pick up once access has been obtained.

Mr. Davis then showed a map of the CS-10 Southern Trench area and pointed out: the new extraction well; the pipeline, which leads to the Sandwich Road Treatment Plant; and the new reinjection well. He said that all of this work has been completed and the system is expected to begin operating very soon.

Mr. Davis also mentioned that the Ashumet Valley easement offer was mailed to the property owner on January 12, 2009, and that startup testing for the new CS-10 Southern Trench system is scheduled to begin next week. An asphalt overlay on Currier and Sandwich Roads will be done in April, and additional restoration in the spring. Mr. Davis concluded his presentation by showing a number of photographs of the Ashumet Valley and CS-10 construction activities.

CS-20 Leading Edge Update

Mr. Davis showed a map of the Southwest plumes (CS-21, Fuel Spill 29 [FS-29], CS-20, and CS-4) and reminded the group that at the September 2008 MMRCT meeting he'd reported that a new monitoring well would be installed at the leading edge of the CS-20 plume, where AFCEE had been unable to install an extraction well and where monitoring has been ongoing. He then pointed out the portion of the CS-20 plume that is attenuating and heading south, as well as a monitoring well where 1.8 ppb perchloroethylene (PCE) was detected, which led to the installation of the additional monitoring well. Mr. Davis also noted that there's a water supply well to the south (Falmouth's Crooked Pond well, which has wellhead treatment on it), and then reported that drilling results from the new monitoring well showed nondetects and a couple of below reporting limit (BRL) concentrations. He said that it's thought that the BRLs may be an indication that the pond is influencing the plume, and monitoring well screens are being set at the appropriate locations to ensure good coverage of the area. Mr. Davis also reported that the new monitoring well will be integrated into the monitoring well network, for which a sampling event is scheduled for March 2009. He further noted that the new well will also be added to the Falmouth's Crooked Pond Water Supply Well sentry program.

Mr. Goddard asked if it's correct that PCE concentrations are not above the maximum contaminant level (MCL). Mr. Davis pointed out locations where concentrations exceeded the MCL, but noted that there are no MCL exceedances "down here." Mr. Goddard then inquired about the above-MCL detections. Mr. Davis pointed out where PCE was detected at 7 ppb and noted that there was a detection in the low teens in a well on Raspberry Path. Mr. Goddard asked if the purpose of the new monitoring well is to see how much of the upgradient contamination reaches that area. Mr. Davis confirmed that it is. Mr. Goddard then asked if there's any hydraulic influence from Deep Pond that would cause the plume to head toward it. Mr. Davis said that the pond must have some influence, but at the depth that's being seen it's likely not (drawing the plume toward it). Mr. Goddard asked if the plume is expected to disperse and dilute before reaching the public water supply well. Mr. Davis replied that it is, and also noted that AFCEE monitors Deep Pond.

Agenda Item #5. Adjourn

Mr. Field stated that the MMRCT would meet next on Wednesday, March 11, 2009. Mr. Goddard asked if a review of community relations/public outreach would be included in an upcoming MMRCT agenda. Mr. Field noted that this is under discussion, and it's possible there might be a brief update at the next meeting. He then adjourned the meeting at 7:40 p.m.