Response to Comments
Proposal to Amend EPA's AO for Tango, Juliet and Kilo Ranges to allow the firing of lead ammunition at MMR
January 28, 2009

Introduction

In a letter dated September 25, 2008, the Massachusetts National Guard ("MANG) requested that the United States Environmental Protection Agency ("EPA") modify the Scope of Work ("SOW") to Administrative Order SDWA I-97-1030 ("AO2") issued pursuant to Section 1431(a) of the Safe Drinking Water Act with respect to three small arms ranges at the Massachusetts Military Reservation ("MMR"). First, the MANG requested that its currently effective authorization to fire with lead ammunition for a pilot project at T (Tango) Range be extended past its expiration date of December 31, 2008. Second, the MANG requested approval to resume firing with lead ammunition at two small arms ranges on MMR, known as J (Juliet) and K (Kilo) Ranges, with a bullet trap system, an accompanying pollution prevention plan and proposed environmental monitoring program. On October 23, 2008, EPA responded to this request and proposed modifications to AO2 subject to a 30 day public comment period. The comment period expired on November 24, 2008. EPA received several sets of comments from the public during this period. This document contains a summary of the comments received and EPA's responses.

Response to Comments

1. *Comment:* The commenter requested information on how the public can get a copy of the environmental report on the effectiveness of the bullet trap and information on the firm/agency that wrote the report. Specifically, the commenter requested information on the report/section that best describes the actual bullet trap system and the company who makes and installs the system. The commenter also asked if EPA did its own testing of this system or if EPA relied on MANG data and whether there was a non-MANG company or agency that oversaw the testing phase.

   Response: The following web site contains several documents with information responsive to the comment: http://www.mass.gov/guard/E&RC/startpage.htm. Section 3.0 in the document entitled Draft J Range Best Management Practices: Operations, Maintenance and Monitoring Plan (OMMP), prepared by URS Corporation, dated October 22, 2008, contains a description of the bullet capture system, known as the STAPP system. STAPP is also the name of the company that manufactures and installs the system: http://www.stappebc.com/index.html. There are similar descriptions of the STAPP bullet capture system found in the OMMPs for Tango and Kilo Range.

   The STAPP system at Tango Range has been in use for approximately 1 year. EPA has conducted six independent inspections of the STAPP system at Tango Range. The Massachusetts Department of Environmental Protection (Mass DEP) and the MMR Environmental Management Commission (EMC) have also conducted additional independent inspections of the system. In addition, the Mass Guard is required to collect environmental performance data including groundwater, soil and soil pore water samples and submit this data to EPA, the Mass DEP and the EMC for

review. This data provides important information on the performance of the system with respect to environmental protection.

2. *Comment:* The commenter stated "I firmly believe that all small arms fire should be conducted on government property at the former Otis Air Base property. It is a great problem for the residents of West Barnstable to have a firing range located near our homes....all range activities should be relocated to government land where it can be monitored better and not interfere with the peace of mind it's local residents. I feel like I live in a war zone here and it is nerve rattling and simply unfair to us who would like to enjoy our properties and peace of mind and spirit. I am not concerned about the makeup of bullets, but I am concerned that all fire range shooting be done on government property far away from homeowners."

   Response: While EPA understands the concerns raised by the commenter, EPA's role is to ensure that the training conducted at the MMR be conducted in a manner that is protective of human health and the environment including the sole source aquifer beneath the site. Concerns or questions pertaining to firing ranges outside of the MMR should be directed to the local Boards of Selectmen.

3. *Comment:* The commenter expressed concern about the opening of the new ranges at the MMR, as well as the continued use of the Tango Range. The commenter stated that "it is clear from the events of last Monday that the National Guard has behaved irresponsibly in following the protocols set forth in the LALAT, which were suspended that day. The particulates that were produced from the cleanup have been added to the Somerset and Sagamore pollution, in the county that has the worst air in the Commonwealth. Being a person with lung disease, I cannot afford to have any more pollution in the air, and the same goes for many thousands of elderly residents of the Cape. I would therefore recommend that you permanently suspend small arms fire at the MMR and let the Guard train with small arms somewhere that doesn't involve as fragile an ecosystem as we have on the Cape, and might also behave more responsibly."

   Response: The commenter is referring to a release which occurred during a maintenance activity to remove lead bullets from the bullet capture system as part of a mass balance evaluation conducted under the pilot. The activity was not performed in accordance with the approved OMMP Plan using the proper containment system to minimize spillage. During the activity, lead dust was observed on the ground around the equipment used to collect and sift the bullets from the bullet capture system. The MANG temporarily terminated this activity, cleaned the impacted area, and conducted sampling to demonstrate that the cleanup was successful. To ensure that this issue does not occur in the future, EPA and the EMC are requiring amendments to the OMMP that expand and reinforce the pollution prevention requirements during the maintenance of the STAPP system. In addition, EPA along with the EMC and Mass DEP will continue to closely inspect the implementation of the pilot to ensure

that all requirements of the OMMP are being followed. Finally, in its approval of continuing the pilot project at Tango, and including Juliet and Kilo Ranges in the pilot project, EPA is requiring that MANG submit a report by June 30, 2009 which reports on any compliance problems and establishes a plan to eliminate such problems.

4. *Comment:* The commenter recommended that EPA approve the MANG's request to fire lead under a pilot project at Tango Range after December 31, 2008 and to resume training at Juliet and Kilo Ranges.

   Response: After review of the information submitted and comments received, EPA has decided to approve the request with conditions as indicated in its approval letter dated January 28, 2009.

5. *Comment:* The commenter fully supported the proposal to increase the use of additional firing ranges and any other resource at the Mass. Military Reservation that will better prepare our military and other Department of Homeland Security personnel. Firing lead into the firing ranges with proper environmental protection should be approved and implemented at the earliest time possible.

   Response: After review of the comments received, EPA has decided to approve the request with conditions as indicated in its approval letter dated January 28, 2009.

6. *Comment:* The Sierra Club (the Cape Cod & Islands Group) raised concerns about the conceptual model being used to guide the fate and transport modeling effort. They view the soil as a living, dynamic ecosystem with mineral particles, nonliving dissolved and particulate organic carbon components with variable turnover times and biological organisms ranging in size from bacteria/fungi to earthworms. They believe that in the dynamic conceptual model, the soil biota play a critical role in the decay of the surface DOC/POC in the soil; release the attached heavy metals and organic contaminants into pore water and mixing the surface organic matter deeper into the mineral soil layers. They request that the MANG and regulators examine this alternative conceptual model and explore its implications for the monitoring program and Best Management Practices (BMPs).

   Response: EPA, EMC and Mass DEP agree with the view presented by the Sierra Club of soil as a dynamic ecosystem, with soil biota possibly exerting a significant influence on contaminant transport. The MANG and the regulatory agencies recognize that some of the current modeling is highly simplified, particularly that applied to assess the potential impact of contamination in surface soil on underlying groundwater. The protocols followed to date draw heavily from EPA soil-screening guidance (EPA, 1996), which is conditioned by broad experience with common contaminants. At the same time, it is recognized that there is less experience with some of the contaminants of concern at Camp Edwards (e.g., explosives, propellants,

heavy metals), and that research is needed in order to identify and model the processes that control their mobility in the environment. The conceptual – as well as the mathematical and computational – models are under review and revision in an effort to improve their predictive capabilities. The MANG, its contractors, and the regulators are all working together to advance the understanding of contaminant transport processes in this setting. With encouragement from the EPA, EMC and Mass DEP, the Army has performed extensive work to characterize the behavior of metals (e.g., Clausen, Korte, et al., 2007; Clausen, Taylor, et al., 2007), propellants (e.g., Clausen, Scott, et al., 2008), and explosives (e.g., Lever, et al., 2005) in Camp Edwards soils. These data are available to support more direct, empirical approaches, as well as to constrain and/or calibrate transport models. It is expected that the ability to predict the fate of range contaminants will continue to improve, and consideration of the processes noted by the Sierra Club (i.e., those mediated by soil biota) should certainly be a part of that development.

It should be noted that the distance between "static" models of the type currently in use for soil screening assessments and "dynamic" models of the type advocated by the Sierra Club may not be as great as it may at first appear. Transport modeling typically adopts a "macroscopic" view of the processes of interest, because the motivation for the modeling effort is also of a "macroscopic" nature (e.g., What is the expected average concentration of a particular contaminant in groundwater at some point of compliance?). The underlying "microscopic" mechanisms often are not represented explicitly. However, that does not mean that they are not accounted for. For example, Army's current research on nitroglycerine suggests that the compound is readily degraded once in aqueous solution. For the purpose of transport calculations, this process might be represented by some idealized phenomenological model, such as a first-order reaction, characterized by a single rate constant. If such a model is supported by the appropriate laboratory experiments, and the predictions are consistent with field observations, one can often proceed without a detailed understanding of, or an explicit model representation of, the underlying mechanisms of degradation (e.g., microbially mediated redox reactions, phototransformation, etc.) However, it would be implicit in this sort of "macroscopic" model that it captures the essential behavior of the underlying "microscopic" processes, which might include the very things noted by the Sierra Club (i.e., the action of soil microbes and invertebrates). In constructing the appropriate "macroscopic" models, of course, it is often of great utility to understand as much as possible about the underlying "microscopic" processes, and, for that reason, the MANG is encouraged to consider the conceptual model as outlined by the Sierra Club.

The EPA, EMC and Mass DEP believe that the description of the conceptual site model (CSM) for the Small Arms Ranges is not adequate, and is requiring the MANG to add a description and graphical depiction of the CSM to the OMMP for J and K ranges. The CSM should show that lead is captured and retained in the bullet trap. A "blow-up" of the soil horizons on the range floor would enhance the depiction.

The Sierra Club's concerns are of particular note for a range where the native soil is the primary capture medium; therefore, a more dynamic CSM will be considered for any range with a bullet capture system proposing to use that design.

7. *Comment:* The Sierra Club noted that it found it interesting that the UXO Working group is considering what spatial components of a range are significant: firing line, targets, berms behind targets and the fan-shaped no use region behind the berms. They recommended that the military and regulators should consult soil ecologists on the appropriate spatial/temporal scales to implement a monitoring program based on a dynamic conceptual model to see if it differs significantly from the current monitoring program designed using the static conceptual model. In addition to the range Best Management Practices (BMPs), one needs to consider if there are important temporal components in contaminant recycling and vertical transport through the aerated zone in the soil (vadose zone). Vadose zone modeling of contaminant transport appears to be in a much more primitive state than saturated zone modeling.

   In the short term the dynamic and static conceptual models will likely yield similar predictions for the monitoring program and BMPs, but over the longer term where cumulative impacts occur and variable climatic patterns come into play the predictions are likely to differ. That is why we are recommending that the MANG and regulators examine this alternative conceptual model and explore its implications for the monitoring program and range BMPs. It might be worthwhile conducting a vulnerabilty analysis to identify the appropriate temporal/spatial scales for evaluating different the threats associated with different types of ranges (obviously firing at a STAPP system target from a fixed firing line will differ from troops maneuvering through an area shooting at multiple targets at different heights). The fate and effect transport models used to predict the movement of contaminants from the surface soil into the groundwater are likely to differ between the dynamic and static conceptual model perspectives.

   Response: The Regulators support continued improvement in range management practices, as well as in the scientific basis for the monitoring program. Modeling performed in support of decision making will continue to be subjected to technical review. MANG will be encouraged to consider the dynamic soil processes noted by the Sierra Club as the modeling tools evolve.

   It is agreed that many aspects of vadose-zone modeling are not as well developed as for the saturated zone. Because of the complexity of vadose-zone transport processes, the MANG and the regulatory agencies have relied in part upon direct field measurements, rather than entirely on modeling. In particular, lysimeters are being used to test the conceptual site model. The lysimeters capture pore water that has passed through the contaminated surface soil layer, and allow for direct analysis for the water chemistry.

The EPA, EMC and Mass DEP view the soil as a valuable resource, having no significant ability to restore itself from metals contamination, thus having the potential for cumulative impacts. The agencies do not view soil as an expendable metals "sink" whose value is just to filter and adsorb lead and other metals. It is agreed that the soil ecosystem is complex and dynamic. It should not be viewed as having a sole environmental function simply to assist in making sure lead does not make it to groundwater.

8. *Comment:* The Sierra Club requests that the leakage of water into the STAPP bullet trap system be resolved and that the source of the high lead, copper and antimony levels in the collection water is addressed.

   Response: All involved agree that the water collection issue in the STAPP system at Tango Range needs to be resolved. It is important to note that the STAPP systems at Juliet and Kilo Range have not experienced similar problems. This observation helps in the assessment of Tango range. Recently, the STAPP system at Tango was inspected by the manufacturer. The manufacturer has agreed to replace the top liner as it is believed to be too short for the structure and may in fact be the cause of the water collection. The top liner replacement is scheduled to occur in April 2009. If this change does not resolve the issue at Tango, EPA will continue to work closely with the MANG to resolve this issue.

   The levels of lead, copper and antimony in the collection water is believed to be from the bullets themselves. The OMMP plan has been modified to ensure that water collecting in the system is promptly removed within 72 hours. Until the water collection issue is resolved, EPA, Mass DEP and EMC will continue to closely review the monitoring data from the lysimeters beneath the STAPP system to verify that the system is not leaking and negatively impacting the environment.

9. *Comment:* Given the detection of dinitrotoluene isomers in the surface soil and groundwater at Demo 1 and some of the plumes located in the Central Impact Area (CIA), the Sierra Club requests that the soil and groundwater be analyzed for all five isomers of DNT. Furthermore, they suggest that the regulators work with the state Health Department in Wisconsin to develop cleanup standards based on the experience at Badger Ammunition Plant.

   Response: Analyses of soil and groundwater samples to date have focused on 2,4-DNT and 2,6-DNT, based on the fact that technical grade DNT is approximately 95% composed (by weight) of these two isomers, and because various soil- and water-quality standards have been established for them. Therefore, it is generally believed that soil and groundwater characterization based on the predominant isomers provides adequate support for remedial design and/or long-term monitoring. However, EPA and Mass DEP are aware that there are known examples (e.g., at Badger Army

Ammunition Plant, as cited by the Sierra Club) where the less-common isomers have been detected in groundwater at concentrations significantly greater than the predominant isomers. EPA and MassDEP agree with the Sierra Club that it is worthwhile to establish whether or not the less-common isomers are present in Camp Edwards soil and/or groundwater at detectable concentrations and has been working with the Army's Impact Area Groundwater Study Program to develop a sampling plan. Thus far, we have reached agreement to sample a subset of groundwater monitoring wells around the site including those where DNT has already been detected and some that are down gradient from the small arms ranges. These selected wells have been analyzed for all six isomers of DNT using the analytical lab at Badger which is capable of achieving the low level detection limit necessary. Preliminary results indicated 0.216 ppb of 2,4-DNT detected at Demo 1 (MW 31), all other results were ND. Data validation has not yet been completed. If data validation confirms these results, the regulators do not believe that additional sampling is necessary at this time.

10. *Comment:* The Sierra Club noted that they accept the need for the military to conduct realistic training, since their troops are being sent into harms way in the mid-east. The Sierra Club wants to make sure that the contaminants stay either in the surface soil or STAPP system/berms, so that conducting an accurate mass balance is critical to make sure that we don't pollute our sole source aquifer for drinking water. Given the cost and time required to treat polluted groundwater, pollution prevention needs to be our main goal in the training at the 3 current ranges and future proposed ones. The lessons learned from the operation of the Tango range will certainly inform the process as we move forward with the Pilot Test. The fact that the contaminants stay either in the surface soil or STAPP system berms and suggest that an accurate mass balance is critical to make sure that we don't pollute our sole source aquifer for drinking water.

    Response: The EPA, EMC and Mass DEP agrees with the Sierra Club and will continue to work closely with the MANG to minimize the environmental impacts of training, and to advance the scientific basis for development of sound range management, remediation of past or future impacts, and design of protective monitoring. We agree that the mass balance is a critical piece to understand the effectiveness of the bullet capture systems at MMR. EPA has notified the MANG that the mass balance work conducted to date has not been adequate. A revised plan for the implementation of the mass balance will be submitted to the regulators for review and approval and will be implemented and evaluated before any final decisions will be made by EPA.

11. *Comment:* The commenter requested the regulators take a more objective position on this issue and pursue a more precautionary approach to protect the public and the natural environment. One component of this precautionary approach would be to close the gap between the scientific state of technology and that used to support the cleanup process. The commenter suggests that EPA use the ecological risk

assessment process to supplement the health risk assessment techniques currently being used at Camp Edwards.

Response: EPA believes that it has taken a very objective and cautionary approach in responding to the requests by the MANG to resume training with lead bullets at MMR. We have consulted, and continue to consult with several experts in the field of bullet capture systems and believe that the STAPP system is considered a state of the art system for managing bullets at small arms ranges. We have also consulted with numerous experts in the field of analytical sampling methods and have implemented innovative methods to sample and model the impacts from these contaminants. EPA's approval of the MANG requests to resume training with lead bullets under a pilot program with numerous pollution prevention requirements is another example of the cautionary approach to allowing these activities at MMR. EPA shares the same concerns as the commenter and will continue to take measures to ensure the activities at MMR are protective of human health and the environment.