

MEMO

To: Len Pinaud, MassDEP

Cc: Michelle O'Brien / Joseph Farside, Fireworks Site Joint Defense Group

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Subject: Proposed Changes to Munitions Response Work Sequence at the Fireworks Site

During munitions clearance in the PortaDam corridor for the High Metal Density Area (HMDA), the UXO Dive Team located a cluster of approximately one hundred 5" rocket fuzes and a portion of the solid Ballistite propellant from a 5" rocket motor. This cluster of items was located on clearance transect T-40 approximately midway north-to-south along the PortaDam corridor. The cluster was found on the inside (Eastern) end of this transect immediately adjacent to where the post-excavation sheet piling for the HMDA is planned to be installed (just outside the limits of excavation at that location). The actual rocket motor was not seen, nor was a rocket warhead observed. The discovery of propellant from a rocket motor is notable since this type of munition had not been observed during any previous munitions response work at the Site. As described below, this discovery has led to a recommended change in the sequence of munitions response actions and a postponement of the HMDA work.

When the 18.11-pound Ballistite propellant was discovered, the implications of this find on the ongoing Immediate Response Action (IRA) munitions response activities were immediately evaluated. After the Department of Defense (DoD) Munitions Explosive Safety requirements were reviewed and considered, it was determined that the discovery of the Ballistite propellant on May 19 represented an anomalous situation that would justify a "one off" variance of the requirement to immediately reassign this item as the largest Most Probable Munition (MPM). For this reason, no change to the current safety distances at the Site was necessary. However, should a second piece of 5" rocket motor propellant or some other munitions item with an overpressure blast or fragmentation exclusion zone distance larger than a 40mm projectile be discovered, work in the HMDA or the Shoreline Disposal Area (SDA) (which also is linked historically with the disposal operations evident in the HMDA) could not continue with the current safety and operational procedures. These safety and operational procedures would have to be revised to account for the larger item(s) for work to continue in these areas.

As noted above, the recovered cylindrical cast propellant (Ballistite) weighed 18.11 pounds. While the propellant was not cased and would not create fragmentation, it would create a blast risk due to the overpressure created if detonated. The U.S. Army Engineering and Support Center Buried Explosive Module (Version 7.2) indicates that

the “Non-Essential Personnel Distance” for the Ballistite is 861 feet. This munition find is a larger explosive item than the largest MPM, a 40mm Mark II projectile, that has been used as the basis for the design of the equipment shielding and establishing the exclusion zones for the IRA munitions response work. While not presenting a new fragmentation hazard, the 5” cylindrical cast rocket propellant has more restrictive overpressure protection requirements that would require adjustment to the existing operations if operations were to continue and another similar item were encountered. Currently, intrusive operations maintain a 10-foot separation distance between the excavation and the excavator operator in the cab as the safe distance for blast overpressure. The corresponding required blast overpressure separation distance for the 18.11 pounds of Ballistite is 46.5 feet. It must be noted that the piece of Ballistite recovered was not a full charge of propellant for a 5” rocket motor. If a full amount of propellant for a 5” rocket is considered, the required separation distance for the propellant would be 52 feet. These distances cannot be maintained with the excavator currently on-site and could not even be maintained with a long-reach excavator. The excavator operator would be too close to an item during excavation and handling. Shielding (like the current plexiglass shielding on the excavator and front loaders) only provides protection from fragmentation hazards but does not provide protection for blast overpressure. The only option available to remove material from the HMDA would involve utilizing remote controlled heavy equipment.

If the largest MPM were to become the 5” rocket propellant or a 5” rocket motor with a full load of propellant, the following would need to be modified:

- The “Non-Essential Personnel Distance” would increase from the current 132 feet to 428 feet. This means that only the excavator operator (the only “Essential Personnel” to the excavation task) could be within this distance during the excavation. Even other UXO Technicians could not be or work within this distance while excavation or intrusive activity was occurring. This extended exclusion distance would also affect neighboring properties, as detailed below.
- As mentioned above, the most likely option for continuing the planned excavation in the HMDA would be with a remotely operated robotic excavator and two remotely operated robotic front-end loaders. This would involve both specialized equipment and specially trained operators. Initial inquiries with potential equipment suppliers indicated that locating and procuring and shielding the required robotic excavator and front-end loaders and preparing for continued excavation would take a minimum of two months. The robotic operations also would be slower than the excavation process duration currently anticipated using the current excavation equipment and approach. These schedule delays would likely prevent the HMDA excavation from being completed before the winter weather would preclude continued robotic excavation and material handling in the HMDA.
- The excavated sediment would need to be laid out in a thin layer (similar to what is done now for the post-mechanically screened material) so that the UXO Technicians could remove any potentially explosive items larger than a 40mm projectile. This need for greater sediment handling and observation would also require additional quality control and oversight efforts.
- The vibratory screening plant and the manual screening pads would need to be moved far enough away from the HMDA excavation to allow continued screening operations. The additional manual screening step pad (with the 428 feet exclusion distance) could potentially be placed in the MUA Soil Area although this would depend on exactly what type of larger item was found.

- A 428 feet exclusion zone distance would intercept part of the P.A. Landers property when the northern-most Excavation Cell of the HMDA would be excavated. The affected part of that property would be the wooded area with the former access roads, but potentially not the active equipment and storage pile operations on the P.A. Landers property. This distance is not indicated to intercept the Westford residential neighborhood or properties in the Town of Hanson. However, the explosive safety distance would be based on the actual munitions found in the HMDA and could possibly increase.
- Observations made by the UXO Divers during the PortaDam corridor clearance confirmed the presence of construction debris and panels similar to those previously discovered onshore that were confirmed to be asbestos-containing material (ACM). These materials will require additional handling and disposal precautions.

Given our experiences to date in Factory Pond and the SDA, it is believed that there is a high likelihood that a second piece of 5" rocket motor propellant or some other munitions item with an overpressure blast or fragmentation exclusion zone distance greater than a 40mm projectile will be discovered once excavation in the HMDA is begun. This would require all the changes noted in the above paragraphs to be implemented. This would include a work stoppage and a significant change in procedures and equipment. The time delays associated with the shift to robotic operations would likely not allow the work in the HMDA to be completed within the 2022 field season. In addition, there may be a short period of time when the onshore excavation operations in the upland areas would have to be put on hold while the decision to continue that work under the separate Munitions Response Area (MRA) is documented and a consensus path forward is reached.

An option would exist for defining the HMDA and the SDA as a separate MRA given the documented history of use and the observed MEC and other contamination found within these areas relative to the other munitions response areas already remediated. The remaining unremediated portion of the overall IRA munitions response area (which includes Operations Areas 1 and 2 and the remainder of the Southern Remainder Area West – High Density Area) would be a second MRA that could continue to be remediated under the current safety and operational procedures. Based on the applicable DoD requirements, all potential disturbances of the sediment in the HMDA or the soil in the SDA would be stopped and work in the upland areas could continue under the current safety and operational procedures.

In light of the challenges presented above, it is recommended that the water/wetland IRA munitions response shift from the HMDA to the MUA Sediment Area for the 2022 field season. Nearly all the equipment and preparations made for the HMDA work would be used for the MUA Sediment Area work, with the exception of the PortaDam. This would include the paved pad and ClearSpan temporary fabric structure, the on-site Portable Water Treatment System (PWTS), the dewatering sumps and piping materials, the extended electrical connections, the concrete Ecology blocks, the ambient air monitoring equipment, the crane mats, and the Q-Pac (3/4" dense grade) surfaced areas and vehicle access roads. The only costs expended for the HMDA that would not be used for the MUA Sediment Area would be:

- The PortaDam (component mobilization cost plus 1 month of rental);
- The two continuous measurement turbidity monitoring buoys (1 month of rental); and
- The silt curtain will be recovered and placed into safe storage until the HMDA work can be accomplished.

Our review of the HMDA permits indicates that minor revisions may be required to extend their expiration dates to accommodate the HMDA work in the future. These sunk costs are estimated to be approximately \$150,000, which is much less than the costs that would result from the restrictions and down time that would be required to make the significant operational and site layout adjustments that would be needed to comply with a larger overpressure blast or fragmentation explosive safety distance.

Implementing the planned munitions response in the MUA Sediment Area would require that the current Work Plan (which has been reviewed once by MassDEP and has been revised based on MassDEP comments) and the anticipated costs be revised within the next two weeks and presented to MassDEP. During this two-week period, the MUA wetland plants and conditions could be inventoried to support the MUA Sediment Area wetland restoration and the initial X-Ray Fluorescence (XRF): analytical laboratory mercury and lead correlations can be finalized. It should also be noted that it would be advantageous to perform the MUA Sediment Area work at this time since the water level in the wetland is as low as it has been in a few years, which would make the maintenance dewatering effort easier. All permits and approvals for the work in the MUA Sediment Area are already in hand.

Having a better understanding of the potential for larger munitions items, occurrence of ACM, and potentially other hazardous debris in the HMDA and SDA, the recommended shift to work in the MUA Sediment Area this season will allow the remediation plan for the HMDA and SDA to be reconsidered to ensure that the broader set of likely wastes are effectively addressed. The HMDA and the SDA also could potentially be combined to streamline the planning for these two areas with a similar history and indicated contamination.

It is our intention to immediately make the required changes to the existing Draft MUA Sediment Area Work Plan and cost estimate, defer the IRA munitions response in the HMDA for this season, and prepare the MUA Sediment Area for munitions response.