# Lake City Army Ammunition Plant (LCAAP) Optimization (Task N.0823)

**Government POC**
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**Status**
Complete

## Statement of Need

Lake City Army Ammunition Plant (LCAAP), a government-owned, contractor-operated (GOCO) facility located in Independence, MO, is the Department of Defense's (DoD) only manufacturing facility for small caliber ammunition (i.e., 5.56mm, 7.62mm, and caliber [Cal.] 50). To ensure efficient and sustainable operations, it is imperative to improve operations at LCAAP to adapt to increased environmental regulations and production demands. Numerous individual technologies being investigated are interlaced and a modification to one of these technologies ultimately has an effect on the others and therefore all must be addressed using a Design to Production (D2P) approach. This Task continued to build upon previous efforts conducted for the Modernization and Green Ammunition programs that are expected to continue through the LCAAP contract transition period. The intent of all these projects is to improve production efficiency, reduce environmental impact, ensure environmental compliance, minimize environmental resources needed for production, and reduce energy consumption and operating costs at LCAAP.

## Technical Approach

Many technologies are continuing to mature through the development within and transition to PM-MAS. For some of these technologies, the complex and changing environmental regulations add additional difficulties to the process of developing a solution to issues at hand. Because of this, a D2P approach was utilized throughout the execution of this Task. This approach instilled a full lifecycle and comprehensive understanding (from concept to production) of stakeholders, environmental impacts and compliance, necessary approvals, associated key characteristics of products, and production requirements. D2P integrated these ideas to optimize and implement solutions systematically to move LCAAP closer to an ideal future state facility. This Task benefited by using the D2P approach because the entire process as a whole system is examined, from environmental concerns to producibility, rather than just the end product. A systematic D2P approach provided a fresh and full life-cycle understanding when executing projects and moving LCAAP towards an ideal state of manufacturing. There were several efforts executed that involved changes to manufacturing processes. These efforts ranged from removing a known harmful material (mercury) and replacing it with a more environmentally friendly process, to replacing a solvent-based sealant with an alternate substance that has less of a negative impact on the manufacturing environment.

Under a previous NDCEE effort entitled "Task 0737 - Identification of Alternatives to Munitions Primer Sealant," the NDCEE successfully tested and demonstrated environmentally friendly alternative primer sealants through laboratory tests that showed potential to replace the current lacquer sealant being utilized at LCAAP for sealing the interface between the primer and primer pocket. To better understand the possibility of implementing these sealants into LCAAP operations, the NDCEE sealed and tested cartridges with the candidate alternative primer sealants in a production-like environment that replicated LCAAP primer sealing operations and executed non-live fire laboratory testing in Johnstown, PA that provided successful. Though live fire testing was not conducted, if positive live fire at a Government site was to be completed, then a Standard Operating Procedure (SOP) for the best performing candidate would need to be developed in order to be implemented into LCAAP Operations.

An ammonia vapor test was developed under a previous NDCEE effort entitled "Task 0782 - PM-MAS Assessment for Current & Future Small Caliber Ammunition" and further matured under the previous NDCEE effort entitled "Task 0757 - Sustainability & Acquisition Support For The GOCO Lake City Army Ammunition Plant" to possibly replace the current mercurous nitrate test used for evaluating residual tensile stresses in ammunition cases. The NDCEE executed side – by–side testing of ammonia vapor versus mercurous nitrate in Johnstown, PA to ensure ammonia vapor is able to correlate to the current mercurous nitrate testing process being utilized in LCAAP operations and was successful but with instrumented brass test strips. To verify the two tests correlate actual defective cases produced at LCAAP would need to be tested in both tests side-by-side to support the instrumented brass testing of strips. An ammonia vapor testing setup was also stood up and tested by Armament Research, Development and Engineering Center (ARDEC) in conjunction with the NDCEE's ammonia vapor test set-up to ensure the process is repeatable and reliable, which ARDECs setup was able to execute successful testing.

## Results and Benefits

The NDCEE utilized a D2P approach that has been utilized under all previous tasks and will continue to be utilized for all future work. The D2P approach instilled a full lifecycle approach and comprehensive understanding from concept to production to move LCAAP closer to an ideal future state facility. This D2P philosophy allowed for a much deeper understanding of process engineering and is not myopic in focus but the entire process as a whole system is examined, from environmental concerns to producibility, rather than just the end product. This has resulted in many positive results implementing technologies and benefits, both tangible and intangible. Once such technology is the ammonia vapor process developed by the NDCEE that testing moved this technology closer to a readiness level that is capable of being transferrable to LCAAP.

## Technology Transfer and Outreach

The NDCEE optimized technologies and processes moving them closer to being transitioned. The efforts with the highest levels of readiness include the Ammonia Vapor and Primer Sealant technologies.