

**FY 11 Secretary of Army Environmental Awards Nomination**  
***Scranton Army Ammunition Plant***  
**Sustainability – Industrial Installation**

**Introduction:**

As the Army's premier manufacturing center for large caliber steel projectiles for artillery, mortar, and projectile metal parts, the Scranton Army Ammunition Plant (SCAAP) is committed to meeting mission requirements while promoting environmental sustainability. As an active government-owned, contractor operated (GOCO) facility of the US Army Joint Munitions Command (JMC), the capabilities of the plant support the mission of the Single Manager for Conventional Ammunition (SMCA) within the Department of Defense. Munition items include the manufacturing of ammunition metal parts and production of 60 mm to 8-inch diameter projectiles, 120mm mortars, 5"/54 gun projectiles, and 155 mm artillery projectiles. SCAAP capabilities include forging, heat treating, machining, finishing and testing, and select research, development, test & evaluation (RDT&E) case studies.

**Background:**

SCAAP is located on 15.3 acres in the heart of downtown Scranton, Pennsylvania. The United States Army began manufacturing ammunition metal parts at this site in 1953. Built in 1907, the landmark production buildings served as home to the Delaware,



*Photo 1: Aerial view of SCAAP, taken in November 2007.*

Lackawanna and Western Railroad (DL&W) locomotive repair and erecting facility. Today, the four original DL&W buildings are maintained as part of the Steamtown Historic District, and remain in active use. In total, SCAAP occupies seven buildings located on the property. With a total of 509,000 square feet, SCAAP is the only Joint Munitions Command (JMC) installation to reside in a fully industrial setting. SCAAP takes great pride in its national significance, historical setting, and continually works to preserve and protect the natural and built environment in which it resides.

Scranton is the largest principle city in the Scranton/Wilkes-Barre metropolitan area. With an approximate population of 76,089 in 2010, according to the US Census, the SCAAP provides a wealth of opportunity and support to its metropolitan community. In Fiscal Year 2009, SCAAP had an operating budget of \$600,000.00 and a payroll of \$840,000.00. There are 10 Department of the Army civilians and is operated by General Dynamics – Ordnance and Tactical Systems (GD-OTS).

As the geographic, cultural center, and county seat for Lackawanna county, Scranton, is located between mountains to the east and west. Roaring Brook borders the installation and plays an important role in SCAAP's long-term sustainability plan and initiatives. Roaring Brook is a tributary of the Susquehanna River. At 464 miles, the Susquehanna is the longest riverway in the eastern United States and provides over one-half of the fresh water intake to the Chesapeake Bay. Due to its connection to the Chesapeake Bay, SCAAP has worked to reduce its impact to stormwater runoff and sought ways to conserve water use through various initiatives.

### **Program Summary:**

SCAAP faces significant challenges in incorporating sustainable initiatives into its all-industrial setting. Limited in space to expand, SCAAP must work with the existing infrastructure and incorporate low-impact development (LID) conformant with the established standards for historic buildings. Additionally, SCAAP must consider the community in its master planning initiatives, due to its proximity to residential and commercial buildings. There is little greenspace at SCAAP, leaving the installation to come up with innovative, green technologies to include as part of its sustainability plan, its commitment to the community, and to environmental stewardship.

Staff at SCAAP continually work to evaluate the aspects and impacts of its industrial mission included within its ISO 14001 certified environmental management system (EMS). GD-OTS achieved ISO 14001 certification in 2002 for production operations, and has continually worked to improve and expand the installations commitment to the environment. In 2010, SCAAP became the first Department of Defense installation to commit to the Department of Energy's LEADER program. Participants to the program pledge to adopt a goal to reduce energy intensity by twenty-five percent over a ten-year time span. Additionally, GD-OTS is in the process of achieving ISO 50001 certification.



*Photo 2: Jeff Brunozi, General Dynamics Vice President of Large Caliber Ammunition Operations, explains a manufacturing process to BG Perna during an industrial site tour of operations at SCAAP.*

Full certification to the ISO 50001 standard is expected in April 2012. Additionally, in December 2000 the Pennsylvania Department of Environmental Protection granted the Army liability protection for soil and groundwater in recognition of the Army's successful completion of a complete site investigation and remediation to reduce all contamination beneath the levels specified in the Land Recycling and Environmental Remediation Standards Act

Through its utilization and implementation of ISO standards, SCAAP followed Army initiatives for sustainability planning and is well on its way to achieving reduction goals on Executive Orders 13423 and 13514. Scranton and GD-OTS have made environmental compliance and utility conservation a key component of facility modernization. During FY10 - FY11, SCAAP introduced several key technologies and best practices to reduce and reuse water, improve air emissions in its production facility, analyze RDT&E concepts for reducing hazardous materials in production, and initiating multiple energy-efficiency projects. Additionally, SCAAP has participated in multiple Chesapeake Bay initiatives, maintained an active recycling program, and continued to promote green procurement in the installation's acquisition process.

### **Accomplishments:**

#### *Water Conservation and Reuse*

Working with the infrastructure present, SCAAP has initiated a rainwater collection system which utilizes approximately 2.2 acres of roof space on the facility. With an average rainfall of 40 inches per year, the system enables the capture and reuse of more than 2,500,000 gallons per year of rainwater. The system captures and diverts the rainwater to three 23,688-gallon storage tanks, which is then utilized as cooling water for the plant's production operations. Initiated in April 2010, over 3.1 million gallons of rainwater have been collected and reused within the production process. This allows the facility to reduce the demand for city water and lessens the facilities stormwater discharge. Without divergence, stormwater in the Scranton, PA area is eventually released to the Chesapeake Bay watershed. Since installation, SCAAP has reduced operating expenses by over \$38,500.00 per year. Savings have been generated through reductions in utilities procurement (city water), chemical treatment, and city sewer discharge. Due to the success of the 2010 pilot collection system, SCAAP hopes to install an additional system which will further enable conservation and reduction measures at the facility.



*Photo 3: Array of SCAAP Rainwater Collection System. From top left – Rooftop collection basins. Top Right – Collection storage tanks. Bottom – Plant view of collection system in production area.*

Another ongoing initiative at SCAAP is to reduce wastewater discharge to the municipal sewer authority. A membrane ultrafiltration system has been installed to the facility's TMP operation. The membrane system allows the facility to successfully recycle all wastewater from the operation and re-use it as make-up water for the facility's non-contact cooling water system. The

successful implementation of this system has allowed the Scranton Operation to eliminate a previously permitted point of discharge to the Scranton Sewer Authority. Since installation in April 2010, the system has recycled over one million gallons of oily wastewater from the forging operation. The installation has realized over \$110,000.00 in total economic savings from this sustainable investment. Environmental benefits are numerous and include the reduction in municipal water used for cooling towers, the elimination of a sewer outfall, and reducing volumes released to the municipal sewer and potable water (POTW) supply. Through the installation of the rainwater collection system and ultrafiltration system, SCAAP has achieved the requirements for water conservation under Executive Orders (EOs) 13423 and 13514 by reducing POTW consumption intensity, promoting reuse strategies, and achieving the US EPA's stormwater management objectives.

### *Reduce Greenhouse Gases and Improve Indoor Air Quality*

As part of its mission, SCAAP is responsible for the production of large caliber ammunition casings ranging from 60mm to 155mm which require coating. Identified as a significant aspect of its ISO 14001 EMS, SCAAP established an objective to reduce the volume of Volatile Organic Compounds (VOCs), stemming from the coatings operation. Concentrations of VOCs are consistently higher in indoor environments, and improving the air quality within the SCAAP production facility was of key concern. As part of a Pollution Prevention (P2) program, an effort was initiated to identify technology controls, which would reduce the amount of paint and solvent required for the coatings operation. Following analysis, funding was provided for the procurement of new, state of the art, electrostatic atomizing paint guns. Through proper training and use of the new paint guns, the installation has identified improved efficiency in the coating process, reduce material waste, and improved overall indoor air quality. The measurable increase in efficiency has translated into a sixty-percent reduction in the facility's overall VOC emissions. In FY11, GD-OTS supported the conversion and installation of the final of three paint lines. SCAAP's paint lines are 100-percent compliant to emissions standards for the coating process, while generating fewer emissions and gaining economic cost savings along the way.

### *Material Substitution and Elimination*

In June 2011, SCAAP initiated a RDT&E effort to reduce Zinc-Phosphate in its production process. Zinc is currently regulated by the Scranton Sewer Authority, while Phosphate will be regulated under the total maximum daily load (TMDL) for the Chesapeake Bay watershed in the near future. Currently, steel ammunition parts are treated prior to painting to improve corrosion resistance and paint adherence. This process includes an initial alkaline bath used to remove oil and grease. Parts are then rinsed with water, treated with a Zinc Phosphate solution and rinsed again with water prior to sealant application. The chemical application and rinse baths produce a Zinc-Phosphate waste stream which must be treated before release to the municipal sewer district. SCAAP is currently in the process of evaluating alternative replacement chemicals for the alkaline bath and Zinc-Phosphate treatment. With success, SCAAP will be able to eliminate Zinc-Phosphate from the process in entirety. Additionally, SCAAP is evaluating chemicals which do not require heat treatment, which will support energy conservation and generate

savings for the manufacturing process. SCAAP and GD-OTS have worked to ensure green procurement and materials management practices within the work effort.

### *Energy Conservation, Consumption Efficiencies, and Utilities Savings*

As part of its plan for sustainable modernization, SCAAP has consistently worked to meet the Army's energy conservation goals of Executive Orders (EO) 13423 and 13514 within industrial base planning exercises. Recently, SCAAP has moved forward with several efforts which will promote conservation and efficiency across the installation. Current efforts include:



*Photo 4: Erie 1 Rotary Hearth Furnace*



*Photo 5: Erie 1 Forge Press Line*



*Photo 6: Keeler Boiler*

- Modernization of Erie 1 Rotary Hearth Furnace (Photo 4): The Erie 1 furnace is undergoing extensive refurbishment to include new burners and recuperators, compliant with emissions standards and reduction goals. When complete, this project is expected to yield a twenty-five percent reduction in natural gas consumption per annum and achieve greenhouse gas reduction goals.

- Reduced consumption of the Erie Forge Press Line (Photo 5): A demonstration of transferable technology, this effort will use design concepts from SCAAP's Bliss III Forging Press modernization effort in application to the Erie I lines. Upon completion, all three Erie I forge presses will utilize hydraulic pressure and load-sensing pump compensators. The use of load-sensing compensators allows for a reduction in horsepower, which consequently lowers the electrical intensity of the press line. A fifteen-percent reduction (per annum) in utilities savings is an expected result of this effort.
- Keeler Boiler Replacement for Emissions Reductions (Photo 6): The effort to replace SCAAP's Keeler Boiler is currently underway. Boiler replacement will allow the installation to reduce natural gas consumption by twenty percent and bring an overall thirty-percent reduction in emissions, while supporting EO 13423 and 13514 reductions for greenhouse gases, fuel use, and energy conservation.

*TMDL and the Chesapeake Bay Action Plan*

In FY10, SCAAP was selected as one of eight installations for participation in a pilot study to determine the potential impacts of TMDL regulations on Army facilities within the Chesapeake



*(Above) Geographic boundary of the Chesapeake Bay watershed area.*

Bay watershed. The findings from the analysis performed at SCAAP will provide valuable lessons learned to the DoD and EPA for TMDL development. In addition, the SCAAP analysis will be used to support TMDL implementation at the many small-scale installations and Army National Guard locations within the watershed area. In response to the EPA's Chesapeake Bay TMDL initiative, Army facilities will need to establish baseline loadings for nutrients and sediments and work with local, state, and Federal regulators to determine their individual allocations. These allocations will be used to set maximum pollutant loads associated with existing and future permits for point sources and nonpoint sources. A gap analysis was completed at the eight Army pilot sites to identify gaps in existing data and determine a path forward for future data collection

related to TMDL. Monitoring surveys are ongoing. Eventual results will allow the Army to evaluate baseline loading conditions for point and nonpoint sources at Army facilities and provide a recommended approach for stormwater pollution control implementation and TMDL monitoring at facilities located within the watershed. In addition to TMDL participation, SCAAP has been an active participant in local, regional, and Army efforts aimed at preserving the Chesapeake Bay through action plan implementation.

### *Sustainable Recycling Programs*

SCAAP continues to meet the Army's goals for Integrated Solid Waste Management (ISWM) through the utilization of material diversion, reuse, and elimination in its operations processes. Additionally, SCAAP continues to maintain a formal recycling program to minimize material disposal wherever possible. In FY10, proceeds for SCAAP's R3 program totaled \$44,691.00. Reported proceeds are generated through the recycling efforts of government owned scrap materials. Materials diverted include projectile casings, steel, mixed metals, scrap wood, wood pallets, lead-acid batteries, miscellaneous equipment, chemical constituents, cardboard, paper products, and electronics. Proceeds retained by SCAAP are used to support and maintain the facility's recycling program. In addition to traditional recycling and ISWM practices, SCAAP continues to invest in P2 technologies, such as closed-loop and filtration systems, to minimize the total waste stream and allow for improved collection of recyclable byproducts. Compliance to environmental regulations is central to SCAAP's ISWM activities – the installation consistently ensures proper waste handling, storage, and disposal methods, and has been commended for its positive efforts. SCAAP's adherence to ISWM and effective use of P2 have ensured the viability and continuance of its recycling and reuse efforts across the installation.

### **Conclusion:**

Throughout FYs 10 – 11, SCAAP has consistently applied sustainability practices to all aspects of the installation's mission and base-optimization initiatives. SCAAP continues to evolve its day-to-day operations and long-range strategy to meet developing sustainability goals and initiatives. Through the continual review of significant aspects, assessment of energy performance indicators, and commitment to its community, SCAAP has positioned itself as an example for installations of all sizes. SCAAP is an established sustainability leader who will continue to meet mission demands and excel in adherence to Army sustainability goals.