

NORTH CAROLINA ARMY NATIONAL GUARD



SUSTAINABILITY, INDUSTRIAL INSTALLATION

INTRODUCTION AND BACKGROUND

The North Carolina National Guard's (NCNG's) **Field Maintenance Shop (FMS) #1** is a critical component of the state's military mission. The shop maintains and rehabilitates over 900 pieces of equipment, including various vehicles, communications and electronics equipment, and weapons systems integral to the NCNG's Soldier training. Based in Asheville, FMS #1 supports seven locations throughout six counties in Western North Carolina. The facility also coordinates efforts with local city and county Emergency Management Directors, Industrial Waste Inspectors and Fire Marshalls to ensure environmental compliance and hazardous material notifications are current. This shop is further distinguished for its reputation in the NCNG as an environmental leader based on previous national-level environmental awards and on its dedication to exceeding expectations and exploring new avenues to exercise stewardship in promoting sustainability and pollution prevention.

FMS #1 experiences compliance and sustainability challenges in its day-to-day operations due to its geographical location and responsibilities to the community. The facility is adjacent to the French Broad River and must remain vigilant to prevent spills or contamination of groundwater supplies. Not only does the facility have to meet stringent federal guidelines, it must also adhere to local compliance regulations enforced by the Metropolitan Sewerage District (MSD) of Buncombe County, North Carolina, to receive a permit to conduct daily operations. MSD performs annual inspections of the facility to ensure no effluent discharges are occurring, which would contaminate local water supplies due to storm water run-off. Geographically located within a city residential district, FMS #1 must also remain proactive in control of noise pollution, inherent to maintenance operations, so as not to disturb the local populace. Since the facility opened in 2008, FMS #1 has continuously maintained its reputation as a responsible steward of Western North Carolina's environment and

a “good neighbor” to its citizens through policy adherence and a proactive philosophy of environmental protection.



FMS #1, a premier industrial installation and environmental innovator in Asheville, NC.

Among the shop’s milestone achievements over the past 2 years are significant reductions in both hazardous and universal waste, the implementation and hosting of new environmental training and material inventory innovations. The accomplishments in waste stream reduction and energy conservation are in direct support of NCNG’s eMS targets and objectives. FMS #1 exceeded the NCNG objectives for 10 percent energy and water use reduction and increase in recyclables by 2016-17. These efforts included publicizing NCNG energy conservation programs and activities by the state headquarters, thus, resulting in utilities savings.

FMS #1 is staffed by nine maintenance and logistics management personnel, who have received training as Facility Environmental Coordinators and Hazardous Material Managers. Of these nine personnel, a three-person team serves as dedicated Facility Environmental Coordinators and HAZMAT Monitors to oversee day-to-day compliance and quality issues. FMS #1, in turn, coordinates with all of its supported NCNG units for equipment rehabilitation, hazardous and non-regulated material management and disposal, and training. The Facility Environmental Coordinators also serve as dedicated liaisons to the NCNG Environmental Office and command staff. All management plans for the installation are updated every year and revised every 5 years. These include

hazardous material management, waste management and spill prevention control and training. Proactive adherence to these plans has aided FMS #1 and its supported units in maintaining environmental compliance, while focusing on achieving NCNG’s military mission. The Environmental Management staff at FMS #1 conducts periodic sustainment training to incorporate any P2 plan changes. Better Management Practices are shared with supported units and the Regional Environmental Manager to promote a shared philosophy of asymmetrical compliance.

FMS #1 has adopted a proactive position toward compliance rather than merely controlling and treating hazardous waste by end-of-the-pipe measures. The facility has instituted internal facility P2 management practices to: reduce or eliminate waste volume and toxicity; improve material storage; expand recycling and reclamation of used materials; and minimize effluent discharges. FMS #1 has consistently met or exceeded current and anticipated regulatory mandates and Army-established goals, since it opened in 2008.

Environmental Budgeting for the facility is managed by the state environmental office, with a regional representative dedicated to FMS #1. The facility helps to sustain its own operations and maximize budget funding by reinvesting some recycling revenues into purchases of operational and environmental equipment. Additional recycling revenues are returned to NCNG through the Qualified Recycling Program (QRP) for NGNC’s mission. Cost avoidance is achieved through FMS #1’s significant waste stream and chemical inventory reduction via reduced disposal costs. To ensure this, the facility environmental team reviews Safety Data Sheets (SDS) for all products used in the vehicle rehabilitation process to ensure they don’t pose any increased environmental threat, while still meeting military specifications prescribed in equipment technical manuals. Overall, FMS #1’s environmental management practices help save NCNG resources in compliance-related activities, thus freeing Soldiers to focus on their jobs without harm to the environment.

Green Construction and Landscaping: The sustainability aspects of FMS #1 begin outside the building. In meeting the *2011 Guidance for Federal Agencies on Sustainable Landscaping* FMS #1 has undergone a landscape maintenance project,

introduced by the NGNC Facility Management Office, to improve the aesthetic appearance of the grounds surrounding the facility and introduce native plants and grasses to promote weed control and erosion prevention. This erosion prevention helps maintain a healthy ecosystem and protect native aquatic life in the French Broad River adjacent to the facility.

The sustainability features at FMS #1 began with the very construction of the facility to LEED 2.2 Energy 10 standards. State Environmental Staff have analyzed, designed, reviewed and approved energy-efficient features for HVAC, lighting and water conserving systems for new construction, renovation and retrofitting throughout the state based on the successes of FMS #1. Its green operations elements include an overhead pneumatic pump delivery system for petroleum products with output hoses in each maintenance bay. This system negates the possibility of accidental product release, while transporting petroleum between storage and work stations. In addition, the 55-gallon petroleum drums, located in the delivery system bulk storage area, are contained within 90-gallon over-pack containers, which are stored on top of another secondary containment floor system in case of accidental rupture. To aid in energy conservation, FMS #1 has employed internal practices to reduce energy consumption by opening window shades to allow for natural heating and lighting of work areas during cooler months and closure of shades during the summer months to negate excessive cooling system operation

The FMS #1's indoor environmental control systems are regularly serviced to guarantee energy efficiency and proper operations. Facility personnel perform scheduled inspections of the air filtration units to ensure filters are clear from heavy dust accumulations that increase energy costs. To achieve goals of energy reduction and sustainable operations, FMS #1 is currently working with the NGNC Energy Manager (Mr. Matthew Dobson) and Duke Power Company for the replacement of light fixtures throughout the facility to a greener and more cost-effective installation of LED lights. The anticipated power reduction savings are 50.4 percent. The projected cost savings include:

LIGHTING	Existing System	Proposed Solution	Results
Annual Usage	24,696 kWh	12,240 kWh	12,456 kWh
Annual Cost of Lighting	\$2,344	\$1,162	\$1,182 SAVED

Section	Annual Cost Savings	Cost	Simple Payback (years)	Rebates	Final Cost	Payback w/ Rebates (years)	kWh Saved
FMS Total Lighting	\$1,182	\$13,119	11.1	\$3,936	\$9,183	7.8	12,456

Completion of this project will have a positive environmental impact equal to 12,456 KWh and 4 KW of demand, as well as annual avoided greenhouse and noxious gas emissions of:

- 15,383 lbs. Carbon Dioxide
- 75 lbs. Sulfur Dioxide
- 13 lbs. Nitrogen Oxides
- 1 lb. Carbon Monoxide
- 2 lbs. Particulate Matter
- 214 lbs. Mercury Compounds
- 301 lbs. Lead Compounds

These avoided emissions are equivalent to:

- Planting 3 trees every day
- Planting 2 acres of forest per year
- Saving 855 gallons of gas each year
- Annually removing 2 cars from the road
- Driving 19,438 fewer miles each year

FMS #1 efforts in sustainability and P2 management date back at least 9 years. These material management efforts strive to meet the E.O. 13693 and Department of Defense-Strategic Sustainability Performance Plan (DoD SSPP) Goals for 2017 to mitigate climate change on military operations and national security.

Waste Reduction and Recycling: The shop recycles oil, rubber, plastic, metal, paper, cardboard, antifreeze, batteries, and wood pallets, diverting over 19 tons (39,173 lbs.) of these materials from landfills annually.

FY16 and FY17 Recyclables		
Material	FY16 Volume	FY17 Volume (11 Aug 17)
*Antifreeze (Recycled)	225 gallons	450 gallons
Paper	3200 lbs.	3800 lbs.
Cardboard	1800 lbs.	1930 lbs.
Wood Pallets	2300 lbs.	2650 lbs.
Steel (Mixed Metals / filters)	3800 lbs.	7105 lbs.
Plastic	320 lbs.	283 lbs.
Aluminum	175 lbs.	230 lbs.
Rubber and Tires	6300 lbs.	5280 lbs.

*Antifreeze volumes shown were recycled on-site for reuse and did not create a waste stream.

Used oil and fuel filters are drained of oil for contractor recycling, with the filters themselves crushed in-shop for recycling. In FY17, 230 pounds of used filters were recycled. (Aerosol cans and cylinders are also punctured and collected for scrap metal recycling.) Used oil products are recycled and transported by a contract vendor to an off-site processing station. The used oil is filtered with diesel fuel and reintroduced for retail sale as residential and industrial heating oils. Through this contract, FMS #1 no longer has to transport, store or otherwise dispose of used oil. On average, approximately 1200 gallons of waste oil have been recycled each year since 2008.

FMS #1 first utilized antifreeze recycling with the acquisition of a coolant filtering machine that connects directly to vehicles to extract, clean and re-inject antifreeze in a closed loop. The system is self-monitoring and indicates the need for filter change via analog gauges, thus eliminating unnecessary maintenance processes that would generate hazardous waste. Since the initial process was introduced, the State Environmental Manager purchased recycling machines for the other maintenance facilities across the state. To date, FMS #1 has recycled more than 675 gallons. This process minimizes stocking of excessive quantities of replacement antifreeze, reduces waste generation and operator exposure to hazardous substances.




Onsite antifreeze recycling has significantly increased waste diversion and material reuse at FMS #1, where over 900 vehicles and equipment items are maintained.

The shop collects, stores and cleans (via contract) all shop towels. The contract provides for 800 towels exchanged monthly, but better management practices at FMS #1 have reduced the number of rags used. In FY 14-15, the shop used an average of 315 shop towels each month; in FY16 the staff reduced that volume to just 120 towels each month. To date in FY17, consumption has further dropped to approximately 90 towels per month.

Air and Water Resources: In addition to regular water-protecting equipment, FMS #1 conducts weekly “clean sweeps” to monitor and correct any leak problems among the vehicles present at the post. Vehicles are also washed in a wash rack prior to maintenance activities so that residue on equipment can be captured by the oil-water separator. Emergency spill containment kits are also strategically located throughout the shop for immediate incident response. In addition, residual aerosols and products left in empty paint cans are collected through a filtering system, which punctures the cans and drains material with carbon cartridge filters. These filters effectively prevent VOCs from being released into the air.

Material Substitution and Green Procurement:

 FMS #1 utilizes both Gel-Cell and lead-acid type batteries conventionally used in military equipment. These Gel-Cell batteries are completely sealed and pose no risk of acidic leaks. Gel-Cells also offer a much longer life-span that makes them more cost-efficient than traditional batteries, despite their greater purchase cost. The new batteries are air-transportable and non-hazardous. In addition, they can be stored for up to 30 months, reducing the disposal costs associated with unused or expired batteries. If it is recharged every 6 months during storage, however, it will last almost indefinitely. Through implementation of the Gel-Cell technology, FMS #1 was able to collect nearly 10000 pounds of lead-acid batteries for turn-in through a contracted vendor in FY16-17. FMS #1 also uses an aqueous brake cleaner machine that reduces employee exposure to harmful brake dust during daily operations. This system is self-contained and uses a water-based “wet method” for cleaning drums, linings and other brake components. The brake cleaner is serviced by Safety-Kleen Incorporated, which controls the waste stream for filtering and disposal if required.



Flammable material storage cabinet at FMS #1. All materials at the facility are rigorously monitored and inventoried.

Material Management: FMS #1 conducts weekly inspections of controlled hazardous material and waste storage areas. The installation also conducts POL product inventories (mandated on an annual basis) at quarterly intervals to ensure accountability of manageable quantities and prevent excessive stock of materials. In addition, since 2008, the installation has reduced its universal and hazardous waste output by approximately 1½ tons.

FMS #1 has nurtured and developed its environmental program through review of internal better management practices and pollution prevention measures since facility operations began in 2008. The challenges of updated federal and local regulations, support of multiple military missions, manning shortages and fiscal constraints have driven the development of environmental program innovations to meet operational requirements. Despite these challenges, FMS #1 has continued to adhere to environmental policies and exceed expectations as evidenced in its program accomplishments, continuing to accomplish its vital support of the NCNG training and readiness mission.

FMS #1 routinely hosts Facility Environmental Coordinator refresher training, presented by the State Environmental Office, to provide managers and coordinators in its supported armories with the necessary skills to make informed decisions and take responsible actions. Since operations began in 2008, more than 80 personnel have been trained at FMS #1. FMS #1’s continued efforts to improve sustainability in the areas of waste reduction, employee awareness and training, pollution prevention and energy conservation are paramount to the ideologies of environmental stewardship being fostered in NCNG and at the installation. What is more, the facility’s efforts save time, resources and money that can be redirected back into other NCNG missions, while making the shop safer and its staff’s jobs easier. As the coordinator for its supported units waste and recycling turn-in, FMS #1 is also able to train and foster environmental awareness beyond its own post and into field operations across six counties.

FMS #1 is thoroughly involved in expanding sustainability practices throughout NCNG, acting as liaison for National Guard, federal and state personnel for all conservation activities involving electricity, fuel oil, gas, water and water treatment,

including bio-fuels, solar energy and other renewable resources. Proactive coordination of resources and the search for new “green” technologies sets NCNG apart from many civilian counterparts in environmental awareness and sustainment efforts. The shop also provides support and initiates conservation efforts for personnel from other state agencies and shares this information with National Guard organizations across the United States. The shop’s influence is further bolstered by its actions to ensure continuity; FMS #1 internally manages all manuals, reports, records and forms in electronic format, thereby eliminating the need for hard copies and maximizing consistency for all personnel.

Though the nature of activities at FMS #1 normally preclude community access, shop staff emphasizes the importance of education and awareness for sustainable environmental practices. Installation environmental coordinators serve as liaison for the NCNG environmental section, the shop and its supported units. Shop personnel also provide environmental training for new soldiers and monitor environmental operations. FMS #1 further communicates and coordinates with North Carolina environmental agencies and hosts visits for county emergency management officials, city fire marshals and regional environmental coordinators. This outreach not only supports the military mission through compliance, but also upholds NCNG’s excellent reputation for environmental protection and enhancement.