

# Combined Support Maintenance Shop, Michigan ARNG

## Pollution Prevention, Non-Industrial Installation

The Michigan Army National Guard (MIARNG) Joint Forces Headquarters in Lansing, Mich. and its Combined Support Maintenance Shop (CSMS) and Environmental Division have been recognized for being a shining example of environmental stewardship and sustainability in the region. The MIARNG's mission is to provide trained and ready forces in support of the National Military Strategy; respond as needed to state, local and regional emergencies to ensure peace, order and public safety; and add value to our communities through continuous interaction.

One way that the MIARNG is providing that value is through the installations' pollution prevention (P2) program. The MIARNG CSMS has implemented new pollution prevention technologies that help make their operation more mission practical, environmentally sound, and therefore more sustainable.

The MIARNG CSMS is located in the capital city of Lansing, which is the sixth largest city in the state located about 80 miles west-north-west of Detroit.

*On this page: (Left to right) Ukraine Capt. Alexander Dodukh, Staff Sgt. Brandon Post and Staff Sgt. Chris Collins of the Michigan National Guard compare wind speed readings during a joint training exercise. (U.S. Marine Corps photo by Gunnery Sgt. Donald E. Preston)*



### JUDGING CRITERIA



Program Management



Orientation to Mission



Technical Merit



Transferability



Stakeholder Involvement

As stated in the Adjutant General (TAG) Environmental Policy Statement, the MIARNG is committed to a sustainable mission operation through its commitment to environmental improvement, P2, environmental compliance, and mission sustainable training. The P2 efforts of the CSMS have been essential to the military mission of the MIARNG. Prior to the opening of the new CSMS four years ago, the previous paint shop could not pass the state regulatory requirements and painting activities ceased for many years. The MIARNG's new CSMS is the only full re-painting facility for the MIARNG and processes 12 to 15 vehicles/pieces of equipment every month in support of MIARNG missions. The CSMS is a 143,518 square foot ground-vehicle maintenance facility consisting of 53 work bays and eight motor vehicle storage bays. The shop occupies 31.2 acres and is part of the Joint Forces Headquarters Complex which totals 58.64 acres. The CSMS employs 100 full-time MIARNG members and



**"If it wasn't for P2 initiatives that we employ in our painting operation I have to believe our operating costs would be much higher, perhaps even an order of magnitude higher."**

*- Richard L. Wilder, CW4 OD MIARNG, CSMS Allied Trades Section*

80 part-time members and is committed to expanding P2 awareness. In fact, some of the CSMS employees also serve on the MIARNG Environmental Management System (EMS) Cross-Functional Team which leverages teamwork and partnership, to identify mission priorities across the installation to maintain a sustainable operation. The MIARNG is transitioning its installation headquarters into a truly joint force headquarters and enhancing adaptive-mission strategies to execute our nation's defense strategy. The MIARNG is a leader for the National Guard in its P2 practices and commitment to sustainability.

## BACKGROUND

The National Guard has a unique dual mission that consists of both Federal and State roles. The

MIARNG's mission is to provide a trained, ready, and sustainable force structure in support of the National Military Strategy. One way that MIARNG is completing their mission is through the installations' P2 program. P2 focuses on conservation of resources, replacement of hazardous materials with less hazardous materials, waste reduction, recycling, and other preventive means to successfully and cost effectively avoid, prevent, or reduce the generation of pollutants. The MIARNG installation Environmental Division works with the National Guard Bureau (NGB) to find new equipment that will benefit the installations' P2 efforts and develops budgets to fund the procurement of that equipment. The money saved by implementing these P2 efforts is redirected to soldier training and



An aerial view of the CSMS located at the Michigan National Guard's Headquarters Complex in Lansing, Mich. The MIARNG CSMS paints and processes 12 to 15 vehicles/pieces of equipment every month and provides the only full re-painting services for the MIARNG. In addition, the Allied Trades Shop manages sheet metal repairs and weapons storage/shipping containers for mobilization and annual training.

readiness, facility and equipment improvements, and other mission related programs and resources. The CSMS is one such shop that promotes environmental improvement and encourages pollution prevention through its practices and materials. The CSMS is ISO9001 and AS2000 certified and supports vehicle maintenance and mobilization and training activities. The MIARNG CSMS has reached some key milestones over the past two years which have made it greener and more sustainable than ever.

**Key Milestones:**

- Implemented Spray Technique Analysis and Research for Defense (STAR4D) painter training programs
- Conversion from solvent-based to water-based Chemical Agent Resistant Coating (CARC) painting systems and water-based painting materials

**P2 Benefits of Water-Based Painting Systems:**

- Reduced air filter replacement
- Cut hazardous waste streams
- Reduced hazardous waste disposal costs
- Enhanced soldier safety

The MIARNG believes that EMS implementation plays an important role in mission sustainability, as outlined in TAG's Environmental Policy statement. The MIARNG is committed to maximizing the availability of training areas and facilities to enable soldier training and readiness today and into the future, maintaining compliance with environmental



*The MIARNG CSMS received their ISO 9001:2000 Quality Management Systems certification. It includes a requirement for the continual improvement of Quality Management Systems.*

regulations, preventing pollution of training lands, water, and air, and improving the performance of environmental, energy, and fuel management practices to sustain our natural resources and advance our nation's energy security. The CSMS and Environmental Division staffs work closely on a day-to-day basis, they also meet quarterly with the MIARNG Environmental Quality Control Committee (EQCC) to review EMS integration and set targets and objectives for operations throughout the installation. One such target accomplished in the past two years was training and equipping all paint staff with water-based CARC paints.

**New Technologies**

One of the most promising new technologies utilized in the painting operation at the CSMS is

the Closed Loop Advanced Water-jet System (CLAWS) used in the paint stripping bay. The CLAWS is a paint stripping operation designed to remove old paint with water instead of the typical, more commonly used blasting material. CLAWS uses a high pressured water jet to remove old paint, a process that significantly reduces the amount of both solid waste and hazardous waste generation and significantly lowers labor and disposal costs as well as future liability. The chart below compares the typical cost of waste generation differences between CLAWS and conventional paint stripping methods one would expect to find with each.

The Allied Trades staff at the CSMS likes the ease and simplicity of this system that can strip paint at a comparable, if not faster rate than conventional stripping methods (personnel strip

	Typical Waste Disposal Unit Costs	Typical Annual Disposal Cost	Vehicles/Equipment stripped per week
<b>Conventional Method</b>	72 tons at unit cost of \$52/ton	\$5,000	3-4
<b>CLAWS Method</b>	205 lbs at unit cost of \$0.52/lb.	\$500	3-4

approximately 12-15 vehicles per month, in addition to numerous other pieces of equipment of varying size). The CSMS has made the switch from using a solvent-based CARC paint and primer to a water-based CARC paint and primer on tactical vehicles because it does not soak up chemical agents the way alkyd (oil) paint does. It also resists removal by decontaminating solutions. Moreover, from a mission perspective, the water-based CARC paint reportedly is up to 3-times more durable than conventional solvent-based CARC paint. The CSMS Allied Trades group realizes that having the right equipment and using the correct materials are not enough in the painting process. Therefore, each painter is sent to the STAR4D program, a three-day training course for military coatings operations. The program teaches effective spraying techniques to maximize coating efficiency and minimize environmental pollution.

#### PROGRAM SUMMARY

The MIARNG CSMS has met and exceeded its primary goal to be efficient and utilize new technologies. During its inception, saving time and money and providing a safe work environment for employees, while protecting the environment was on everyone's mind. As a result many pollution prevention control measures were installed at the new facility. Sound program management has contributed to the CSMS' P2 program success. Key accomplishments over

the past two years include earning ISO9001 and AS2000 certifications; implementation of the STAR4D painter training programs; conversion from solvent-based to water-based CARC painting systems and water-based painting materials; and participating in Green Procurement and Leadership in Energy and Environmental Design (LEED) training hosted by the MIARNG. One goal that the MIARNG Environmental Quality Control Committee achieved in the past two years was training and equipping all paint staff with water-based CARC paints. Water-based CARC and primer were created to meet U.S. Environmental Protection Agency's Clean Air Act regulations but they also have the added benefit of being safer for painters, are easier to use, and significantly reduce the hazardous waste stream volume for the painting operation.

#### ACCOMPLISHMENTS

##### Material Substitution

In the past two years, the transition to painting procedures entirely based on water-based CARC paint has been completed, eliminating the need for solvent-based paints, thinners and reducing air filter replacement. An external filter covered with



*New paint mixers ensure the most efficient mixing and storage for vehicle and equipment paint. This not only reduces the likelihood of spills, but also simplifies operations for CSMS painters. Paint mixers also reduce waste by keeping paint fresh, avoiding the disposal of unused paint.*

pre-filter mesh cloths capture downdraft paint particulates in the paint booth. The pre-filter cloths can be replaced more often at limited cost, while the filters themselves have longer use. Filters also are disposed of as solid waste minimizing the overall waste stream of the CSMS paint shop. The shop replaced solvent-based primers with water-based primers, producing environmental and operational benefits. The CLAWS used in the paint prep shop recycles the water used for paint stripping through a filtration system. A micro-separator uses a centrifuge process that collects paint particles, rust, and debris from used water. The deionization process also minimizes flash rusting, enhancing paint life. The substitution to water-based paint has also benefited soldier health and safety by minimizing their exposure to potentially harmful toxins.

##### Process Improvement

STAR4D training is an important element for CSMS operations. The new CSMS training processes



have also helped make the shop an example within the Guard. When a new painter is hired, he or she is teamed with an experienced painter for mentoring. After approximately two months working in this capacity, the new painter will be considered a full member of the paint shop team and sent to STAR4D training. With an extensive analysis and research library, the STAR4D experts have the most up-to-date information on coatings, technologies, and application techniques. The painters attending STAR4D training are given both an entrance test as well as an exit test. Test results indicate an across the board improvement of approximately 10 percent. This equates to decreased VOCs being released into the atmosphere, an improvement in transfer efficiency and savings in paint material used.

### Improved Material Management

Using updated material management practices minimizes the CSMS waste streams and provides inventory and personnel support which helps the shop run more efficiently.

- The environmental staff provides regular training on spill prevention and response, hazardous materials management, and compliance protocols. All plans and SOPs are updated as the work environment changes.
- CSMS and the environmental staff conduct spill drills to prepare the CSMS staff in the event of an accident. This



*A painter uses claws equipment to strip paint from a MIARNG vehicle. The system recycles the water used for paint stripping through a filtration system. The substitution to water-based paint processes has also benefited soldier health and safety by minimizing their exposure to potentially harmful toxins.*

proved beneficial this past year when a vehicle fuel tank was damaged and leaked in the paint stripping shop. The CSMS staff was able to contain and clean up the spill and the quick response resulted in no negative actions.

- The Standard Army Maintenance Management System-Enhanced (SAMS-E) not only allows the CSMS to track man hours, assign jobs, and account for equipment, it also provides inventory support that tracks the paint and shop supplies on-hand, monitor use and expiration dates, and guide re-purchasing.

### Recycling Program

Another area that the MIARNG's CSMS focuses on is recycling. The CSMS continues to look for new recycling streams. Water is already recycled in the paint prepping process using CLAWS and waste disposal has been minimized. A micro-separator

uses a centrifuge process that collects paint particles, rust, and debris from used water. These waste materials are the only stream that has to be disposed of as hazardous waste. The deionization process also minimizes flash rusting, therefore enhancing paint life on material. In addition, all aerosol cans used at CSMS are punctured and drained after use then recycled as scrap metal. A special laundry contract also collects shop rags for laundering and reuse, thereby eliminating this solid waste stream and avoiding the costs of new material purchase.

### Education, Outreach, and Partnering

The MIARNG installation has set a leadership example of Army's Triple Bottom Line of mission, environment, and community by hosting numerous meetings and events and providing tours of the CSMS and its operations for public and



private organizations. They have given tours and demonstrations to Lansing Community College classes, scout troops, Department of Defense/State of Michigan Environmental Alliance, the Environmental Protection Agency, and the Department of Environmental Quality. The MIARNG has also supported private companies interested in switching to water based CARC painting systems. In 2008, the MIARNG hosted the annual Department of Defense and State of Michigan Environmental Alliance Federal Facilities Workshop on Green Procurement and LEED training. The 2008 workshop was the first time the Environmental Alliance reached out to a target audience comprising participants other than environmental personnel to emphasize the importance of Cross-Functional Integration to organizations who want to achieve a sustainable operation. The training helps enable MIARNG to meet Army and DoD procurement policy requirements while supporting the overall sustainability of its operations through sound management of fiscal resources, natural resources, infrastructure, and energy.



### Reductions Achieved

The CSMS has achieved significant reductions in hazardous waste, resources used, and disposal costs by integrating new technologies and training into its everyday P2 operations. The CSMS has made the switch from using a solvent-based CARC paint and primer to a water-



CSMS painter Chris Adair explains the camouflage painting process for a 34-ton semi-trailer to MIARNG Soldiers. Internally, regular training and planning updates help to keep all CSMS personnel up-to-date on compliance and P2 requirements. The mentoring relationship for new staff ensures that best practices are continued throughout the organization.

based CARC paint and primer on tactical vehicles. The water-based CARC and primer contain no hazardous air pollutants and have significantly reduced air emissions of Volatile Organic Compounds (VOCs). The results of training studies at the STAR4D program, which the CSMS sends its painters to, demonstrates significant improvement in painting efficiency. A comparison of pre-training data to post-training data shows an increase in transfer efficiency of 23 percent, a decrease in material consumption of more than 15 percent, and a reduction of VOC air emissions of over 15 percent. The CLAWS operation only generates approximately 15 lbs of hazardous waste per month or less, keeping operating and labor costs low while reducing future disposal liability concerns. The total hazardous waste disposal cost including analytical testing for the

painting operation was less than \$1,000 for fiscal year 2007. This is significantly less than disposal costs generally associated with more conventional paint stripping methods.

### Program Management

The staff at the CSMS manage automotive repair, supply facility weapons repair, and Allied Trades operations. Working closely with the MIARNG Environmental Division, and following EMS and TAG policy guidelines, the staff has integrated environmental awareness into all operations, and cooperates to target waste streams for reduction and identify process improvements. The location of the Headquarters campus also ensures that CSMS and Environmental Division staff can easily communicate and collaborate with MIARNG





*The micro-separator uses a centrifuge process that collects paint particles, rust, and debris from used water; these waste materials are the only stream that has to be disposed of as hazardous waste. The deionization process also minimizes flash rusting, therefore enhancing paint life on material.*

command to expand P2 activities. All management plans for P2 and compliance are up-to-date and reviewed annually. This commitment to planning and training has helped the installation to maintain its record of no Notices of Violation or compliance problems.



### **Compliance with E.O. 13423**

In accordance with E.O. 13423 Strengthening Federal Environmental, Energy and Transportation Management, the CSMS has designed their processes to reduce negative impacts on the environment, improve the comfort of the building occupants, and reduce operating costs while improving building performance. Eliminating solvent-based materials has reduced air filter replacement, cut hazardous waste streams, and enhanced soldier safety. The use of the CLAWS system has reduced water consumption. The use of water-based CARC has led to a reduction in the use of chemicals and toxic materials.

The implementation of EMS at all appropriate organizational levels to ensure use of EMS as the primary management approach for addressing environmental aspects of internal agency operations and activities has ensured that the CSMS will remain a sustainable and environmentally friendly facility.

### **Green Procurement**

Green procurement is rooted in the principle of pollution prevention, which strives to eliminate or to reduce risks to human health and the environment. The CSMS has received its ISO9001 and AS2000 certifications for continuing to improve their quality management systems. The CSMS has made the switch from using a solvent-based CARC paint to a water-based CARC paint on tactical vehicles. The water-based CARC and primer contain no hazardous air pollutants and have significantly reduced air emissions of Volatile Organic Compounds (VOCs). The implementation of STAR4D training has reduced material consumption and VOCs. The CLAWS system recycles water used for paint stripping through a filtration system. The substitution to water-based paint has had a positive impact on soldier health and safety by minimizing their exposure to potentially harmful toxins.

### **CONCLUSION**

The MIARNG's Joint Forces Headquarters set the standard for pollution prevention initiatives and sustainability in Michigan.

Many other states are taking notice of the MIARNG's P2 practices and are continuing to seek out the MIARNG's expertise in setting up similar operations in their facilities. The CSMS was recognized by the Department of Defense/State of Michigan Environmental Alliance for their efforts in pollution prevention by having their success story posted on the Michigan Department of Environmental Quality web site. The NGB has selected the MIARNG and its \$24 million CSMS facility as the 2008 winner of the NGB "Pollution Prevention" environmental award. Winning the award was truly a joint effort between the environmental office and the CSMS staff. The partnership included procuring and obligating funds through the NGB's P2 program to purchase painting equipment, provide specialized training that increased efficiency and minimized waste generation, and to invest in waste stream evaluation and analysis resulting from water based CARC and painting operations. This partnership between the CSMS and Environmental Division staff demonstrates how the ability to accomplish the mission can be enhanced through sustainable actions such as P2. The MIARNG's commitment to outreach, information-sharing, and engagement with environmental regulators, government agencies, industry, and other members of the community has made the installation a pollution prevention leader not only in Michigan, but also in the region and throughout its military structure.