

USAG DAEGU, SOUTH KOREA



ENVIRONMENTAL QUALITY

INTRODUCTION

U.S. Army Garrison (USAG) Daegu consists of 14 U.S. military installations and encompasses more than 19,000 square miles (49.8 percent) of the South Korean Peninsula. USAG Daegu is home to Camps Henry, Walker, George and Carroll, as well as Pier 8 and Busan Storage Facility. Daegu's garrison provides facilities and support for more than 85 units and organizations. The city of Daegu in the Gyeongbuk Province, is the fourth largest city in Korea and is located approximately 200 miles south of Seoul. The combined population of the installations totals more than 10,667 active-duty military, Department of Defense (DoD) civilians, families, Korean civilian workers and contractors. Camp Henry serves as headquarters for USAG Daegu, while Camps George and Walker provide on-post housing for 183 military families.

USAG Daegu is currently in the process of building four state-of-the-art apartment complexes to accommodate service members and their families. The Directorate of Public Works (DPW) Environmental Division team consists of five Department of the Army civilians, six Korean National civilians, and one contract worker. The team is responsible for compliance and sustainability management of all USAG Daegu facilities and installations. This team is truly making a difference with their commitment to the military mission while promoting great environmental stewardship. This has been demonstrated time and time again through their waste minimization, resource protection and conservation efforts. The team's community and stakeholder outreach program is second to none in Korea.

BACKGROUND

The USAG Daegu Environmental Division is responsible for environmental stewardship in Area IV consisting of 13 geographically separate activities within the garrison's area of responsibility. USAG Daegu's DPW Environmental Division staff is comprised of 12 U.S. and Korean civilians: Division Chief, Conservation and Planning Branch Chief, four Environmental Engineers, five Environmental Protection Specialists and one Natural Resources Manager (contractor). The team has responsibility and oversight of 38 environmental media and sub-programs such as air emissions, cultural and historical resources, natural resources, storage tanks, hazardous materials, hazardous waste, medical waste, solid waste, recycling, pollution prevention, water quality/wastewater, toxic substances (asbestos/lead-based paint (LBP)/polychlorinated biphenyls (PCB), radon), pest management, spill response, environmental management system (EMS), budgeting and planning execution, environmental database and reporting oversight (e.g., environmental quality (EQ), solid waste annual reporting (SWAR), Garrison Environmental Requirements Board (GERB)/Installation Status Report (ISR)/Performance Assessment Review (PAR), audit support for Environmental Performance Assessment and Assistance System (EPAAS) and Command/Organization Inspection Programs (CIP/OIP)).

PROGRAM SUMMARY

USAG Daegu has multiple processes to mitigate and ensure environmental compliance with established inspections and audits performed by the Installation Safety Office, DPW Real Property, Environmental and Energy Offices, Resource Management Office and Internal Review Office. The garrison mitigates risk with periodic training on safety, environmental compliance and ethics. The goal is to surpass the requirements of each inspectable area and meet or exceed mandated usage reductions. Environmental stewardship is another key mission for the garrison. USAG Daegu's Wetlands Green Neighbor Initiative (GNI) program informs local communities how the U.S. Government ensures the environment is improved or maintained on Army installations in South Korea. This program includes regular visits from local government organizations.

USAG Daegu has also developed and maintained an EMS website that allows access to on-line training. This website has both English and Korean components to assure conformance with requirements. The garrison's Environmental Division includes a handbook as a training tool in the Environmental Officer (EO) training course.

Additionally, USAG Daegu is currently the only garrison on the Korean Peninsula that segregates all recyclable materials at the source. This allows the garrison to optimize profits from recycling, allowing funding to be returned to military quality of life improvements. USAG Daegu continues to support the Household Hazardous Waste turn-in program and recycles household cleaning products to supply incoming Soldiers and their families, which helps reduce hazardous waste. This brings savings to both the community and the garrison and reduces disposal requirements and costs. USAG Daegu's environmental team relentlessly develops and executes special emphasis campaigns and safety programs to strategically communicate to the community to increase awareness of these important recycling efforts.

USAG Daegu's vibrant GNI, under the aegis of U.S. Forces Korea, and in concert with the 19th Expeditionary Sustainment Command, includes extensive community support programs and initiatives. To increase awareness, the garrison holds activities for school-age children, allowing them to visit the installation's wetlands and provides tours of other facilities. The garrison sponsors weekly and monthly English and Math classes for underprivileged students. In addition, military members and Army civilian employees plant trees side-by-side with Korean neighbors on Arbor Day and Earth Week. The garrison provides installation tours for all segments of the host nation (HN) population, from dignitaries to those who reside right outside installation walls. Safety, environmental, energy and emergency services are synergized through educational tours, memorandums of agreement, memorandums of understandings and joint projects.



As part of the Green Neighbor Initiative, garrison members travel to local schools to provide information on the importance of recycling and becoming good environmental stewards.

Waste Reduction

The DPW Environmental Division has a sustained Environmental Awareness Training curriculum for Soldiers, Civilians and Korean Nationals (KN) working at USAG Daegu. All tenants are made aware of the products and services offered through the Environmental Division. Tenants are highly encouraged to participate and provide feedback, and are considered integral for sustaining and improving reduction of solid waste generation and increasing recycling efforts.



During Earth Week, KATUSA and U.S. Soldiers cleaned up a local lake area.

The USAG Daegu Environmental Team routinely uses different methods of outreach to keep all tenants informed of the benefits and importance of maximum participation in recycling initiatives. AFN radio and television spots, community events, environmental website and distribution of informational pamphlets on Earth Day and America Recycles Day, as well as other community outreach initiatives throughout the

year at different locations, have resulted in increased recycling support throughout the garrison. USAG Daegu has indoor and outdoor recycling receptacles that can be found at every facility on each installation, including family housing. To further promote and encourage recycling efforts and ensure recyclables are properly segregated and differentiated from refuse, all the receptacles are clearly labeled, strategically located, collected frequently and well maintained. Additionally, recycling bins were placed in the common areas of unaccompanied Soldier's housing and as a result, many are taking the lead to ensure fellow Soldiers are recycling. Construction of two new Family Housing Towers on Camp Walker has begun. The Environmental Division developed and provided a recycling informational pamphlet to housing that is briefed and distributed to all tenants prior to them signing for and occupying all government-owned/-leased housing.

Solid waste diversion, reduction and disposal cost avoidance are stewardship initiatives recognized and much appreciated by the garrison's Korean partners. Landfills are scarce on the peninsula. Reuse, recycling and reduction are paramount. An initiative to reduce/eliminate the cost of food waste disposal was implemented in September 2017 with the installation of a food dehydrator at Camp Henry's dining facility. The food dehydrator is expected to reduce the amount of food waste generated at this facility by 85-93 percent. Information about reductions in waste generated and disposal cost avoidance resulting from the use of the food dehydrator will be shared across the garrison, and evaluated for implementation at other locations, such as the commissary, schools, and other eating establishments throughout Area IV.



A food dehydrator at Camp Henry DFAC was installed to reduce the volume of food waste generated.



USAG Daegu has consistently exceeded the DoD Measure of Merit (MoM) reduction goal of 50 percent by 2016 for solid waste reduction/diversion. In FY16 USAG Daegu's solid waste reduction/diversion rate was 67.8 percent and 70.7 percent was diverted in FY17. Less than 10 percent of construction/demolition waste generated by the installation was sent to the landfill for disposal in 2016 and 2017. The combined solid waste disposal cost avoidance for FY16 and FY17 exceeded \$5 million. Proceeds from USAG Daegu's recycling program are reinvested into sustainment and improvements to the recycling program and other environmental initiatives.



Another integral component of USAG Daegu's solid waste reduction and diversion program is land farm operations. The land farm is used to treat contaminated soil to a reusable level thus avoiding disposal cost. Soil is treated at one of two land farm sites (Camps Carroll and Walker) using internal manpower and resources. The Environmental Team performs sampling analysis until the soil is treated to reusable standards, then it is used as backfill for ongoing projects throughout the garrison. Land farm operations yielded \$1,058,000 disposal cost avoidance as 7,427,000 pounds of contaminated soil were treated and reused.



Prior to the wetland and stream restoration project, this area was an eyesore.

Natural Resource Management

USAG Daegu encompasses an extensive area with its diverse installations and facilities across the southern half of the Korean peninsula. Conservation measures, biodiversity enhancement and a robust outreach program have created a sustained commitment

incorporated into the natural resource management program. The team's efforts to support the natural resources program is a collaborative approach, successfully integrated into DPW's Environmental Division. A critical nexus is the ongoing command support encompassing the diverse initiatives. Realizing that a sustained effort requires public involvement, the Environmental Division advances outreach using the GNI which includes a diverse populace across the greater off-post community and bilingual staff to communicate, inform and educate all community members of environmental initiatives at the garrison.



A key element of the conservation program, which also provides outreach opportunities, is the ongoing support of a unique, one-of-a-kind wetland and stream restoration project. USAG Daegu's DPW recognizes the significance of wetlands management for landscape sustainability and has taken the initiative to restore and enhance the Camp Carroll wetland system to promote both near-term and long-term biodiversity values for the community. DPW provided the technical approach to design a project to rejuvenate and improve the function of the wetland system, based on hydrology and native vegetative components of both the stream and wetland habitats.



The Wetland and Stream restoration project provides many benefits for wildlife and community outreach.



The main goal of the wetland restoration, like the majority of natural resources conservation initiatives, is to provide a sustainable mission landscape. The restoration of the wetland and stream corridor provides many benefits for both the on-post and off-post community, including stream hydrologic function, streambank enhancement, pond formation and downstream enhancements to the Nakdong River. The wetland and associated greenway corridor now support a rich assemblage of biodiversity and hydrologic benefits, including flood control, erosion abatement, groundwater recharge, high-value native wetland forest, native groundcover species and water quality improvement services. In addition, it allows community outreach year-round to both on-post student and civic groups, local universities, Chilgok County Environmental Office, environmental training groups and local Korean veterans. Finally, the wetlands provide a haven for native wildlife species, including 51 protected bird species, two species of protected reptiles and one species of protected mammal (Korean Water Deer). The Camp Carroll Wetland and Stream Restoration Project incorporated wetland restoration, wetland enhancement and wetland creation design objectives, which ultimately transformed this former storage lot for heavy equipment back to its historic sustainable function.

The Wetland Project corridor is now one of the centerpieces for the GNI, annually hosting numerous diverse visitor groups and volunteers including: Korean university students, Boy Scouts, municipal government officials, local environmental engineers, Soldiers, Korean War Veterans and student groups. Each year hundreds of visitors and volunteers receive hands-on wetland training and four seasons of discovery in this unique setting. Armed Forces Network (AFN)-Daegu Radio provides a weekly “Flyways and Byways” show streamed across AFN Pacific to spread the word about this valuable resource and outreach opportunity.

Waste Minimization

USAG Daegu’s Environmental Division has successfully completed the Army-wide migration from Hazardous Material Management System (HMMS) to Enterprise Environmental Safety and Occupational Health-Management Information

System (EESOH-MIS). USAG Daegu was the first Army installation on the peninsula to completely migrate and implement EESOH-MIS into daily operations. The establishment of a solid tracking system has provided the garrison better tracking of all hazardous materials entering the Army Supply System through distribution to the workforce. The Environmental Division also created its first Hazardous Materials Pharmacy (HAZMART) Customer Guide to help spread awareness about the Free-Issue Program, Antifreeze Recycling, and Shelf-Life Extension Program. The garrison also created brochures, briefed the community at garrison-wide events and utilized AFN Radio to help spread awareness. Since FY 16, approximately 291 Environmental Officers have been trained from the brigade to company level. Environmental Officers are serving in the front lines at the unit/shop level to help ensure that hazardous materials are being managed properly throughout the lifecycle. Due to their efforts, USAG Daegu was able to save \$1.2 million dollars in disposal costs since FY16. Cost disposal savings were a direct result from units utilizing the Free-Issue Program, Antifreeze Recycling, and conducting shelf-life extensions to extend the life of products. Minimizing the amount of hazardous materials in the workplace and finding safer environmentally-friendly substitutions has been one of the priorities.



Garrison military barracks residents actively participate in the installation's recycling program.

The Environmental Division’s focus on improving hazardous material management processes has contributed to reducing USAG Daegu’s hazardous

waste footprint by 64.3 percent since FY16. USAG Daegu generated approximately 149 tons of hazardous waste in FY16 and only 52.9 tons in FY17. Continued reduction initiatives will aid with improving operations, minimizing garrison impacts on the environment and maintaining mission sustainability for the future.

Waste Reduction

Wet sludge produced at the wastewater treatment plant in Camp Carroll requires the garrison use a Sludge Drying Bed to dewater sludge via filtration and evaporation. A reduction of approximately 35 percent in moisture content can be removed after drying and does not require electrical energy. In prior years the sludge generated from the Camp Carroll plant has been turned in as regulated waste due to its heavy metal contents. The Environmental Team conducted a waste stream analysis and identified that oil-water separators (OWS) were the source for the heavy metals. To minimize the heavy metals content in the sludge, cleanup frequency for OWS maintenance was increased. This initiative helped reduce the heavy metal content and allowed the waste stream to be reclassified to a non-regulated waste. During the award period, 182,989 pounds of sludge were generated from plant operations. Through the dewatering sludge process, better discharge control from the OWS and reclassification from a regulated waste to non-regulated waste, USAG Daegu reduced its annual disposal expenditure from \$36,238.81 to \$10,363.66; a cost avoidance of 71.4 percent.

Water Quality Management

In 2016, USAG Daegu established the Backflow Prevention Assembly (BPA) inspection and testing program to test and inspect the installation's 1,189 BPAs. In previous years, the BPA inspections and testing program was outsourced through contract as there was no trained personnel. The environmental staff's program manager was certified to conduct inspections and testing. The PM assisted with ensuring Operations and Maintenance (O&M) Division personnel successfully completed and passed the rigorous certification course. The PM volunteered his own personal time and initiative to translate the textbook training materials into Hangul to assist his teammates. He conducted a one-day

classroom pre-training session, as well as a one-day field testing practice to help prepare his team for the week-long course. A professional instructor providing this type of pre-training and textbook translation would have cost the garrison approximately \$30,000.00. The garrison inspected and tested 1,200 potential cross-connection points. To reduce the environmental impacts and reduce/eliminate contaminants in the water, the lines were flushed during the BPA testing. Use of DPW in-house personnel to perform BPA inspections and testing eliminated the requirement for contracting the service at an annual cost of more than \$100,000.00.

Environmental Management System (EMS)

The Environmental Division has implemented and sustained a fully developed EMS. The Environmental staff conducted quarterly Environmental Quality Control Committee (EQCC) meetings, chaired by the Garrison Commander, and worked with unit environmental officers and other garrison directorate personnel in the cross-functional teams to ensure the EMS format was within their capability to support the units' missions. By reviewing trends and discussing best management practices the cross-functional team helped reduce reportable spills by 100 percent in FY17. This was accomplished through hands-on spill prevention training exercises and awareness training. Although implementation and employment of an EMS is no longer a mandatory requirement, The Environmental Team continues to incorporate EMS principles (Plan, Do, Check, Act) to sustain stakeholder interaction and environmental stewardship throughout the garrison. The Environmental Team along with DPW Master Planning, O&M, Business, Operations and Integration, Fire Department, Safety and Contracting, review work orders, projects and plans. During the award period, the Environmental Team and stakeholders reviewed more than 4,000 requests/projects. These team reviews help to provide alternatives to minimize the impacts of our activities on the environment and maintain mission accomplishment. USAG Daegu's EMS successes are due to a collaborative effort of all tenants of the installation, working together on the various programs, following the basic principles of EMS: continuous improvement aimed at long-term mission sustainability. Through this collaborative effort the garrison has been able to reduce hazardous and solid

waste disposal, eliminate reportable spills, provide significant cost-savings for the Army and reduce the environmental footprint, while supporting and sustaining the mission. Maintaining environmental compliance starts with having effective environmental awareness and training programs, as well as constant review of information and processes. The EO training was once a five-day course. After several reviews and modifications the course is now a two-day intensive course covering the required topics needed to help maintain compliance. Additionally, a Korean Hazardous Material/Waste Handler's course has been added, where previously only the English version was taught. Despite language barriers, high operations tempo and high turnover rates, USAG Daegu has implemented clear and concise requirements that are easily understood to help overcome these challenges.

Effective Use of Funds

USAG Daegu set a historic record in energy savings in FY16 and easily exceeded the Army's goal (Executive Order 13693) of energy reduction (2.5 percent annually). USAG Daegu acquired \$4.82 million from the \$16.51 million allotted to IMCOM Sustainment, Restoration and Modernization management decision package/funding for energy efficiency and utilities modernization projects (QUTM). This was the most energy funds allocated to a single installation (29 percent) in IMCOM and allowed the garrison to execute 10 projects for energy and water consumption, renewable energy, and heating, ventilation and air conditioning (HVAC) upgrades. Additionally, USAG Daegu championed the Energy Savings Performance Contracting (ESPC) program with \$13 million used for light emitting diode (LED) replacement, oil to gas conversion and replacement of HVAC beyond life cycle. Successful execution and efforts in energy conservation contributed to a 13.75 percent energy intensity reduction (measured in million British thermal units per thousand square feet or MBTU/KSF) resulting in \$2.1 million in energy and water consumption savings in FY16. The garrison upgraded mechanical systems and lighting by installing cool roof technology and installing solar tube lighting systems. The cool roof technology was applied to 162,546 square foot of roof within the garrison footprint. This decreases air conditioning

requirements and also may extend the roof life cycle. Solar tubes have 4.7 years of return on investment that also provides environmental and emotional benefits. With solar tubes, hundreds of light bulb replacements will not be required, while production rates will increase as natural lights are more comfortable to human eyes thereby improving eye comfort. An important secondary benefit of these upgrades is an estimated 12 percent reduction in corrective maintenance. The natural gas conversion versus heating oil at all three camps (Camps Henry, Walker and Carroll) is more cost-effective, environmental friendly, with less hazardous air emissions to warm facilities. An annual savings of \$1.6 million for both energy and water costs is anticipated. The QUTM and ESPC efforts also reduced the maintenance man-hours and materials, as less maintenance is required for newer assets. In FY16, 12 percent less corrective maintenance was required.

CONCLUSION

The Environmental Division's significant waste minimization efforts; reduction and conservation of energy and water resources; protection and enhancement of natural/culture resources; interaction with other garrisons across the peninsula, installation directorates, units and tenants; community outreach initiatives; recognition of environmental stewardship by the local Korean Ministry of Environmental; receipt of numerous Commander's Award for Civilian Service and Certificates of Appreciation for Environmental stewardship, and 100 percent positive customer feedback through the Interactive Customer Evaluation (ICE) program, speaks volumes about the work accomplished by this team. The garrison's motto of "MAKE-A-DIFFERENCE" is truly epitomized with this teams' commitment to supporting and sustaining the mission through communicating environmental awareness, providing training, protecting environmental resources, ensuring continual program and business practices improvements, enhancing installation and local community outreach programs and being great stewards of the environment. We are the Army's Home, Serving the Rugged Professional.