2016 SECRETARY OF DEFENSE
ENVIRONMENTAL AWARD NARRATIVE
ENVIRONMENTAL QUALITY- INDIVIDUAL

Background:

The Marine Corps Air Ground Combat Center's primary mission is to train military personnel under live-fire conditions. The austere desert environment and reliance on finite groundwater resources pose unique challenges to train over 45,000 Marines annually. The Natural Resources Environmental Affairs (NREA) Division oversees utilization of this unique desert training environment, enabling the Marine Corps units and tenant commands to achieve and maintain environmental compliance and protection, while sustaining resources essential to combat readiness.

Mr. Chris Elliott, Water Resources Manager for the Natural Resources Environmental Affairs Division, ensures the Combat Center meets water resource compliance and stewardship requirements in support of the training mission. Mr. Elliott has over 27 years of dedicated Federal service. His exceptional performance, superior managerial skills, and dedication reflect great credit upon himself, this Division, and the Combat Center. Mr. Elliot's diverse experience -- as a California Certified Wastewater Operator, Certified Storm Water Inspector, and, previously, as the Utilities Operator Repairer for Combat Center Naval Hospital -- is invaluable to this command and its mission. He has served in his current capacity as the Water Resources Manager for eight years and has used his technical expertise, sound judgment, and knowledge of the regulatory rules to successfully manage a preeminent Water Resources program, while supporting Combat Center's demanding mission.

Position Description:

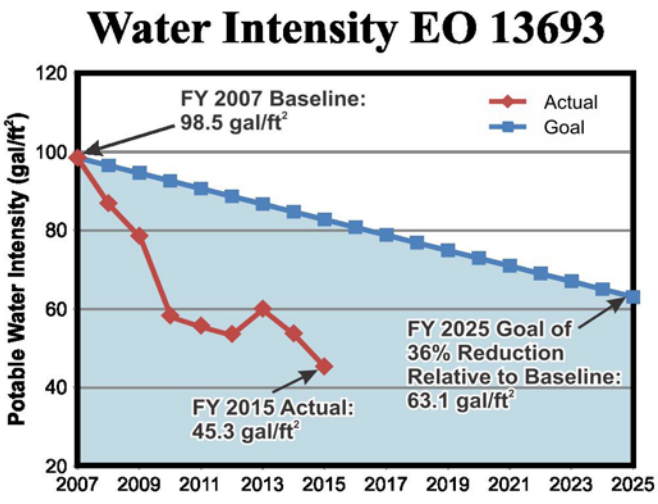
Mr. Elliott is responsible for the management and environmental oversight of the Combat Center's water resources program -- including drinking water, storm water, recycled water, and wastewater. He ensures environmental compliance of the installation's waste water treatment plant and systems with their respective discharge permits. His oversight/compliance of drinking water systems supports the mission through interpretation of regulations, setting standards, and developing programs ensuring compliance and management of water resources. To achieve success, Mr. Elliott coordinates with other base personnel to ensure the water systems are monitored in accordance with permit requirements. He works directly with Headquarters Marine Corps (HQMC) to obtain funding for projects and verify compliance with HQMC instructions and policies. Mr. Elliott is responsible for ensuring all of the reporting requirements are being met both in quality and in timeliness, and acts as liaison with the federal, state, and local regulatory agencies. Reporting requirements consist of the periodic reporting of monitoring data, spill or incident reporting, or as required by permit conditions, compliance agreements with federal, state, and local regulatory agencies as well as any DOD/Navy/Marine Corps directives. His management of this program is based on knowledge of water treatment principles and practices, general physics/chemistry of wastewater, hydraulics, geologic, and hydro geologic conditions.

Summary of Accomplishments:

Water Conservation

The unique desert environment of the Combat Center results in a reliance on groundwater aquifers as its only source of potable water. Relying entirely the Surprise Springs Sub-basin as its supply of potable water, the Combat Center has experienced water-level subsidence of as much as 190 feet in the Surprise Spring Sub-basin over the last 75 years. This consumption of groundwater has reduced the thickness of the productive upper aquifer by almost 50 percent, compared to predevelopment conditions. Historically, water consumption has exceeded the recharge rate of its potable-water aquifer due to slow groundwater recharge. Therefore, water conservation is critical if the Combat Center is to continue meeting its mission as a premier desert training facility.

With California facing one of the most severe droughts on record, the Combat Center is committed to meeting and -- when possible -- exceeding conservation requirements and the sustainability of our water resources. Mr. Elliott has taken this principle and elevated the water conservation program to one of the most successful in the DoD. Water conservation, using water efficiently, and avoiding waste are all fundamental to ensuring water availability for the Combat Center's future.



Mr. Elliott has been instrumental in the consistent reduction of Combat Center water intensity every year since 2007 -- when he took the Water Resources position -- to present. From FY14 to FY15 the Combat Center has reduced the total annual water consumed by over 130 million gallons. Additionally, the Combat Center has achieved a FY15 per-capita water use of 69 gallons per person per day. The Combat Center per-capita is the lowest in the Colorado Region and is well below the National average (157 gal/person/day), and the California average (181 gal/person/day). Mr. Elliott's efforts allowed the Combat Center to exceed Executive Order 13693 water reduction requirements, resulting in an unprecedented 54% reduction in water intensity for FY15 as compared to the 2007 baseline.

In FY15, Mr. Elliott, in an effort to further increase water conservation, steered the development of the Commanding General's Water Conservation Policy, Drought Response Plan, and created the Water Conservation Task Force (WCTF). The WCTF is a Commanding General-chartered group comprised of members from the Natural Resources Environmental Affairs Division serving as Chair, the Public Works Division

as Co-Chair, Lincoln Military Housing, Marine Corps Community Services, Family Housing, and Bachelor Billeting. These installation stakeholders provide valued input and contribute to the success of the conservation program. The WCTF leads efforts to ensure the conservation and sustainability of water resources. Through the WCTF, Mr. Elliott works to achieve these goals by evaluating current and projected water use; assessing infrastructure, operations, and management practices; implementing relevant conservation technologies and methods; and educating all members aboard the Combat Center. Through his efforts and by charging our leaders, Marines, Sailors, civilians, and family members aboard the installation to take an active role in this important program, the Combat Center is creating a behavioral change that will ensure our long-term water conservation success.

With the WCTF, Mr. Elliott had the initiative and forward-thinking to develop and incorporate specific water-saving measures into a new Base Bulletin that applies to every individual living or working at the Combat Center. He worked with Lincoln Military Housing, Public Works Department, WCTF members, and other tenant commands to ensure successful implementation. Some of these new water-conscious requirements are:

1. New construction, major renovation, repair, and alteration of buildings shall install water-saving fixtures (faucets, urinals, toilets, and showers) that meet the EPA Water Sense gallons per minute (GPM) and gallons per flush (GPF) standards.
2. No washing of paved surfaces, including sidewalks, driveways, patios, and parking lots, shall be done except where necessary to alleviate immediate safety or sanitation hazards
3. Potable water and recycled water landscape irrigation shall not wet adjacent areas such as sidewalks, driveways, parking lots, or streets
4. All hoses must be equipped with a positive shut off nozzle that prevents water from running when the hose is not in use
5. Use of potable water for fountains or decorative water features is prohibited
6. Implemented Combat Center-wide time, frequency, and duration requirements for irrigation

Always looking for new ways to save water, Mr. Elliott recognized the potential for water saving during the Oil Water Separator (OWS) cleaning process. Ordinarily, water from OWS cleaning is sent out as hazardous waste or sent to the sewer system. He identified a process by which the water would be separated, cleaned and reutilized in the OWS. This process reduces the amount of potable water needed to support the OWS. Using specialized Transportable Treatment Units containing carbon filter beds and chemical cleaning methods, the water from the OWS is reused instead of using potable water.

This effort resulted in an annual water savings for the Combat Center of 420,000 gallons.

Additionally, Mr. Elliott's comprehensive Water Conservation program includes a multimedia outreach campaign. This campaign incorporates the Combat Center lgo and branding, utilizing brochures, magnets, the base newspaper, and social media to publicize the Water Conservation program. The multimedia campaign also promoted the water conservation hot line (830-SAVE) for base personnel to report water waste. Since its inception, the hot line has resulted in numerous calls that may have otherwise gone unattended and resulted in a significant loss of water.

Earth Day 2015 Activities

As part of Earth Day 2015, NREA along with the WCTF sponsored a host of clean-up and water conservation awareness activities aboard the installation. These activities focused around this year's theme: "Think green, save blue" and included a poster contest to engage the kids at the local elementary schools. This year's grand finalist is Kate Bobadilla – her poster is featured as the cover of this year's CCR!

Round of applause for this year's finalists:

First Runner-Up – **Madison Fulcher** (see inset)
Second Runner-Up – **Sara Willis** (see inset)

Finalists:

Hailey Beck, TPES, 5th grade
Mitchell Klich, Condor, K
Bryce Newland, TPES, 4th grade
Patricia Ochoa, Condor, K
Isabella Ramirez, Condor, 3rd grade
Jesse Williams, TPES, 4th grade

Big THANK YOU to all the Teachers at TPES and Condor for participating in the inaugural year of this annual event!

As part of Mr. Elliott's public outreach, he proactively reached out and partnered with the local elementary schools to have children participate in a water conservation poster contest. He visited the schools and provided the teachers and children with information regarding the need for water conservation, and the posters created by the children were voted on by the Combat Center community at an annual Earth Day event. The children whose posters received the most votes were recognized at their school, in the Combat Center's newspaper, and in the base Consumer Confidence Report. Working with the local schools and educating children about the need to conserve water resources creates early behavioral changes that can last a lifetime.

Mr. Elliott was also asked by the California Regional Water Quality Control Board to speak at their Drought Symposium regarding the successes achieved by his program at the Combat Center. His attendance, presentation, and program successes were recognized by the California State Water Resources Control Board through a formal letter to the Combat Center command. This letter praised and endorsed the efforts and achievements of the Combat Center's Water Conservation Program.

Mr. Elliott also published an article titled "Water Management at Twentynine Palms" in the November-December 2013 issue of The Military Engineer. The article covered the early stages of the Combat Center's water conservation program, outlining many projects and plans that have since been completed.

Additionally, Mr. Elliott developed an Urban Water Management Plan that provides information needed for long-term planning and includes current conservation efforts, projected savings based on future conservation measures, and potential impacts resulting from climate change and increased population. His development of the Urban Water Management Plan shows the Combat Center's water resources are secured for the next 90 years without implementation of the projects and programs. With full implementation of

his long-term plan, the Combat Center would have water resources available for the next 140+ years.

Wastewater

The Combat Center's Wastewater Treatment Plant (WWTP), a 136-acre open pond system, was originally constructed in the 1950s. It has since undergone several repairs and upgrades in order to meet the constantly evolving and expanding mission of the Combat Center. The WWTP is the only treatment facility in the high-desert region of the southern Mojave Desert, and exclusively serves the Combat Center.

Mr. Elliott possessed the vision and experience to realize the current treatment plant was not the correct process for our desert environment and was losing over 60% of the available water for reuse to evaporation. Utilizing a proactive approach, he initiated a WWTP Optimization Study to analyze the current wastewater process and determine the most cost effective treatment method that would also maximize available water for reuse.

The WWTP upgrades are focused on improving the operational capabilities of the WWTP while providing significant environmental improvements, energy savings, and maximum water reuse. These renovations will improve the existing primary treatment process and remove the existing secondary storage pond system, thereby eliminating odors and evaporative loss. This new treatment process will not only meet permit requirements and save water for reuse, but it will also reduce annual chemical costs by $200,000.

Wastewater passing through the facility will be treated to California disinfected tertiary standards and be reused for irrigation at the Combat Center parade field, golf course, and other common-use areas. This recycled water reduces the need for potable water by 320,000 gallons a day. Recycled water for irrigation provides a sustainable method of conserving potable water and ensuring the longevity of the installation's potable water supply. It also sustains quality of life, future training, and operations at the Combat Center.

Storm Water

Mr. Elliott conceptualized and developed a feasibility analysis of storm water capture and reuse aboard the Combat Center. This study investigated the use of storm water to augment existing recycled water supplies and reduce the demand on the Combat Center's limited water supply, including the demand on potable groundwater from Surprise Spring Sub-basin. Mr. Elliott's development of a storm water capture and reuse project improves the sustainability and longevity of potable water sources that currently support mission requirements.

Mr. Elliott's investigation found that approximately 131 acre-feet per year (AFY) (over 42 million gallons) of water could be captured from storm water runoff to supplement the

recycled water supply. New or improved facilities required to implement this project include: rehabilitation of existing storm water retention basins; construction of a pumping station; and rehabilitation of a filter treatment process at the existing wastewater treatment plant. The capital costs of these facilities is approximately $422,500, resulting in a 50-year life cycle cost of $94 per acre-foot (AF) after avoided potable water pumping costs from the Surprise Spring Sub-basin are accounted.

Water Quality

California is the first state in the nation to directly regulate hexavalent chromium in state-wide public drinking water systems. California established a new Maximum Contaminant Level (MCL) of 10 parts per billion (ppb) for hexavalent chromium on July 1, 2014. Mr. Elliott identified the California regulatory change for hexavalent chromium and potential impacts to the Combat Center well before the change was adopted. Much of the low-level hexavalent chromium found in drinking water is naturally occurring, reflecting its presence in geological formations throughout the state, which is the case at the Combat Center. Mr. Elliott aggressively pursued funding and developed a project for determining the best process for the Combat Center to ensure compliance with the MCL. He conducted preliminary sampling and analysis of the Combat Center's potable groundwater wells and identified wells exceeding the proposed MCL. Because the Combat Center has no water treatment process to remove or treat the hexavalent chromium, his proactive approach, knowledge, and experience were instrumental in preparing for the construction of a water treatment facility to remove the hexavalent chromium from the drinking water, securing compliance with the new California MCL and permit requirements.

As a section of one, Mr. Elliott faced the difficulties of tracking and maintaining the large volume of data associated with required water and wastewater sampling. In keeping with the Environmental Management System systematic approach and continual process improvement, he sought a solution to this challenge. To streamline data storage, Mr. Elliott implemented WaterTrax; aimed at tracking, managing, and storing all water-related analytical data. The Combat Center is the first Marine Corps installation to use this program, though other military installations and civilian water districts use this program, and HQMC is considering implementation as an enterprise solution. WaterTrax provides instant upload of all analytical data directly from the laboratory, reducing wait times and chances for discrepancies. Mr. Elliott's vision led to improved accuracy and allows data to be recalled via computer remotely. His use of the WaterTrax program resulted in paperless storage and a reduction in the necessary amount of file storage. With this ability for instant recall of data, reports detailing everything from trend analyses to time line tracking are immediately available, as required. The data is stored in multiple offsite servers for secure backup, yet allows remove access via login and password from almost anywhere there is an Internet connection.

Another time-saving feature of WaterTrax is the incident management module. This module allows the Water Resources office to track everything from sanitary sewer

overflows to drinking water complaints. The WaterTrax program also provides instant email alerts for any data loaded into the system that exceeds parameters established by the user.

Mr. Elliott's vision and efforts have led to the development of long-term planning strategies for ground water management and will ensure that water resources are properly sustained to support the Combat Center's training mission for years to come. Additionally, his work with U.S. Geological Services to develop hydrogeological modeling established that utilization of additional sub-basins would allow measurable recharge to occur in the Surprise Springs sub-basin and ensure the Combat Center's long-term water security.