

CHINA LAKE FINDS THAT MACHINE POWER SAVES MUSCLE POWER

Naval Air Weapons Station China Lake (NAWS China Lake), located in the northeast region of California's Mojave Desert within the northwest section of San Bernardino County, is an airborne weapons testing and training range operated by the United States Navy and its contractors.

NAWS China Lake is the Navy's largest single landholding, representing 34 percent of the Navy's total land worldwide. The 19,600 square miles of restricted airspace represents 12 percent of California's total airspace. NAWS China Lake provides an unprecedented venue for integrated testing and training for today's war fighters both on the ground and in the air. Over 95 percent of its 1.1 million acres has remained undisturbed during the course of the NAWS mission.

Temperatures in this desert region can exceed 110° F during May to September.

NAWS environmental specialists retrieve, categorize, store, and dispose of various hazardous waste materials gathered from across the base using a wide variety of storage containers. They follow strict hazardous waste protocols to prevent unauthorized waste from being disposed of illegally or accidentally.

Environmental protection specialists are exposed to a number of physical hazards, most notably heavy and awkward lifting, pulling/pushing, frequent standing, and temperature



Before: Pulling super sack (1 cu. yd.) of oily rags onto lift gate



Before: Pushing a plastic hopper, with super sack inside, onto the truck during loading



Before: Off-loading truck at storage/containment site

extremes. The physically demanding nature of the profession combined with the temperature extremes, placed the employees at increased risk of developing [work related muscular skeletal disorders](#) (WMSDs).

Environmental protection specialists repeatedly lifted, pulled, and pushed heavy items on and off trucks as seen in the photos above. These items, such as solar and automotive batteries, drums, oil rags (over 2 million pounds a year), solvents, and cubic yard bulk bags (called super sacks), are handled multiple times throughout the disposal cycle.

The specialists lifted most items from ground level, and dragged or pushed them onto the truck's lift gate. The great expanse of the China Lake property means that items may be retrieved from various staging sites. Once back at the hazardous material processing/staging site, the items are removed from the truck. Some items are weighed while others are quickly categorized/staged for storage, and later moved again for disposal.



Totes of categorized solvents in storage area

NAWS China Lake's safety department contacted the Naval Facilities Engineering Command (NAVFAC) following a mishap involving one of their environmental protection specialists resulting in a WMSD.

NAVFAC manages the Chief of Naval Operations (CNO) Mishap Prevention and Hazard Abatement (MP/HA) program. Among the services provided is the technical assessment of work processes in order to reduce the risk of WMSDs.

The NAVFAC MP/HA Program Team assessed the NAWS China Lake hazardous waste operation, discussed potential resolutions with China Lake personnel, and generated a detailed report. An MP/HA project was subsequently developed, submitted, and funded in April of 2007. Sufficient program funding was identified to purchase, install, and certify a truck mounted knuckle boom crane, which replaced muscle power with machine power, and therefore greatly reduced the physical exertion levels and exposure to [ergonomics](#) stressors.

Although the hazardous waste operation procedures inherently require the specialists to sit, climb, balance, stoop, kneel, crouch, crawl, lift up to 50 pounds (or more) and frequently walk and stand; the use of the knuckle boom crane has reduced the severity and frequency of the exposure to ergonomics stressors. The crane attached to the truck has eliminated much of the

excessive materials handling and is capable of retrieving drums, super sacks or bulk bags (used for rags), and other heavy items from any storage surface (pavement or sand). The successful completion of this project has saved a considerable amount of time and effort during the movement of hazardous waste. The completed project replaces manual effort with machine power and improves the overall safety and health of the environmental specialists.

Many readers may be familiar with the hazardous materials operation at China Lake from the *Navy Ergonomics Program Course A-493-0085*. Reference to this project is used as part of the hands-on manual material handling exercise.

More information on ergonomics and the technical support available through the MP/HA Program can be found on NAVFAC's Ergonomics website at www.navfac.navy.mil/safety (select "ergonomics").



After: Truck mounted knuckle boom is being used in operations where other material handling equipment has not been capable of performing the removal of waste items safely.

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