FACT SHEET

FORMER FORT ORD, MONTEREY, CALIFORNIA
ORDNANCE DETECTION AND DISCRIMINATION STUDY (ODDS)

August 2001

SITE DESCRIPTION

Fort Ord is located near Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco. The base comprises approx. 28,000 acres adjacent to the cities of Seaside, Sand City, Monterey, and Del Rey Oaks to the south and Marina to the north.

SITE HISTORY

Fort Ord became a training installation in 1917 and was used to train Army Infantry, Cavalry and Field Artillery for WWI and II, Korea, Vietnam and Desert Storm. In 1991 the site was included on the Base Realignment and Closure (BRAC) list and closed in 1994. Since the BRAC and closure of Fort Ord, ordnance and explosives (OE) investigation and removal actions have been performed and documented to address explosive safety hazards and to prepare for the transfer and reuse of Fort Ord property.

OVERVIEW

As part of the OE RI/FS, the Ordnance Detection and Discrimination Study (ODDS) was completed as a phased evaluation of geophysical instruments used under site conditions at the former Fort Ord. The study objectives included the evaluation of existing commercially available OE detection systems and their ability to discriminate unexploded ordnance (UXO) from ordnance and other scrap in the specific OE, geologic and cultural conditions at Fort Ord. Criteria used to select ODDS instrumentation were proven success at government OE test sites or OE removal actions, digital data acquisition capability, ease of deployment, system sensitivity, accuracy, and resolution.

Study phases included:

I. Static Test: Free-air testing of instruments over inert OE items at varying depths and orientations.

II. Seeded Test: Testing the effectiveness of the geophysical systems at locating and discriminating inert OE objects placed in the ground.

III. Field Trial: Evaluation of geophysical systems and survey processes at actual uninvestigated OE sites.

IV. Evaluation and analysis: Results of tests were analyzed to determine performance criteria for the instruments.

TESTING

The U.S. Army Corps of Engineering and Support Center, Huntsville (USAESCH), identified the devices to be evaluated during the ODDS. The ODDS evaluated these families of existing OE detection systems for locating and discriminating OE at Fort Ord and developed OE signature libraries for each system. A secondary objective for the ODDS was the evaluation of digital geomapping and OE target identification procedures. Digital geomapping digitally records the sensor readings and their geographic location. To aid in evaluating past OE investigation and removal actions at Fort Ord, those detectors previously used at the site were also evaluated.

Photographs of several of the geophysical instruments tested during the ODDS in operation.

I. Static Test: The ODDS static test involved testing of four digital instruments in "free-air", above the ground surface. These instruments were used to acquire data over inert OE items placed at varying depths and orientations beneath a non-metallic test stand elevated above the ground surface. Some of the systems were not tested during this phase because they were either vehicle towed or do not digitally record data and signal libraries could not be developed for them.

Photograph of Static Test stand in use.

The test stand and ordnance holder used during the tests are shown in the photograph above. The ordnance holder allowed for raising or lowering the ordnance items at fixed intervals. Sixteen different types of OE common to Fort Ord (shown below) were used in the test. Each item was lowered away from the top of the test stand incrementally until a survey across the top of the stand with the instrument being tested did not result in the detection of the item at any orientation.

Photograph of the types of OE items tested in the static test and buried in the seeded test plots.

The static test resulted in the compilation of a library of free-air data profiles for different OE types, depths and orientations. Additional information with respect to instrument detection capabilities was also collected and documented.

II. Seeded Test: The seeded test was conducted on several areas that were cleared of anomalies. In one of the areas, the participants knew the placement, depth and orientations of OE items. In the other area, the target information was withheld. Some ordnance scrap was also seeded to allow evaluation of discrimination capabilities (whether the geophysical data analysts could determine that the item was not an intact OE item.)

Participants using different types of geophysical equipment acquired data over the test plots. Those using digital instruments (data recording) identified OE anomalies, and produced an OE "dig list" that identified the locations of the anomalies. Analog (non-data recording) detectors were used to flag anomalies and the flagged locations were recorded with GPS.

The seeded test resulted in the following conclusions:

- Instrument noise levels increased from the static test, resulting in less efficient detection abilities.
- Some of the instruments were better at detecting smaller, shallower items and others at detecting larger, deeper items.

III. Field Trial: The field trial test was performed to evaluate the instruments' depths of detection and suitability of the detectors for use in site conditions at Fort Ord. Six sites were selected to represent the range of OE sites at Fort Ord. The terrain varied from flat and open to steep slopes with moderately heavy brush.

Participants again acquired data over the grids, identified and flagged anomalies. The anomalies were then dug and the type, depth and orientation of each item found was recorded. To validate the effectiveness of the instruments in detecting OE, two 100'X100' and eight 10'X10' areas, were sifted to a depth of four feet to determine whether any ordnance items were missed by the detectors.

The field trial resulted in the following conclusions:

- Range residue (e.g. targets such as tanks) must be removed before OE investigations begin in order that they do not interfere with the geophysical surveys.
- Survey profiles (used to select anomalies in the data representing OE) degraded significantly from the static to the seeded to the field trials.

IV. Evaluation and Analysis: The data from each instrument were analyzed and *Probability of Detection* and *False Alarm Rates* were calculated. It was found that instruments with the highest detection rates also had the highest false alarm rates.

Other conclusions made during the ODDS were:

- The ability to discriminate between OE and OE-scrap (e.g. fragments of OE) using geophysical data from Fort Ord is still in the development stage.
- There is no single instrument solution to the OE detection needs at Fort Ord. Instead, different types of instruments are best suited to different types of OE, terrain and vegetation.

To view a copy of the ODDS report, log on to our website at www.fortordcleanup.com, visit one of our information repositories in the Seaside, CSUMB, or Chamberlin libraries, or email Lyle Shurtleff at cqc@redshift.com.