Community Perspectives on Munitions Response at Department of Defense Installations

Lenny Siegel
Center for Public Environmental Oversight
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Protecting the public from encounters with unexploded ordnance and other munitions hazards in the more than 10 million acres of former military land ranges in the United States is one of the most technically challenging and potentially expensive federal environmental programs. In 2003, the second Defense Science Board Task Force on Unexploded Ordnance, concluded:

> Estimated cleanup costs are uncertain but are clearly tens of billions of dollars. This cost is driven by the digging of holes in which no UXOs are present. The instruments used to detect UXOs (generally located underground) produce many false alarms—i.e., detections from scrap metal or other foreign or natural objects—for every detection of a real unexploded munition found. Because each of these false alarms could potentially be a UXO, a careful excavation is required, leading to very high costs. The Task Force believes that modern technology can substantially reduce such false alarms leading to a dramatic reduction in overall cleanup cost.

Munitions Response Activity at the Former Lowry Range, Colorado

The Defense Department is in fact sponsoring a number of research and development projects designed to do exactly that, and the results are promising. Furthermore, Army Corps of Engineers projects teams are already applying a "pick list" strategy to ordnance sites, using existing geophysical technologies and equipment to decide which "anomalies" to excavate. (Anomalies are signals picked up by survey equipment, indicating the presence of metallic objects.) For these approaches to succeed, however, they must earn the confidence of regulatory agencies and affected communities, including the owners of former military property.

Consequently, the Center for Public Environmental Oversight evaluated public stakeholders' views of existing and emerging munitions response technologies. In particular, CPEO sought to find out how impacted communities view munitions response strategies in which project teams selectively excavate geophysical anomalies recorded during site surveys.

To answer this question, I visited munitions response sites at Amaknak (Dutch Harbor), Alaska; the former Lowry Bombing and Gunnery Range, Colorado; Camp Edwards, Massachusetts; and the Former Mojave Gunnery Range Complex, California. In addition, I drew upon earlier visits to numerous other military ranges as well as correspondence with stakeholders from other munitions response properties. I interviewed landowners, members of Restoration Advisory Boards, and other public stakeholders.

In general, few public stakeholders have accumulated significant technical expertise on munitions response. Nevertheless, enough community members have experience with munitions response to draw preliminary conclusions. As I have written in other reports, community attitudes toward response technologies depend upon the level of trust that exists at the site. People are more likely to accept the recommendations of the Army Corps of Engineers or other responsible party representatives, as well as the comments of environmental regulatory agencies, if they have been kept informed and if those in authority have taken the time to consider genuinely community concerns.

If asked directly about selective excavation, most community stakeholders first answer, "Dig everything!" But as they consider more thoroughly what that might entail, they qualify their response. Still, most—but not all—do not support limiting excavation just so the military can save money.

Instead, at most sites, communities oppose the over-excavation of unique natural habitat because they want to preserve the natural environment. In Alaska, it's the tundra, which "takes a hundred years or more to grow back." It's not much different in the Mojave Desert. In Colorado, it's prairie grasses. On Cape Cod, the pine barrens are vulnerable. Thus, concerned residents actually support technologies that allow the selective excavation of potential live ordnance. They also seem to like the use of survey schemes, such as "meandering path transects," that minimize disruption of the landscape.

At sites undergoing development, however, habitat preservation is not an issue. Particularly where homes or schools are planned, most people want to err on the side of caution. However, when facing the possibility that even the most complete geophysical investigation might miss live ordnance, they support other strategies, such as the layering of clean fill, to prevent encounters with ordnance. Public stakeholders are more willing to accept a decision not to excavate if the clean-fill safety net is in place.

In some development scenarios, the cost of moving dirt to protect against ordnance is minimal because development itself requires dirt moving. However, if additional dirt-moving is necessary, this strategy makes the most sense in strong real estate markets such as California, where additional work represents a small fraction of property value.

Former Mojave Gunnery Range

Interestingly enough, public stakeholders often mention other hazards associated with live ranges. They are concerned about releases of the chemical compounds, such as RDX and perchlorate, which make up ordnance, and they worry about the deposition of heavy metals and other byproducts of explosion. Though sometimes the Defense Department challenges the authority of regulatory agencies to oversee the cleanup of explosive constituents and byproducts on ranges, the methodologies for dealing with such compounds are well established. Communities expect cleanup, at least where there are viable pathways.

Strategies for dealing with toxic compounds on ranges work best, however, where there are unusually high concentrations, such as narrow impact areas or burial sites. The regulatory system, which focuses on concentrations, not overall mass, does not provide a good way to address low concentrations of toxic compounds that are widely distributed—a condition found on large portions of many ranges. However, none of the public stakeholders interviewed in the course of this project proposed a solution to this dilemma.

Still, they did express concern about physical hazards from metal waste, such as "frag"—shrapnel from exploded munitions. This may pose risks at both habitat and development sites.[1] At most sites, there appears to be no clear regulatory driver for removing metal, but it is normally done to eliminate anomalies that interfere with the search for live ordnance. Thus, discrimination strategies that deliberately leave metal waste in place should consider public concerns about the continuing presence of rusty, sharp metal on or near the surface.

In most cases, though, the explosive risk is still the number one concern. If cleanup crews are to excavate potential ordnance selectively, they need to demonstrate to the people who live on or near the property that the risk is being fully addressed. One long-active community stakeholder at Camp Edwards suggested an approach that I believe other stakeholders strongly endorse. He proposed that at each property, there should be a publicly transparent geophysical prove-out. Initially, that could take place at a seeded plot, where munitions and other objects are placed to determine the effectiveness of multiple pieces of survey equipment. This is normal practice at munitions response sites.

But, he urged, after the seeded plot is used to select equipment and fine-tune the methodology, the selected technology should be tested on a real plot—that is, on a small parcel of land containing ordnance and other metallic objects from training, testing, or other military activities. Once the cleanup team selects the anomalies it would excavate in this were an actual cleanup, it would dig every anomaly to see how well its selection algorithm worked.

This real-plot test would not only heighten public confidence, but it would create data that better evaluates effectiveness than from a seeded plot. Seeded plots that I'm familiar with such as the Fort Ord, California ODDS (Ordnance Detection and Discrimination Study) in 2000, tend to distribute targets evenly throughout the vertical dimension. This may be useful for evaluating instruments or software, but it ends up underestimating their effectiveness. At many sites, such as Fort Ord, there is strong evidence that buried ordnance is concentrated near the surface. While some instruments detected less than 50% at lower depths, several achieved a 100% probability of detection in the upper six inches. While it's important to know that it's hard to find deeper

[1] On Amaknak and Unalaska, Rommel Stakes, used in preparing the islands' defenses during World War II, are a more prevalent risk that either ordnance or frag. With funds from the Defense Department's National American Lands Environmental Mitigation Program, the Qawalangin Tribe hires young people in the summer to find and remove such stakes.

ordnance, it's also re-assuring to communities that detection levels are extremely high for most of the ordnance—particularly those near-surface munitions the public is most likely to encounter. The public wants to know the probability of detection, not for a seeded plot with ordnance at multiple depths, but in the real world.

Demolition Area at Camp Edwards, Massachusetts Military Reservation

Furthermore, whether the prove-out is conducted on a real range or a seeded plot, the Defense Department should develop protocols that report effectiveness, not just for technical reasons, but because the prove-out is what the public must rely on if people are to accept selective excavation.

The military, particularly the Army Corps of Engineers, routinely incorporates community relations into its munitions response activity. Many such sites even have Restoration Advisory Boards. That public outreach would be much more effective and probably more re-assuring if project managers were to consider how their technical preparations for range response might help answer the worries of the people who live, work, or recreate nearby.