



Best Management Practices for ARNG Operational Ranges

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BEST MANAGEMENT PRACTICES FOR ARMY NATIONAL GUARD OPERATIONAL RANGES

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The Army National Guard (ARNG) Directorate completes Phase II (quantitative) Operational Range Assessments at operational range complexes across the nation. The Department of Defense recently established the Operational Range Assessment requirement to ensure the long-term viability of operational ranges, while also protecting human health and the environment. The assessment determines whether a release—or substantial threat of a release—of munitions constituents from operational ranges to an off-range area creates an unacceptable risk to human health or the environment. One element of the work associated with these assessments is the delivery of a separate ‘letter report’ to and for the installation that outlines and describes specific actions the installation may take to mitigate potential releases of munitions constituents. These ‘best management practices’ for small arms ranges and other than small arms ranges include operational changes, vegetative solutions, storm water management, design and structural enhancements, soil amendments, and pollution prevention, and focused periodic removal. This talk will cover as many of these categories and specific solutions as time allows.



Agenda

- Background
- Technical Approach
- BMPs for Installation use at Operational Ranges



Operational Range Assessment Background

Program Drivers

- Part of the Army's Sustainable Range Program
- Department of Defense Directive 4715.11 (10 May 2004)
"...Ensure the long-term viability of operational ranges while protecting human health and the environment."
- Department of Defense Instruction 4715.14 (30 Nov 2005)
"... Determining whether a release or substantial threat of a release of munitions constituents of concern from an operational range to an off-range area creates an unacceptable risk to human health or the environment."



Operational Range Assessment Background (cont'd)

Munitions Constituents of Concern (MCOC)

- Small Arms
 - Lead
 - Antimony
 - Copper
 - Zinc
 - Tungsten
- Explosives
 - HMX
 - RDX
 - TNT
 - White Phosphorus
- Other
 - Perchlorate





Operational Range Assessment Background (cont'd)

Program Phases

- **Phase I:** determine based upon available information:
 - **Unlikely:** site unlikely to have a release to a potential receptor
 - **Inconclusive:** insufficient information to make a determination
 - **Referred:** off range foot print area referred to appropriate clean up program
- **Phase II:** Gather data from Inconclusive areas (principally the pathways) to determine whether munitions constituents leave the range foot print at concentrations that may pose a risk to human health or the environment:
 - **Unlikely:** BMP letter reports for operational areas
 - **Referred:** off range foot print area referred to appropriate clean up program; BMPs letter reports for operational areas
- **Periodic Review:** All unlikely areas periodically reviewed to ensure no change to source, pathway and /or receptor
 - BMP letter reports for operational areas

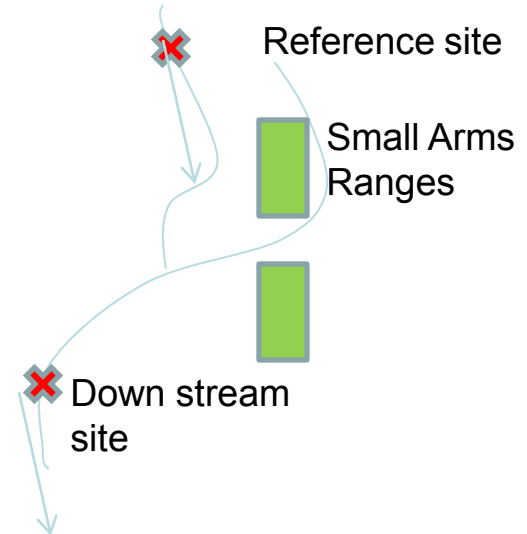


Phase II ORA Technical Approach

Surface water, sediment,
storm water & groundwater

- Surface water: Sampled down stream and reference site
- Groundwater: sample down gradient & background where appropriate

Surface Water



Groundwater





Technical Approach- Outcomes

- Best Management Practices** (BMPs) currently working 
- Recommend BMPs for specific areas 
- Coordinate with appropriate authorities & recommend post-ORA evaluation & BMPs 
- All installations undergo periodic review

***BMPs are mission critical*



Small Arms Ranges

- Storm Water Management/Erosion Control
- Vegetative Solutions
- Operational Strategies
- Range and Berm Design
- Soil Amendments
- Pollution Prevention
- MCOC Mass Control



Small Arms Ranges

Conceptual Model



Small Arms range
particulate transport



Bullets and
bullet
fragments from
splatter pile





Small Arms Ranges

No BMPs here



(Source: Army Small Arms Range BMP Manual)

BMPs working here



BMPs working here

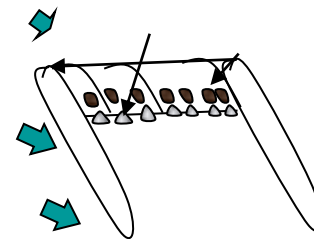




Small Arms Ranges

Storm water management/Erosion Control

- Land shaping/grading
- Diversion channels
- Check dams
- Channel stabilization
- Sand filters/ french drains
- Sediment barriers
- Dust control



Rip rap check dams along road



(Source: Army Small Arms Range BMP manual)



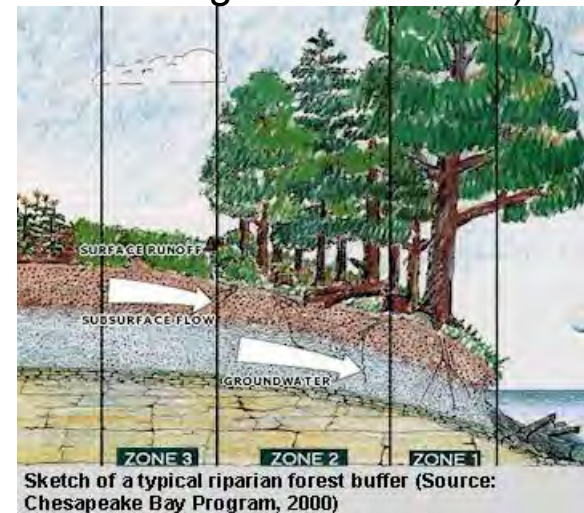
Small Arms Ranges

Vegetative Solutions

- Establish vegetative cover (wear tolerant vegetation guide for specific cultivar types)
 - Climate and soil specific, fire management, rhizomes & more
- Aerial seeding for inaccessible areas
- Grass in channels and swales
- Grass filter strips, manage mowing heights
- Riparian buffer zones
- Erosion control mats with vegetation



(Source: Army Small Arms Range BMP manual)



Sketch of a typical riparian forest buffer (Source: Chesapeake Bay Program, 2000)



Small Arms Ranges

Operational strategies

- Sustain vegetation/manage mowing heights
- Maintain range
- Distribute firing lane use
- Number of targets per frame (4 is not better)
- Minimize/eliminate firing into water
- Inspect BMPs



Small Arms Ranges

Range and Berm Design

- End berms to manage surface water; sdz
- 2:1 slope maximum for berm
- Materials: cohesive soil for berm core, but sandy front eases lead management
- Berm structural enhancements
- Range floor grading

(Source: Army Small Arms Range BMP manual)





Small Arms Ranges

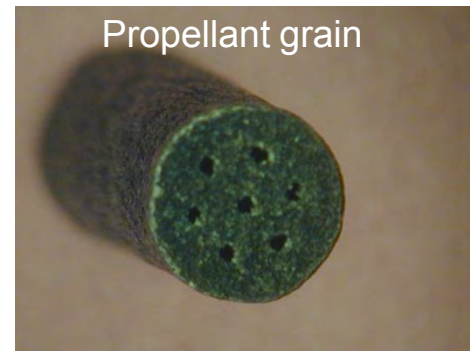
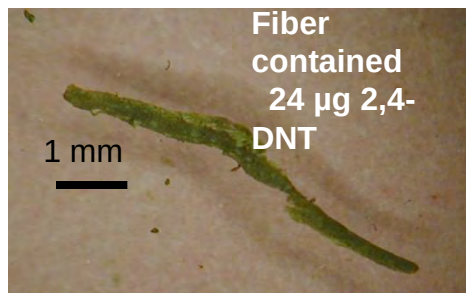
- Soil Amendments: maintain pH 6-8
- Pollution Prevention: green ammunition, picking up brass
- MCOC Mass Control: sift out lead from bullet pockets; if possible, don't push back berm



Other than Small Arms Ranges



Low order 155mm

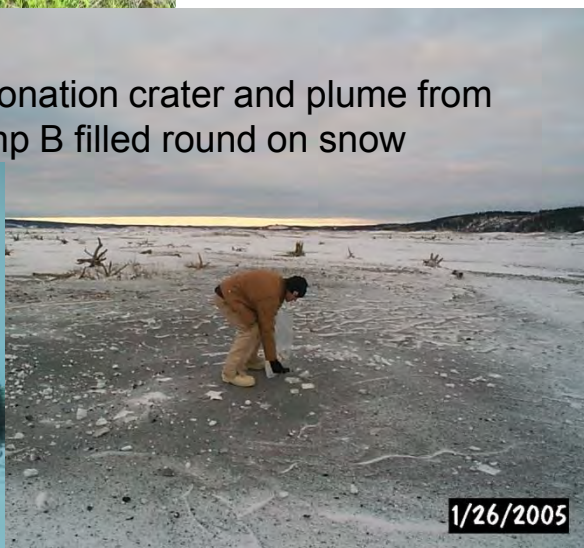


Propellant grain

Detonation crater and plume from comp B filled round on snow



155 mm Howitzer gun



1/26/2005



Comp B particles from low order

Photographs courtesy of ERDC-CRREL



Lime Treatment of HGR & OB/OD

Both have small areas conducive to treating HE with hydrated lime

- Increase pH to 11.5 for short period
- Ft. Jackson HGR used one ton of lime
- Mixing can be done by several methods
- Rain water rather than engineered addition of water
- Cost of lime ~\$500- ~\$1000 depends on area size/ soil



ERDC: Deborah Felt, Steve Larson, Andy Martin, Chris Griggs, Jared Johnson
ATC: Gene Fabian
ARA, Inc: Catherine Nestler.

ESTCP ER 0216 and ER 0742 Users Guides



Other than Small Arms Ranges

- Storm water management/erosion control- same as for small arms
- Environmentally compliant range designs: low water stream, tank turn pad, mover berm, defilade position





Other than Small Arms Ranges

Vegetation Solutions

- Wear tolerant vegetation guide: impact, maneuver, bivouac, cantonment areas
 - Arid Northwest
 - Northeast (in review)
- Aerial seeding for impact areas

Pollution prevention pyrotechnics: new simulators; pick up partially spent flares



Other than Small Arms Ranges

Operational strategies for impact areas

- Minimize rocky outcrop targets- they create low orders
- Minimize low order detonations, by munitions type
- Minimize firing into water
- Sustain vegetation
- Maintain range
- Inspect BMPs



(Photograph courtesy of Clif Youmans-MTARNG)



Questions?