Warning! This document has not been amended since publication. Some content may be out of date and may no longer apply.
EXECUTIVE SUMMARY

Small arms firing ranges (SAFRs) include government, commercial, and recreational rifle, pistol, trap, skeet, and sporting clay ranges. Small arms firing ranges are those ranges accepting 50 caliber or smaller ammunition. This definition is meant to include shotgun ammunition used on trap- and skeet-type ranges. SAFRs may contain lead, antimony, copper, zinc, arsenic, and polycyclic aromatic hydrocarbons (PAHs) from nonexploding (nonenergetic) bullets and fragments, bullet jackets, and related sporting material (e.g., clay targets); however, lead is the primary risk driver and is thereby the focus of this guidance.

Lead has documented impacts on human health, particularly for children. There are many mechanisms for exposure to lead, including drinking lead-contaminated groundwater, ingesting lead-contaminated soil or sediment, or inhaling airborne particles of lead. Lead dissolution and migration to groundwater or through aerally (windblown) or hydraulically (erosion and deposition) dispersed particles can cause exposure and result in elevated levels of lead in the blood of humans and wildlife and may ultimately impact beneficial future land use.

The U.S. Department of Defense (DoD) oversees more than 3,000 active SAFRs as well as the closure, or pending closure, of 200 more. In all, DoD expends more than 2 million pounds of lead annually. In addition to DoD facilities, there are an estimated 9,000 nonmilitary outdoor ranges in the United States (USEPA, January 2001). USEPA also estimates that 4% of the 80,000 tons of lead produced in the United States during the late 1990s was made into bullets and shot.

This guidance is designed to display a logical and easy-to-follow decision diagram for determining how best to remediate lead and lead-contaminated soils at closed small arms firing ranges. A decision diagram is included to assist the practitioner in formulating a proper strategy for removing the threat that metal, particularly lead, presents at small arms firing ranges. This decision diagram and accompanying documentation is valuable for planning, evaluating, and approving lead soil remediation systems. It defines site parameters and appropriate ranges of criteria necessary for characterizing, testing, designing, and monitoring lead soil remediation technologies. Contaminants, associated chemicals of concern, and contaminant distribution may differ among small arms firing ranges; however, many characteristics of a site, necessary to determine the efficacy of lead remediation technologies, are similar. Once a site has been characterized and the postremediation land use of the site established, engineered approaches can be designed, tested, and deployed. The decision diagram defines the primary decision points and
provides characteristics used to evaluate various lead soil remediation strategies. The flow
diagram references the sections where each element is more thoroughly discussed in the body of
the document. When viewing the flow diagram electronically, simply click on the box in the
flow diagram to proceed directly to that section for additional information. This approach is
useful to state and federal regulators, environmental consultants, responsible parties/owners, and
community stakeholders.

Site owners and operators have only recently become familiar with the environmental
consequences of their practice. Their industry has since developed Best Management Practices
(BMPs) for environmental management and maintenance of their range and, consequently,
operators are incorporating these into their operating procedures. Federal agencies, specifically
DoD, and commercial sporting range operators are proactively developing a greater
understanding of lead management and remediation. There are a number of remediation
technologies as well as sampling and analysis techniques that, if appropriately applied, can
adequately characterize and remediate lead contamination at any SAFR.

Because of the increased scrutiny being paid to SAFRs, the U.S. Department of Navy, USEPA
Region 2, and the state of Florida have developed BMP documents to provide guidance on the
operation of active SAFRs. These documents closely follow the guidance provided by the

While researching and compiling information for this guidance, the team identified a number of
regulatory and technical issues encountered while remediating a SAFR. Through this guidance,
the team seeks to clarify these issues and make recommendations, which in the team’s view
enhance the use of the techniques discussed in the guidance. Following are some of the more
significant issues identified by the team. See Section 6.0 of this guidance for further discussion:

- At some ranges, it may be possible and desirable to reuse the soil from the backstop of a
range that is being closed to construct a new berm or rebuild an existing berm located in
another area of the same property or facility. It is USEPA’s position that ranges that
reclaim and recycle lead bullets or lead shot may place the soil that is generated during the
reclamation process back onto an active range on the same property or facility or a
property adjacent to and under the same ownership as the property where the soils
originated without testing the soil for hazardous waste characteristics.

- It has been suggested that range soil from a former backstop may also be reused, following
lead reclamation, for constructing or rebuilding a backstop at a location that is not on the
range property. The same environmental benefits from berm reuse as described later in this
document could be realized, but extra oversight may be needed. Since individual states
may not permit this action, or may impose additional requirements for transportation,
documentation, and approvals, state regulations and regulatory agencies should be
consulted prior to transporting range soils to a property that is not the same as or adjacent
to and under the same ownership as the property where the soils originated.

- While many current analytical methods rely on using only soil that has been passed uncrushed
through a 30-mesh sieve as the source for analytical tests, some controversy exists in the field as
to the best method(s). Other sample preparation protocols have been proposed and approved by
governing regulatory bodies. Differences in sample preparation protocols include the designation
of the size of sieve or whether to use a sieve at all and on the degree of disaggregation prior to
sieving. Therefore, to recommend a specific sample preparation method may be misleading. No
matter which method is selected, however, it should result in a sample that is representative of the site and its environment and is agreeable to the regulatory community and the other parties involved in the evaluation.

Other recommendations on relevant issues can be found throughout this document. Please refer to Section 6.0 for a comprehensive listing of all issues contained in this document.