

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460**

OFFICE OF
WATER

December 25, 1999

Mr. Cornel J. Lazinski, Chief
Protective Services
National Security Agency
Central Security Service
Fort George G. Meade, Maryland 20755-6000

Dear Chief Lazinski,

Your letter of 4 October 1999 has come to my attention. This advance notice of a significant change in range management and operations is troublesome from my point of view as Senior Science Advisor, Office of Science and Technology, the United States Environmental Protection Agency, from two perspectives, science and policy.

Your assertion that the use of lead based ammunition is hazardous is in error. Study after study of adults using outdoor firing ranges has not shown any increases in blood lead levels. People using indoor properly ventilated firing ranges have shown no increases in blood lead levels of match participants. Indoor ranges when cleaned using prescribed protocols have shown no increases in the blood lead levels of range personnel.

The United States Environmental Protection Agency bases all its human health standards on blood lead level using the background documents I wrote. Since there have been no increases in blood lead levels there does not exist a potential human health threat.

Your statement that proactive measures have been responsible for the closure of outdoor firing ranges is true. That does not mean that those actions were correct. In nearly all cases there was no sound environmental or human health basis to do so. Most often these ranges were closed by city or county officials in response to complaints of voters of noise pollution or unfounded fear of water contamination (see below).

Unless lead shot is used over known migrating bird flyways almost no threat exists to wild life other than the obvious due to trauma. Birds will eat lead shot and incorporate it in their crops. This organ will grind the lead shot producing significantly high levels of blood leads in birds. Bullets are hardly ever eaten by migrating fowl.

Lead does not pose an environmental threat when used in ammunition. The soil

serves as a repository that successively immobilizes it and progressively makes an insoluble material into other insoluble salts. Therefore, lead if left alone will become less and less mobile and less and less soluble. Disturbing lead only worsens a stable situation.

Imposing an expensive unneeded regulation on the personnel who use rifle and pistol ranges is both scientifically and morally wrong. Those Secret Service, police and national guard units must practice with the material they will use on the job, if they are to be effective in their on the job performance. As demonstrated below there are no scientific bases to require a change from the lead based ammunition currently in use. It is bad policy to base a regulation and/or guideline on feelings, environmental concerns, or political correctness. When taken to court they are almost always overturned and precious resources and time are needlessly wasted.

The United States Environmental Protection Agency spent seven million dollars preparing a comprehensive review of the health and environmental aspects of lead entitled Air Quality Criteria for Lead¹. It is a four volume work (hence a-d). Volume II of IV concerns itself with the chemical and physical properties of lead. Chapter 6 explains in great detail the *TRANSPORT AND TRANSFORMATION* of lead once in the environment. Sections 6.2 through 6.4 discuss various aspects of lead in air. Section 6.5 *Transformation and Transport in other Environmental Media* has three subsections 6.5.1 Soil, 6.5.2 Water and 6.5.3 Vegetation Surfaces.

The idea of taking mitigating measures on the ranges at Fort G. Meade poses a great threat to the environment and to the workers involved. Once lead has impacted the earth it becomes part of the soil. "Most of it is retained by the soil and very little passes into the surface or ground water" (ibid., page 6-29).

The exact technical discussions state, "In the solid phase, metals may be incorporated in the crystalline structure of the parent rock material, into secondary clay minerals, or precipitated as *insoluble* organic or inorganic complexes" (ibid. Page 6-30-emphasis added).

SOIL

There are several processes that may occur at the soil surface. Lead immobilization is most highly correlated with organic chelation. Metallic lead once on the surface of the soil does not break down. Lead either chelates with fulvic and/or humic acids or forms the carbonate or Phosphate [$PbCO_3$, $Pb_3(PO_4)_2$] all of which are nearly

¹U.S. EPA 1986. Air Quality Criteria for Lead. Office of Research and Development, Office of Health and Criteria Assessment, Environmental Criteria and Assessment Office, Research Triangle Park. EPA-600/8-83/028 a-dF.

insoluble. Lead simply does not pose an environmental or human hazard.

WATER

“An outstanding characteristic of lead is its tendency to form compounds of low solubility with the major anions of natural water (ibid. Page 6-34).”

In water lead acts much the same as in soil rapidly settling on the bottom in the sediment. The solubility is directly related to the pH of the water. All of the same comments apply as do for soil. Most stream beds contain plentiful amounts of plant materials. Depending upon the rate of flow, lead chelates with the fulvic and/or humic acids. In acidic water that contains carbonates (so called hard water) lead carbonate forms, $PbCO_3$. Corrosivity is a property of water that relates to the carbonic acid carbonate buffer capacity. That it how it is possible to have carbonate formation in high acidic waters. In those areas where there are relatively low levels of carbonates (so called soft water) the hydroxide of lead forms, $Pb(OH)_2$. If the water has a basic pH and plentiful carbonates $2PbCO_3 \cdot Pb(OH)_2$ may form.

All these reactions are temperature dependent. “The chemistry of lead in an aqueous solution is highly complex because the element can be found in a multiplicity of forms (ibid., page 6-34).” Theoretical calculated amounts of lead in ground and surface water “vary significantly from the theoretically calculated ones (ibid. Page 6-34).”

Based on the available science there is no justification for imposition of a no lead policy on Fort George Meade Ranges. The so called no lead ammunition was developed for indoor ranges in which sufficient ventilation could not be retrofitted to prevent significant lead contamination. These considerations do not apply to outdoor conditions or well ventilated indoor ranges.

Very truly yours,



William L. Marcus, Ph.D., D.A.B.T.
Senior Science Advisor
Office of Science and Technology, 4301
401 'M' St., S.W.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
WATER

September 25, 2000

Mr. Cornel J. Lazinski, Chief
Protective Services
National Security Agency
Central Security Service
Fort George G. Meade, Maryland 20755-6000

Dear Mr. Cornel J. Lazinski.

Enclosed is a letter I sent to you on December 25, 1999. Since that time I have learned that studies have been conducted at different Civil War battle fields to determine the ability of lead to migrate through soils using expended nearly pure lead projectiles (mini balls) fired during that conflict.

The results confirmed EPA's¹ conclusions in the four volume study completed and published in 1986. The lead from these bullets fired in 1863 more than 130 years ago migrated less than one inch. The study performed at Gettysburg battle field showed the less than one inch migration and was in the limits of experimental error. It is possible that the lead found that was displaced at the time of impact and not as a result of leaching.

The idea of requiring a change from lead containing ammunition to lead free ammunition as a result of potential lead contamination is scientifically unsupportable. The conclusions in the December 25, 1999 letter mentioned above are borne out by actual field measurements and repeated below. Therefore they are factual and not a deductive exercise.

"Based on the available science there is no justification for imposition of a no lead policy on Fort George Meade Ranges. The so called no lead ammunition was developed for indoor ranges in which sufficient ventilation could not be retrofitted to prevent significant lead contamination. These considerations do not apply to outdoor conditions or well ventilated indoor ranges."

Very truly yours,

A handwritten signature in cursive script that reads "William L. Marcus".

William L. Marcus, Ph.D., D.A.B.T.
Senior Science Advisor
Office of Science and Technology, 4301
401 'M' St., S.W.

¹U.S. EPA 1986. Air Quality Criteria for Lead. Office of Research and Development, Office of Health and Criteria Assessment, Environmental Criteria and Assessment Office, Research Triangle Park. EPA-600/8-83/028 a-dF.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
WATER

October 23, 2000

Mr. Cornel J. Lazinski, Chief
Protective Services
National Security Agency
Central Security Service
Fort George G. Meade, Maryland 20755-6000

Dear Chief Lazinski,

The results confirmed EPA's¹ conclusions of their four volume study completed and published in 1986. The lead from these bullets fired in 1863 more than 130 years ago migrated less than one inch. The study performed at Gettysburg battle field showed the less than one inch migration and was in the limits of experimental error. It is possible that the lead found that was displaced at the time of impact and not as a result of leaching.

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I would greatly appreciate a response and your scientific justification in view of your latest directive instructing that no lead containing bullets be used to fire into the ground. If you peruse my first communication you will note in paragraph six, I give the current official scientific findings and policy as published by US EPA:

"Lead does not pose an environmental threat when used in ammunition. The soil serves as a repository that successively immobilizes it and progressively makes an insoluble material into other insoluble salts. Therefore, lead if left alone will become less and less mobile and less and less soluble. Disturbing lead only worsens a stable situation."

Very truly yours,

A handwritten signature in cursive script that reads "William L. Marcus".

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