A PRELIMINARY EVALUATION OF LEAD CONCENTRATIONS IN SOILS WITHIN THE LYTHE CREEK DRAINAGE BASIN (A SUB-BASIN OF THE SANTA ANA RIVER) NEAR DEVORE, CALIFORNIA.

A Master’s project by Harvey Clark Norton, Under the Direction of James Noblet, Ph.D., Chemistry/Environmental Sciences, and the faculty of California State University, San Bernardino

Abstract
This poster represents a master’s project that is a preliminary surface and sub-surface soil survey of the Lythe Creek sub-Watershed, near Devore, California. The sub-Watershed is a recreational site within the San Bernardino National Forrest, and has been the site for previous Water Quality studies. Of students at CSUSB. Recently (October-November of 2008) detectable lead levels were noted by students in the course of some Water Quality studies. The site has two(2) Shooting ranges, and potential lead contamination within the site is of concern to the Forestry Department, and to local residents downstream from the gun ranges. No previous studies of the lead concentrations within the sub-Watershed have been found in recent literature searches. The project will include a literature search of the area, and sample testing of soils from above the shooting range in the upper areas of the watershed, to the I-15 freeway, where the watershed feeds the Greater Santa Ana River drainage basin. This study is not meant to be exhaustive, but should offer some valuable insights into the presence of current lead contaminant levels, compared to normal environmental lead levels. Other chemical characteristics of the soil samples may also be examined, to increase the understanding of any noted lead contaminant movement within watershed.

Methods and Materials
To conduct this study, 30 soil samples, and 5 water samples were collected using EPA guidelines from the Lythe Creek water shed, and processed using EPA Lead extraction method 3050B. Samples were then run through a Flame Atomic Absorption Spectrometry Analyzer. The collected data was then evaluated. Data from the analysis appears in the table that follows in the results section. Collection site where also recorded and a map of the sites was developed to graphically show where the sites are located within the watershed.

Water samples Flame A.A. results were all below the lowest value of standards that were made for the analysis, and are reported only as “Value Not Detectable”. Because of this, water sample results are not included on the table on this poster to save space.

Photo Gallery

Legend
Points of interest
Appellate Point
Forest Service Office
Village of Lythe Creek
New Gun Range
Lythe Creek Shooting Range Area
Lead Samples
ppt
0.00 - 1.00
1.06 - 9.82
8.83 - 71.30
>71.3 - 504.10
964.17 - 4495.79
Photo Locations
Streams
Lythe Creek Subwatershed

Results and Discussion
The results of this study indicate that there is minimal lead contamination within some of the soil samples. However, the values for lead contamination are all well below the EPA standards for acceptable lead levels present within recreational fields. Most of the samples throughout the watershed can be attributed to expected normal background lead within the environment. As noted within the Table below, and the graphic representation to the right of the table, the highest sample values fall within the area where it is presumed that munitions from historic recreational shooting have fallen.

This analysis did have a single soil value that was an enigma. This sample #11 on the table below. This elevated lead value within the soil was explained by the presence of several melted car batteries near the site where the sample was collected. The soil sample was not included on the graphic due to space constraints on the graph.

Conclusion
The most common method for removing lead from a contaminated site is removal of all soil from the site, and transferring the soil to a hazmat dump. The contaminated topsoil is replaced with fresh topsoil. This process would be cost prohibitive, and ecologically unsound for a unique area such as Lythe Creek. Lead is not a highly reactive element, and it is not very mobile within the soils of this watershed.

This study indicates that, although some sites have lead at higher concentrations than expected normal ambient values, sites with higher lead values remain within acceptable limits set by the EPA for lead within a recreational field. If there is a suspected site of contamination, (as sample #11) the lead concentrations within the soil fall rapidly to ambient levels downstream.

Community Litter removal is the best option for lead control within this unique watershed.

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Figure 1: This is a map of the Watershed showing the soil sample collection sites. The map was created in the legend shows the location of the watershed.

A Comparison of Soil Lead Values Compared to Landmarks in the Lythe Creek Watershed.

Lythe Creek Lead Analysis Project
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Data Sources:
Lead Samples collected by CSUSB Soil and Water Quality Laboratory
Boron from CSUSB with field maps
With Lythe Creek Data 2008

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