

QUARTERLY PROGRESS REPORT

October 1, 2001 - December 31, 2001

PROJECT TITLE: Environmental Impacts of Lead Pellets at Shooting Ranges & Arsenical Herbicides on Golf Courses in Florida

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WORK ACCOMPLISHED DURING THIS REPORTING PERIOD:

1. Soil samples were collected from the berm of a newly opened shooting range in Florida on a monthly basis, to corroborate experimental results from abrasion study.
2. Weathering incubation study involving 200-mesh lead powder in soil to simulate abraded lead was conducted. The soils included acidic Florida soil, same soil amended with phosphate rock (PR), and same soil amended with CaCO_3 ; and was incubated at field capacity and 80% field capacity moisture levels.
3. Samples from incubation experiment were examined and compared using XRD technique. Water-soluble Pb and pH change were also monitored in incubation experiment.
4. Incubation experiment involving 200-mesh lead powder in >150 mesh autoclaved sand at field capacity and 80% field capacity moisture levels was begun. Samples were examined and compared using XRD technique.
5. Optimization of phosphate rock amendment for Pb contaminated soil at shooting ranges in Florida
6. Characterization for phosphate-induced immobilization of Pb, Cu, and Zn using Flow Calorimetry and EXFAS techniques

SIGNIFICANT RESULTS ACHIEVED:

1. Soil pH rose drastically and then leveled off in the unamended (pH 4.9-6) and phosphate rock amended (pH 4.6-8.6) soils with the addition of 5% Pb. The CaCO_3 amended soil showed a greater buffering capacity of the soil with the addition of Pb, and remained between pH 6-7. After 4 weeks, the pH in all incubation chambers was similar (5.8-6.5).
2. XRD results suggested that no metallic Pb was present in all samples within one week of incubation suggesting complete transformation, and that hydrocerussite had formed in the unamended and phosphate rock amended soils.
3. XRD results from autoclaved sand incubation after initial week suggested that only metallic Pb was present, and that no transformation of Pb had taken place.

4. Preparations made for intact soil core collection in Ocala and Broward County.
5. Phosphate rock coupled with H_3PO_4 is more effective for Pb immobilization than phosphate rock alone
6. H_3PO_4 synchro-acidification is preferably effective for phosphate rock to immobilize Pb with less change of soil pH and less release of soluble P relative to pre-acidification and post-acidification
7. The 2:1 ratio of PR: H_3PO_4 is best for Pb immobilization

Table 1 Project milestones

Tasks	1st quarter	2nd quarter	3rd quarter	4th quarter
Sample Collection	⊗	⊗	⊗	
Sample analysis	⊗	⊗	⊗	
Mobilization test		⊗	⊗	×
Remediation test			⊗	×
Quarterly report	⊗	⊗	⊗	×
Annual report				×

⊗: Task that has been accomplished according to the originally proposed timetable.

×: Task need to be accomplished in accordance with the proposal.

INFORMATION DISSEMINATION ACTIVITIES

- ◆ A manuscript titled “Chemical characteristics and environmental impacts of lead at shooting ranges in Florida” was submitted to J. Environ. Qual.

TAG MEETINGS

- ◆ The research team is contacting the technical advisory group members for this project and scheduling a half-day TAG meeting at the University of Florida, Gainesville, FL. based on the time availability of all TAG members.

WORKS TO BE ACCOMPLISHED DURING THE NEXT THREE MONTHS

- ◆ Incubation experiment involving lead powder in >150 mesh acidic Florida soil and the same soil autoclaved.
- ◆ Column leaching studies involving intact soil cores, and remediation techniques examined using intact soil cores in column leaching studies.
- ◆ Characterization for phosphate-induced immobilization of Pb, Cu, and Zn using Flow Calorimetry and EXFAS techniques