91247

Los Alamos
NATIONAL LABORATORY

Technical Information Release

Group S-7, Mail Stop F674, Phone 7-5013,
TA-3, SM-43, Room A115

This form is to be completed and submitted to S-7, Classification Group, with copies as required of abstract or paper BEFORE you present or submit for publication any technical work of the Laboratory.

Allow three days for S-7 review.

LA-UR
LA-CP LA-UR-03-6512

Package for review must include:
- ✓ Completed Technical Information Release Form
- ✓ Cover sheet on each submission (Form 836 for LA-UR, Form 1756a-e for LA-CP)
- ✓ 2 copies of unclassified submission (LA-UR) ~or~ 1 copy of a controlled submission (LA-CP)

1. Author(s) name(s)

Last	first	middle	Z#	group (or affiliation)
Hickmott	Donald	D.	105510	EES-1
Reid	Kevin	D.	111646	Shaw

2. Author(s) Signature and Date (optional for S-7)

3. Title of Article (in caps: spell out all symbols)

BARIUM AND HIGH EXPLOSIVES IN A SEMIARID ALLUVIAL SYSTEM, CANON DE VALLE, NEW MEXICO

4. Type of Information
- [X] Abstract
- [ ] Full Paper
- [ ] Summary
- [ ] Poster
- [ ] Audio-Visual (abstract required)
- [ ] Viewgraphs (abstract required)
- [ ] Other: _____

Intended for: [ ] Journal [ ] Proceedings [X] Meeting [ ] Talk [ ] Book [ ] Book Chapter [ ] Electronic (e.g. e-print archive) [ ] Other: _____

Particulars: **(See point #4 of instruction sheet.)**
Meeting/Conf. Name: AGU meeting
City/State or Country: San Francisco Mtg. Date: December 2003
Journal Name: _____
Other: _____

Controlled Meeting/Journal/Report: Yes [ ] No [X]

5. List the LA numbers of previous reports that might be useful to the reviewer

6. Research sponsored by: [X] DOE [ ] DOD [ ] NRC [ ] Other: _____

Program Code used to fund this work: MR3R

Rough Draft Yes [ ] No [X]

DOE OSTI Distribution? Yes [ ] No [X]

7. Funding agency release required: Yes [ ] No [X] Copy Attached: Yes [ ] No [X]

8. Deadline Date 09/11/03

Z number, name and phone of contact for notification of release: 114686, Nancy Riebe, 7-5020

Mail Stop M992

9. Typed/Printed Name of Derivative Classifier: Roy Bohn

Signature and Date: 9/5/03

DUSA Designator: _____

[ ] Classified [X] Unclassified [ ] Unclassified, limited → Explain: _____

10. Typed/Printed Name of Responsible Author/Requester: Donald D. Hickmott

Signature and Date (***Required, see Note****)

11. Typed/Printed Name of Manager: Alison Dorries

Signature and Date (***Required, see Note****) 9/5/03

Classification Group (S-7)

Date Received	Subject or NRC Category	Group/Author Notification of Release
Reviewer	Date	[ ] U [ ] C [ ] S [ ] RD [ ] FRD [ ] NSI [ ] UCNI [ ] ECI [ ] OUO [ ] Prop [ ] CRADA [ ] Other _____ Guide _____ Duration _____

Comments:

Business and Patent Law

Patent Interest	Docket Number	Patent Law Reviewer and Date
Yes [ ] No [ ]		

***Note**: By signing on lines 10 and 11, I certify compliance with this form's instructions on the back, including the integrity of research requirement.

678 (4/03)

14350

LA-UR-

Approved for public release; distribution is unlimited.

Title: Barium and High Explosives in a Semiarid Alluvial System, Canon de Valle, New Mexico

Author(s): Donald D. Hickmott
Kevin D. Reid

Submitted to: AGU meeting

Los Alamos
NATIONAL LABORATORY

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the University of California for the U.S. Department of Energy under contract W-7405-ENG-36. By acceptance of this article, the publisher recognizes that the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.

Form 836 (8/00)

(2)

Barium and High Explosives in a Semiarid Alluvial System, Cañon de Valle, New Mexico.

Kevin D. Reid[1], Donald D.Hickmott[2], Steven L. Reneau[2], Brent D. Newman[2], Jeff M. Heikoop[2], Elmer D. Alcon[1], Peter E.M. Gram[3], Katherine A. Herrell[1], Devon E. Jercinovic[1], David S. Lawler[1], John M. Pietz[1]

[1] Shaw E & I 335 Central Park Square, Los Alamos, NM 87544
[2]Los Alamos National Laboratory MS-D462, Los Alamos, NM 87545
[3]PMC Technologies 2237 Trinity Bldg.#2, Los Alamos, NM 87544

Barium and RDX (a military high explosive compound) were evaluated from 1998 to 2002 within a semiarid alluvial system, Cañon de Valle (CdV), New Mexico. A high explosive (HE) machining facility discharged effluent containing these analytes to the canyon from 1951 to 1996. Surface water, alluvial groundwater, active channel sediments, and floodplain sediments were characterized along a 2 km long reach of canyon. Barium concentrations were higher in the alluvial groundwater than the surface water with the highest concentration centered approximately 500 m downgradient from the HE facility. Of the 21,000 kg of Ba estimated to be in CdV sediment in 1999, about 65% is estimated to have been contained in fine-grained floodplain deposits, 10% in the active channel, and 25% in coarse-grained deposits below the floodplains. The ratio of Ba concentration in fine grained deposits to the active channel increases downstream and increased over time. These data indicate that Ba from the effluent was first stored in the active channel where it could preferentially bind to fine sediment particles, and then was redistributed onto floodplains following scour and suspension during floods. The Ba residing within the floodplain sediments appears relatively stable, and remains isolated from surface water and alluvial groundwater. Approximately 5 kg of RDX was estimated to reside in CdV sediment, also preferentially in fine-grained sediment. RDX concentrations in groundwater were highest (up to 759 ug/L) during high flow snowmelt runoff. The highest average RDX concentration was from an alluvial well approximately 1000 m down gradient. There was a positive correlation between saturated thickness in CdV alluvial wells and RDX concentration. The strong correlation between RDX concentration and saturated thickness suggests that RDX resides in the vadose zone and mobilizes during wet periods when the effective saturated area increases. RDX and Ba show markedly different transport pathways through the alluvial system. Barium is readily sorbed and transported with the sediment fraction. In contrast, RDX is unbuffered and conservative. Thus as the alluvial system wets up, the RDX mobilizes. Knowledge of the distribution of Ba and RDX is critical to design and implementation of corrective measures for this system.

RECEIVED
JUN 08 2005
By S.V.