LA-UR-13-23948

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Title:	**Background Metals and Radioactivity in Storm Water Chemistry on the Pajarito Plateau, Poster, Individual Permit for Storm Water, NPDES Permit No. NM0030759**
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Intended for:	Public
Purpose:	This poster was prepared for the June 2013 Individual Permit for Storm Water (IP) public meeting. The purpose of the meeting was to update the public on implementation of the permit as required under Part 1.I (7) of the IP (National Pollutant Discharge Elimination System Permit No. NM0030759). The poster will be available on Los Alamos National Laboratory's (LANL's) public website.

Background Metals and Radioactivity in Storm Water Chemistry on the Pajarito Plateau

What is Background?

The U.S. Environmental Protection Agency (EPA) defines “background” as substances or locations not influenced by the release of pollutants from a site. There are two general categories of background:

(1) Human-influenced or anthropogenic background (baseline)—natural and human-made substances present in the environment as a result of human activity, for example, an urban developed landscape such as a city or townsite.

(2) Naturally occurring—substances present in the environment in forms that have not been influenced by human activity, for example, a landscape where no industrial or invasive agricultural activity has occurred (national forest lands).

Background Studies at Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) has conducted several background studies for soils, sediments, rock, and groundwater. These data have been used in reports subsequently approved by the New Mexico Environment Department (NMED).

In 2012, a report describing the distribution of polychlorinated biphenyls (PCBs) in precipitation and storm water within the upper Rio Grande watershed was published. This study was conducted jointly by NMED and LANL.

In 2013, a report presenting background metals and radioactivity in storm water on the Pajarito Plateau was published. The results from this report are presented here.

Statistical Methods

All statistical analyses were performed on validated data. Estimated concentrations, “J” qualified, and nonqualified results were used in the calculations. Data qualified with “U,” “UJ,” or “R” (not detected or rejected) were not used in the statistical analysis.

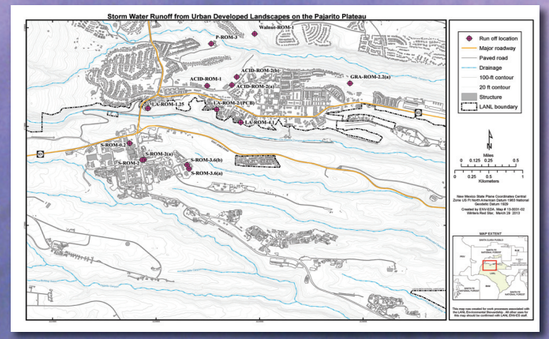
Data were analyzed using Statistica 8.0 (StatSoft, Tulsa, Oklahoma) and EPA software ProUCL 4.1; (http://www.epa.gov/nertesd1/databases/dathome.htm).

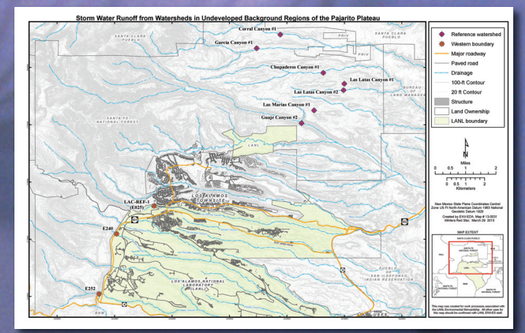
Statistical results were considered significant at $p < 0.05$.

If the largest result for a given analyte was anomolous (e.g., more than 5 times larger) compared with the second largest result, it was considered to be suspect and was removed.

Upper tolerance limits (UTLs) or background values (BVs) were calculated for each parameter with 7 or more detected results (UTL = 95% and 95% coverage). UTLs represent the BV for each constituent.

The two tables to the right show (1) BVs calculated for undeveloped and developed urban landscapes on the Pajarito Plateau (the most common detections at site monitoring areas [SMAs] are shaded) and (2) the most common metals measured in urban storm water at several locations in the United States.





Analyte	Reference Watersheds (Undeveloped Landscape, Weathered Bandelier Tuff)		Developed Urban Landscape (Los Alamos County and LANL)		Target Action Levels (TAL; ATAL/MTAL) der the Individual Permit
	Dissolved (filtered)	Total (nonfiltered)	Dissolved (filtered)	Total (nonfiltered)	
Units are µg/L unless otherwise stated	UTL or BV	UTL or BV	UTL or BV	UTL or BV	
Aluminum	2210	161,000	245	17,700	750
Antimony	—	—	9.25	9.36	640
Arsenic	—	46	2.55	5.32	9
Boron	30	56	47.3	48.2	5000
Cadmium	—	7.3	0.36	1.25	0.6
Chromium	—	322	4.07	24.9	210
Cobalt	7.53	103	9.2	11	1000
Copper	3.43	1490	32.3	84	4.3
Cyanide, weak acid dissociable (mg/L)	—	—	—	0.004	5.2/22
Gross Alpha (pCi/L)	—	1490	—	32.5	15
Hardness (mg/L)	74	—	105	—	30
Lead	9.03	393	3.3	133	17
Mercury	—	—	—	—	0.77/1.4
Nickel	3.53	220	7.57	21.2	170
Radium-226 + 228 (pCi/L)	—	52.7	—	8.94	30
Selenium	—	—	—	—	5/20
Silver	—	—	—	0.263	0.4
Thallium	—	—	—	—	6.3
Vanadium	5.77	379	10.6	32.2	100
Zinc	109	1350	1120	1671	42

Dissolved Metals in Storm Water and Precipitation in Other Developed Urban Environments

Media	Environment/ Material	Cadmium	Copper	Lead	Zinc	Reference
Storm Water	Highway Runoff	0.14 - <0.6	1.96 - 13.9	0.15 - 7.6	6.4 - 78.5	Highway Storm Water Runoff Study, 1998, Michigan Department of Transportation, CH2MHILL Report.
Storm Water	Urban/Suburban Runoff	No data	1.0 - 16.9	3.8 - 15.4	8.4 - 905	Rose, S. et al., 2001, Comparitive zinc dynamics in Atlanta metropolitan region stream and street runoff, Environmental Geology, 40, p. 983-992.
Rain Water	Atmosphere	0.1 - 3.9	1 - 355	2.0 - 76	5 - 235	Gobel, P. et al., 2007, Storm Water Runoff Concentration Matrix for Urban Areas, Journal of Contaminant Hydrology, 91, p. 26-42.
Storm Water	Roof Runoff	0.2 - 1.0	6 - 3.4	2 - 493	24 - 4,880	
Storm Water	Traffic Area: low density	0.2 - 0.5	21 - 140	98 - 170	15 - 1,420	
Storm Water	Traffic Area: high density	0.3 - 13.0	97 - 104	11 - 525	120 - 2,000	

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