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Title: **Urban Storm Water Runoff 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 13th Annual Student Symposium at Los Alamos National Laboratory (LANL) held in July 2013. The symposium is a showcase for the work of students at the Laboratory. The poster was prepared by a student who provides support to the Individual Permit (IP) project. It will be available on LANL's IP public website.

Urban Storm Water Runoff on the Pajarito Plateau

Storm Water and the Issues at Hand

Storm water runoff is any precipitation generated in urban areas that does not evaporate or soak into the ground but instead flows over land or impervious surfaces such as streets, parking lots, and roof tops. Increased development in communities across the nation has contributed to the accumulation of chemicals, debris, sediment, excess nutrients, and other pollutants in runoff from urban areas and, in turn, affects the water quality in receiving bodies of water.

Example of Storm Water Flow Path

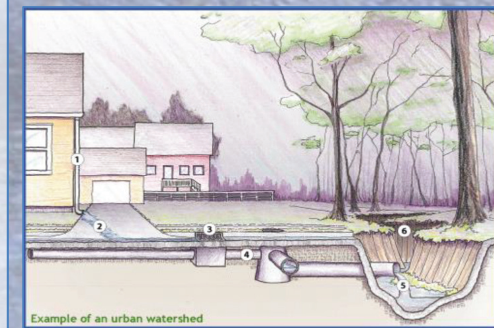

Figure 1. Diagram illustrating the storm water flow path in a standard urban environment

Constituents of Storm Water

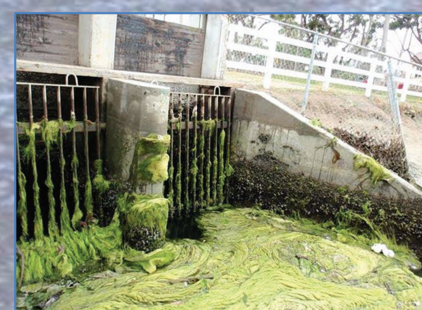

Figure 2. Photos illustrating different constituents of concern in storm water, which include chemicals, trash, excess nutrients, sediment, and debris

Storm Water Sampling

Storm water samples are collected using automated Global Water sampler model WS750, with two single-gallon bottles (one poly and one glass), flow sensors, braided tubing, two pumps, and a control panel, all of which work simultaneously to collect samples during the storm events. In some cases, single-stage samplers are used to collect samples in areas where the water is not sufficient for mechanical sampling.

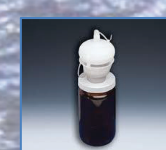

Figure 6. Global Water sampler (top), sampler configuration (middle), and single-stage sampler (bottom)

Storm Water Flow Process

Under the National Pollutant Discharge Elimination System (NPDES) Individual Permit, Los Alamos National Laboratory (LANL) monitors storm water discharge at solid waste management units (SWMUs). Storm water is monitored below SWMUs to detect pollutants associated with legacy discharges and to measure the performance of sediment mitigation structures established to control runoff. In many cases, storm water emanating from upstream landscapes flows onto SWMUs, transporting sediments and pollutants not associated with the SWMU and contributing to the runoff loading. Target action limits (TALs) are defined for the 406 SWMUs within the 250 site monitoring areas (SMAs). Approximately 13% of all 253 SMAs have 45% or greater impervious surface runoff contribution.

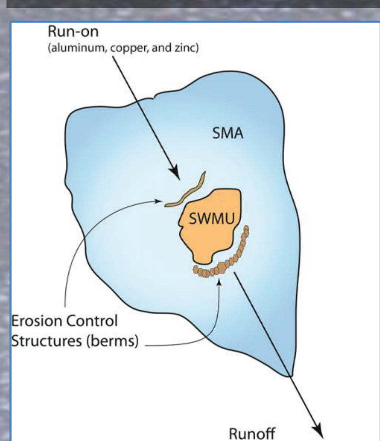

Figure 3. Illustration exemplifying the storm water flow process and sampling locations

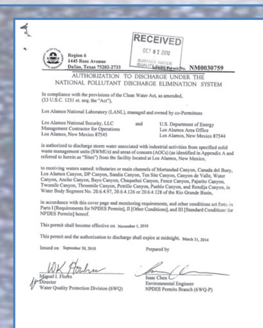

Figure 4. NPDES Individual Permit

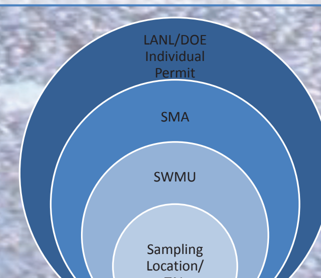

Figure 5. A hierarchy chart explaining the storm water process at LANL

2012 Monitoring Season

Previous studies have shown that concentrations of copper, zinc, and polychlorinated biphenyls (PCBs) in storm water runoff on the Pajarito Plateau have, in many cases, exceeded TALs. Often these constituents are not associated with SWMUs and, instead, are associated with more naturally occurring materials and urban runoff. Therefore, sampling locations were identified and sampling units were deployed to collect samples. The purpose of this study was to determine the contribution of pollutants in storm water running onto SMAs next to urban and industrial environments. This study will help to determine whether SWMUs were transporting pollutants to canyon bottoms or if other sources were contributing to the chemical character of the SMA storm water runoff.

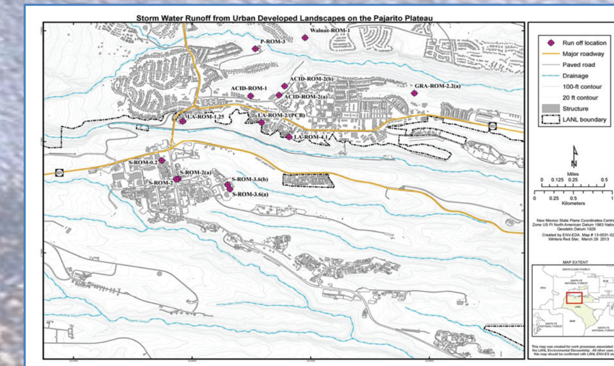

Figure 7. 2012 monitoring season sampling locations

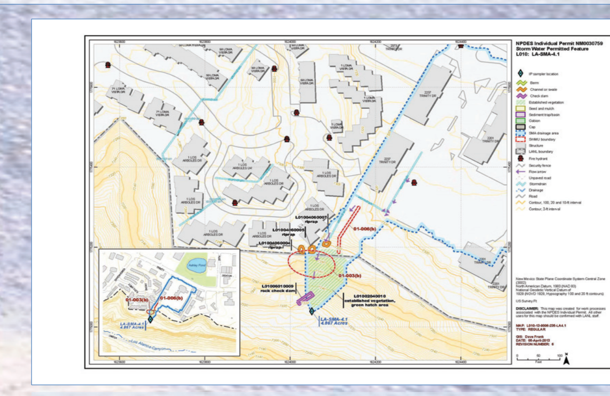

Figure 8. An example of an SMA map where sampling occurred that demonstrates the amount of impervious surfaces associated with any SMA location

2012 Results

Once samples are retrieved from the field, they are brought into the storm water lab and then analyzed according to the LANL contract laboratory statement. The following results were found for copper, zinc, and PCBs during the 2012 monitoring season.

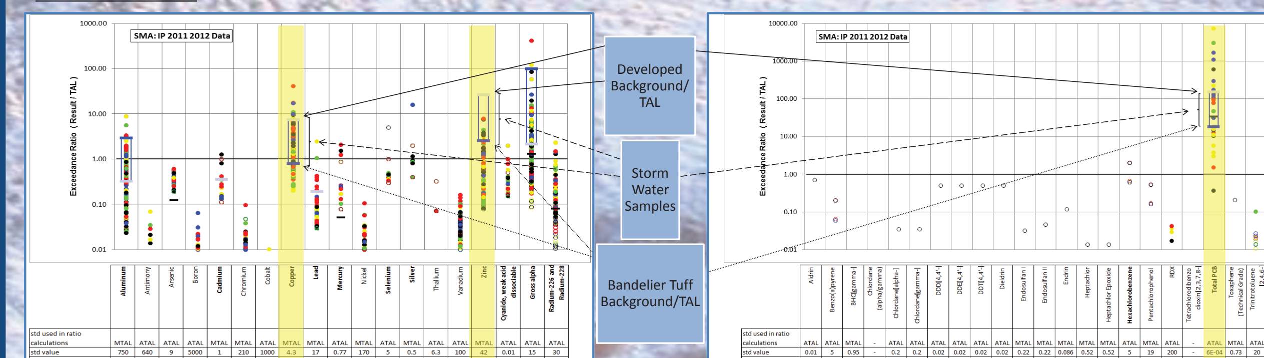

Figure 9. Analytical results plots showing background values associated with copper, zinc, and total PCBs collected from the 2012 monitoring season

2013 Monitoring Season

Monitoring will continue during the 2013 monitoring season at developed urban landscapes to address data gaps and to further characterize storm water runoff from these landscapes. Once sampling is complete for the monitoring season, compliance sample results will be compared with run-on monitoring results at SMAs in an attempt to differentiate off-site and on-site sources. Data objectives for this study include determining the contribution of pollutants in storm water run-on to SMAs located next to urban and industrial environments, investigating nonpoint source pollutants in urban runoff, and evaluating for background upper tolerance limits (UTLs). The proposed locations for this year's monitoring season are presented in Figure 10.

Based upon the new locations, stations will collect four full samples to determine the concentrations of copper, zinc, aluminum, gross-alpha particles, and PCBs. With the newly added urban neighborhood monitoring efforts, we will be able to supplement the existing population of previous analytical results and also determine UTLs for inorganic, organic, and radioactive constituents from urban neighborhoods on the Pajarito Plateau.

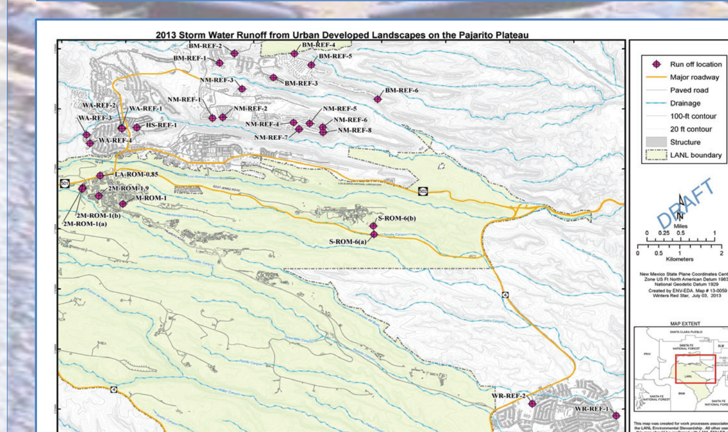

Figure 10. 2013 monitoring season proposed sampling locations

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