

# Potential Release Site Sediment Concentrations Correlated to Storm Water Station Runoff through GIS Modeling

## Abstract

This research focused on examining the relationship between sediment sample data taken at Potential Release Sites (PRSs) and storm water samples taken at selected sites at and around Los Alamos National Laboratory (LANL). The PRSs had been evaluated for erosion potential and a matrix scoring system implemented. It was assumed that there would be a stronger relationship between the high erosion PRSs and the storm water samples. To establish the relationship the research was broken into two areas. The first area was raster based modeling and the second area was data analysis utilizing the raster based modeling results and the sediment and storm water sample results.

Two geodatabases were created utilizing raster modeling functions and the Arc Hydro program. The geodatabase created using only Arc Hydro functions contains very fine catchment drainage areas in association with the geometric network and can be used for future contaminant tracking. The second geodatabase created sub watersheds for all storm water stations. If two storm water stations were in a contiguous drainage basin then two sub watersheds were delineated with the first watershed ending where the

second started. Both models house a geometric network, which has directional functionality for stream network modeling.

The second area of the study focused on data analysis. The analytical sediment data table was joined to the PRSs spatial data in ArcMap. The PRSs that were above the background value were retained after the join function. The storm water station spatial data were joined to the table of analyte values over the National Pollutant Discharge Elimination System (NPDES) benchmark value or the Department of Energy (DOE) Drinking Water Defined Contribution Guideline (DWDCG). Only the storm water stations were retained that had sample values greater than the screening level. Separate maps were created for each analyte showing the sub watersheds, the PRSs over the background in each watershed, and the storm water stations over the screening level for the specific analyte. The relationship between the PRSs and the storm water stations could be easily determined visually by watershed. Tables were then created by analyte that listed the PRSs average value by storm water station watershed allowing a tabular view of the mapped data. The final table that was created lists the number of high erosion PRSs and regular PRSs over that background values that are contained by each watershed.

A relationship was not identified between the high erosion PRSs of the regular PRSs and the storm water stations by watershed after reviewing the data created during this study. However the Arc Hydro data models created for this analysis and the information gained can allow further in depth study by refining the methods developed in this study.