

SERDP PROJECT OF THE YEAR

ENVIRONMENTAL RESTORATION

IDENTIFICATION AND CHARACTERIZATION OF NATURAL SOURCES OF PERCHLORATE

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Perchlorate is an emerging contaminant of concern throughout the nation, with 44 states identified as having water sources that have tested positive for perchlorate. For some time, it has been assumed that because perchlorate is a primary component of fuel for rockets and missiles, most perchlorate in the environment must come primarily from military sources, although non-military sources also were known. Scientists have been aware that perchlorate also occurs naturally in the environment, but the sources and extent of its occurrence have not been well documented. To effectively manage the potential risks posed by perchlorate, an understanding of sources, their relative strengths, and pathways for movement in the environment is essential.

This groundbreaking project, conducted by Dr. Gregory Harvey in collaboration with colleagues at Texas Tech University and the U.S. Geological Survey, for the first time provides a conceptual picture with supporting data about naturally occurring perchlorate, mechanisms of its production, and how it accumulates and moves in the environment. The results, which include data from dozens of sites in the United States and around the world, show that there is a significant reservoir (up to 1 kilogram per hectare) of natural perchlorate present in the subsurface in semi-arid and arid areas. This perchlorate is most likely of atmospheric origin, and concentrations in the subsurface are highly correlated to chloride concentrations. This reservoir of perchlorate is sufficiently large to have a substantial impact on groundwater where irrigation from agriculture or urbanization can flush accumulated salts from near-surface soils to groundwater.

These findings provide scientists, regulators, the military, and other stakeholders with a better understanding of where perchlorate comes from—knowledge that is essential to effectively manage the potential associated environmental risk. In addition, results of this project will lead to the capability to differentiate natural from anthropogenic sources of perchlorate as well as to predict where natural perchlorate is most likely to be found under various geological and climatic conditions, greatly aiding forensic investigations.

For more specific information about this project, stop by Poster #116.