

# **Panama Ranch Garbage Dump Cave— Toxaphene and DDT Remediation**

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## **Abstract**

Pesticide contamination in the Panama Ranch Garbage Dump Cave was discovered during a volunteer clean-up effort by the Southwest Region of the National Speleological Society, the White Sands Grotto, and the United States Forest Service. Analytical testing of the dump debris and soil indicated high concentrations of Toxaphene, Lindane, and DDT. The contaminant of highest concentration, Toxaphene (an insecticide banned in the early 1980s), is a known mutagen and suspected carcinogen. Zenitech personnel, knowledgeable in cave conservation practices and trained to work with hazardous materials, conducted clean-up (remediation) of the contaminated material. Remediation efforts commenced at the level of contamination discovery, approximately 25 feet below the surface, and continued to the cave basement, approximately 110 feet below the surface. Soil and debris were found scattered on ledge surfaces down to the basement floor, where a large debris pile was found. Remediation efforts were suspended and samples were collected from the basement to assess the extent of contamination. Analytical results indicated Toxaphene concentrations two to five times higher than those near the surface. Additional sampling for the Toxicity Characteristic Leaching Procedure indicated that the Toxaphene and DDT did not exhibit the toxicity concentrations to be considered a characteristic hazardous waste. However, the contamination concentrations exceeded the maximum thresholds defined for the protection of human health and groundwater. Further remediation was recommended to remove the contaminated soil and debris. Funding for the final phase was requested under the New Mexico State Superfund, requiring an Engineering Evaluation/Cost Analysis of several alternative remediation methods and remediation action levels. Removal of the soil and debris to the removal action level of 5.0 mg/Kg by vacuum was recommended in the final evaluation. Six months after the initial remediation efforts, Zenitech personnel completed the remediation efforts. Approximately 23 cubic yards of soil were removed (approximately 40 cubic yards total) and 60 bags of debris collected during the final phase, bringing the residual contamination down to less than 5.0 mg/Kg. The entire project was completed for a cost of only \$88,000.