

## **Documentation of Completion of Cross-Vane Structure Corrective Maintenance Actions in Pueblo Canyon**

The project to implement modifications to the three cross-vane structures located in Pueblo Canyon has been completed. As directed by the New Mexico Environment Department (NMED) in its December 3, 2009, letter, "Direction to Correct Cross-Vane Structures in Pueblo Canyon Los Alamos National Laboratory" (EPA ID# NM0890010515 LANL-HWB-08-047), this work involved the following four activities.

First, the tapers of the top surfaces of the boulders that make up the structures were adjusted so the boulders comprising the vertex of each structure are at the elevation of the existing stream channel, and the boulders anchoring the structure have been extended to the full stream bank elevation.

Second, the structures extend at approximately 30-degree angles from the stream banks to the vertex of each structure. The structures have been keyed into the stream bank at distances ranging from two to four times the diameters of the boulders that make up the in-channel portions of the structures.

Third, all gaps in the structures have been filled either by adjusting the boulders and retrenching them or by trenching in smaller boulders between and in front of the existing gaps.

Finally, the vertex of each structure has been lowered by 6 in. to 1 ft, so there is an elevation difference of 1.75 to 2.50 ft between the vertex and the anchor legs of each structure, with an approximate 2% to 3% grade on each leg and less than 1 ft of elevation difference between each adjoining boulder in the structures.

Figures 1 through 3 show the finished structures. The references in the figures to cross vane 1 refer to the westernmost structure, cross vane 2 denotes the middle structure, and cross vane 3 refers to the easternmost structure in the canyon.



**Figure 1** Pueblo Canyon cross vane 1 looking eastward (downcanyon). Note that the vertex of the structure is at stream-bed elevation.



**Figure 2** Pueblo Canyon cross vane 2 looking eastward (downcanyon). Note that the vertex is at the elevation of the stream bed, and the gaps in large rocks are filled.



**Figure 3** Pueblo Canyon cross vane 3 looking westward (upcanyon). Note that the vertex is at the elevation of the stream bed, and the gaps in the large rocks are filled.