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**Seismic Reflection Investigation of Hidden Valley: A  
Volcanotectonic Regime**

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Hidden Valley is located in the north-central McCullough Range south of Las Vegas along the western edge of the Colorado River extensional corridor in the Central Basin and Range. The western Colorado River extensional corridor is an area of highly extended terrain thought to represent low-angle normal faulting. Hidden Valley is bound on all sides by volcanic rock of the relatively unextended

central and northern McCullough Mountains. The evolution of Hidden Valley is still unresolved because of a lack of surface expression of faulting. Recent studies show reactivation of the McCullough Wash Fault splays during volcanic sagging related to the eruption of the Mount Hanna Andesite in the mid-late Miocene. An east-west trending high-resolution seismic reflection profile was acquired in the valley to determine the relationship between volcanism and extension in the area as well as to determine the basin structure. From the eastern edge of the basin moving west, a 2.18 km seismic profile was acquired using a combination of alternating hammer source and 15 second linear vibroseis sweeps of 30 to 160 Hz at 5 meter spacing. Hammer source was used to resolve the shallow part of the basin while vibroseis was used to resolve the mid-basin. The data was collected with a 60-channel system at 300 m intervals with the total seismic profile extending just beyond the center of the valley. Preliminary interpretations of shot gathers show a thin basin fill on the eastern edge of the basin with basaltic basement rock on that side of the valley. The basin fill thickens to the middle of the valley, possibly associated with faulting. Depth of signal in the deepest part of the valley is approximately 500–700 meters with shallowing to the east. Preliminary results show little faulting, which would strengthen the evidence for volcanic sagging. Further processing could reveal normal faulting, which alternatively would suggest a half-graben. Faulting of Holocene sediments would indicate a possible seismic hazard for the growing population of the Las Vegas area. Future work will entail detailed reflection interpretation and refraction processing to constrain the evolution of Hidden Valley and the role of extension in the volcanic terrain of the northern McCullough Range.

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