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**Preliminary Report  
Mesa-Edge Instability on Pajarito Mesa  
Summary of FY92 Field Work**

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January 19, 1993**

**Introduction to Field Studies**

Investigation of the stability of mesa edges at the proposed MWSDF began with a traverse of both the north and south rims of Pajarito Mesa to identify the primary processes of mass wasting. On the north rim significant mass movement was identified, extending up to 200 feet or more back from the mesa edge, and the distribution of instability was mapped and described. On the south rim the dislodgement of relatively small (< 20 ft thick) blocks seems to be the predominant mechanism of cliff retreat, and the focus there has been on attempting to quantify this process by applying recently-developed techniques involving the buildup of cosmogenically-produced isotopes in the rocks. Here the investigation of the north rim is summarized to aid in the preliminary location of pits.

**Characteristics of Landslide Area**

Along the north rim of Pajarito Mesa, an extensive area of instability exists roughly centered on the projected extension of the Guaje Mountain fault. Characteristics of the mesa edge here are significantly different from that present either east or west along the north rim, or to the south along the south rim. The clearest evidence for instability is in places along the immediate rim, where areas up to 100 feet back from the mesa edge are characterized by multiple partially-detached landslide blocks, in part bounded by troughs on the south side that record significant movement towards the canyon. To the south, towards the center of the mesa, these areas are bordered by zones with "hummocks" of Bandelier Tuff, probably bounded by fractures, with the hummocks becoming less distinct to the south away from the canyon. These zones probably reflect lesser amounts of movement than occurred along the immediate mesa edge, sufficient to step down fracture-bounded blocks of tuff and open up the intervening fractures,



but insufficient to produce distinct, continuous landslide scarps. South of this area of subtle hummocky topography, closer to the center of the mesa, subtle steps exist that are probably associated with the mesa-edge landsliding, and these were mapped to show the inferred distribution of recognizable instability. This zone extends up to 200 feet or more back from the mesa edge. It is possible that small movements (< 2 feet) have occurred farther south, obscured by soil and vegetation.

### **Timing of Landsliding**

No evidence is available on the age of the landslides on the north rim of Pajarito Mesa. Trees growing on the landslide blocks are not visibly affected, implying an age greater than 100 years. The close association between the area of maximum landsliding and the projection of the Guaje Mountain fault zone suggests a relationship between landsliding and seismic activity. The most likely trigger for future landsliding on Pajarito Mesa may thus be seismic shaking, and seismic triggering of landslides is well documented elsewhere.

### **Recommendations for Pit Locations**

The zone of identified landsliding should be avoided because of the potential for disrupting the integrity of disposal pits during seismic events. In addition, because the zone of landsliding has probably migrated south towards the center of Pajarito Mesa, and may extend farther into the mesa during seismic events, an additional buffer is recommended. However, the desirable size of this buffer zone is not obvious because the landsliding process here is poorly defined. Incipient slide blocks are suggested by subtle steps that have been identified up to 50 feet back from the more prominent landslide steps, suggesting a minimum additional buffer of 50 feet from any inferred landslide features to avoid future landslides. A more conservative approach would be to double this buffer to 100 feet.

Because of the relatively low potential for landslides in the buffer zone, and also in the adjacent area of inferred incipient landslide features, these areas are appropriate for non-critical facilities such as roads, parking areas, and temporary structures.