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Remote Imagery Studies in Hidden Valley, Nevada

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The use of aerial photography for archaeological exploration is not a new technique. Only recently, however, has small-scale, high altitude imagery become available for this purpose. The use of color infrared and other films sensitive in the near-infrared range, and the use of cameras and flight techniques which provide excellent resolution have made such high altitude imagery a practical tool for archaeological investigation. Such small-scale imagery has photographic properties which render it superior to large-scale photography for certain purposes. For example, the small-scale coverage allows the investigator an uninterrupted view of a vast area in a single frame, with a constant sun angle, constant weather conditions, and so on. The search for larger features, like ditches and rock constructions, is thus much facilitated. Observations made in Hidden Valley, Nevada demonstrate the value of high altitude aerial photography for such archaeological purposes.

While observing U-2 imagery (scale 1:131,000, taken at about 65,000 feet with a 6-inch lens) I noted several odd lines around the margin of Hidden Valley, about twenty miles south of Las Vegas (see Figs. 1 and 2). These lines had several interesting characteristics indicating that they may represent an archaeological feature. First, the lines, overall, extend for more than four miles, mainly on the west side of Hidden Valley, but they also appear faintly in the southeast. There are at least 18 lines in the best preserved series. Also, they are evenly spaced, curving, and parallel, as if they were created by design and with the aid of surveying skills. They do not, however, follow lines of equal elevation such as the recessional shorelines of the Pleistocene

lake which formerly occupied Hidden Valley. Moreover, they can be seen to have deflected drainage in several areas. There is no natural mechanism by which these lines might have been created, and the land's present leasee knows of no contemporary or recent practice which would account for these lines, nor did he know that they existed.

Close observation of the imagery suggests that these lines end abruptly at the edges of several alluvial fans and then resume on the opposite side. There are only a few ways in which this situation could occur. It is tempting to suggest that the lines underlie and are older than the fans in question. It is a generally held opinion among geomorphologists that such fans have not been growing in the southwest since the end of the last glacio-pluvial cycle, 10 to 13,000 years ago. Since that time, fans in the area have been subjected to erosion. Therefore, if the lines were proven to be overlain by the fans, they would be at least 10,000 years old. Ground observation, however, has revealed that the lines are basically continuous across all fans in spite of the impression of discontinuity one gets from observing the imagery. Thus, a more recent origin is suggested.

The mechanism by which this illusion of discontinuity has been created is interesting; moreover, it demonstrates the type of pitfall which awaits the unskilled photointerpreter. The imagery is of a sufficiently small scale and limited resolution so that detection of the lines themselves would be impossible. Ground observation revealed the lines to be discontinuous rock structures with an average width of 1 to 2 feet and an average height of 6 to 18 inches, far below the resolving power of the imagery (see Fig. 3). Nevertheless, these rock structures have apparently retarded runoff and thereby provided favorable growing conditions for certain plants, especially creosote bush (*Larrea divaricata* Cav.). It is apparently the resultant linear plant formations which

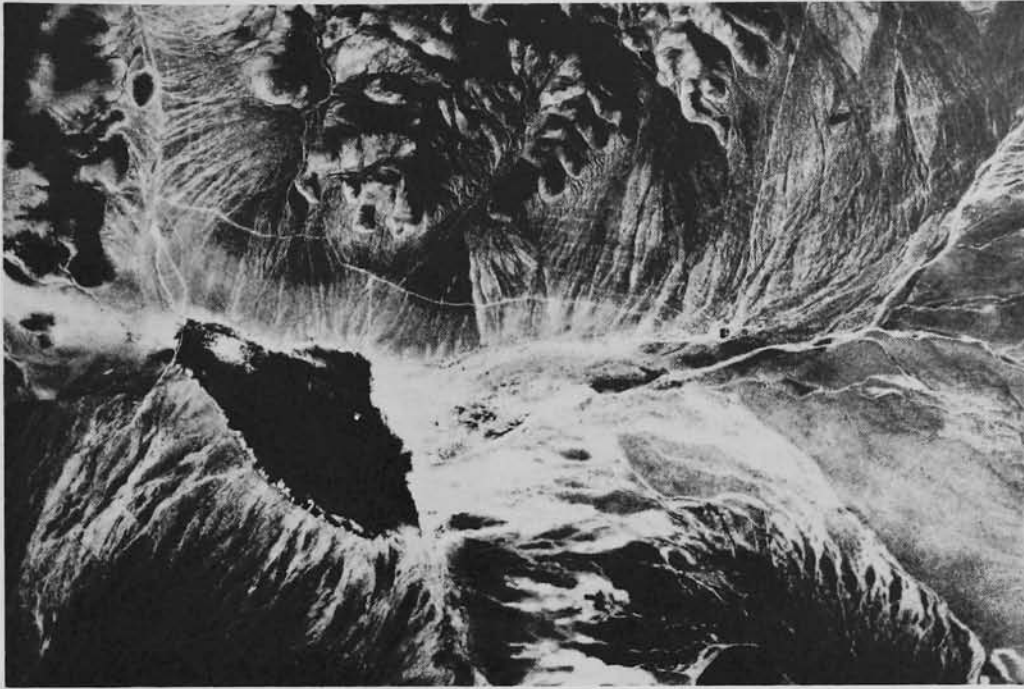


Fig. 1. Aerial photograph (1 in. equals approx. 0.7 mi.) of Hidden Valley, Nevada. (NASA photograph.)

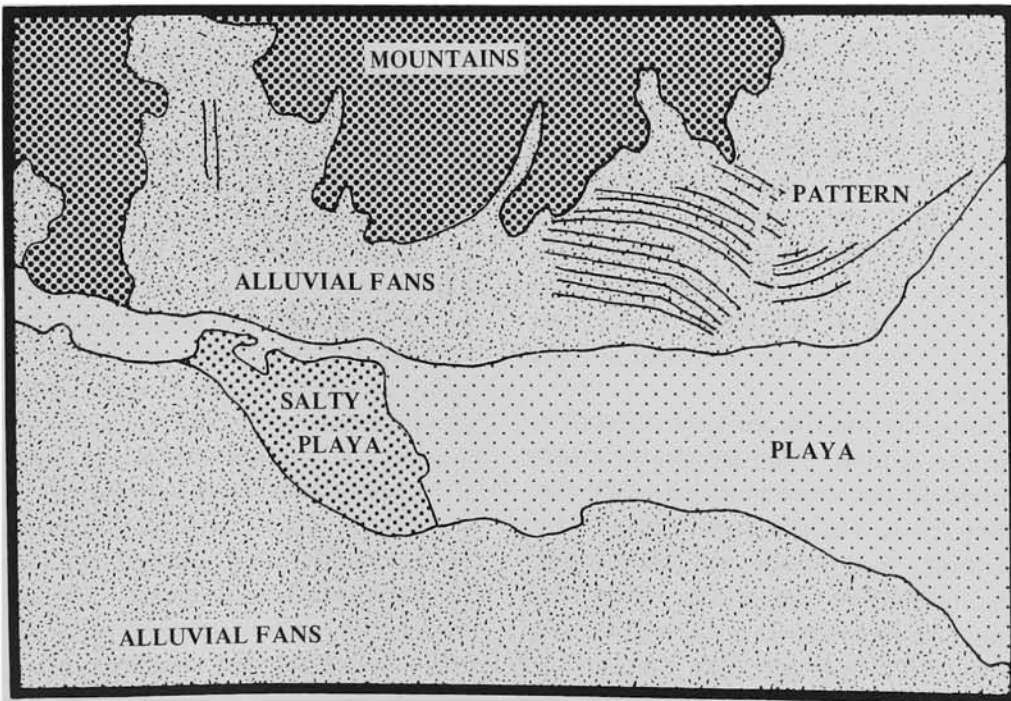


Fig. 2. Detail of Fig. 1, showing physiographic features and location of pattern revealed by remote imagery.

have been recorded upon the imagery. Those fans which the rock lines appear not to cross, however, are covered with a well developed and highly patinated desert pavement which undoubtedly encourages runoff and retards plant growth. Thus, these linear plant formations are not found on them and, on the imagery the lines appear to terminate.

Ground observations have also revealed the existence of other man-made features in the valley including rock circles, hearths, and grinding surfaces. These are frequently heavily patinated on the upper surfaces. It is not clear whether these features were produced by the line builders or by some other group. Flakes and chips have not yet been found in Hidden Valley proper, but they are common in the vicinity of a seasonal waterhold just to the south.

It is surprising, given the existence of these larger features, that no worked stone has yet been located in the valley proper. The native rock in Hidden Valley is a poorly consolidated vesicular basalt which is not appropriate for the manufacture of stone tools. Yet, almost nothing in the way of introduced material has been found. Of equal interest is the fact that at present no permanent source of water exists in the valley. One would think that a relatively large population requiring a reasonably reliable source of water would be necessary for the creation of features as extensive as the lines in question. Perhaps such a water supply did exist at some remote time.

The lines themselves are very difficult to locate on the ground. They are almost totally indiscernible on the lower portions of the fans which they cross. On the upper parts of the fans, however, they appear as disconnected rock structures of varying width, height, and consistency. In fact, the lines are much more obvious on the U-2 image than they are on the ground surface. Similarly, the lines are more easily seen from a distance, much as a



Fig. 3. Rock alignments in Hidden Valley, Nevada.

pointillistic painting takes on a more concrete appearance as one moves away from it.

Future research may yet prove that the stone lines found in Hidden Valley are not aboriginal in origin. Much more work needs to be done to determine the origin, age, and purpose of these lines. As such, this report is as much a call for suggestions and related findings as it is a disclosure of findings. In any case, the utility of small scale, high altitude aerial photography for purposes of archaeological exploration has been demonstrated.

A speculative explanation of the origin of these stone lines seems in order. Today, the floor of Hidden Valley supports a lush growth of wild flowers each spring. The valley contains fertile soil weathered from the basalts which comprise the regolith of the area. Shortly after the drying of the Pleistocene lake which once filled the valley, soils were

undoubtedly less saline and even more fertile. At this earlier time, the valley floor, a natural water catchment, must have provided a lush growth of grasses, many with edible seeds, a resource which aboriginal populations would have undoubtedly exploited. Such grasses with edible seeds, notably Indian rice grass (*Oryzopsis hymenoides* Ricker), occur in the valley today.

Subsequent partial fillings of the lake followed by evaporation would have increased soil salinity on the valley floor until these grasses could no longer survive there. It is at this point that the rock alignments may have

been constructed. Their function, if this theory is correct, would have been to retard sheetwash and other runoff so as to encourage the growth of grasses on the less saline alluvial fans above the valley floor. It may be that Hidden Valley was only seasonally occupied during the time of seed harvest. In that case, the stone lines would represent many successive years work.

Hopefully, the origins of these lines will be more certainly established through further field work in Hidden Valley.

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