

A Case Study: Death Valley National Monument California-Nevada¹

Dan Hamson and Toni Ristau ^{2/}

Abstract: With passage of the Mining in the Parks Act (P.L. 94-429) in 1976, the National Park Service, Department of the Interior, was given the responsibility of preparing a report to Congress outlining the environmental consequences of mining on claims within Death Valley National Monument. In addition, the Secretary of the Interior is required to formulate a recommendation to Congress on the acquisition or continued mining of claims within the monument, and on any boundary adjustment that could be undertaken to exclude mining claims and thereby reduce acquisition costs. As scenic qualities are specifically identified in the proclamation creating the monument as one of the monument's prime resources, an analysis of the visibility of mining activities by monument visitors was undertaken. The results of this analysis were incorporated in the discussion of environmental consequences and were used in the formulation of the Secretary's recommendation to Congress.

INTRODUCTION

Death Valley National Monument was established in February 1933 by Presidential proclamation under the authority of the Antiquities Act of 1906 (fig. 1). When President Hoover made the proclamation, special note was taken of the "unusual features of scenic, scientific, and educational interest therein contained . . .," and, as a result of the proclamation, lands within the monument were closed to mineral entry. However, four

months after establishment of the monument, an action by Congress reopened Death Valley to mineral location.

Two primary types of claims for minerals can be located under the Mining Law of 1872: placer and lode. Placer claims which may be as large as 160 acres are filed where alluvial deposits contain ore which has been carried away from its original source, usually by the action of water. Lode claims which may be approximately 21 acres are filed upon rock-in-place which contains a vein or lode, along with the adjoining surface.

In addition, the miner may claim up to 5 acres of nonmineralized land for use as a millsite. A valid or patented millsite entitles the owner to use of the surface, including such resources as water and timber, to support his mining or milling operations

^{1/}Presented at the National Conference on Applied Techniques for Analysis and Management of the Visual Resource, Incline Village, Nevada, April 23-25, 1979.

^{2/}Environmental Specialist, and Environmental Engineer (project manager), Denver Service Center, National Park Service, Denver, Colorado.



Figure 1-- VICINITY MAP

CALIFORNIA NEVADA
DEATH VALLEY NATIONAL MONUMENT PUBLIC LAW 94 429 MINING STUDY

Death Valley has had a romanticized history of prospecting and mining. The image of the grizzled prospector moving tracklessly across the desert with his faithful burro, and the 20-mule-team borax wagon trains making the 250-mile trek to Mojave, California, are an established part of western lore. Early prospecting and mining operations were small-scale efforts; the mines themselves were underground. Despite continuing efforts to find untold mineral riches, the operations in Death Valley netted only about \$2 million in the 60 years following the first flurries of prospecting activities in the 1880s. Small amounts of precious metals were discovered and mined out, but the most profitable commodities in the region proved to be talc and borates.

Talc is a relatively common mineral, and it is mined in several parts of the country (Wendel 1978). There was a brief rise in talc mining activity during World War II, but the operations since that time have been sporadic and small-scale, and remain so today. Sizeable amounts of borates within this country, however, are only found in southern California and Nevada (Wendel 1978). A few years after borates were found in Death Valley, much larger discoveries of sodium borates were made in the Searles Lake and Boron, California area, about 100 miles southwest of the monument (Cranston 1976). As a result, interest was shifted to those areas and mining for borax in the monument was essentially shut down.

In the early 1970s, increased demand for colemanite and ulexite (the sodium-calcium borate ores found in Death Valley National Monument) prompted Tenneco Oil Company to enter Death Valley National Monument and stake claims for borates directly below Zabriskie Point. Internationally famous, Zabriskie Point is one of the prime scenic viewpoints within the monument; it was the view from Zabriskie Point that, over one hundred years ago, prompted pioneer William Manly to write that he had "just seen all of God's creation." After locating their claims, Tenneco announced plans to begin a strip-mining operation for borates. To the horror of both the National Park Service (NPS) and the

general public, it was discovered that the company was within its rights under the Mining Law of 1872, and that the NPS could do little to prevent such an operation (fig 2). When Congress authorized mineral entry in the monument it allowed not only the prospector with burro, pick and shovel, but large-scale strip mining operations as well. The resultant public outcry prompted Congress to take steps to prevent the desecration of Death Valley National Monument's natural, cultural and scenic resources.

On September 28, 1976, Congress passed the Mining in the Parks Act (Public Law 94-429). This law provided, among other things, that National Park System lands be closed to future mineral entry, that existing mineral claims be examined for validity, that the environmental consequences of mineral extraction upon these valid claims be examined, and that upon completion of these examinations the Secretary of the Interior make a recommendation to Congress on whether to: (1) allow mining to continue; (2) acquire valid claims, or; (3) exclude significant mineral deposits by boundary adjustment in order to reduce the cost of acquisition. In order to protect against additional damage to surface resources during the time allotted for the studies, a moratorium on further surface disturbance for the purposes of mineral extraction was imposed; this moratorium applied to Death Valley. The Secretary of the Interior was given until September 28, 1978 to perform the required studies and formulate his recommendation to Congress.

The NPS was given the responsibility for conducting the studies mandated by P.L. 94-429. As there was little time available in which to perform fieldwork and complete the studies, the two facets of the project--validity determination and assessment of environmental consequences--proceeded simultaneously. Originally, 860 unpatented mineral claims were recorded with the superintendent in compliance with P.L. 94-429. After completion of fieldwork, 22 of these claims were determined to be valid by the examining mining engineers, with the remaining claims

being contested. Within Death Valley here are 118 patented claims in addition to the 22 valid unpatented claims. The valid and patented claims can be combined in various ways to offer a large number of alternatives which would allow mining on some claims, provide for acquisition of some claims, or exclude certain claims through boundary adjustment. It was decided, in order to facilitate the choice of reasonable alternatives, the first step would be to study the environmental consequences of mineral extraction on all of the valid and patented claims.

SCOPE OF REPORT

Because scenic quality is recognized to be one of the monument's special resource values, the impact on the landscape of the Death Valley was of major concern to the NPS. Most visitors to the monument come to view the spectacle of multicolored rock, magnificent desert vistas, stark salt pans and majestic mountain ranges. Therefore, in assessing the visual impact of mining, there was no need to conduct a landscape evaluation to define areas of the monument which were of high scenic quality, so it was



Figure 2--1975 photo showing Tenneco's Mining, Inc.'s open pit Boraxo mine located in the upper Furnace Creek Wash area of Death Valley National Monument

As a result, to define the claims with the highest visibility from sensitive visitor interest areas better, some groups were later split and run again.

Again, because of time constraints, some important factors for visibility were not included in the study (e.g., contrast, horizon silhouetting of above-ground structures, and dust/smoke plumes). Contrast, for example, was viewed by most members of the study team as extremely important. For instance, talc is starkly white and offers a high degree of contrast with the natural colors of the surrounding rock and vegetation, making talc operations slightly more visible from greater distances. However, recent reclamation programs on existing operations within the monument which mask the tailings by covering them with darker overburden materials have proven quite successful in reducing the visibility of these operations. With reclamation in consideration then, the study team chose not to evaluate contrast as a specific factor in the program. It must be emphasized that the visibility analysis was run to show which of the mining claims would be visible from visitor-interest areas. The analysis did not purport to include any information on the relative intrusiveness of differing types of mining methods or on the commodity mined, etc.

The data obtained from the computer model were plotted on monument-wide base maps, which delineate the areas within the monument from which one or more of a particular set of claims is visible. With the help of the monument staff, the most popular visitor points were identified and plotted on the base map (fig 3).

After field checking, the study team decided that the recognition factor (discussed earlier in this paper) would drop off dramatically from 20 to 25 miles from the mine area so that even if the area were visible from a great distance, the casual observer would not be able to identify a mining operation as an unnatural feature. To assist the evaluation, a circle with a 25-mile radius was drawn around each claim group analyzed and the acreage affected within that

circle determined. This was then the zone of highest sensitivity, where aesthetic impact would be greater. However, in the final report, data were presented for both zones; acreages were calculated, both within the 25-mile radius and for the entire monument as well. Finally, the number of visitor interest points and miles of monument roadway that fell within the viewshed were identified. With this information, the team was able to estimate the number of visitors who might annually view the current or potential mining operations during their visit to the monument.

CONCLUSIONS

The "visibility" analysis carried out as one part of the overall study on the environmental consequences of mining within Death Valley National Monument was extremely valuable^{3/}. Selection of a computer-assisted program was necessary to conduct the analysis. Without the IMGRID-VIS program, the study team would not have been able to conduct such an analysis manually within project time constraints and visibility would have been less completely addressed as a factor in the environmental assessment. The automated program also provided a more objective analysis by helping to remove bias so often present in any manual analysis. Most importantly, the study team was able to quantify the impacts on the scenic and/or aesthetic resources of the monument and relate these impacts directly to numbers of visitors potentially affected. For instance, in figure 3, the mining proposed for the three claim groups would disturb a

^{3/}The study mandated by P.L. 94-429 for Death Valley National Monument was submitted to Congress in two parts--Phase I discussed the environmental consequences of mineral extraction and included the "visibility" analysis as one factor to consider, and Phase II presented alternatives for allowing mining, boundary adjustment, and acquisition of mining claims. At this writing, Congress has not made its decision on a course of action regarding mining in Death Valley and in other National Park System units.

not necessary or desirable to address subjective aesthetic values. The task was simply to determine which existing or potential mining operations would likely be visible from heavily used visitor interest areas in the monument and to identify those claims where mining operations would alter the scenic quality of the monument. In carrying out this task, the parameters of "visibility" were defined to be the range in which a mine area could be recognized as such, and not just something "spotted" on the landscape. We felt this was important for an area such as Death Valley where most views arc of semi-barren, multicolored rock.

METHODS AND RESULTS

In order to objectively analyze the more than 2.1 million acres contained within Death Valley National Monument a computer-assisted program was imperative. In consultation with our in-house Automatic Data Processing unit, the study team decided to use a routine developed by Colorado State University which utilizes the IMGRID cellular data system developed by the Department of Landscape Architecture at Harvard University. The IMGRID system is essentially a computer program designed to manipulate natural resource data which have been organized in a grid cell structure. Visual information System (VIS), the CSU program, is a routine of IMGRID which analyzes the terrain visible from a single point or from multiple observer points. A search of 360 degrees is made from the observer point to delineate the viewshed for a given horizontal distance.

The IMGRID-VIS program was chosen so that the terrain information already digitized by the Defense Mapping Service (DMS) and now distributed by the National Cartographic Information Center (NCIC) could be utilized. These tapes contain digitized topographic data from 1/250,000 scale U.S.G.S. topographic maps interpolated to produce a data print for approximately every 208 feet on the ground. This data interpolation is accurate within ± 100 feet vertically and ± 400 feet horizontally. Using an existing routine, the DMS data were then integrated into the IMGRID

format. Without the information available on the NCIC tapes, it would not have been possible to have the terrain information digitized and carry out the analysis within the time and budget constraints established for the project.

A study area boundary was selected to encompass the entire monument. The area contained 54,540 information cells each approximately 83 acres in size, covering an area of approximately 7,100 square miles. An elevation point was selected for each cell from information read from the NCIC tapes. To ensure that the analysis would be on the conservative side, the lowest point inside each cell was used, rather than the average or the highest. Mining claims were grouped according to specific geographic and mineral resource characteristics. This facilitated the analysis by eliminating the need to make a run from each individual mining claim (each lode claim is approximately 20 acres while each placer claim is a maximum of 160 acres). Selection of claims for grouping therefore was important since single data points were required both to represent claim groups and to fit the level of refinement mandated by the 83-acre cell size of the program.

Mining claim locations were incorporated into the program according to information furnished by the Mining Office in Death Valley. To reduce computer costs, all searches or visual scans originated from the group of mining claims and scanned an arc with a horizontal map distance of 79 miles and a vertical map distance of 82-1/2 miles. A factor of 5 feet was added to each cell searched to obtain an average height for a person standing in one location and looking into the mining area; the origin point, or mine claim, was left at ground elevation.

The tabular form was chosen for the study's final product. Thus, the value printed in any particular cell indicated the number of mining claim groups in each run which could be seen along a direct sightline from that location in the monument. If none of the claim groups was visible from a location, the cell was left blank. The program did not identify which claims within a group were visible.

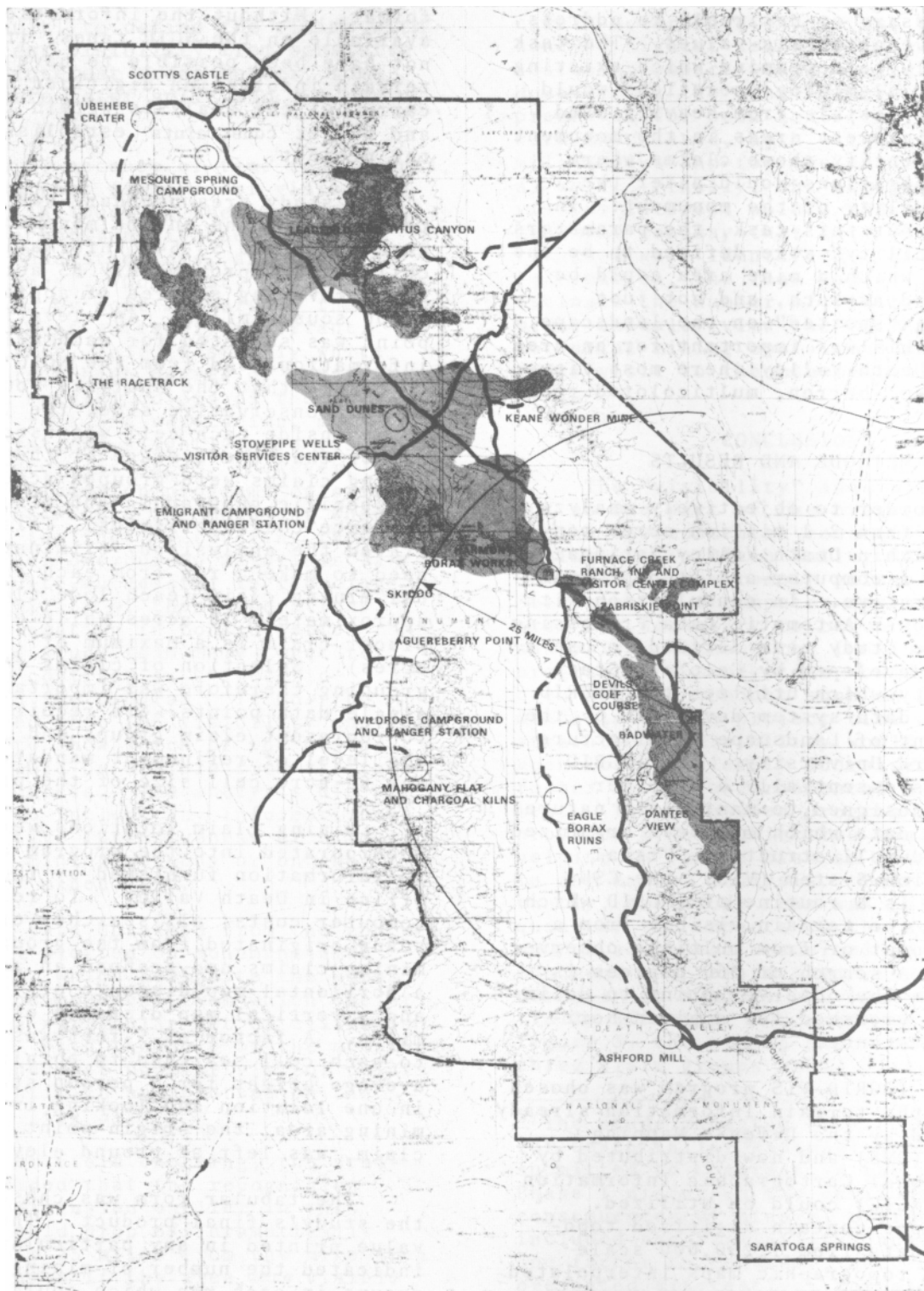


Figure 3 -- VISIBILITY ANALYSIS

FURNACE CREEK WASH AREA CLAIM GROUPS
DEATH VALLEY NATIONAL MONUMENT, PUBLIC LAW 94-429 MINING STUDY

- PRIMARY VISITOR INTEREST POINT
- MAJOR CIRCULATION NETWORK
- * LOCATION OF CLAIM GROUPS
- AREA WITHIN THE MONUMENT FROM WHICH ONE OR MORE OF THE CLAIM GROUPS ARE VISIBLE
- CLAIM GROUPS INCLUDED:
 - 5 - RUSTY
 - 35 - LOUISE
 - 46 - WIDOW PAULINE

maximum of 1,390 acres in the Furnace Creek area of the monument. However, the analysis revealed that those disturbed lands would be potentially visible from 86,000 acres within 25-miles of the claims and from 559,000 acres within the monument as a whole, potentially affecting some 310,000 visitors annually. The procedure thus allowed comparison of the visibility of mining operations on the various claim groups within the monument. The analysis has also provided help in designing reclamation plans for mining operations on claims highly visible from visitor-interest areas. Mining plans of operations developed with the goal of reducing visual impact not only reduce damage to the scenic environment but also help to reduce the cost of reclamation scheduled during operations and when mining activity ceases.

With the value, limitations and weaknesses learned during the Death Valley analysis, the NPS is again using a modified IMGRID-VIS program for a study on the consequences of open-pit mining in a historic district of Virginia. For this analysis of 14,000 acres of gently rolling terrain, the study team is digitizing its own topographic data at a greater level of definition, interpolating to within two foot contour intervals. In addition, vegetation cover, type and height is also being analyzed to evaluate the seasonal screening effect of the vegetation. With "visibility" a key controversial element in the project, the IMGRID-VIS program will allow the study team to provide a reliable, objective analysis which can directly quantify the impact of the mining on the aesthetic values of the historic district.

LITERATURE CITED

- Cranston, Alan
1976. The Battle for Death Valley,
In: National Parks and Conservation Magazine (Vol. 50, No. 1).
- Sinton, David F.
1976. The User's Guide to IMGRID.
Department of Landscape Architecture, Harvard University,
Cambridge, Massachusetts.

U.S. Department of the Interior,
National Park Service

1978. Environmental Consequences of Mineral Extraction: Death and Organ Pipe Cactus National Monuments (Denver Service Center, August 1978).

U.S. Department of the Interior,
National Park Service

1978. Discussion of the Alternatives for Acquisition of Mining Claims and/or Boundary Modifications to Reduce Possible Acquisition Costs. Death Valley National Monument (Denver Service Center, December 1978).

U.S. Department of the Interior,
National Park Service

1978. Special Report on Borate Resources (prepared by Clarence Wendel, April 1978).

U.S. Department of the Interior,
National Park Service.

1978. Special Report on Talc Resources (prepared by Clarence Wendel, August 1978).