Long-Term Protection for Carlsbad Cavern

Dale L. Pate

NPS Cave & Karst Program Coordinator

National Park Service

Development began initially as an effort to harvest bat guano from the Bat Cave portion of Carlsbad Cave in the early 1900's. Few remnants of this initial development are evident today. One of the guano miners, Jim White, took the opportunity to explore much of the cave during the next number of years. Jim White's discoveries became legendary and generated much publicity. By 1923, Carlsbad Cave National Monument was created by proclamation by President Calvin Coolidge. Over the following 70 years, development on top of the cave grew sporadically to give the visiting public easy access to the cave and to make it easier for the NPS to manage the cave as well. This development (Figure 1) included a maintenance facility, visitor center, parking lots, buried gasoline tanks, employee housing, and a host of other infrastructure needed to facilitate visitor access. The last major building effort was part of Mission 66 construction projects that added, among other items, 12 3 -bedroom apartments, a new larger visitor center, a large seating area at the cave entrance for watching the bat flight, and an addition to the elevator shaft that added two larger elevator cars to accommodate larger groups of visitors. This infrastructure was placed directly on top of the cave without knowledge of the potential impacts that could result in damage to the cave itself.

Beginning in 1992, money was sought to begin an infiltration study that would help the NPS better understand the connections between the surface and the cave. Funded by the NPS Water Resources Division in 1994, Colorado School of Mines was awarded a contract to complete this study. This project produced a master's thesis by Mark Brooks in 1996 and a final report in 1997. The report documented high concentrations of aluminum, zinc, total organic carbon, and nitrates that were found in drips and pools in a number of locations throughout Carlsbad Cavern. Much of this high concentration was also found to be related to chronic, relatively low-level releases from specific surface locations. Additionally, the report discussed the likely potential for a variety of accidents, spills, and leakage scenarios that threatened water quality and public health from sewer line leaks and spills, gasoline spills and vehicle fires that would lead to contaminated runoff from parking lots and road segments; and spills, leaking tanks, fires, and other accidental releases from the maintenance yard and other structures.

By 1996, Carlsbad Caverns National Park released its new General Management Plan that among other items, directed the park to complete a Development Concept Plan (DCP) based on the Infiltration Study results. The thesis completed in 1996 determined infiltration pathways from surface runoff into several locations within Carlsbad Cavern.

By 2002, the DCP titled *Carlsbad Cavern Resource Protection Plan and Environmental Assessment (EA)* had been completed with a signed FONSI (Findings of No Significant Impacts) by the Superintendent and Regional Director. This plan and EA considered alternatives that would:

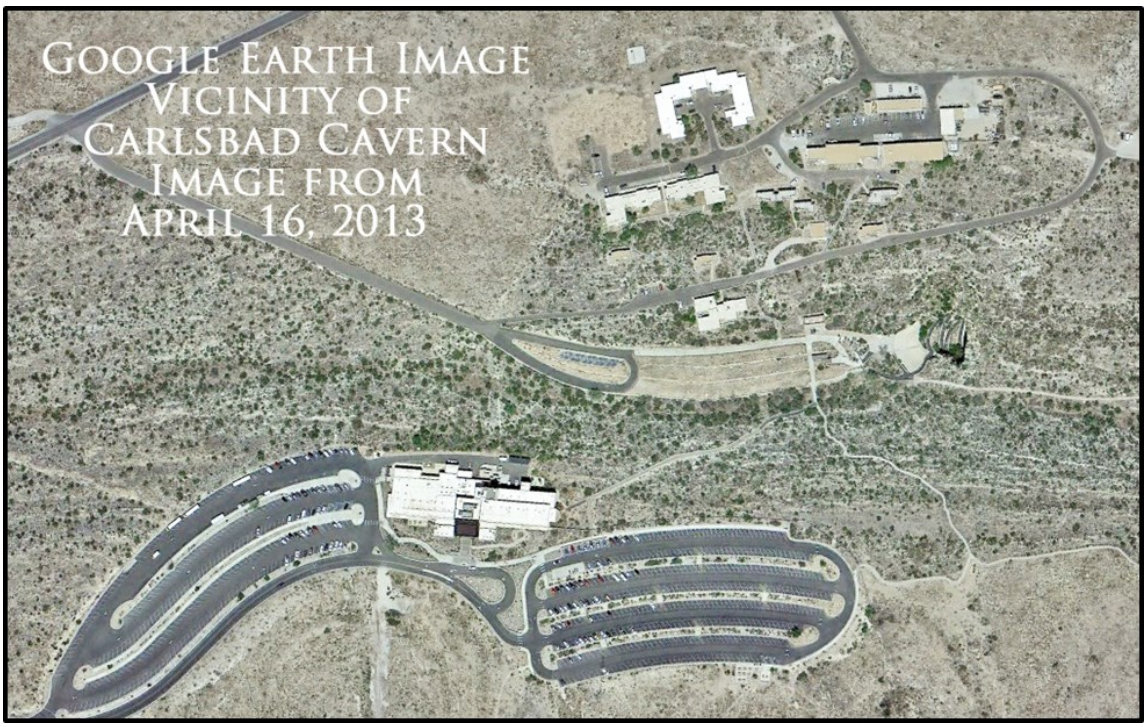

Figure 1 Structures in the vicinity of Carlsbad Cavern

- Eliminate pollution sources above the cave such as fuel storage, paved areas, maintenance operations, and park residences;
- Restore natural infiltration above the cave;
- Reduce catastrophic threats from spills, vehicle fires, and structural fires;
- And, implement mitigation measures to protect natural resources and the public where threats remained.

Out of three alternatives provided, the Park Preferred Action and Environmentally Preferred Alternative selected to remove the most threatening sources of contamination and mitigate potential contamination from remaining facilities. The major infrastructure changes were as follows:

- **Buried Outfall Sewer Line Replacement -** The buried outfall sewer line that ran from the Visitor Center to the east for over 1-mile before turning south and running off of the escarpment on the surface to the Evaporation Ponds located off the escarpment was identified as a critical problem. This gravity-fed line dated from the 1930s to the 1950s. Portions of the lines were still clay pipe with newer steel pipe being used from work done in the 1950s. Much of the system was designed to overflow and had routinely overflowed and spilled for a number of years. This line was long overdue for replacement. In 2004, this sewer line was replaced with an above ground line that ran directly off of the escarpment. Once off of the top of the cave areas, the line was buried and emptied into re-lined evaporation ponds.

- **Gas Pumps and Buried Tanks Removed** - Identified as a potential problem, the park removed gas pumps along with their buried tanks from the maintenance yard in 2008.

- **Bat Flight Parking Area Changes** – Identified as a serious, long-term problem, this

parking lot dates from the 1920s and sits directly over the Main Corridor in Carlsbad Cavern. This lot accumulated oil, fuel, antifreeze, and other heavy metal contaminants from the thousands of cars that annually parked in this lot. Additionally, the lot collected runoff from some housing and administrative buildings. The design of the lot funneled contaminate-laden water directly into Bat Cave Draw and quickly into the cave. Other concerns included bus and auto fumes and noise that were drawn down into the cave entrance and was identified as significantly detracting from the natural setting of the entrance. In 2010, most of this parking lot was rehabbed leaving historic walls in place, planting native plants in much of the recovered area, and building a new turn-around for dropping people off to walk to the cave entrance and containing a few handicapped parking places.

- **Parking Lot Filters – Oil and Grit Separators** – In an effort to remove contaminants from parking lot runoff, oil and grit separators were placed in various locations on remaining parking lots around the Visitor Center. The grade of the two upper, large visitor parking lots was changed to funnel water to the south off of the escarpment, which also received oil and grit separators. These separators were installed in 2010.

- **Removal of Mission 66 Housing** – Mission 66 housing was also considered a long-term chronic contamination point. These were 12 3-bedroom apartments built in two large structures in the early 1960s. These apartments housed a number of permanent employee families with a number of vehicles parked throughout the year. Contaminant sources included clogged sewer lines and day-to-day uses and activities that released various types of materials onto the ground above the cave. These structures at the time were not considered historic and did not represent the 1926-1942 Period of Significance for structures built directly on top of the cave. In 2010, one of the large structures holding 6 3-bedroom apartments was removed returning the area to natural conditions.

Summary

It took 18 years to formulate ideas and develop projects to better understand the surface to cave connections at Carlsbad Cavern that led to implementation of the final products mentioned above. The process to affect the completion of these projects is testament to the scientific integrity of the studies and the ability to use existing laws to develop public planning documents that are designed to protect the incredible natural resources such as Carlsbad Cavern. The end result is that we have better understanding of processes that affect Carlsbad Cavern and have removed or mitigated structures and processes to provide long-term protection for the cave. There is still much work to do but we've started the process. More things to consider for the future include: establish a new maintenance facility off of the limestone escarpment at or near White's City; install oil and grit separators and other filtering devices on remaining parking lots and roads in the current maintenance, office, and housing areas; build new resource offices and housing area for seasonal and volunteer workers along with the new maintenance facility or locate in the town of Carlsbad; remove the east pod of the Mission 66 apartments and the last few remaining non-historic buildings; remove propane from use in housing, offices, and other structures if at all possible; and find a better solution for the location of the park generator and buried diesel tank that is currently located on the north side of the visitor center immediately adjacent to Bat Cave Draw.