***Q. Is it true that the primary and secondary elevator systems are both broken because the National Park Service (NPS) is not doing proper maintenance on them?***

A.The current situation with the elevators is not the result of improper planning or poor maintenance. The NPS has been moving forward systematically with much-needed component renewal work on both elevator systems, for over 10 years. The work has always been planned and executed in a manner where only one elevator system is down for maintenance at any given time, leaving the other system available for visitor transportation.

The smaller, or secondary elevators, were installed 85 years ago. The larger, primary elevators were installed 60 years ago. Over the decades, the motors, cars, sheaves, buffers, ropes, and controllers have all been replaced many times. These types of component renewals occur on a 20-year cycle. By 2010, the steel I-beam hoistways were the only original items remaining in the 754-foot shafts.

As early as the 1990s, the NPS was aware that corrosion of steel beams was becoming a serious problem in both hoist ways. Repairs were completed on the steel in the secondary hoistway in 2003. Two years later, many of the freshly-coated beams began shedding their paint. In large part, the coating failures occurred because the wet/humid environment in the hoistway along with difficulties with ventilation and handling of toxic materials affected paint curing and adhesion and contributed to the coating failure.

In 2007/08, the primary elevators were taken off-line for a motor overhaul. The two motors were removed from the elevator tower and were completely disassembled, inspected, and rebuilt at a cost of $400,000.

In 2013, a $5.2 million elevator steel beam replacement project began. Based on the coating failures in the secondary elevator hoistway, we opted to replace, rather than repair, the steel beams. It took over two years to remove 153 beams and install new ones.

Upon completion of the motor overhaul and beam replacement projects, we felt that the primary elevators would continue providing reliable service for years to come. It was at this point, we began the planning process to completely replace the older, secondary elevator system.

It should also be added that there is a lot more to "preventive maintenance" than just replacing and rebuilding components. Hoist ropes, sheave grooves, buffers, roller guides, landing systems, door operators, and hoistway safety devices all need to be inspected, adjusted, repaired, and/or replaced periodically. There is also the daily troubleshooting that involves clearing door tracks, adjusting floor leveling, taking slack out of the hoist ropes, recovering from power failures and controller drop-outs. This is ongoing work that keeps the elevator systems running safely and reliably.

Significant effort and expense had been invested into these assets to ensure their reliable operation in the years ahead. There was absolutely no way that park elevator mechanics or hired specialists could have predicted or prevented the rotor shaft failure that disabled the park's primary elevators in November 2015.

***Q. Why don’t you study the elevator systems at the potash mines in the area and learn from them?***

A.The elevators at Carlsbad Caverns operate on similar mechanical principles to the drum hoists used in potash mines.  However, the actual machinery, intent of the application, and life-cycle planning are completely different.

Mine hoists are designed and used to carry personnel, equipment, and ore product, in and out of an industrial environment. Operational focus is on production and speed, with little regard for rider comfort, or impacts to the environment such as noise, vibration, and pollution.

In a mining operation, the decision process for equipment replacement, maintenance, and operations are driven by simple and straightforward principles such as "direct costs of downtime," and "cost/benefit ratios."  Therefore, maintenance and repairs in a commercial mining business model can be carried out at any time, with minimal planning effort and the instant availability of funding and equipment resources. Major maintenance and repair work can be initiated on a moment's notice. The mine hoistway and vertical transportation apparatus is readily accessible to heavy equipment, which is usually staged onsite to expedite repairs and keep production moving.

In a mining operation, there is a much different long-term plan for the asset and for the environment in which it operates.  In 20-30 years, the ore is depleted and the hoist machinery is abandoned or demolished.

By contrast, the elevators at Carlsbad Caverns are a conveyance designed to carry people, in and out of the Cavern. The machinery at Carlsbad Caverns has much more in common with a high-rise building elevator, than a mine hoist.

In addition, unlike a readily-accessible mine hoistway, the elevator machinery at Carlsbad Caverns is enclosed in a tower, making access for major work much more difficult. .

Operations and Maintenance procedures between the industrial environment of a production mine, and the fragile underground environment of a world-class cavern, are vastly different.  Mining operations do not take into account the effects of noise, vibration, and air pollution on fragile cave formations or on wildlife, such as bats, that live underground.

The above-ground access to the elevator system at Carlsbad Caverns, is inside the Visitor Center - that includes visitor services, exhibits, a restaurant, and offices.  Every elevator car that makes the trip down into the Cavern, and back up, discharges some "cavern air" into the facility. These conditions demand special consideration when carrying out industrial work (such as repairing elevators and steelwork) in the hoistway.

As a National Park unit, we are entrusted to protect the natural and cultural resources within our boundaries. We must also protect our employees and the visiting public, in this rather unique interface of industrial, business, and natural environments.  It is, and will continue to be a challenge.

***Q. Why didn't you just replace the broken rotor shaft in the motor and put the elevator back in service?***

A. There is a lot at stake here in terms of safety, collateral damage, and an issue of obsolete equipment that is due for replacement. The motor shaft sheared in two, rendering the motor not only inoperative, but we can't even manually rotate it to bring the elevator car back to the surface, or even to lower it into the pit below. The car is literally stuck in the hoistway, with all the weight of the car hanging on the ropes which are wrapped around the motor drive sheave.  An elevator consulting firm tried several methods of temporary repairs to get the car moved, without success. Getting the motor out of the machine room will require us to remove the other motor first, because it blocks access to the elevator tower door. Suffice it to say that the effort to get the car up and the motor out, will require extraordinary effort and planning. That all has to be done before we can undertake any repair or replacement work.

The cause of the motor failure is still unknown. Was there a latent defect in the forged steel rotor shaft that finally manifested itself after 40 years of service? If so, since these motors were manufactured by the same company at the same time, is the other rotor shaft in the same (pre-failure) condition? Or, is there a defect in the hoistway steel work that caused the car to hang up and overload the motor? Until we get the car out of the hoistway and carry out an inspection, we will not know. Forensic analysis will be done at some point before we can proceed with installing new equipment.

We have already decided that we will replace both motors, partly for the reasons listed above, but also because the computerized motor controllers are obsolete and no longer supported by their manufacturer. We believe that elevator motor technology has improved over the past 40 years, and that more efficient and reliable motors are probably available for our elevator application.