Executive summary report: Floyd Collins Crystal Cave Restoration, Flag #146 – Doug Soroka and Chris Nicola

The goals and objectives of the Floyd Collins Crystal Cave (FCCC) Restoration were to assess the methodology and begin the restoration of FCCC. This cave was heavily vandalized in 1995 and the National Park Service has now allowed repairs (2009) to begin to this project. FCCC is part of Mammoth Cave National Park and is a World Heritage Site.

Goal 1 – To assess the methods of repair.

We found that the processes developed by Jim Werker and Val Hildreth-Werker is in fact feasible and do join broken pieces of formation (speleothem) back together. The friable gypsum crust is repairable but requires more effort and time than a hard speleothem venue. Hard speleothems are epoxied together using Shell Epon™ 828 with Epicure™ 3234 curing agent which produces an archival, non-toxic product that connects the limestone pieces and does not kill off biological cave life in the surrounding area. This type of repair joint is held together with clamps, scaffolding, or bungee cord while the epoxy hardens. At times gravity may hold stacked pieces in place. It is this part of the procedure that requires the most creative thinking on how to hold the pieces together during the curing process. Almost anything will do—from specialized clamps to piled rocks.

The archival epoxy is also a successful adhesive for softer gypsum crust, but the broken edges tend not to be sharp and clean like the harder limestone speleothem formations. Filler material made out of gypsum powder, epoxy, and soil or rock dust from the cave (for correct color) may be needed to fill in cracks at the repair joints. Sometimes larger broken pieces are drilled and stainless steel rods (314 stainless) inserted into the bedrock wall to support the piece until the epoxy finishes curing. With this type of repair the center-rod drill hole is backed filled to finish off the top front surface. When done properly it is nearly impossible to tell where a repair has been made. During our tourist explanation visits with park officials we sometimes lost repair spots as they blended in so well with the existing wall. It takes 24 hours for the epoxy to dry.

Many of the pieces recovered from rock shops were acid cleaned or bleached and are now calcite white—thus, we cannot use color to find location. Fragment thickness and texture must be used to locate and match areas. There will also be a challenge to color these entire surfaces so they will blend into the existing landscape. When we looked at some of the recovered Collins Avenue pieces we also wondered if the pieces actually came from FCCC or whether they originated in some other cave.

Goal 2 - To assess the feasibility of larger scale work groups.

Small highly trained work groups appear to be the best work force for restoration in this cave. Each group should have the capability of finding and repairing formation pieces. It
does not seem practical to have multiple groups overlapping as they will probably get in each others way. The most time consuming part is finding pieces that fit together. It is conceivable to have small groups that are finders whose job it would be to find pieces that fit. During removal, return, and evidence collecting, broken items were not returned to original locations. What appears to be an obvious fit is usually not the case. A small wall damaged area with a few pieces below the damage does not necessarily mean that the pieces directly below fit. We have found that this is in many cases where we attempted to relocate material from below to back on the wall. One would expect that smaller sub groups would develop into the finders, gluers, and finishers. Based on the talents of each member there would be a natural sifting to each person’s appropriate level. We would guess that a maximum of five groups at any one time would be the maximum that the cave system would allow if there were no specific areas of responsibility. The Thomas Avenue area would allow greater volume of people where the Collins Avenue would require a few people working on the helictite damaged areas. There is always the possibility of volunteer burn out and frustration levels when success rates begin to decline. It is possible to go for days and not get a piece that fits, luck and skill are interchangeable parts of the success equation. In the helictite areas, success may be reconnection of a few sections that can be measured in cm or grams where the Thomas rate could be measured in meters or Kg of material replaced.

Goal 3 –
To project next long term achievement goals.

This project can be projected out to a five-year project from the Park Service and the Caving Community to commit time and resources to fulfill the goals of restoration. The biggest hurdle is the relocating of formation pieces. We can suggest that all the pieces will never be replaced due to sales at rock shops, lost or stolen segments, center wall pieces which have no matching edges and those that we cannot find a suitable location. There also must be taken into account the historical pieces that have names and dates on them from the 1920s which was not part of the 1995 vandalism. We also must hope that as word of this restoration continues to be known throughout the community, both Cave City locals and the Caving and Exploration communities, that old photographs in private collections may surface with images of the wall areas so a better understanding of actual wall formations. There are, to our knowledge, few historic images of Collins Avenue and The Banana Stalk, other than the photos that Neville made. We have found only one Neville photo of the Banana Stalk before vandalism. It is highly probable that family vacation photos exist, but have not be brought to our attention. During our looking and having the ample time to look at the cave we noticed many old flash bulbs discarded by tourists.

Presentations;

A presentation was given at the 2009 International Congress of Speleology in Kerrville Texas at the Restoration and Conservation Workshop July 2009. There also will be a presentation at the Salt Spring Island Symposium in BC Canada in September of 2009.