

## **Peppersauce Cave Conservation Project's (PCCP) Cave Graffiti Sandblaster Equipment (managed by Ray Keeler)**

### **Introduction**

At the 2003 NSS Convention, Dick Blenz saw a demonstration of Ray Keeler's sandblaster equipment designed specifically for use in removal of graffiti in caves. At that time, Dick expressed interest in the possibility of borrowing it for use in Buckner Cave, and therefore tentatively reserved it at that time. The equipment (currently in TAG) is now available for use, and serious consideration should be made to determine the feasibility and logistics of obtaining and using it. This document highlights some details that will hopefully generate discussion, which will then determine a course of action in a timely fashion, and start the ball rolling toward planning and execution if decided upon to pursue.

### **Purpose**

**The PCCP equipment is designed to allow three sandblasting teams to remove graffiti in caves, simultaneously and efficiently.**

**Equipment Details:** a trailer with a perpetual Arizona license contains all the gear, which includes:

**Compressor:** weighing 475 pounds, this largest and heaviest component is held on to the trailer by tension straps, but can be removed and relocated if needed. Dimensions: 30 inches wide x 4 feet long x 4 feet high.

**Hoses:** 1500 feet of large (3/4 inch) and 600 feet of smaller (3/8 inch) hose in 50-foot sections.

**Gas-powered generator & lights:** for running electric power for lights and other tools inside the cave. Included is 1900 feet of 12-gauge extension cord and lights. 2-20 Amp 110V socket capability. Recommended generator placement from cave entrance is +100 feet.

**Misc. equipment:** three tubs, each containing goggles, respirators (fitted with canisters rated at high level of filtration protection), gloves, and other misc. items, including one power drill (capable of being equipped with a wire brush attachment) per team. Phone line is also included.

### **Specifications:**

**Workload capacity:** if desired, 3 separate teams could work simultaneously within 100 feet of each other due to splitting of the main hose at the regulator

**Compressor pressure:** 175 PSI; installed regulators drop it down to 90PSI per team/hose.

**Blast medium:** glass beads or sand.

### **Special Considerations**

**Transport:** the trailer with equipment is currently in TAG. Jim Wilbanks has offered to assist in transporting it toward Bloomington. (Perhaps someone could meet him partway?) We would be responsible for covering transportation costs, although partial funding assistance is possible (see below).

**Storage:** The equipment needs to be secure and protected from the elements at all times. There are several options or combinations of options that could acceptably meet this requirement. Some of the equipment could be left set up inside the cave for certain periods of time, but security would be a must (a gated cave is one option). Anything that could rust or that critters could damage should be adequately stored or otherwise protected if left inside the cave, and removed if not possible.

(Note: although the equipment is not currently insured, perhaps it could be? Ray notes that although that has not been done in the past, it is a possible option.)

**Expenditures:** certain things will need to be provided by the group using the equipment, such as unleaded gasoline (for the generator), blast media, respirator inserts, black electricians tape, transportation costs, manpower, etc.

**Project Funding Possibilities:** (other than the particular group/s doing the project)

**Peppersauce Cave Conservation Project:** a grant could be applied for to this group in order to assist with equipment transportation costs.

**Federal Clean Waters Act #319-H:** if a stream is present in the cave, and it is determined that lead-based spray paint or other contaminants are present in the stream, a grant could be applied for. However, time constraints are a factor, since the grant process could be a lengthy one.

*Notes from Ray:*

The Federal Clean Waters Act is to clean up America's streams and aquifers. PCCP created a proposal for grant money, cavers supplied the matching labor and times. The proposal was for \$71,000. We spent less than \$40,000. We should have spent more. We found E. coli in the pools in the cave.

Ray mentioned that in various cases, water samples have been collected from streams within various caves, and blind lab tests were subsequently requested, with testers asked to look specifically for coliforms and e-coli. A certain monetary amount (~\$100) was paid for each test. Samples which tested positive proved to mitigate funding requests.

*Notes from Ray:*

Water samples would only need to be taken if Federal Clean Waters monies were applied for as part of a larger grant proposal.

**Save the Caves Fund:** an NSS fund set up to provide funding to conservation projects

*Notes from Ray:*

Go to <http://www.caves.org/nss-business/bog/sec-18.html>

We can submit a grant request to Jim and Val Werker, the Conservation Chairs. Act 18:367 reads:

**Save-the-Caves Fund**

18-367 Save-the-Caves Fund

3-23-02, 4-7-01, 3-27-99, 6-23-97, 11-21-81, 11-17-7

The Save-the-Caves Fund shall be used to support the general conservation goals of the Society. This fund was established by donors. Money may be expended by Board action on the recommendation of the Conservation Committee and AVP or as authorized by Acts [18-289](#) (Loans to Conservation Task Forces), [19-321](#) (Conservation Grants), and [43-116](#) (Conservation Award).

### **Other Details and Notes**

Equipment loan duration: one year

Set-up time and logistics: high, depending on each situation. Suggested procedure would be to start graffiti removal at entrance and proceed inward.

Volunteer burnout rate: high. However some get really involved and stick with it.

Manpower requirements: high (depending on many factors, of course)

Satisfaction rate: high

Blast media: needs to be dry, and can be reused if dried out in bright, hot sunlight first.

*Notes from Ray:*

The glass beads run about \$40 per 5 gallon bucket so drying it would be cost effective. We collected it on the tarps, put it back in the empty buckets, hauled it back out of the cave and dried it later in the sun. After drying it was filtered and reused. I don't know if this is worth it if sand is used.

Blast media containment: depends on media, biology concerns, and other factors.

Air quality: depends on particular cave.

Paint comes off in layers, and the process also works on speleothems and mineral deposits, although that could influence the choice of blast media used. Sandblasting gun should be held within one inch of surface.

Training: Ray Keeler would hold one initial, on-site session for the core project personnel organizing the removal, preferably after the equipment is on site.

Relocation of compressor: Ray notes that perhaps an ATV and/or a vertical hauling and belay system could be used to relocate the compressor close to the entrance of the cave, thereby maximizing hose lengths.

*(Ray, the Timpanogos Grotto website mentioned 'several thousand feet of hose'. Did those cavers obtain and use additional hose? Or was that just an overstatement?)*

*Notes from Ray:*

It is just the 1500 feet of large hose and 600 feet of smaller hose. They did not buy any more.

**The larger items on the equipment list are:**

- 1 trailer with perpetual licence
- 1 vehicle mounted compressor
- 1500 ft. 3/4 inch high pressure hose & couplings
- 600 ft. 3/8 inch high pressure hose & couplings
- 3 cave phones with 1/2 mile of wire
- A 3-way regulator assembly allowing three working sandblast teams
- 2 rechargeable family radios
- 25 respirators
- 25 goggles
- 15 face shields
- 1 generator with 2-20 amp, 110 VAC outlets
- 1800 ft. of 100 ft. extension chords on reels.
- 250 ft. of 50 ft. extension chords
- 4 gas cans
- 2 GFI Interrupts
- 3 Shop Vacs
- Some other stuff
- 3 sandblast teams' equipment. Each team's equipment includes: sand blasting guns, hoppers, tarps, brushes, elec. lights, drills with brushes, 2 dust pans, 2 ext. chords each, carrying tubs

**Lessons Learned**

- Weekends work better than single days. Setup and clean up cut in half. Most people do not work both days.
- 20 is enough to keep three teams working with relief.
- Get buy-in from local groups. Not just cavers
- Always be looking for fresh help.
- No one drills (brushes) or sandblasts without eye protection
- Safety is always a concern
- Get the phones in early

- Two person relief teams for lunch breaks. Keep the sandblasters going.
- Fresh covers to help pulling equipment at the end of the day are wonderful
- Sandblasting only on formations. No wire brushes. Flowstone and rimstone show little damage and the blast media gets the graffiti in the depressions.
- Clean respirators after every use using anaseptic wipes.
- Place in-cave signage high, out of reach.

**A couple of Pictures:**

Here are a couple of pictures to help:



Peppersauce Cave main passage looking towards entrance. Before and after. 2 Signs installed. About 4 hours work including more tags outside of picture.



**Cavers using the equipment:**

(Upper right: caver is vacuuming up glass beads and broken glass.)

