



University of South Florida

## Digital Commons @ University of South Florida

---

Cave Talk

Newsletters and Periodicals

---

June 2004

### Cave Talk

Cave Association National

Follow this and additional works at: [https://digitalcommons.usf.edu/cave\\_talk](https://digitalcommons.usf.edu/cave_talk)

---

#### Recommended Citation

National, Cave Association, "Cave Talk" (2004). *Cave Talk*. 22.  
[https://digitalcommons.usf.edu/cave\\_talk/22](https://digitalcommons.usf.edu/cave_talk/22)

This Book is brought to you for free and open access by the Newsletters and Periodicals at Digital Commons @ University of South Florida. It has been accepted for inclusion in Cave Talk by an authorized administrator of Digital Commons @ University of South Florida. For more information, please contact [scholarcommons@usf.edu](mailto:scholarcommons@usf.edu).



# CaveTalk

THE OFFICIAL NEWSLETTER OF THE NATIONAL CAVES ASSOCIATION

**National Caves Association**  
**Susan Berdeaux, Coordinator**  
P.O. Box 280  
Park City, KY 42160  
[susan@cavern.com](mailto:susan@cavern.com)  
866-552-2837 (toll free) 270-749-2428 (fax)

## OFFICERS:

**President: John Sagendorf**  
Howe Caverns, NY 518-296-8900  
[johns@howecaverns.com](mailto:johns@howecaverns.com)

**Vice President: Brad Wuest**  
Natural Bridge Caverns, TX 210-651-6101  
[bwuest@naturalbridgecaverns.com](mailto:bwuest@naturalbridgecaverns.com)

**Secretary Treasurer: Susan Berdeaux**  
Diamond Caverns, KY 866-552-2837  
[susan@cavern.com](mailto:susan@cavern.com)

**Past President: Richard (Dick) Bell**  
Seneca Caverns, OH 419-483-6711  
[senecacaverns@yahoo.com](mailto:senecacaverns@yahoo.com)

## REGIONAL DIRECTORS

**Region One:**  
(CT, DE, ME, MA, NH, NJ, NY, PA, RI, VT)  
**Ann Molosky** - Lincoln Caverns, PA  
814-643-0268 [info@lincolncaverns.com](mailto:info@lincolncaverns.com)

**Region Two:** (MD, VA, WV, KY)  
**Gary Berdeaux** - Diamond Caverns, KY  
270-749-2233 [gary@diamondcaverns.com](mailto:gary@diamondcaverns.com)

**Region Three:** (IN, MI, OH)  
**Claudia Yundt** - Squire Boone Caverns, IN  
812-732-4382 [claudia@squireboone.com](mailto:claudia@squireboone.com)

**Region Four:** (AR, IL, IA, MO, MS, LA )  
**Steve Thompson** - Fantastic Caverns, MO  
417-833-2010  
[sthompson@fantasticcaverns.com](mailto:sthompson@fantasticcaverns.com)

**Region Five:** (MT, WY, NE, MN, WI)  
**Joe Klimczak** - Cave of the Mounds, WI  
608-437-3038 [joe@caveofthemounds.com](mailto:joe@caveofthemounds.com)

**Region Six :** (WA, ID, OR, NV, CA, HI, AK)  
VACANT

**Region Seven:** (UT, CO, AZ, NM, SD, ND)  
**Steve Beckley** - Glenwood Caverns, CO  
800-530-1635 [mantapet@aol.com](mailto:mantapet@aol.com)

**Region Eight:** (TX, OK, KS)  
**Michelle Devaney** - Long Horn Caverns, TX  
830-598-CAVE  
[michelle@longhorncaverns.com](mailto:michelle@longhorncaverns.com)

**Region Nine:** (AL, FL, GA, NC, SC, TN, PR)  
**Jack Steiner Jr.** - Ruby Falls, TN  
423-825-1958 [jackjr@rubyfalls.com](mailto:jackjr@rubyfalls.com)

**International:**  
**Jeanne Gurnee** - TN  
615-264-0019 [jgurnee@aol.com](mailto:jgurnee@aol.com)

**June 2004**  
*(Alpha Radiation Edition)*

## NCA TAKES RESPONSIBILITY

I hope you enjoy this *Special Edition* of Cave Talk devoted entirely to the very important topic of reducing the effect of alpha radiation on guests and staff at NCA member show caves.

In October 2002, in a bold, responsible and unanimous move, NCA members approved a three-year cave radiation study and monitoring program to be administered by Ozark Underground Laboratory (OUL). The intended outcomes of this effort was to develop industry standards, acceptable to the federal Occupational Safety and Health Administration (OSHA), which would allow the show cave industry to be self-regulating on the issue of alpha radiation.

Tom Aley, president of OUL, has done an outstanding job of both monitoring caves while working with OSHA toward satisfactory outcomes. In this issue, Tom Aley summarizes, in substantial detail, the progress to date.

Consistent with the unanimous approval by the membership in 2002, it is important that we continue to give our full attention, support and enthusiasm to this project. The short and long term benefits for all current and future NCA members is immeasurable!

Again, I hope you enjoy this *Special Edition* and appreciate the superb work and accomplishments of Tom Aley and his Ozark Underground Laboratory.

John Sagendorf

President, National Caves Association

# AN UPDATE ON THE CAVE RADIATION ISSUE

Tom Aley, Ozark Underground Laboratory, Protem, MO 65733.

## Background

Alpha radiation is a natural product resulting from the atomic decay of radon and thoron in rocks and other earth materials. Since caves are surrounded by rocks and earth materials they, like basements in homes, routinely have higher alpha radiation concentrations than are encountered in above-ground environments.

Some, but not all, medical studies indicate that exposure to alpha radiation may increase the risk of a person ultimately developing lung cancer. As a result of concern about the potential health impacts of alpha radiation various agencies have developed various standards and guidelines for various industries and situations. In 1978 the NCA adopted an industry standard entitled "Precautionary Cave Radiation Health Standards for Natural Caves Developed for Visitation by the General Public". These standards have served as the industry standard for show-caves. In the absence of any regulatory agency standards for show-caves, OSHA (Occupational Safety and Health Administration) enforces industry standards if they are credible and if they are being used and complied with in the industry.

While 9/11/01 is a date all Americans remember, it has a double meaning for one NCA-member show-cave. That was the date when an OSHA inspector arrived at their cave to investigate employee complaints that natural radon in the cave was endangering their health. While the outcome of the issue was positive, the following months of measurements, meetings, and paperwork pointed out short-comings in the NCA standards and in the operations at the cave. It was a close call for this particular cave and for the viability of the NCA standards. Among other things, it was clear that the NCA standards needed to be based on more cave-specific monitoring if the standards were to be acceptable to OSHA as credible industry standards.

At the 2002 NCA Convention the cave radiation issue was the focus of several hours of presentations and discussions. I proposed a study and monitoring program which I believed would protect member show-caves from encountering similar OSHA "experiences" in the future while ensuring the protection of caves and cave businesses. Those attending the convention voted unanimously to fund the proposed three year study.

## Progress to Date

### NCA Conventions

Cathy and I attended last year's convention in Redding, California and gave a progress report on the project. Over the course of a couple of days we answered questions from many of the people in attendance. We will be at this year's convention at Put-in Bay, Ohio and have a slot on the tentative program on the morning of Wednesday, October 13. We expect to be present at the meeting on the 12th and 14th as well, and look forward to discussing the issues and answering questions. This is a bold-faced pitch for people to attend the NCA Convention!

### Radiation Monitoring at NCA-Member Caves

We have conducted alpha radiation at least once at 28 caves. Here are three interesting findings:

- ◆ Mean alpha radiation concentrations in individual caves have varied by a factor of over 600. Some caves have less alpha radiation than we have measured on the surface in places like Missouri and Kentucky. Other caves have concentrations that would close a uranium mine. The results are client confidential and they are provided only to the cave operator. We don't provide OSHA or anyone else with the monitoring results.

- ◆ Even in some relatively small caves alpha radiation concentrations can vary substantially from point to point in the cave.
- ◆ 46% of the monitored caves had one or more features of state or federal significance. This included 4 caves that were designated National Natural Landmarks, 5 caves that had been evaluated and recommended for National Natural Landmark designation, 6 caves that provided habitat for one or more federally listed threatened or endangered species, 1 cave that had a state-listed endangered species, and 6 caves with state significance such as being a designated state natural area. OSHA was very impressed that so many NCA-member caves possess features of recognized state and national significance; regulatory actions that would damage these caves or their features are both ethically, and in some cases legally, unacceptable.

### **Alliance Agreement**

OSHA has a program to establish “Alliance Agreements” with industries where OSHA has a responsibility to monitor and regulate employee safety and health. Under these agreements OSHA works with representatives of an industry to deal with particular industry-specific issues. I negotiated an Alliance Agreement with OSHA; the agreement is between OSHA and the Ozark Underground Laboratory, Inc., and is specifically designed to help show-cave owners and operators. The agreement was signed here at our cave last August by Charles Adkins, Regional Administrator for OSHA and by Manuel Olmedo, Area Director for the Kansas City Area Office. The Assistant Area Director for OSHA also attended. After the signing we toured the cave and focused on the fragility of cave ecosystems. Prior to the session I don’t think the OSHA folks had realized what incredible resources are found in the show-caves of the U.S.

What does NCA get from the Alliance Agreement? First, we get time. Time to gather essential cave-specific alpha radiation data at NCA-member caves. Second, the opportunity to devise, in cooperation with OSHA, show-cave industry radiation standards which will ensure the protection of cave employees, cave businesses, and caves. If we don’t have show-cave standards then OSHA will apply standards for other industries. Because of the unique conditions of caves and cave employment, the effects of application of radiation standards from other industries to show-caves would be bad for most caves and terrible for a few operations.

Why not just improve our present standards? Our previous standards, which I also worked on, were developed in consultation with the National Park Service (but without the involvement of OSHA). With the advantage of hindsight these standards placed too much attention on being similar to alpha radiation standards for mines. Our recent monitoring shows that the old standards pose significant problems for some private cave operations. Furthermore, they are a “one-size-fits-all” approach which works no better with caves than it does with shoes.

Why not develop standards of our own without OSHA involvement? The answer is simple: credibility. Standards developed under an Alliance Agreement will have more credibility than if we developed them alone or with public show-cave operators such as the National Park Service.

The most important accomplishment to date of the Alliance Agreement is the mutual recognition that a “one-size-fits-all” set of standards is poorly suited to the alpha radiation issue in show-caves. Because of the highly variable conditions encountered at show-caves it is the opinion of the partners in the Alliance that the best approach will be to develop and implement Best Management Practices (BMPs) for alpha radiation exposure in show-caves on a cave-specific basis. The BMPs will be designed to minimize alpha radiation exposures through management actions which are reasonable and attainable at each individual cave. As envisioned a written alpha radiation BMP plan would be prepared and ultimately implemented at each NCA-member cave. The Ozark Underground Laboratory (OUL) would review the plans and, if they were consistent with guidelines established as a part of the Alliance, would certify that the plans were in compliance with the general Alliance-developed BMP strategy for minimizing alpha radiation exposures at show-caves. As a condition of membership the NCA would require that all member caves develop an alpha radiation BMP plan, implement it, and comply with its provisions. The BMP plans could, of course, be modified as appropriate when conditions or knowledge changed.

Why are cave-specific alpha radiation plans a good idea? The approach should appeal to NCA-members since each cave would develop an attainable plan which fits their own unique conditions. The approach appeals to OSHA because each cave would do what is reasonable to minimize employee exposure to alpha radiation. However, this approach will work only if NCA maintains the “high road” position that they have taken on this issue and ensures that meaningful, but reasonable and attainable, plans are developed for each member cave.

Fundamental requirements for a written alpha radiation BMP plan would include the following; this list could be modified based upon experience gained in preparing and reviewing some of the first plans to be developed.

- ◆ At least one set of alpha radiation monitoring data for each cave. We are already doing this for most NCA-member caves. There would be a requirement that this monitoring be done by an experienced and qualified person using acceptable equipment which would report alpha radiation concentrations for both radon and thoron daughters in Working Levels. Acceptable monitoring would be designed to provide basic information on likely mean alpha radiation concentrations present in the cave. Acceptable monitoring would give due consideration to the microclimate conditions existing in the cave at the time of the monitoring and to likely general microclimatic condition in the cave.
- ◆ A requirement that smoking of tobacco, either by employees or visitors, be prohibited in the cave and in any building which is connected to the cave or cave air. As a general estimate smoking in an alpha radiation environment increases the risk of an ultimate lung cancer by a factor of ten.
- ◆ A requirement that at least one member of management at each show-cave be familiar with alpha radiation as encountered in caves and with the alpha radiation issue in general. As an initial approach the NCA, in cooperation with the OUL, would offer a short-course on the topic at the NCA annual conventions. Alternate adequate training would be acceptable if and when it exists.
- ◆ A requirement that employees expected to work in caves in excess of 100 hours during their careers must be informed about alpha radiation as encountered in caves. Members of management familiar with alpha radiation as encountered in caves will be responsible for ensuring that accurate information is provided. The OUL, as a part of this Alliance, has prepared brief written information which can be used to provide this information. Many cave operations have employee handbooks, and this material can be included in those handbooks. The 100 hour requirement is designed to exclude people who normally would not work in the cave except under unusual and short-term conditions.
- ◆ A requirement that special attention be given to show-caves that have buildings which are constructed over, or connected to, cave entrances. In some cases these buildings impede natural cave ventilation and increase alpha radiation concentrations inside the cave. In many cases alpha radiation in the attached building is elevated above concentrations which would be expected in a building not connected to the cave or to cave air. Any show-cave which has a building connected to a cave entrance or a building which receives cave air would be required to specifically consider actions to prevent or mitigate any impedance of natural cave ventilation which increases, or is likely to increase, alpha radiation concentrations inside the cave. Show-cave operations with facilities such as gift shops and food service areas that are inside caves, connected to cave entrances, or receive cave air will be required to identify actions which will be taken to eliminate or minimize cave-derived alpha radiation within these facilities.
- ◆ A generalized summary of work patterns for employees who work in the cave. This would include information on typical amounts of time spent in the cave per work day and information on the lengths of time that employees work for the show-cave. We expect that these data will show that almost all underground employment at privately owned show-caves is short-term and less than full time, and that almost all employees who work underground at show-caves will have career totals of less than 2000 hours of employment underground.
- ◆ Existing alpha radiation guidance presumes that the potential health risk from alpha radiation increases as a straight line from zero to infinity. As a result, limiting the number of hours that an employee works

underground during a particular year does not reduce the total potential health risk to employees if the work time limits do not result in a decrease in total work time by all employees at the particular cave. Spreading the potential health risk that a few employees would receive among more employees does not reduce the total potential health risk to employees and thus, of itself, will not be viewed as an action which represents an alpha radiation Best Management Practice. Similarly, establishing an annual maximum alpha radiation dose limit per cave employee will not be viewed as an alpha radiation Best Management Practice unless it can be shown that such a limit reduces the total alpha radiation dose received by all employees at the particular cave. For purposes of clarification, management approaches which limit per employee exposures while not reducing total exposure by all employees are not acceptable alpha radiation Best Management Practices.

- ◆ Routine alpha radiation monitoring of a particular show-cave may be useful for some purposes, but will not be viewed as a Best Management Practice unless the resulting data are used, or will be used, by management to adjust work times in particular cave areas or used in some other fashion to reduce the total alpha radiation received by all employees in that show-cave.

### **Where Do We Go From Here?**

First, we will continue to monitor alpha radiation in previously unmonitored NCA-member caves. This was our key initial task under the contract between NCA and OUL.

Second, with input from OSHA, we will develop a template which show-caves can use in preparing their cave-specific plans. It is my hope that we can develop a template good enough that it will allow most cave operations to develop their alpha radiation plan with two days or less of effort.

Third, before the NCA convention I hope to develop a couple of sample plans for show-caves. Our primary Alliance Agreement contact is Ms. Kim Castillon, Assistant Area Director of the Kansas City Area office of OSHA. Because of this, the sample plans will be for caves within this area of OSHA; this includes caves in the western half of Missouri.

I am convinced that we have a unique opportunity to protect caves and cave businesses from the threat of alpha radiation regulation that are not technically and/or economically attainable. Internally, OSHA has used our Alliance Agreement as an illustration of the benefits of this program in working with industries. The fact that a Regional Director of OSHA came to our cave to sign the agreement, and to learn about delicate cave environments, is indicative of the agency's desire to see our mutual efforts succeed. It is critical for NCA members to understand (and I hope support) what we are doing. If anyone has questions, comments, or concerns please let me know. You can reach me as follows: Ozark Underground Laboratory, 1572 Aley Lane, Protem, MO 65733. 417-785-4289 (voice) 417-785-4290 (fax). OUL@Tri-Lakes.Net.