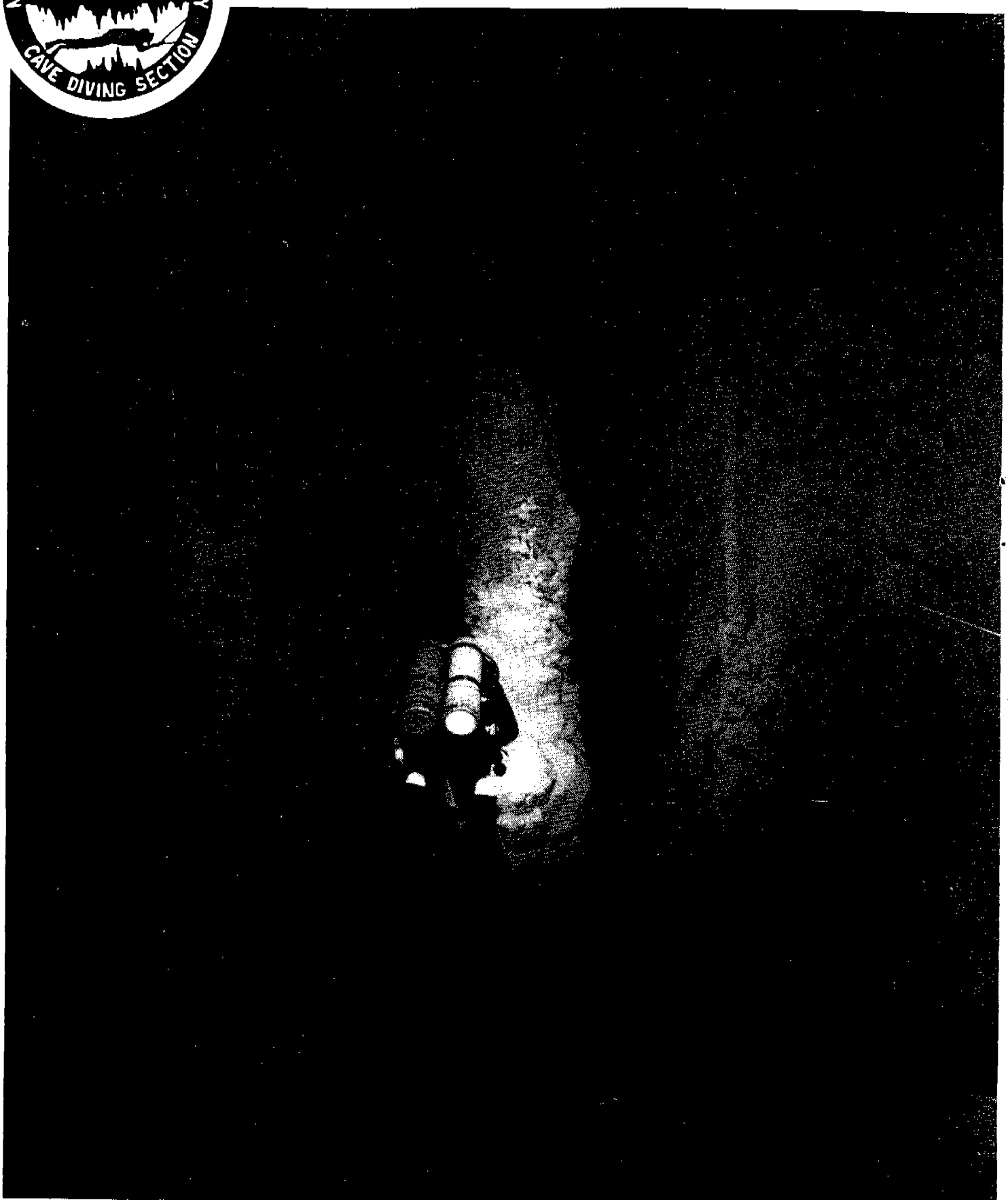
UNDERWATER SPELEOLOGY

VOLUME FIFTEEN, NUMBER ONE - February, 1988



Cave Diver views huge, magnificently decorated column in enormous chamber in Cemetary Bluehole, offshore of Freeport, Grand Bahama Island. Photo by Wesley C. Skiles.

Underwater Speleology is the official newsletter of the

CAVE DIVING SECTION OF THE NATIONAL SPELEOLOGICAL SOCIETY, INC.
P.O. Box 950, Branford, Florida 32008-0950

IMPORTANT! - CHANGES OF ADDRESS

Members and subscribers are urged to report any change of address or address corrections in writing immediately to the Section in order to insure continuity of newsletter receipt. Membership/subscription status, applications, and general information may be obtained by writing to the Secretary-Treasurer c/o the Section's permanent address:

Secretary/Treasurer
NSS Cave Diving Section
P.O. Box 950
Branford, FL 32008-0950

NEWSLETTER SUBMISSIONS

We welcome all current news items, reports, articles, photographs, negatives, slides, cartoons, notices for gear wanted/for sale (individuals only), or other submissions of relevance or potential interest for publication in this newsletter. We can now accept textual information on computer diskette if it is in an IBM-XT-compatible standard ASCII text format or WordStar version 3.3 or lower, using 5-1/4" 360K floppies; however, all computer diskettes must be accompanied by a complete paper printout. All newsletter submissions should be sent in directly to the Editor:

H.V. Grey, Editor, UWS
P.O. Box 575
Venice, FL 34284-0575

CALENDAR

Feb. 5-7, 1988 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman. (Additional non-Florida Instructor Institutes are planned and will be announced.)

May 28-29, 1988 - NSS-CDS Spring Cave Diving Workshop. Branford, Florida.

July, 1988 - Congresso de Espeleologia da America Latine e Caribe. Belo Horizonte, Mias Gerais, Brazil. See article, p. 5.

July 15-17, 1988 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman.

Sept. 30 - Oct. 2, 1988 - FADO (Florida Assoc. of Dive Operators) "International Dive and Travel Show." Orange City Convention Center, Orlando, Florida. Contact Russ Teall, 111 Saguaro Ln., Marathon, FL 33050, (305) 743-3942.

Nov. 18-20, 1988 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman.

Dec. 1988 - NSS-CDS Winter Cave Diving Workshop. Branford, Florida.

Feb. 3-5, 1989 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman.

May 1989 - NSS-CDS Spring Cave Diving Workshop. Branford, Florida.

Nov. 17-19, 1989 - NSS-CDS Instructor Institute. To be held in Florida. For additional information, contact the Section or Training Chairman.

COURTESY OF BRENT POTTS

HELP! - RECOVERY DIVERS UPDATE
- by Lt. Henry Nicholson

When we first started the cave-diving recovery program in 1982, the Jacksonville Sheriff's Office National Crime Information Center (NCIC) had no problem handling the recovery call-out list and call-out procedure. Since then, we have conducted several Recovery Workshops which have tremendously increased the number of available qualified recovery divers. This is great. However, this has become an excessive burden on the Jacksonville Sheriff's Office NCIC operators. I am afraid if we continue with the present procedure that it will jeopardize our access to the NCIC system.

There is an answer to the problem. We will select Area Coordinators to maintain a master list of their specific area. Only the Area Coordinators and, if possible, two assistants' names will be logged with the NCIC operator. This will greatly minimize the phone calls coming into the NCIC operators. The Area Coordinator will be responsible for the following:

1. Maintaining a current list of available qualified recovery divers in the area of his responsibility.
2. Assigning at least two assistants to be on the NCIC call-out list. Hopefully, when the NCIC relays a request for recovery divers, one of the three will be contacted. The Assistant Area Coordinator will have access to a current recovery list the same as the Area Coordinator's list of all available qualified recovery divers in their area.
3. Handling the recovery or assigning appropriate recovery divers for the task. REMEMBER: Once you accept the call--you must see that it will be completed.
4. Seeing that all recovery divers in the area have a copy of the updated recovery divers list.
5. Submitting an updated list of Assistants and himself to Lt. Nicholson quarterly.
6. Submitting his updated list of all recovery divers in his area to the other Area Coordinators of the NSS-CDS Recovery Team. This will assure that the Coordinator in another area will have access to the needed manpower in the event that he can't be reached.
7. Submitting an updated list of all recovery divers in his area to the NCRC Cave Diving Officer.

HOW TO BECOME A RECOVERY DIVER UNDER THE NEW SYSTEM

You must have completed one of our Cave Accident Recovery Workshops. Contact the Area Coordinator in the area where you live. The Area Coordinator will place you on the local area list that he maintains. The Area Coordinator's will submit the final list to Lt. Henry W. Nicholson, who will be responsible to the NCIC.

The Area Coordinators have been selected because of their availability and their access to a computer. Computerizing the recovery lists will enhance the entire operation and make it easier on everyone.

The following Area Coordinators have been selected for the following areas:

AREA ONE:
Lenny Kolcyznksi
1000 Broward Rd., #1106
Jacksonville, FL 32218
(H) 904-765-1940
(W) 904-771-6207

AREA TWO:
G. E. O'Brien
5429 Hamilton Bridge Rd.
Milton, FL 32571
(H) 904-994-6082
(W) 904-994-4540

AREA THREE:
Joe S. Harrell
8162 Darts St.
Brooksville, FL 34613
(H) 904-596-4395
(W) 813-847-8102

AREA FOUR:
Joe Prosser
7400 N.W. 55th St.
Miami, FL 33166
(H) 305-966-0619
(W) 305-592-3146

GEORGIA:
John Crea
P.O. Box 1906
Bainbridge, GA 31717
(H) 912-246-9349
(W) 912-246-3500

ALABAMA:
Joe Dabbs
1815 Inspiration Lane
Huntsville, AL 35801
(H) 205-534-8668
(W) 205-544-0623

TEXAS:
Jim Bowden
1306 Colorada St.
Austin, TX 78701
(H) 512-477-5043
(W) 512-441-3708

OTHER (UNITED STATES):
Steve Ormeroid
629 West 4th St.
Marysville, OH 43040
(H) 513-642-7775
(W) 513-644-2559

NCRC CAVE DIVING OFFICER:
Lt. Henry Nicholson
Jacksonville Sheriff's Office
501 E. Bay St.
Jacksonville, FL 32202

AREA ONE - NORTH FLORIDA
All of Suwannee River area
Peacock Springs
Little River
Edwards Springs
Suwanneecoochee Springs
All of Santa Fe River area
Devil's Ear and Eye
All of Withlacoochee River area
Corbet Springs
Madison Blue Springs
Green Sink
Lafayette Springs
Thunderhole Sink
Tallahassee area
Telford Springs
Royal Springs, etc.

AREA TWO - NORTHWEST FLORIDA
Florida Panhandle
Pensacola area
Merritt Mill Pond
Jackson Blue Hole
Hole in the Wall Springs
Twin Caves
Vortex Spring
Morrison Spring, etc.

AREA THREE - CENTRAL FLORIDA
Orlando area
Orange City Blue Hole
Ponce de Leon
Weeki Wachi area
Williston area
Bronson area, etc.

AREA FOUR - SOUTH FLORIDA & CARIBBEAN
Mexico
Bahamas
Puerto Rico, etc.

GEORGIA - All caves in Georgia

ALABAMA - All caves in Alabama

TEXAS - All caves in Texas

OTHER (UNITED STATES)
Any cave in U.S. other than those listed above

NSS-CDS BOARD OF DIRECTORS MEETING

A meeting of the NSS-CDS Board of Directors was held January 1, 1988 at the Suwannee River Cove Restaurant in Branford, Florida. Present were Steve Ormeroid, Jeff Bozanic, Joe Prosser, Wes Skiles, Pete Butt, H.V. Grey, and Lee Ann Hires; Lee Ann Hires, Treasurer, reporting.

OLD BUSINESS

Cave Files: After some checking it seems that Mike Sanders has the cave files and is being tracked down.

Scuba Safety Act: FADO (Florida Association of Dive Operators), a politically active group, considers the Safety Act the issue of #1 importance for the upcoming Florida legislation. FADO's next meeting is set for Sept. 30 - Oct. 2, 1988 at the Orange City Convention Center in Orlando, Florida, where there will be a big trade show. It was decided that Pete Butt would represent the CDS at the general meetings. Wes Skiles has been elected to the Board of Directors of FADO.

Alachua Sink: Joe Prosser has talked with the NSS and has obtained their support for the project. Joe will continue slowly with this project.

Instructors: It was decided that instructors whose Instructor Renewals were returned by the Post Office with no forwarding address will be dropped as instructors. Joe Prosser reported that he had had good responses from most instructors; however, a few were dropping out now.

NEW BUSINESS

PUBLICATIONS: Newsletter: Volume 14, Number 6, December 1987 is in the mail. (We are now printing 900 copies of each issue.)

Cavern Manual: is ready all except for the chapter on cave formations, which is being revised by Bill Wilson of the Florida Sinkhole Research Institute. It has been promised to us by Feb. 1, 1988.

Maps: Tim Holden has resigned as map coordinator effective after the workshop, and Frank Howard has agreed to take over the position. Frank brings with him lots of ideas for our map section (see "A Program for Underwater Cave Mapping," by Frank Howard, elsewhere in this issue). Motion was made to accept his proposal for the maps and for him to put together a committee to start with the first part of it.

T-Shirts: Kathy Jasper has agreed to take over the handling of the t-shirts. A motion was passed to order more t-shirts and to add a new design. It was agreed to ask Terri Skiles to work on a new design.

Computer Software: John Crea, our Accident Files Coordinator, has made a very generous donation of diagnostics and system IBM software to the Section.

1988 Members Manual: Tom Gilleland has agreed to be editor of the 1988 Members Manual. Deadlines set for the manual are to close the book by June 1, to have it to the printer by July 1, and in the mail by August 1.

SIGNS. Above-ground sounds: PADI is working with the NSS- CDS and NACD on getting a sign made for above-ground use and outside of caverns. Mark Leonard has been talking with Harry Averill of PADI about the wording of these signs and a survey of instructors has been made.

Spanish Signs: Underwater signs in Spanish, as requested by Jim Coke for the Yucatan, were discussed and it was decided that Jeff Bozanic would approach some industrialists in the Yucatan about donating money towards this project.

English Signs: Motion was made for more underwater signs to be printed in English and was accepted.

Compressor and Sonar Gun: Wes Skiles is now storing the Section compressor and sonar gun. After use by the Wakulla Project, the compressor engine needs to be rebuilt and it was agreed on to do it. From now on, a condition for the loan of any equipment owned by the CDS will be that a report on the expedition be written and given to the CDS for publication.

WORKSHOPS. Spring Workshop: It was decided to try to get the instructors more involved. Plan on getting the advertisement out by February 1 and the mail-outs out by the end of March. Try to do some classroom and some course work. Have instructors doing some new type of courses such as sump, scooter, extended exploration and technology development. Also, lots of basic-level dives. Give the instructors more input.

Winter Workshop: dates were established: Dec. 31, 1988 - Jan. 1, 1989.

TRAINING: New Brochures: Joe Prosser requested that a brochure be made with a product display, pricing, and membership application for use as an envelope filler to go with C-cards when they are returned to the students. A prototype Cavern Brochure has been printed and will be modified for future distribution, with possible space for co-op with dive shops. There was also discussion of a brochure on basic-cave and cave courses, which would give a more complete description of the courses.

Carbonless Forms: Joe proposed a single form for all three levels of training, which would be less confusing and more convenient to use than the current forms. 20,000 registration forms have been printed in the past and more are now needed: approved. (1378 individuals have gone through training; many of them have been certified at several different levels though, giving a much larger number of actual certifications.)

Slide Program for Instructors: Mark Leonard has a 3-part slide program for instruction (1 part for each training level). There was discussion of needs for a script, drawings, and titles; expenses; cooperation from instructors and NACD.

HANDBOOK FOR BOD: Steve proposed a small handbook outlining all of the jobs of board members and program coordinators.

BY-LAWS: The changes in the By-Laws were approved by the voting.

BOARD OF DIRECTORS ELECTION: Ballots were counted and announced. The new board members are John Burge (pronounced with a hard "g"), Wes Skiles, H.V. Grey, and Joe Prosser as Training Chairman. Motion was made for Jeff Bozanic to be Chairman and John Burge to be Vice-Chairman and both were accepted. Motion was made and accepted to appoint Lee Ann Hires as Secretary/Treasurer to fill the position vacated by Joe Prosser. The names and addresses of the new board are listed on the inside cover of the newsletter.

FINANCIAL: Assets: Cash $6667.73, Advance to Newsletter $100.00, Other Advances $75.00, Equipment $1761.80, Inventory (Shirts) $2480.53, Inventory (books) $5136.30, Inventory (other) $2683.85. TOTAL ASSETS: $18,905.21. TOTAL LIABILITIES: 0.

EQUITY: Retained Earnings $21,209.96, IRS & State Penalty - $1671.06. TOTAL EQUITY: $18,905.21.

REVENUE for the Year to Date: Publications (non-taxable $7098.01, Publications (taxable) $1667.19, Training Committee (non-tax.) $1189.25, Training Committee (tax.) $3779.38, NSS Dues Collected $3886.00, CDS Dues Collected $2064.75, Subscriptions $330.65, Interest Earned $177.83, Advertising (Members Manual) $1090.00, Advertising (tax.) $155.00, Contributions $234.20, Spring Workshop $569.50, W/S 1987 $1624.50, Excess Payments received $72.00, Refunds Received, $0.10, Bad Checks made good $20.25. TOTAL REVENUE: $23,958.61.

EXPENSES: Publications (for resale) $3037.93, Safety Brochures $345.80, Publications (other) $3313.96, Training Committee $443.95, Training Committee (other) $1195.34, NSS Dues Paid $3886.00, Newsletter $4190.92, Members Manual $1020.00, Spring Workshop $1470.13, W/S 1987 $707.36, Office $795.95, Scientific Grant $1500.00, Bad Checks $12.50, Bank Fees $13.81, Other $416.27, Sales Tax

$333.10, Accounting and Legal $1085.00, Federal Taxes $430.00, Interest Paid $598.68, State Taxes $823.97. TOTAL EXPENSES: $25,629.67. PROFIT/LOSS: -$1671.06. (Note: because the Winter Workshop did not take place in 1987, those expenses and revenues are not reflected in this financial statement.)

TRAINING COMMITTEE MEETING - by Joe Prosser, Training Chairman

The purpose of this Training Committee meeting was fourfold. First, to review administrative changes with existing instructors. Second, to announce Instructor Institute dates (through 1989) and answer questions regarding same. Third, to remind instructors and other interested parties that the purpose of the Spring Workshop is that it be an "Instructors'" Workshop. This concept allows instructors and others an opportunity to introduce "specialty" courses (although these courses are not intended to be of certification quality). Fourth, to support the cavern-diving course (in particular, a slide program and script are underway).

ADMINISTRATIVE CHANGES. Changes in handling of student applications for certification were announced. Individual applications will now cost $10.00 (plus applicable tax). This is the first appreciable cost increase since the 1970's. Instructors may, however, pre-purchase quantities of "envelopes" to take advantage of price discounts. Completed certification cards will now be mailed directly to the student if desired by the instructor.

Temporary C-cards for all levels of certification were introduced to meet the increasing demand of many private and public park owners' desire for proof of training. Wall certificates, suitable for framing, were also introduced. Students may order same directly from the Section ($10.00 each) or instructors may purchase quantities for distribution.

Instructors were asked if they desired for the Section to change from the traditional single-sheet student registration to a 3-part carbonless registration (one for the Section, one for the instructor's records, and one for the Student's records). All present believed it to be a good idea even if some limits on "free" distribution may be required.

INSTRUCTOR INSTITUTE DATES. Dates have been established through 1989 for institutes in North Florida (see calendar, page 2). Specific dates for other locations are under investigation. Locales include the Bahamas, Mexico, and California or Hawaii.

SPRING WORKSHOP. Beginning in 1986, the Spring Workshop was implimented as an "Instructors' Workshop." To this end instructors and other interested parties are encouraged to offer assistance and expertise to help develop techniques and in particular, specialized techniques, to other basic and full Cave Divers in the community. The workshop offers instructors the opportunities to present more advanced aspects of cave diving for hands-on learning experience. This year's workshop will include approximately a half day of classroom, then the remainder of the weekend will be devoted to field exercises and site clean-ups. Instructors and others interested in assisting or heading a specialized field are invited to contact the Training Chairman.

SLIDE PROGRAM FOR CAVERN DIVING. The cavern-diving manual was not completed in time for the winter workshop. This disappointment was compounded by the desire to begin work on a slide program to support the course. A prepared slide program was offered by Mark Leonard and Bob Janowski for use by the Section. Kelly Brady volunteered to transcribe the notes for a written script to go along with the slides. The program, when completed, will be shared with the NACD and others for use by interested instructors.

TRAINING COMMITTEE. The Training Committee Chairman is required to include at least 5 cave-diving instructors on the Training Committee to advise and counsel the Chairman. It is the intention of this Training Chairman to invite any and all interested parties to join the committee and work on existing or new projects of concern to the cave-diving community. Currently, the two biggest projects are Sump Diving and the Surveyor's course. These projects are being headed, not by instructors, but by experienced members within the Section. Clearly, the more people involved, the better. Those of you with a desire to become involved in a special project are invited to contact the Training Chairman.

ABE DAVIS AWARDS

At the Winter Workshop, January 2-3, Abe Davis Awards recognizing the safe completion of 100 safe cave dives were presented to the following people:

Lawrence Green, 100th dive at Little River, 8-24-87
Gary P. Stamm, Blue Spring (Madison Co.). 11-28-87
Jack D. Evans, Devil's Ear, 8-26-87
Arthur M. L. Hearl, Luraville One, 11-29-87
Pat Watson, Blue Spring (Madison Co.), 4-26-87
Keith Kinard, Peacock Slough, 4-24-87
Virgil L. Yoder, Eagles Nest, 4-26-87
Alan R. Barfoot, Eagles Nest, 4-26-87
Mary Elizabeth Crea, Little River, 6-27-86
John M. Kibler, Jr., Eagles Nest, 9-25-86
Michael O'Leary, Bonnet Spring, 10-2-87
Bill Cronin, Devil's Ear, 4-18-87
Douglas L. Chappell, Hidden Spring, 4-24-82
Joseph A. Youngblood, Telford Spring, 11-30-86
Johanna de Groot, Naharon, Mexico, 1-8-87
Eric P. Tasso, Orange Grove Sink, 11-28-87
Glen R. Thayer, Blue Spring (Jackson Co.), 5-23-87
Randal A. Kwiatkowski, Section 6 (Dickenson Co., WI), 11-2-86

I CONGRESSO DE ESPELEOLOGIA DA AMERICA LATINA E CARIBE - First Circular Letter

The 1st Speleological Congress of Latin American and the Carib ("I CEALC") and the III General Assembly of the Speleological Federation of Latin America and the Carib ("FEALC") will be held with the sponsorship of the Sociedade Brasileira de Espelogia ("SBE").

The event will take place in Belo Horizonte, Mias Gerais, Brazil, in July, 1988.

SUBJECTS TO BE DISCUSSED. The I CEALC will discuss mainly "The Situation of Speleology in Latin America and the Caribbean, namely: History, Technique, Environment, and Legislation."

Presentation of specific work by organizers of speleological activities in the countries that are members of the FEALC with be welcome. Also welcome will be work covering either directly or indirectly the aforesaid subject, to be presented by representatives of speleological organizations and independent speleologists.

Work entered in the I CEALC will be selected by the Organization Committee for publication in the Bulletin of the event.

BASIC PROGRAM. The I CEALC will include the following topics:

Central Act of the Congress, covering:

- Presentation of work pertinent to the subject matter of the Congress by the organizers of speleological activities in the countries that are members of the FEALC;

- Presentation of technical, scientific, and cultural work related to the subject matter of the Congress;
- Round tables and assemblies;
- Exhibits of speleological photographs, films, and video tapes;
- Exhibits and marketing of speleological publications;
- Exhibits and marketing of speleological material and equipment;
- Presentation of the II Assemble'ia Geral da FEALC.

Pre- and Post-Congress Activities:

- Guided excursions to caves in the states of Minas Gerais, Sa'o Paulo/Parana', Goia's/the Federal District, and the state of Bahia.

The definitive program, as well as the itinerary of the excursion, will be announced in the 2nd circular letter.

[Interested persons who would like a copy of the complete text of the First Circular Letter should write to the Editor: HV Grey, POB 575, Venice, FL 34284-0575.]

A PROGRAM FOR UNDERWATER CAVE MAPPING - by Frank Howard

[Cover letter dated Dec. 3, 1987, accompanying proposal sent to board members and program directors]

...During the past few years my dive buddy, John Burge, and I have been concentrating our cave-diving activities on underwater cave surveying and cartography. We are now in the process of producing our third map, which should be released sometime in the first quarter of 1988. The first two maps were Ginnie Springs and Morrison Spring; both were published in Underwater Speleology. The third deals with Twin Cave, Jackson County, Florida.

I feel that John and I have learned a great deal about surveying and cartography policy and procedures as the subjects are currently managed by the NSS-CDS. I believe the program could be improved. Enclosed is a white paper containing my thoughts on the subject. Duplicate copies have been sent to each member of the NSS BOD and to the Program Directors involved, Lamar Hires for Survey and Tim Holden for Maps.

It is my hope that you will review these ideas at a coming BOD meeting and take action to adopt a program based on this thought process. I will be in attendance at the Jan. 1988 Winter Workshop and would be available to discuss the program with the Board if it is desired....

A PROGRAM FOR UNDERWATER CAVE MAPPING

Recent summer and winter workshops have featured programs on underwater surveying and cartography. A special effort has been made to interest cave divers in the disciplines and techniques of cave surveying, the art of underwater cave cartography, and the general skills for reading underwater cave maps.

This paper identifies opportunities to strengthen the overall underwater cave mapping program and offers suggested actions for consideration.

Present Conditions and Considerations. The average cave diver could be safer and better prepared to enter an underwater cave if the diver used a map of the cave as a tool in pre-dive planning.

Emphasis placed on underwater surveying, cartography and map reading during cave-diver training varies between instructors. I have not reviewed the requirements of the NSS Training Standard. However, an informal survey of certified cave divers indicates that many students are certified as Cave Diver without demonstrating minimum skills in surveying or map reading.

Numerous underwater cave maps have been prepared over the years. Some have been donated or otherwise made available to the NSS-CDS. Others seem to have been withheld for one reason or another. Systems established for map filing, inventory control and distribution to the cave-diver community broke down. Most maps have not been made available to the average cave diver.

Underwater cave map symbology has not been standardized to my knowledge. There have been many proposed standards for cartographic symbology in the dry-cave community, both nationally and internationally. None appear to have been universally accepted. Dry-cave symbology systems are not totally suited to the underwater cartographer's needs. The net result is that existing underwater cave maps utilized different techniques in varying degrees to depict the underwater cave environment.

Underwater cave maps can provide significant information to the general public, scientific and resource-management communities. Hydrology, geology, biology, paleontology and specific studies of karst and sinkholes are a few of the disciplines that could benefit from the observations of the underwater cave diver. Judicious use of maps of the underwater cave systems can do much to inform the public and remove some of the mystique that exists. Some individuals have responded to the needs of the public but accomplishments are small by comparison to what is possible if cave-diver observations were available on a broader scale. This subject is closely aligned with issues of access to certain underwater caves.

Recommendations. Addressing the subjects identified above one at a time could provide an overall improvement in our cave-diving program. More significant achievements are possible if the issues are considered collectively to provide an integrated system for the generation, filing, recovery, distribution and use of underwater cave maps.

It is recommended that the NSS-CDS Board of Directors issue a Policy Statement on underwater cave mapping and establish a system for the implementation of a definitive underwater cave-map program.

Candidate Program. The following system definition and rationale are provided as a suggested program:

1. Appoint a Cartography Work Committee with a one-year charter to define a standard symbology system for underwater speleology. The symbols should be coordinated with known underwater surveyors, NACD, NSS and other recognized, interested groups. Within the allocated year, the Work Committee will submit recommended symbology to the NSS-CDS BOD for ratification and formal adoption as a standard for the cave-diver community.

2. A second Cartography Work Committee should be given a one-year charter to define standards for underwater map contents such as title blocks, north reference, legend, scales, notes, borders, etc.; a grading system for accuracy; and map categories denoting map applications. Initial recommendations for categories to be recognized are:

Level 1 - Survey map to a stated accuracy and detail suitable for cave-diver navigation and dive planning.

Level 2 - Survey map to a stated accuracy with scientific or other notations for use with education, scientific, business and/or public communities.

Within the allocated year the Work Committee will submit its recommended system standards to the NSS-CDS BOD for ratification and adoption as a standard for the cave-diver community.

3. A third Cartography Work Committee should be given a one-year charter to define and coordinate a system for NSS-CDS to receive, file, recover, sell and distribute underwater cave maps which come into its possession.

The following system is submitted for consideration:

A. NSS-CDS will actively solicit existing maps and provide a mailing address for the receipt of maps from the dive community.

B. Maps received would be reviewed by the Cartography

Committee, which would recommend to the BOD acceptance/non-acceptance for entry into the NSS-CDS Map Distribution System.

C. Negotiate an agreement with the NSS Bookstore, Huntsville, Alabama, to operate an NSS-CDS Map Distribution System. Maps received and accepted by the BOD would be turned over to the NSS Bookstore with authorization for reproduction and conditional sale. Maps should be sold at a minimum price to encourage use by the diver community. However, pricing should cover reproduction costs, overhead, handling and a small royalty payable to the NSS-CDS to serve as an income to the Cave Diving Section general fund for projects under the control of the BOD.

The system should provide for the maps to be sold to any cave diver. A reciprocity agreement should be negotiated with other cave-diver certifying organizations. A system for identification and a legal release should be obtained from the purchaser affirming the buyer's Cave Certification, relieving NSS-CDS from all responsibility for events resulting from the use of the map, and an affirmation that the map will not be released to non-certified diver(s) for diving or in any way used to encourage cave penetration by an untrained, non-certified diver. Acceptance of all terms and conditions of this hold-harmless agreement confirmed by signature of the buyer, should be a condition of sale.

D. An inventory list of maps available through the NSS Bookstore should be published annually as a part of the annual Membership Manual. In addition to being an encouragement to buy and use, the inventory would provide information to the cave-diver community on what caves need maps. This will encourage cave dives to perform surveys and input maps into the system.

4. The BOD should request the Training Chairman to reconsider Cave Diver Certification requirements as they pertain to surveying and/or map reading.

In certification procedures for cavern, basic cave and advanced cave diving, the student should demonstrate increasing skills in cave-map reading.

Consideration should be given to renaming cave diver or full cave diver to Advanced Cave Diver as differentiated from Basic Cave Diver. At the same time consideration should be given to the establishment of Specialty Certifications, similar to open-water diver programs. Underwater Cave Surveyor would be a prime candidate for such a specialty rating. Other ratings would be Recovery Diver, Staging, Side-Mount, etc. This could also serve as a vehicle for cave instructors to obtain more student hours.

At all levels students must demonstrate ability to interpret maps prepared in accordance with established standards. Cave features identified during pre-dive planning on the map should be identified underwater by the student.

During training students should use maps in all pre-dive planning and they should be encouraged to purchase maps of underwater caves they plan to enter.

Full Cave (Advanced Cave Diver) students should perform a survey and submit a cavern or cave map as a condition of certification. (An alternative would be to establish the specialty course but even then some exposure to surveying should be given the full cave student.)

While quality maps are desired to enlarge the map data base, the quality should not be required for certification. Rather, the training should be directed at a demonstrated understanding of the system, an appreciation of map applications and dedication to the use of maps in normal dive planning. Cave-diver students with cartography skills should be encouraged to submit finished products as contributors to the overall system.

5. Consideration should be given by the BOD to the publication of a manual on Underwater Surveying and Cartography. An approved manual should be available through the NSS Bookstore.

6. It is recommended that the BOD sponsor development of a standard advanced course of instruction in underwater cave surveying and cartography; this course to be provided at Workshops on a regular basis and as often as students are available. The objective should be to bring the existing cave-diver community up to the desired skill level and to obtain the broad-base support for the overall system of map generation and usage.

In addition, the course should provide an introduction to scientific data collection. This would serve as a recruiting tool to identify and encourage divers with inclinations towards this specialty.

Summary. Many cave divers enter underwater caves with an incomplete understanding of the cave features and conditions. Safety and enjoyment would be enhanced by the systematic use of maps in pre-dive planning.

Adoption of the principles outlined above would provide for the generation and use of maps in underwater caves. As the process matures, conditions would evolve for more serious study and understanding of the caves we dive in and provide a basic data base available to the scientific community and the general public.

KARST IN FLORIDA - ADDRESS

Dear Editor,

I enjoyed Bill Wilson's review of Karst in Florida in the October UWS, but its usefulness is considerably diminished by the fact that it didn't say how the book can be ordered; address and price, including postage. It also doesn't give the date of publication, except "recently." Perhaps you could supply the missing information for me and other interested readers.

Good caving, Bill Mixon.

[Thank you, Bill, for pointing out this important missing essential! I made inquiries and was informed Karst in Florida, by Ed Lane, may be ordered for $1.00 from the Library (Publications Office) of the Department of Natural Resources, Bureau of Geology, 903 W. Tennessee St., Tallahassee, FL 32304. Please note: Limit one (1) per customer. --Ed.]

LETTER OF INTEREST TO SECTION RE SUMP DIVING - by Mike Nelson

...My particular interest in cave diving centers around pushing sumps in otherwise "dry" caves. I understand that there is not much published on the subject here in the U.S. and that you are attempting to rectify this. I have adapted methods of transporting scuba gear in caves from equipment innovated by Larry Laine (NSS#14045) of the Minnesota Speleological Survey. I have used this equipment and transport method for alpine-style, deep-cave-penetration sump diving. I am told that this may be a novel approach.

I use a Sherwood 40-cu.-ft. 3000-lb. aluminum tank with Y-valve and dual primary and secondary regulators. If I dive solo, which I generally do, I also use an independent 15.5-cu.-ft. Sherwood pony tank as a backup. They are side mounted on a homemade harness. I use Sherwood Magnum II regulators, environmentally sealed and pressurized. I carry everything to the site in spun fiberglass cylinders crafted from water conditioner resin tanks (7-5/8" outer diameter and approximately 4' long). One tank was sacrificed to make sleeves that were laminated to the inside of the tanks that were cut open 6" to 12" from the top. The sleeve should be mounted on the cap side; the cylinders will then take up to a 71.2-cu.-ft. steel tanks, sans boot. The sleeve stiffens the joint and holds the O-ring that seals the

unit, when shut by 3 stainless-steel, spring-loaded strikes and catches (draw bolts). The "boot" of these fiberglass tanks was also reinforced with sleeves and 1/4" holes drilled near the bottom edge. The hole where the head of the conditioner was, was sealed by two aluminum plates, one inside, one outside, with gaskets, compressed together with a lifting eye that was O-ring sealed itself. This whole unit, or "torpedo," was either floated, dragged, or carried by a nylon strap with heavy-duty harness catches on either end, hooked to the lifting eye for dragging and floating, or to the eye and the holes in the reinforced base for toting. The strap also has an adjustment, like a rifle sling, to accommodate carrying.

Working in spring caves makes these little harder to transport than my own carcass, and we have hauled them as deep into caves as 2km to dive sites with just three of us on the team, dived, then hauled them out. (They work equally as well for long hauls over land to explore springs, also.) They protect the gear superbly, float almost unnoticed, with little effort, and are the key to diving these deep sites.

Please let me know if you would like more detailed information.

Hope to hear from you soon, Mike Nelson (RR #1, Box 52A, Fertile, IA, 50434, 515-582-3157).

ON CAVE DIVING SECURITY

- by Roger Werner

Curt Bemis's article concerning his theft loss at Little River (UWS, June, 1986) has inspired me to share some ideas. After suffering two theft losses, each totaling over $1000, within the space of 2 or 3 months, both at Madison Blue in 1981, I put some serious thought into this very real hazard of cave diving. I truly believe some of the ideas set forth in this article will be worthwhile for everybody to apply. Others will be of interest only to the extremely paranoid and obsessed (or extremely careful and conservative--depending on how you see it).

KEYS: I have long been appalled at what have become almost standard hiding places for car keys. I won't say in published print what these are, but I think most who have been cave-diving for a while know. In Bemis's article, the Sheriff quoted theives who had stolen from his vehicle as having said: "Everybody knows that divers don't go diving with their car keys. All we had to do was search around the truck 'till we found them." For anyone who knows the standard places, such a search shouldn't take long. (They even locked the car back and replaced the keys after stealing the divers' money!)

One CAN safely take keys diving with little to no risk of losing them. There is room along side the battery in a TEKNA light (4 AA cells) to hold one key. There is room in most primary light battery compartments for lots of keys (make sure they can't short out the battery)--and room for lots of folding money as well. It may even be good to let the "rubber-necking" loiterers see you stash your money and keys in your light canister, so they will know you're not leaving them behind. After loading your canister, don't ignore it until you have unloaded it. This mistake is particularly easy to make while standing about bantering before or after the dive. Though I admit it is possible to lose a backup light on a dive, nobody loses their primary light. If you are still concerned about losing keys on a dive, take more than one key to the car (backup principle).

Another technique, which I have used successfully for several years is a key ring on a clip. This is not a standard key ring that you get keys on by sliding them around the ring until they are in. I have had too many of those which have simply fallen to pieces at the oddest moments. I would not recommend them for any application in cave diving. My key ring is made of stainless-steel wire bent into a ring. Since I was concerned that it might catch on something and then pull open enough to drop a key, I carefully selected which keys I would need on my dive trips, added a bronze clip, and had the ring welded shut. (If you have to pay a minimum fee for such a weld, its cost will probably be prohibitive.) After the ring is closed, it can always be reopened with a hacksaw, or a key can be removed without opening the ring by cutting the key (it may be cheaper or simpler to make another key than to reweld the ring). Keys can be added without opening the ring through use of a loop of parachute line or other heavy nylon line.

The ring on a bronze clip arrangement has the advantage that you don't have to open a light to get out a key to open your van before you can set down your 100's after a dive. It is, however, not without disadvantages. Clips sometimes don't get completely attached to whatever they are clipped to, and as a result sometimes come off. I have yet to see a clip which cannot accidentally come open and let go. For this reason, you should backup your clip with a "screw link" (chain splicing device available in hardware stores). Small screw links may also serve as key rings. Snap-eye clips can also get filled with sand, making them impossible to open. Particularly if you dive in salt water, clips may get very sticky and be hard to open or close.*

A ring of keys on a clip also has a lot of dangle. This can be reduced by tucking the keys under a rubber band after clipping on. In any event, if you are going to be riding a scooter, be sure they are in a place where they can't get into the propeller.

THE DIVE VEHICLE: My motto around the dive vehicle is "Out of Sight - Out of Mind." This is based on the theory that if a would-be thief does not see what he wants, he is less likely to break into your vehicle to get it. Be especially wary of "rubber-neckers." These especially curious persons are amazed by how much stuff you have in your vehicle and are constantly craning their necks one way or another to see just what is in there. It may be from innocent curiosity, and I apologize to those who are innocently curious, but there are also those who are taking inventory. There were salient rubber-neckers present in both of my losses. Keeping things covered or out of sight will discourage inventorying and will not tempt those who are too weak to resist.

Leave no valuables exposed in plain view. Also remember, that what something <u>is</u> may not be as important as what it might <u>appear</u> to be. This is a major disadvantage of all cars and windowed vans. If you can't put everything in the trunk, then all you can do is cover it up (towels, sleeping bags). I did this for a long time when I was diving out of my 2-door Dart. Though I could cover everything, it was plain the car was loaded (the back seat was full up to the windows, and there were towels on top of stuff in the front seat). That car was eventually broken into. Vans without windows have a special advantage in this respect because you can hide more stuff without having to cover it. Also, windows in vans are higher than those in cars. Therefore, one must come closer in order to look in a van window than to look in a car window. One can accidentally see in a car window when just walking near the car. To look in a van window requires deliberately walking up to it and peering in (not as much for tall people). Having no windows is not without its sacrifices. It is harder to see around the van while backing (mirrors leave blind spots, and will not prevent you from backing into trees). If there is no window on the side door, you will have to pull up squarely to intersections in order to see to the right. Avoid interstate on-ramps that come in on the left side all together. Vans also are virtually like cave-diver dive flags when parked near a

* I have found the following procedure works well for freeing up sticking bronze clips: Soak in Lime-away 15 minutes and then in white vinegar 30 minutes, occasionally exercising any moving parts. For extremists, once the clip is clean, drip some wax onto it, heat up the clip enough to melt the wax, and exercise to hot clip to eliminate excess wax and leave only a thin film of wax to lubricate the moving surfaces.

ALERT!

Just after press time I received the following emergency alert from Biologist Jill Yager of Old Dominion University:

Alert!! Alert!!
Darn it all--you know that on 5000 acres there's at least one cave with cave animals. Have you heard anything about this project??
Am going to Mexico next month and will try to find out about this and maybe even try to do salvage diving and collect as many animals and H_2 info. as I can before they're blown to bits!
You may want to publish this in UWS....

Alabama Co. Blows Up Mexico

Driving down the east coast of Mexico, in a corridor between ·sh tropical forest and a turquoise sea, you can guess the one ord which best describes Mexico's development plans for this area: tourism.

With a failing peso and high foreign debt, Mexico is pinning most of its economic hopes on the attraction of their powder-white sand beaches and garden-like reefs off the Yucatan Penninsula. So why are they letting an Alabama gravel firm blow it up?

Vulcan Materials of Birmingham, Alabama has collaborated with a Mexican construction firm to establish a 5000-acre quarry, 50 miles south of Cancun. The limestone of this area makes great roadbeds—after you dynamite it into small pieces. Local environmentalists who are protesting the gravel quarry feel that this extraction method is not in the best interests of their fragile reefs, rainforests or lives.

"The standard procedure for this type of excavation is dynamite." says Dr. Snedaker, biologist at the University of Miami in Florida. "Not only does this produce great amounts of silt that will kill the offshore reefs, but the company plans to dredge a deep-water port to ship the gravel to the U.S."

The delicate reefs off the Yucatan are among the most diverse ecosystems on the planet. They are the nurseries and feeding-grounds for lobsters and fish, and provide a solid economic base through local fishing, tourism and sport-diving industries.

"Maybe tourism is a double-edged sword," said Susan Canpos of the Grupo Ecologista del Mayab (GEMA), "but dynamiting and excavating over 5000 acres of shoreline will leave us no choices for the future."

Ms. Canpos is vice-president of GEMA, a Mexican environmental organization struggling in a "David and Goliath" battle against the powerful American firm. To date, there has been no reply to their calls or letters to Vulcan Company.

"There are no environmental safeguards, the area is already being exploited very quietly," says Ms. Canpos. "We feel that letters from tourists who have enjoyed our beaches and beautiful reefs would really make a difference."

Your letters are needed now! Please write to:

Oficina Estatal de Turismo
Av. Tulum No. 22
Gobierno del Estado
Cancun, Q.R. 77500, MEXICO

Herb Skelnar, President
Vulcan Materials
P.O. Box 7497
Birmingham, AL 35253

Earth Island Institute
RAINFOREST ACTION NETWORK
300 Broadway Suite 28 • San Francisco, CA 94133

Alert # 21

Please write your letters NOW, before you even read the rest of the newsletter. Don't delay! Thank you! --Editor

dive site, i.e., if a van is parked near a cave dive site, it probably belongs to a cave diver. Such a conclusion is not as certain with cars.

When selecting a dive vehicle, try to avoid models with separate triangular vent windows. Since these are smaller, a thief may feel he is doing you a favor by breaking out the vent window rather than one of the bigger ones.

Modify your vehicle as much as possible so that even after a window is broken, it is still impossible to unlock the door without the key. If your vehicle has internal buttons for locking or unlocking the doors, remove these and push the push rod down inside the door so it no longer sticks out the hole. Often the buttons are simply threaded onto the push rod. It may be necessary to remove an inside panel or to cut off the tip of the rod in order to remove it from sticking out the hole. If a prospective thief can see in advance that such buttons have been removed, he will not waste his time breaking a window if he is relying on the button to unlock the door. Often internal door latch levers will automatically unlock a front door when pulled. Try to disable this mechanism. Even after making the above modifications, many cars can be quickly and simply unlocked without damage to the car through use of a tools well known to car thieves and operators of tow trucks. You can further protect yourself against such tools by installing an additional latch on your car door. Such a latch should prevent the door from being opened even when the regular lock is unlocked.

Another advantage to vans is that because the windows are higher, it is more difficult to reach inside through them to remove items. It is also easier to put things out of arm's reach from a van window than it is from a car window. Car windows are low enough that one can lean half one's body in through them, and even crawl through a broken car window with much less chance of injury than through a broken van window.

For the very paranoid (or exceptional-risk areas), one can address slowing down or discouraging the burglar once he gets in your vehicle. If you chain your tanks to the vehicle they will be difficult at best to remove. Chances are, unless he has seen your chain, the thief did not bring bolt cutters. Even just chained to each other, tanks will become difficult or impossible to move. If you use case-hardened chain the thief will need a torch to cut it. Disadvantages to the lock and chain business are (1) manipulating the locks and chain is a lot of hassle, and (2) it constantly reminds one of the theft risk and thereby takes a lot of fun out of going diving.

It should go without saying that one should not advertise the fact that it is a dive vehicle (bumper stickers, dive flags, etc.).

SETUP/TAKEDOWN: Again, the motto is "Out of Sight - Out of Mind." Setting up and taking down are the times of greatest exposure of your treasures. I generally lay towels on top of stuff I'm not using. There was a time when a scooter (I am referring to the Farallon Mark VI's) attracted a lot of attention. I submit that a scooter covered with towels would attract a lot less attention, and probably not even be recognized for what it is. If there are two sets of tanks standing up in the back of the van, hang a towel over the set you're not working with. It will look a lot less like $500 and be less eye-catching with a towel over it. Ideally, it will just look like a towel hung up to dry. If something is temporarily exposed, cover it back up. Even if someone has already seen it, if you cover it back up, he will not continue to see it, and its presence will not continue to be reinforced in his mind. He might even forget he saw it.

If you have the means to set up in one place and then drive to the dive site, you may wish to do so (more so for some situations than others). If you choose a private place to set up, no one will see what you've got. If you then suit up and drive to the dive site and jump in the water, exposure of the stuff left in the vehicle will be minimal.

IN THE WATER: It is not unheard of for stage or decompression bottles to get stolen. On my first theft loss, my buddy and I were returning from an aborted (fortunately) triple stage dive when we discovered that 3 tanks of air and 1 full of oxygen, which we had left for decompression, had all been stolen. Two of the tanks of air were single 80's in doubles bands. These 80's and the oxygen 71.2 were locked to the log approximately 27 ft deep under the ledge at Madison Blue. It is within daylight there when the river is not up, and when the river's down you have to swim against a strong current to get to that place. They were not visible from the surface. They were locked using a combination of bicycle cable, chain, bronze rings, and padlocks. The fourth tank was unlocked, but was inside the cavern. The thieves must have had their own SCUBA.

From this experience I decided never again to rely on a bronze ring to secure a tank. Many bicycle cables are also easily cut by bolt cutters. A tank can be attached to a chain by pulling the chain tight around the tank neck, and securing with a padlock. Make sure the tank valve knob can still be turned. After that is done, one need only secure the chain to something reliable. Use case-hardened chain for security applications. Plain 1/4-inch proof coil chain can be cut with a hack saw in about 5 minutes and even faster with bolt cutters. Case-hardened chain on the other hand will put nicks in the jaws of bolt cutters. Also note: once hardened, a chain is no longer suitable for tensile applications (e.g. towing, lifting loads). I have found six-foot lengths of 9/32" or 3/8" chain to be very useful.

Padlocks can be obtained in keyed-alike sets, so you don't need as many keys as you have locks. Hardware stores normally have padlocks in keyed-alike sets of 6. Locks can be specially ordered in any number keyed alike (you may have to consult a locksmith shop for keyed-alike locks in numbers greater than six). (Note: if a thief steals the key to your locks but does not steal the locks themselves, you have lost the security of the locks, but insurance will only pay for the key). Whatever lock you use, it should have a case-hardened shank. If it is hardened, the word "HARDENED" will be stamped on the shank. If "HARDENED" is not stamped on the shank, then it is probably not hardened, and can be cut easily with a hack saw or bolt cutters.

Since locks are mechanical devices, they should not be relied upon to function. They can fill with sand and mud, and may not work when you return. Steel locks will rust. If you oil them, sand will collect in the oil. All-brass locks can be obtained with case-hardened shanks. I have never had a lock which I could not open when I returned, but many times I have had difficulty opening or closing one. For this reason, the locking arrangement must be one such that you never rely on any one lock opening in order to get your tanks free.

Once secured in this way, the only way you are likely to lose your decompression air or oxygen is by somebody draining the tank and unscrewing the valve. Though this is unlikely, it is not improbable that, if you leave a tank of oxygen, some idiot(s) may be excited by the idea of breathing pure oxygen. (Many people think you can get "high" on it.) He may then decide to try it out, and thereby drain your tank, not in order to steal it or harm you, but merely out of selfish interest to see what it's like to breathe oxygen--or he may breathe down your air in order to extend his own dive bottom time. Often, in Madison Blue, I have found a swarm of single-tank divers around my decompression tanks. How does one prevent his tanks from being drained?--by removing the tank valve knob. This adds another very real hazard: What if you lose the knob, or forget to take it with you? You won't get the valve turned on without it. Take more than one. THIS IS ONE THING YOU MUST NOT FORGET. Also, be careful not to bump the exposed valve stem when the knob is off.

How can we secure a regulator? Technically, you can breathe what is in the tank, without the regulator, but it won't be very fun, and probably won't be very efficient. On some regulators, a bicycle cable can be run through the yoke and then

attached to the chain; however, bicycle cables are not very reliable. I had a special yoke screw made for one of my regulators. It consists of a bolt of the proper thread, turned to a point at one end, and a cross (+) welded to the other end. When a chain is attached to the tank neck, links are passed over the spokes of this cross. When the chain is secured, the chain will keep the yoke screw from turning. If you can't turn the yoke screw, you can't get the regulator off. Disadvantages of all this lock-and-chain business are probably obvious by now. There loom the risks of forgetting to take the keys or valve knobs or losing them on the dive. The risk of forgetting of losing a valve knob may be bigger than that of just taking pot luck with those who pass by your tanks. Other disadvantages include: it's a lot of work, it's expensive and the benefits are questionable (though if it reduces stress during the dive, that is significant). It takes a lot of fun out of diving because it forces you to think about getting ripped off and the criminal element somewhere out there. Almost immediately you begin to feel like Marley's Ghost. Some may interpret the lock-and-chain act to be a challenge. For this reason, it is probably better if as few as possible see it.

SURFACE TENDERS: Another solution to the in-the-water security problem might be a surface tender and guard. A big dog is probably an excellent guard for the vehicle, but you must have a person for a tender (someone to shuttle decompression tanks to you). Such persons can be difficult to recruit. (Who wants to go diving and not dive?) Many have reported boredom on the surface during the dive. Still, you must have your own decompression tanks for stops which must be done in the cave or cavern (where somebody from the surface can't get them to you and you can't get a message to him either). If you are going to entrust your decompression tanks to another person on the surface, and you do a decompression dive, then you are entrusting him with your life. He should be abundantly aware of his responsibility as a tender. It is possible to communicate on slates (lowered on a line from a reel above, or raised on a line from below using a plastic bag or jug for a float), but if he is not there to see your float come up and then respond to it, it does no good. I remember one dive on which I had two friends on the surface, but neither was really designated as a tender, and I had taken down all the tanks I expected to need for the dive. At decompression I ran out of oxygen. I had plenty of air left, but would have preferred to use more oxygen, of which I had another tank in the van. I floated a bleach bottle up to the surface with "more O2" written on the bottom and more details such that anybody who read it could have fetched one of my friends. I bobbed it frantically off and on for what must have been one or two hours (the remainder of my decompression)--to no avail. It was a sunny summer day too, with a zillion kids and families out at the spring. The closest I came to getting some help was at one point when a swimmer came down and asked me if I was out of air (out of air sign), which I really was not. I didn't need air. I wanted oxygen. Since he was only holding his breath, and had no mask, there wasn't time to communicate what I needed (though it was written on the jug above). I also didn't want to give him a regulator so we could talk longer and risk his embolizing when he went up. That was the closest I came to getting any help.

THEFT WHILE YOU'RE WATCHING? When I told Wes Skiles of my Madison Blue thefts he relayed a story that once while he was decompressing there, a swimmer tried to swim off with one of his stage bottles--right in front of him!! Unless you react fast, your options at pursuing such a person are limited at best.

INSURANCE: Having insurance does not relieve one from the responsibility of exercising some care to prevent losses. If you have many claims or if you have a large claim (or any claim for some companies), your deductible may be raised, or your policy may even be cancelled. It is also worth noting that your homeowner's or renter's insurance probably does not automatically cover your diving equipment, though its limits may exceed the value of all your possessions. Homeowner's insurance generally includes a coverage for "contents" of the home. Unless explicitly augmented to include other things, "contents" refers to things normally found in the home, e.g. furniture, cooking utensils, and some carefully described limits on certain other things such as cash, jewelry, guns, silverware, securities, watercraft, trailers, etc... The only item of diving equipment which might automatically be covered by such a list on a standard policy is probably the scooter, but a limit of $500 on watercraft is not likely to fully cover your scooter.

In order for your homeowner's insurance to cover your diving equipment, it must be separately scheduled, i.e., you should file a list of it with your insurer. Without scheduling your diving equipment, it is NOT insured (with the possible exception of the scooter), regardless of the limits of the "contents" coverage and the actual value of the true contents of your home. Also, make sure your equipment is covered "off premises," i.e. away from the home address. The standard "off premises" coverage (if you have any) may only be good for up to 30 days away from the home address, or it might not be good at all outside the country. You may want to augment this if you are going on any long trips.

To add the equipment to your policy, consult your insurance agent. At most, it should not cost more than 2% of its value per year. I would also highly recommend getting replacement value coverage. It doesn't cost much more, but it can make a big difference in how much you get for your loss. When filing a claim, you will need receipts to document original costs. (For this reason, get a receipt even when buying used equipment from an individual. It may also protect you if the equipment later turns out to be stolen--it is a signed statement from the seller that he sold it to you. Of course, if you get caught with stolen equipment, and cannot produce the person who you say sold it to you, you may have a problem.) Typically the items in your claim will be depreciated 10% per year since you bought them. If you have replacement coverage, you will first be granted the depreciated amount, and then if you actually replace the stuff and bring in the receipts, then you will get the rest. (There may be a limit with some insurers or on some items such that the replacement cost settlement cannot exceed 4 times the original purchase price.)

Even with replacement coverage, a theft loss is not something to rejoice over. It considerably sours the dive trip experience. Filing a claim is a lot of work, and then there is always the deductible. If your vehicle was broken into, damages to the vehicle probably will not be great enough to exceed the deductible on your automobile insurance (exception: there is usually no deductible on glass.). Unless you have kept meticulous records, it may be impossible to completely determine your loss. This is especially true if they get your goody bag or tool box (spare clips, O-rings, tie-wraps, etc.).

REWARDS. I have a sticker for my car which reads: "$500 REWARD for arrest and conviction of person stealing, vandalizing or causing hit-and-run damage to member's car." It was given to me as part of a membership in an automobile club. When my car was broken into, I advertised this reward, and checked into how one would collect it if I was so lucky as to find a culprit. I was told repeatedly that the reward did not apply to vandalism alone, but that the car had to be stolen in order for the reward to apply at all.

A SPECIAL THANK YOU TO . . .

. . . The Staff of Dive-Rite Manufacturing, Inc. for contributing considerable time and materials in the preparation of two new Warning Signs for Peacock Springs. . . . Paul Smith and Terri Skiles for their help underwater installing the two signs.

IMPROVIZATIONAL CAVE DIVING SIGNALS - by Woody Jasper

Fast noisy air loss--distress light signal immediately brings buddy--buddy tries to stop air--unable to shut down--decides to invent new hand signals.

On Saturday, June 20, 1987, four divers, Tom Morris, Wes Skiles, Rob Palmer, and myself, began a single-stage scooter dive in Sweet Crack #III, a clean, high-outflow cave that is not particularly small, but is characterized by vertical fractures and horizontal bedding planes--high and narrow or low and wide. Combine these shapes with the high flow and several scooters, and the result is a lot of bumping and banging around.

Tom and Rob had a single DIN valve mounted on each of their 100's; Wes and I had Scubapro [dual-valve] manifolds. The dive plan allowed for team members to become separated if unity was not convenient.

We all assembled at the 80' level and began the upstream dive. Rob, being from England and unfamiliar with Tekna riding, fell behind. After a few hundred feet, Wes stopped to wait for Rob while Tom and I continued. Several minutes later, after negotiating a small spot, my Tekna clutch would not engage with the propeller setting in the 6-8 range. I reset the prop to 2-3, which allowed the clutch to catch. Progress was resumed as Wes caught back up. Stage bottles were dropped shortly thereafter. Then Tom, Wes and I started together with me on the slower scooter. In order to keep up, I scootered whenever possible (like sideways in 20-40"-high bedding planes) while continually finning. This resulted in heavy-duty bumping and crashing, but successfully kept Wes and Tom in sight.

After several minutes of this--WH-O-O-S-S-S-S-S-S-S-S-S! My fast and furious light signal caught Wes' eye just as he began to turn the next corner. His response was so prompt that I was still trying to find the off knob when he arrived. Wes passed his backup regulator to me and spent 20-30 seconds dealing with the air leak. Air was still rushing out...Wes backed away about 3' and gave a Jack Benny style (both palms up, hands out) signal. I repeated this new signal back to Wes with an additional quizical, concerned facial expression. Wes nodded, repeated the signal and added yet another new sign (hands crossed at the wrists, palms down, then a scissor-type motion that uncrosses the hands horizontally to a distance of 18"). Try it, you will understand.

As a large air bell developed rapidly in this noisy cave, Tom, Wes and I surfaced to discuss the situation.

It appeared that the regulator knob had been struck with sufficient force to dislodge and rupture the O-ring on the backup regulator. What made this all the more interesting is that the knob to shut off that outlet was gone. The knob, stem, spring and little nut on the right side had been sheared off flush with the manifold on one of the earlier bumps.

So long as the free air lasted (2-3 minutes), we stayed in the air bell laughing about our stupid dive plan and discussing the virtues of manifolds and O-rings. At this point, we decided to swim the scooters back to the stage bottles, and then scooter normally back to the decompression camp.

Except for the unavoidable 7'-hose snags we encountered while swimming the scooters through the low cave, the exit was accomplished uneventfully.

We met Rob Palmer before we came to the stage bottles. If Wes and Tom had been out of sight when the air failure occurred, I would have made a banzai run back toward the stage bottles to either reach them or reach Rob or???! It all would have depended on how long I could have rebreathed on my B.C. after all the air ran out.

Having been worried about this type of situation for several years, I never solo without a filled, unbreathed stage bottle (buddy bottle), or a side mount which incorporates separate air supplies.

But: How often are you really on a solo dive (i.e., unable to communicate to your buddy), during your regular buddy dives? Although this is my first (and possibly last) manifold failure, this occurred (courtesy of Sherwood) to another diver on a dive that I was on at the Crypt five years ago. Several other Sherwood failures have also been reported.

One final footnote: While putting away our gear Saturday, Wes noticed that the center section of his Scubapro manifold had been rotated 180 degrees due to one of his cave bumps and he would probably have been unable to reach his knob without taking off his tanks.

EXPLORATION REEL MODIFICATIONS - by Jeffrey Bozanic

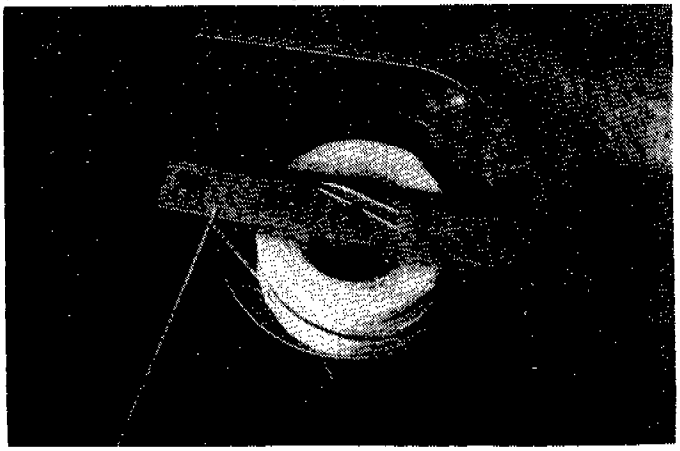
Question: How many hands does it take to tie off the end of an exploration line?

Answer: Seven. One to hold the reel, one to hold the reel end of the line, one to hold the end of the exploration line, one to find and hold the knife, two the tie the line off, one to hold your light....

That's great, if you happen to be a cave-diving octopus. However, I don't know of any Section members who currently meet that qualification.

I cannot recall the number of times I have found myself in the position of trying to accomplish all of those tasks at the same time. Occasionally, your dive buddy will be able to assist with some of these chores, but in restrictions or silt-out conditions this often is not possible. The following modifications made to an exploration reel have significantly reduced task loading and increased safety of this portion of the dive.

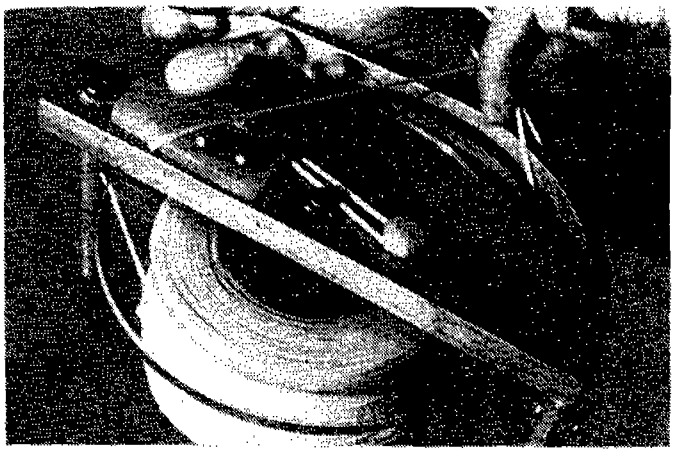
The first problem faced is that of securing the line on the reel during the cutting procedure. It is easy to tighten the set screw to prevent the drum from turning, but once the line is cut the free end can float free and become entangled. Because the diver's primary concern is the line leading back to air, this lesser problem of the reel throwing loops is usually ignored until later.



Line holder keeps tension on line during tie-off procedure. Photo by Jeff Bozanic.

To solve this problem, a rectangular piece of relatively stiff nylon was mounted to the side of the reel (see photograph). Plastic will also work. Before the line is severed, it is first wedged between the nylon and the reel frame, which locks the line securely. With the set screw tightened, and the line held securely, it may now be cut without the possibility of floating free or throwing loops off the reel.

The next task faced by the explorer is that of finding his knife and cutting the line. While this is a relatively minor task, potential problems exist with dropping the knife, not being able to locate or free it easily with one hand, or losing it during the dive



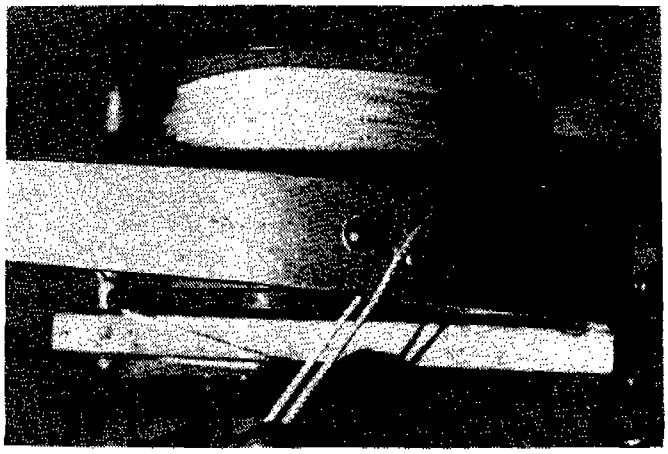
Line holder and line cutter in use on exploration reel. Photo by Jeff Bozanic.

before needing it. By building a line cutter into the handle of the reel itself, the diver has the cutting instrument just where he/she needs it the most. The idea was copied off a reel designed by Gene Melton and Dennis Williams.

A notch about 3/8" long is first cut into the reel handle using a hacksaw. A small, sharp blade is then fastened to the underside of the handle with the edge placed perpendicular across the notch. When the line is pulled into the notch, it is easily severed (see detailed photograph). A straight-edged stainless steel blade made for Exacto knives works well in this application. In over a year of use in both salt and fresh waters, no corrosion was apparent on the blade of the prototype reel. The blade comes with a hole already drilled in it, through which a small stainless-steel screw will fit nicely. This makes the mounting job relatively simple. A second screw may be necessary behind the blade to prevent rotation when the line is pulled against the cutting edge.

The reel may be fastened to the diver at this point without subsequent problems (such as dropping the reel, laying it down and forgetting it, or losing it in a cloud of silt). Both hands are now free for other tasks, including tying off the exploration line. After the line has been tied off, the reel may be unclipped, and a loop tied in the end of the line for further use. This is, however, an optional step which can be postponed until after surfacing if no further use of the reel is anticipated.

The extra loop of line around the set screw on the reel seen in the photograph allows enough slack for the end loop to be easily retied during the dive, as many of our exploration dives involve laying of line in multiple passages.



Detail of line cutter (notch) in handle of exploration reel. Photo by Jeff Bozanic.

Some manner of carrying the light other than in a hand is needed at this point. Looping a normal cave-diving light over the shoulder is one solution, although many others also work. A partial list of solutions includes: having your buddy light the work area, clipping the lighthead off to a shoulder strap (pointing downwards), using a head-mounted or helmet-mounted light, or using an arm-mounted light.

These modifications reduce significantly the complexity of the task of tying off the end of the line, reduce unnecessary handling of accessory equipment, reduce the possibility of losing equipment or dropping the exploration line, and increase the diver's efficiency.

Now, how many hands does it take to tie off the end of an exploration line? Only two--and most cave divers I know fit that qualification easily....

SUMMARY - STEPS FOR TYING OFF LINE USING MODIFIED EXPLORATION REEL:

1. Fasten light so it illuminates work area.
2. Tighten set screw on reel.
3. Wedge line in nylon line lock.
4. Sever line using built-in line cutter.
5. While holding end of exploration line with one hand, use the other to clip reel to body.
6. Tie off end of exploration line using both hands.
7. Unclip reel, tie end loop in line, and re-clip to body (if necessary).
8. Survey out.

Detail of underside of handle of exploration reel, showing Exacto knife blade built into line cutter. Photo by Jeff Bozanic.

WHY CALL IT IDEAL? - by Woody Jasper

The discussions in Underwater Speleology last fall have seemed to have been directed toward which system, manifold or dual K-valves, is less problematic. Discussion of a "no-compromise" system is initiated:

Why call it "ideal"?

The evolution of tank valves for a single tank has progressed for the "J" to the "K," then to the single-regulator DIN and to the dual-regulator Y-valves with or without DIN capabilities. Valves for double tanks have moved from the open-water, single-outlet valves to the "ideal" dual-outlet manifold, also available with DIN connections.

With the exception of the United States, world consensus is that the A-yoke regulator and the standard O-ring is a grossly inferior system. It is a source of inconvenience, plus incidents of minor, major, and catastrophic leaks. There is no valid jus-

tification for retaining this style of regulator connection. It should be phased out whenever possible.

Of the three common tank and valve configurations (single tank, single regulator [the stage bottle]; single tank, dual regulator [the Y-valve]; and dual tanks, dual regulator), only the first (single tank, single regulator) has been perfected.

A single-tank, single-regulator valve with DIN connection is available from Poseidon with additional European-style valves (i.e., cross-flow) soon to be imported. These valves are conceptually perfected. All other valve arrangements need work to qualify as true life-support equipment.

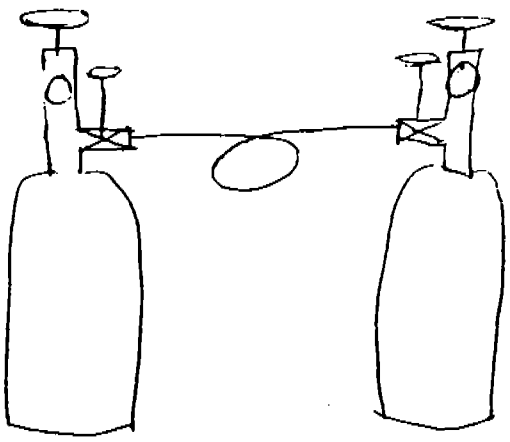
The Y-valve would be an excellent product in a DIN design. Unfortunately, the only DIN Y-valve is sufficiently complex and expensive such that we can only encourage a manufacturer to mass produce this needed "ideal" DIN product.

The most important problem exists with the dual-tank, dual-valve arrangement. An initial question to resolve is "to manifold or not to manifold." The European view of a manifold is "a device designed to allow all available air to be lost very rapidly." This is obviously correct with our current design as both Sherwood and Scubapro manifolds have been involved in several total air-loss situations in the last several years. Scooters greatly increase the abuse that is subjected upon manifolds and regulators, and caves as well. Manifold failure will result in a cave death unless improvements are initiated.

The European-style system uses a DIN regulator and valve on each tank. This system is currently experiencing limited use in the U.S., but has several disadvantages. Operated properly, one must change regulators every few hundred psi to maintain a reasonable balance of air between the two tanks. This exchange procedure is at best an inconvenience, and this exchanging could become a real chore in low visibility, high flow, high stress, or scooter dives. It is not very clean to each to new students and mistakes could be made fairly easily. All this adds up to a significant distraction. A second pressure gauge is obviously required, and this adds to total equipment and provides an additional failure point. If a regulator fails, the air in that tank becomes unavailable. It is reported that the Poseidon valve can easily be inadvertently turned off on the cave ceiling. All in all, certainly far short of "ideal."

The objective seems to be a dual-outlet manifold with DIN connections including an outlet valve for each regulator and a bullet-proof crossover interconnection with a separate valve from each tank into the interconnection: conceptually, dual y-valves with an equalizer hose. This crossover should only allow a slow air flow rate. It could be left open or opened periodically to equalize the tanks.

A crude arrangement as described could be created with existing parts, but this is not recommended. We need a well-designed DIN dual-outlet manifold with crossover valves and with regulator, valve and hose crash-protection integrated.



If the innovators and thinkers give this problem some effort and the instructors and shop owners help guide the manufacturers, we may eventually evolve life-support equipment that can be truly called "ideal."

THE MOST IMPORTANT TASK FOR CAVE DIVING ORGANIZATIONS

- by Milledge Murphey

Recently, on Jan. 3, 1988, Dr. Robert Millott and I drove from Gainesville to Madison in cold, rainy weather for the purpose of diving at Madison Blue. We are both members of an almost non-existent breed, with more than 34 years of cave-diving experience each. We have both been around since the earliest Florida cave dives were accomplished and can remember (not so clearly any more) the early cave divers including long-forgotten men like John Paul Jones, III, George Turner, Al Shivers, Al Welburg, Harrison MacDonald, Doug Duerloo, Don Schenk, and others whom I can no longer remember. These were the North Florida cave divers of the early to mid-1950's, among whom Millott and I may be the last still diving. At any rate, as our hearing diminishes, our memories slowly disintegrate and our joints ache, we are still enjoying frequent cave diving.

As we drove, we passed numerous former (now closed) dive sites and talked about many others that we had checked out in the past. Bob commented that it seemed that most, not merely a few, sites which were available during the '50's were no longer available. In fact, as we described sites, there were many which we could clearly recall but could no longer remember how to get to because they had been closed for so long. We wondered what had happened to all those sites--a few are now state parks, others are commercial operations, others are on private property or otherwise closed to free, recreational cave diving. It is important to realize, however, that most people reading this article don't even know such sites exist as they are not mentioned in any of the reference books on cave diving, nor are they mapped. These are sites which were closed before Sheck Exley, Wes Skiles, and other expert cave-diving cartographers began their work. Further, a number of these sites are not mentioned in Bulletin 31 or other works.

Our conversation then turned to the cave-diving organizations and our thoughts quickly centered on what, to us at least, appears to be the most important challenge faced by cave divers and cave-diving organizations. This topic is the maintenance of access (or reestablishment of access) to all suitable cave-diving sites in Florida. This topic germinated from many recent events. One of these being recent exploration successes by small numbers of elite cave divers into previously unexplored areas, and second, our difficulty in locating suitable open sites for instruction in cavern and cave diving. Obvious, scientific and exploration teams can and do currently dive at most of the desirable sites in Florida. This elite few can, do, and should have such access for a great variety of positive reasons. However, the organizations have an equal if not greater responsibility to the average cave diver who merely seeks a variety of sites to dive, which if more were available, would take some of the massive and destructive pressure off of the few remaining open sites, thus preserving all sites for posterity (or at least for a few years longer).

I am purposely not listing the closed sites which we remembered by name here; rather, I want to call attention to the problem as it presently exists (in a geometric fashion) and, with ever increasing rapidly, inexorably moves toward closure of even more sites. Paul DeLoach, Dustin Clesi, Steve Straatsma and others have done great service to cave diving in their efforts to open or reopen sites for lay-person cave divers. These men should be commended by us all for their continuing efforts.

What I am calling for, however, is a financial campaign (our organizations have funds) to insure appropriate lobby and all other efforts which can be exerted to reopen and keep open most, if not all, suitable sites. For too long we have expected Uncle Paul to "do the work" so we could keep diving.

As Bob and I discussed the issues, it became clear that almost every site that we both had enjoyed most was now closed to us: Indian, Wakulla, Sally Ward, Eagles Nest, Alachua Sink, Dipolder(s), Rainbow (open water) Otter, Silver Glenn, Silver Springs, Hart, Squirrel Chimney, Devil's Den, Blue Sink, Green Sink, Falmouth, Hornsby, Rock Springs, Apopka Blue, Goat Sink, Salt Springs, Magnolia Sink, Mystery Sink, Azure, Little Dysmal, Big Dysmal, Rock Bluff, Jackson Blue, Allen Mill Pond, and I'll stop here although there are 31 more names I wrote down while Bob and I talked.

Perhaps in a decade, site closure, liability issues, and costs will mean that we will all be flying to the Bahamas or Mexico for the weekend even though we have and always will have in Florida, most of the finest cave-diving sites in the entire world. It appears logical, at least to two old timers, that we, the dues-paying supporters of cave diving, should benefit in the most important area in which we are directly involved, the maintenance and re-opening of most, if not all, viable cave-diving sites, to all certified cave divers. This, in fact, is the essence of what we all want to do--cave dive. Can we develop the strategies and provide the finances necessary to accomplish this goal? Of course we can; this is the challenge which our leaders must meet if we will have, as we do now, only a few sites to dive for our cavern courses (at no cost). As I sit at the IBM, Osgood Sink has been closed.

This article is in no way intended as an indictment of "progress," i.e., state parks, commercial dive sites, etc. Rather, it is an observation of 30-plus years of diminution of available sites with no relief in sight. I hope it may result in discussion and possible organized action by our cave-diving organizations, cave divers, and the cave-diving community at large. After all, if there were no open sites available, we, as cave divers, would have lost our most cherished freedom--the right to drive to a site and dive it as Bob and I did at Madison Blue Springs on Jan. 3, 1988.

BLUE SPRINGS, ORANGE CITY, ACCIDENT SUMMARY
- from a report by Lt. Henry W. Nicholson

[Henry Nicholson is a Lieutenant with the Jacksonville Sheriff's Office; active with the Police Scuba Team; Coordinator of the National Speleological Society - Rescue/Recovery Team; and Cave Diving Officer of the National Cave Rescue Commission.]

On Sept. 29, 1987, Lt. Nicholson received a call from Ron Abner, a certified Cave Diving Rescue and Recovery Diver, informing him that the Volusia County Sheriff's Office had requested his assistance for a body recovery at Blue Springs.

"Blue Springs is a State Park and open to divers. The spring is shaped like a stocking with a spacious shaft angling down to a large room at the bottom at a depth of 110'. The room is just outside of the light zone and has an opening in the floor approximately 12' in diameter. A large rock covers the center portion of the hole leaving two individual openings on both sides of the rock. The openings are large enough for a diver to enter but the flow is so swift that any reasonable diver would not attempt to enter. Looking down into the upstream flow you can see downward approximately 20' of tunnel shaft. If you should turn your head to one side while looking into the tunnel your mask is subject to being blown off your face and your regulator out of your mouth. The flow is so tremendous that even experienced cave divers do not enter."

Two divers had entered the spring on Sept. 29, with a nylon line attached to a gallon bucket of concrete with an eye bolt attached to it. The diver who died, who was wearing only a single tank, attempted to use the concrete as an anchor to forcibly pull himself down into the cave shaft against the fierce current. It is not known how deep he actually was able to get, but as some point, just under the huge rock, he lost contact with the line and was forced upwards against the overhead rock which divided the two exits. At the same time his mask was blown off and his regulator was blown from his mouth. His buddy was watching from the ledge but was unable to assist him. The diver obviously drowned at this point.

At the request of the Volusia County Sheriff's Office, Ron Abner and Ken Watkins, the only two certified full cave divers in the area, made several attempts to free the body. But because of the depth, however, they reached critical nitrogen saturation before the body could be freed, and at that point called Lt. Nicholson.

Lt. Nicholson and Detective John McCallum entered the water at approximately 1:17 pm with a pruning saw, heavy-duty poles supplied by the fire department, and a camera. They were able to see the dead diver only a few feet down under the shaft--"He was so close but yet so far because of the current flow." After great physical effort and considerable peril (having his regulator blown from his mouth during the overexertion of trying to extract the body from the rock), Lt. Nicholson was finally able to cut enough of the diver's straps and hoses to be able to push his body away from the rock.

"CONCLUSION. It is the opinion of the writer [Henry Nicholson] that the victim had prearranged a plan to perform a record penetration into Blue Springs. He, apparently, wanted to go deeper than anyone else had ever gone. I have been informed that the victim had just completed a National Speleological Society Cavern Diver Course. This being true, he knowingly exceeded the following limitations of cavern diving:

1. Diving too deep--past 70'.
2. Swam outside of the light zone.
3. Entered a restriction--two divers cannot pass side by side.

The victim was conducting a cave dive in the extreme. As a final analysis, he violated the cardinal rules of cave diving:

1. Failure to be properly trained.
2. Failure to follow the proper air rules.

The victim attempted to accomplish something that a reasonable and prudent diver would not have considered."

ORANGE GROVE SINK BODY RECOVERY
- reported by Dustin Clesi

Sunday, Feb. 7, 1988, the body of John Gillegan, an 18-year old, white male, was recovered from Orange Grove Sink in Suwannee County. Gillegan was certified as an PADI Advanced Open-Water Diver and Rescue Diver in Virginia, with a history of approximately 20 dives over 18 months. He was neither cavern nor cave certified.

Gillegan entered the lower cavern at Orange Grove with two buddies; he was using a single 80 with no octopus, a single light (a UK 600), and no guideline. Followed by one of his buddies, he negotiated two major restrictions at the bottom of the cavern and got into a small pocket. The buddy managed to back his way out, but after totally silting it out, Gillegan tried to ascend straight up through a tight hole.

The body recovery was performed by Arwyn Carr of Spring Systems Dive Center and Dustin Clesi of Tampa (who was teaching a Basic Cave class at Peacock Springs at the time). Dustin said that, with general directions from the surviving buddies, he and Arwyn were quickly able to locate the dead diver. They entered the lower cavern chamber at approximately 1:40

pm at 80' depth, turned their own lights off, and were able to see the glow from the dead diver's light.

Gillegan was found in 120' of water (with a maximum depth of 122' indicated on his gauge), with his tank virtually empty. His slate said only: "Nothing here, let's leave." Visibility was reduced to approximately 6-8'; however, Arwyn and Dustin were able to safely extricate the body back through the restriction within 20 minutes. The safety and efficiency of the rescue operation were greatly enhanced by the efforts of Gordon Watkins, who acted as Surface Record Keeper, and of course, the Suwannee County Sheriff's Department. A formal report as per NSS Rescue\Recovery Team procedures, has already been filed.

PRIMARY LIGHT MODIFICATIONS FOR TRAVELING - by Jeffrey Bozanic

One of the most essential pieces of cave-diving equipment is the primary dive light. In the course of frequent travels, a number of problems with primary lights have occurred. These necessitated either extensive repairs upon arrival, or precluded the light from being used on the trip. This article will list helpful hints making it easier to travel with primary lights, and to avoid some of the pitfalls which lead to equipment destruction.

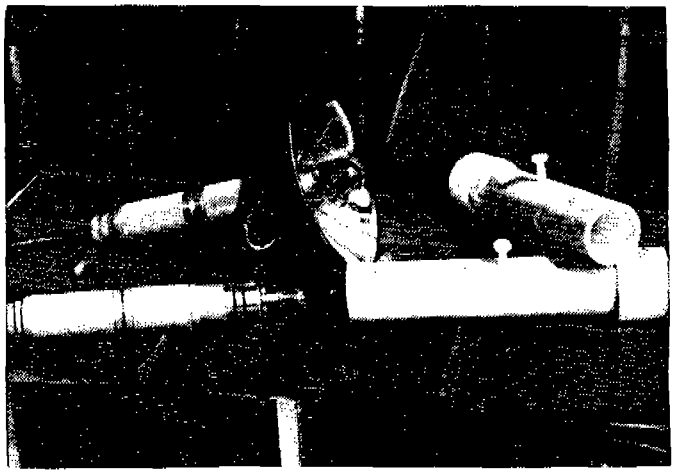
The most common problems have arisen as a result of putting the lights through the "baggage handlers endurance test." Two plexiglass light housings have broken in transit due to rough airline handling. One means of preventing this from occurring is to pad the lights by wrapping them inside your wetsuit or in your drysuit underwear. Enclosing them in this thick padding has prevented further housing breakage and destruction from taking place. Lights can be further protected by shipping them in hard- sided cases like pelican boxes or camera anvil crates.

Another common source of primary light problems are the controls which protrude from the battery housing. These may include switch housings, Ikelite rubber switch boots, or connector housings for removable lighthead cords. Problems have included having rubber boots tear or wear excessively, or having threads on connectors damaged.

To prevent damage to these items, Dennis Williams devised several protective covers. Initially, he used short pieces of PVC pipe or cap-end protectors to cover the protruding objects. These were duct-taped (universal cure-all) to the housing to insure they would remain in place (Figure 1). His later sophistications included a section of plexiglass tubing which would cover the entire upper portion of the battery housing. This is securely fastened with a set screw which locks against the battery housing. This is a far more convenient and secure means of protecting the switches.

PVC-pipe cap protects primary-light switch during transport. Photo by Jeff Bozanic.

Another common problem experienced has been the breakage of test-tube lightheads either in airline transit, or while moving in automobiles from living quarters to the dive site. Lighthead protectors have been constructed which fit around the lightheads, preventing breakage. These are made of PVC pipe with an endcap at one end, forming a cylinder open at one end. The PVC should have an inside diameter just large enough to fit around the widest portion of the lighthead. A set screw is added to the protector to lock it to the lighthead securely (Figure 2). The set screw should be of the same size as the set screw on the reflector, so that it may be used as a spare if one is lost.



PVC piping with set screw protects test-tube portion of lighthead. Photo by Jeff Bozanic

For the Atkinson lightheads in use, 1"-diameter, schedule 40 PVC piping was used. For the Dive Rite lightheads, 1-1/4"-diameter, schedule 40 PVC was used. For the Dive Rite protectors, 1/8"-thick open-cell foam was glued to the inside as further protection for the test-tube portion of the lighthead. This was necessary because the test tube has a narrower diameter than the aluminum housing, and rattled without the foam. The PVC pipe should be long enough to completely cover the lighthead.

Use of these lighthead protectors has reduced test-tube breakage from one tube per light per trip to zero for the last several years.

The reflector of the light is prone to scratching of the reflective surface, and to overall reflector bending. Both of these affect light quality, by dimming or destroying the beam. Dennis hollowed out a piece of styrofoam into which the reflector fits to prevent these problems. By making the styrofoam round, he is able to clamp a metal tank band around it, which he uses later to attach the battery pack to his tanks while diving.

Even with the above precautions, light repairs may need to be made in the field. It is wise to carry enough spare parts to deal with this contingency on all expeditions. Spare parts which should be on hand include extra cables, bulbs, test tubes, set screws, electrical connectors, wire, and cell caps (if present). Necessary tools should also be carried to effect repairs. Beside common items like crescent wrenches, screwdrivers, and wire cutters, other useful tools include volt meters, high-temperature teflon tape, and a soldering gun.

If using wet-cell nicad batteries, extra potassium hydroxide (KOH) should be carried. The most convenient method for carrying sufficient quantities is to carry it in its dry state. KOH should be packed premeasured into plastic bottles. When needed, a predetermined quantity of distilled water may be added to dissolve the KOH. Distilled water is usually obtainable

anywhere. Carrying dry KOH eliminates the possibility of a liquid solution of KOH spilling in transit, ruining expensive equipment.

Many locations where cave diving takes place do not have 110-volt electricity. Often, there is no electric current available. To recharge lights, the most universal source of electricity has been 12-volt car batteries. Cables or adapters which would enable the dive light to be recharged from a car or truck should be carried whenever the source of power is uncertain. Such cables allow flexibility in recharging even if 110-volt current is available, as it would allow for recharge of lights between dives at the site.

Baggage weight during airline travels has often been a concern. With a normal limit of 70 lbs. per piece of luggage, it is easily possible to be overweight. Battery packs are one of the heaviest, densest items of cave-diving equipment. These have been placed in hand baggage and carried onto the plane to alleviate checked baggage weight. The problem with this practice has been occasional arguments with security personnel prior to boarding the plane. Undue interest is more common with wet-cell systems than with dry-cell batteries.

Use of these suggestions should make your expeditions more convenient, more productive, more satisfying, and far less frustrating than some of those conducted by other cave divers in the past.

COURTESY OF STEVE HUDSON

SINKHOLE: Pat and Charles Duff view a sinkhole that developed on their property in Greenville, VA during heavy rains in early December. The hole was estimated to be 30-40 feet deep originally, but enlargement of the mouth has partly filled it with dirt. Photo: UPI (Courtesy of Tim Holden).

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