

NSS - CAVE DIVING INCIDENT REPORTS

1999 Cave Diving Incidents

10 February 1999

Wakulla Springs, Florida lost consciousness, incorrect gas mixture

Jason Richards, Mark Long, Jason Moseley, and Annette Long, divers working with the National Geographic film crew for the expedition, entered the spring in the late afternoon for a planned 10-minute dive to set up lights at -30 meters. Along with their primary gas bottles, the divers carried bottles of pure oxygen which they intended to place on a ledge at -6meters for use during decompression.

Richards carried back-mounted double tanks filled with a gas mixture intended for use at his working depth. Although the gas mixture was breathable at the surface, he chose to breathe from the oxygen bottle initially, intending to switch to the doubles when he dropped the oxygen off at -20 feet (-6meters) . He apparently forgot to make the switch, and breathed oxygen to a depth of at least 15 meters

About eight minutes into the dive, Richards lost consciousness, became inverted, and descended to the bottom. Mark Long saw Richards in trouble, and alerted the other two divers. They were able to get Richards to the surface within one minute of the incident. Other expedition personnel were on the surface nearby, and helped pull Richards from the water. He suffered from spasms and vomiting, but appeared to be recovering.

Richards was taken to the hospital where he was placed in a hyperbaric chamber as a precautionary measure, and then given a CT scan and chest X-ray to check for embolism or aspiration. He was hospitalized overnight for observation, and released the next day. 1. Daily Updates, Wakulla 2 Expedition web site, www.usdct.org, 10 February 1999. 2. Barbara am Ende, "Wakulla 2 — Building the first Fully 3D Cave Map," NSS News, v58n9, September 2000, p. 260.

Comments: Pure oxygen is toxic to the central nervous system at depth. Divers use it in shallow water at the final decompression stage to shorten decompression time. Following the incident, the diving protocols were reviewed, and all divers were required to lower their oxygen bottles to the -6 meter decompression location using a tether. Not using oxygen as a travel gas would be another solution.

15 February 1999

Wakulla Springs, Florida fatality, lost consciousness, cause unknown

According to the expedition report, diver Henry Kendall (72) bypassed both written and electronic safety checklists for his closed circuit rebreather diving equipment and entered the water without the oxygen supply connected to the rebreather. The report states that Kendall ignored the rebreather system's audible and visual warning indicators, and had entered the water without his diving partner. It further states that Kendall lost consciousness in less than two meters of water and drowned. The expedition report also states that the coroner's report indicated that Kendall had some physiological problems before the dive which were believed to have led to his disregard of the safety protocols.

A press release issued by the expedition on 18 February 1999, however, states that information received by the expedition from the Medical Examiner's office indicated that Kendall had died from natural causes, and that his death had no relationship to either his pre-dive procedures or his equipment. 1. Barbara am Ende, "Wakulla 2 - Building the First Fully

3D Cave Map," NSS News, v58n9, September 2000, p.

270. 2. Daily Updates, Wakulla 2 Expedition web site, www.usdct.org, 18 February 1999.

Comments: It was not clear from the reports whether Kendall suffered a heart attack or other illness, or whether he lost consciousness due to lack of oxygen. NOTE: Solo diving was officially banned by the NSSCDS in 2002.

18 April 1999

Jackson Blue Spring, Florida fatality, siltation, out of air

Steven Michael Wixon (33) and two partners were diving in Jackson Blue Spring, and were about 300 meters back in the cave when the passage became obscured by silt in the water. They turned the dive and headed out, but Wixon somehow became separated from the others. His partners searched for him until they ran low on air and were forced to exit. Associated Press, "Huntsville Man Dies Cave Diving in Florida," Huntsville Times, 19 April 1999.

26 April 1999

· ***Diepolder Spring, Florida fatality, incorrect gas mixture, lost consciousness***

Guido Gaudenzi (29) and fellow divers Simone Roncoli and Sandra Derksen entered the cave and descended 57 meters along a passage leading to a large room. They were diving on mixed gases, with oxygen bottles for the final decompression stage on their return. Rather than leaving his oxygen bottle at the -6 meters decompression location, Gaudenzi carried his with him.

When they finished exploring the chamber, they began their ascent to the surface. At the -36 meters decompression stop, Gaudenzi apparently switched mouthpieces and breathed from the oxygen bottle (PO2 of 4.6).

He immediately went into convulsions and lost consciousness, dropping his mouthpiece. Derksen and Roncoli tried to save him, but were unsuccessful. Graham Brink, "Mistake costs diver his life," St. Petersburg Times, 28 April 1999.

Comments: As noted above for the 10 February Wakulla Springs incident, pure oxygen can be toxic at depths greater than -6 meters. Many divers secure their oxygen tanks at the -6 meter level to avoid mistakes. Gaudenzi was an experienced diver, and reportedly had been a cave diver for four years.

24 June 1999

· ***Thunderhole, Florida lost, stranded***

A diver was rescued after being stranded in a small room in the cave for almost six hours. She was an experienced and certified cave diver, but had not been to Thunderhole before. The permanent dive line started about 4 meters below the surface. She entered the water opposite the dive line, and wound up in a small room that is difficult to get out of wearing full diving equipment. Visibility was about 30 centimeters from the surface down to a depth of about 9 meters due to an algae bloom, and she did not realize that she was entering the cave at the wrong spot until she was trapped.

Her dive partner had gone first, taking the correct route, and was waiting for her at a decompression stop at -9 meters. When she did not arrive, he surfaced to check on her. Finding that she was not at the surface, he thought she might have passed him in the poor visibility, so he went back down and searched along the main dive line in the cave. When he did not find her, he surfaced and called for help.

The trapped diver attempted a line search, but her diving reel jammed. She lost her knife trying to free the reel. She then settled on the ceiling and created an air pocket at -3 meters. She breathed from her tanks, and then breathed her exhaled air in the pocket. She could hear vehicles on the surface, and banged on the ceiling to attract attention. A recovery diver entered the water and heard the banging. He was able to locate her in about ten minutes and bring her to the surface. Incident report, International Underwater Cave Rescue and Recovery, www.iucrr.org, 27 June 1999.

17 October 1999

· ***Madison Blue Spring, Florida two fatalities, lost guideline, stranded, out of air***

Richard Siaba and Kevin Lynn, both experienced and certified cave divers, died in Madison Blue Spring when they apparently lost their guideline and were unable to find the route out of the cave. They were found just beyond a constriction in the passage called the Half Hitch, about 850 feet into the cave. When found by recovery divers, their main guideline was reportedly broken, and one of the divers was tangled in the line. They had deployed safety reels of line, apparently searching for the main line or the way out. Apparently they were unable to recover the main line or find the route, and ran out of air. Incident report, International Underwater Cave Rescue and Recovery, www.iucrr.org, 19 October 1999.

20 November 1999

· ***Forty Fathom Grotto, Florida fatality, unknown problem at depth, rapid ascent, decompression sickness***

Vincent James Skaff (32) and partner Daniel Patterson entered the water and descended to -57 meters, intending to follow a diagonal line down to -62 meters. Witnesses reported that Patterson "suddenly shot to the surface without decompressing," and developed decompression sickness. Patterson was taken to a hospital for treatment and later released.

When Skaff failed to surface, recovery divers were called. He was found wedged under a ledge at -47 meters with his buoyancy compensator fully inflated. His equipment was functional and his depth gauge showed a maximum depth of 71 meters. 1. Incident report, International Underwater Cave Rescue and Recovery, www.iucrr.org, 22 November 1999. 2. "Tennessee diver who died in underwater cave is identified," Naples Daily News, 23 November 1999.

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2000 Cave Diving Incidents

6 March 2000

· ***Little River Spring, Florida fatality, siltation, exceeded training***

Michael Hickey (27) and his dive partner entered Little River Spring equipped with double tanks and dive propulsion vehicles. They dropped oxygen bottles for decompression in the cavern zone and then proceeded deeper into the cave, using their vehicles to travel approximately 680 meters back into the cave system. At that point, Hickey reportedly dropped his scooter and silted out the passage. The two divers became separated. Hickey's partner found his way out, but Hickey did not. Rescue attempts were unsuccessful due to the heavy silt conditions. Jeffrey Bozanic, "Cave Diving Fatalities in 2000," Underwater Speleology, v28n2, 2001, p. 6.

Comments: Bozanic reports that both divers were diving beyond their level of training and certification. They held the Intro-Cave Diving certification, which does not include the use of dive propulsion vehicles. He also notes that it had been a year since either had been in Little River, and neither had been diving at all for six months.

11 March 2000

Cenote DOS Ojos, Mexico decompression sickness

While exploring a newly discovered chamber, Jill and Paul Heinerth were forced to end their dive on March 10 at a depth of 95 meters when Jill had trouble with her left sinus. They dove again on following day, and were able to continue their exploration, turning the dive after a maximum depth of 107 meters.

During their ascent, they divers were decompressing at a depth of about 18 meters when Jill Heinerth noticed that the garments under her dry suit had started to pinch and feel uncomfortably snug. Adjustments to the suit did not relieve the discomfort. At six meters depth, the divers entered a dry tank for their two-hour final decompression stage. Getting her 55-pound rebreather system into the tank and adjusting the tight suit required some exertion.

After reaching the surface, Heinerth spent some time resting before climbing the ladder out of the cenote. As she climbed, she felt "extremely fatigued" and realized that she was suffering from decompression sickness. She spent the evening resting and breathing from a tank containing a 70 oxygen mixture.

The next morning, she still felt the effects and decided to go back into the water and repeat the final stages of decompression. Using her rebreather, she spent about two hours at a depth of 13 meters. By noon she was feeling much better. The following day she hiked out from camp and went to a hyperbaric facility at Playa del Carmen, where she underwent three treatments. Jill Heinerth, "An Incident at The Pit," AMCS Newsletter 24, June 2001, p. 86.

Comments: Heinerth felt that the incident was caused by a combination of factors: diving deep on two consecutive days; physical exertion before, during, and after the dive; and the tightness from the suit. She writes that she felt "swept up in the expedition fever" and may have been "doing too much, too quickly." Heinerth further notes that she was initially hesitant to admit that she had made a mistake, feeling that she would be criticized, but feels that it is important for divers to share their experiences so that others can learn from them.

29 May 2000

Little River Spring, Florida fatality, inadequate equipment, out of air

Stephen John Turner (42) drowned while on a solo dive in Little River Spring. He had not told anyone that he would be diving. He was found the next day in the Florida Room, about 330 meters from the cave entrance. When recovered, his single air tank contained 10 Bar. He had two lights, both of which were found with their switches in the "on" position, burned out. He was about ten feet from the permanent guide line. 1. Jeffrey Bozanic, "Cave Diving Fatalities in 2000,"

Underwater Speleology, v28n2, 2001, p. 6. 2. "Diver found dead in cave," Gainesville Sun, 31 May 2000.

Comments: Bozanic notes that Turner had no cave or cavern diving training or certification. He apparently failed to follow the "Rule of Thirds" for air management, and carried only two light sources, neither of which was adequate for use as a primary cave diving light. He passed by an explicit warning sign at the base of the cavern zone, but apparently disregarded its advice.

26 June 2000

Poza de Juan Claro, Cuba four fatalities, inadequate equipment, no line

Jorge Luis (36), Lin Enrique (31), Israel Garcia (32), and Roberta Lagart (33) entered Poza de Juan Claro, a reversing blue hole cave in Cuba. All were certified open water divers, but none had cave diving training or certification. All were using single 80-cubic-foot cylinders (11.5 liters)

. One diver carried two lights, and the others each had one. The cave has a permanent guide line that begins well inside the entrance. The divers did not lay their own line from the entrance to that line. One diver had a dive computer, which indicated a maximum depth of 10 meters. The only place in the cave where that depth can be reached is a small, restricted, silty side tunnel. All four divers were found with their tanks empty. Jeffrey Bozanic, "Cave Diving Fatalities in 2000," Underwater Speleology, v28n2, 2001, p. 6.

Comments: Bozanic observes that the divers violated several basic safety rules: they failed to run a continuous guide line from the surface; they failed to carry three lights each; and they apparently failed to reserve two-thirds of their air for their exit. One diver was found to have a potentially fatal cranial fracture, which may have occurred during the final moments of the dive after he had run out of air.

13 July 2000

Cenote Sabak Ha, Mexico fatality, apparent heart attack

Rafael Mendiburu (55), an experienced and certified cave diver, died of an apparent heart attack while diving in Cenote Sabak Ha. He was exploring the cave with another diver, planning to spend 15 minutes at a depth of -55 meters using open circuit trimix gas. The pair left oxygen cylinders at -6 meters for decompression, descended to -45 meters on air, then switched to the mixed gas cylinders before descending to their planned depth.

After five minutes at -55 meters, Mendiburu signaled to his partner that he wanted to turn the dive. The divers ascended to -150 feet and switched back to air, then continued toward the surface. At -52 meters Mendiburu was having difficulty breathing from his regulator. He switched regulators, but continued to have difficulty. His partner tested the regulator, which seemed to be operating properly. The partner

swam rapidly to a decompression stop at -30 meters while Mendiburu held onto his harness. During this time Mendiburu was clutching at his chest with his other hand.

At -27 meters, Mendiburu released his grip and floated away from his partner. He was located a few minutes later on the ceiling at -12 meters, unresponsive and with his regulator out of his mouth. His partner freed him from the ledge and released him to float to the surface. Ascending to -6 meters he did two minutes decompression before going to the surface to drag Mendiburu to shore. He called for the surface support team to attend to Mendiburu, who was unresponsive and not breathing, and descended to complete his decompression. Mendiburu could not be resuscitated. Jeffrey Bozanic, "Cave Diving Fatalities in 2000, " Underwater Speleology, v28n2, 2001, p. 7.

Comments: An autopsy found that Mendiburu had suffered a major heart attack, as well as a cerebral air embolism. Bozanic notes that the event appears to have been caused by a heart attack while at depth. No cave diving rules were broken. Mendiburu was the President of one of Mexico's leading cave diving organizations, Exploradores Subacuaticos.

17 September 2000

Unnamed well in Goss Canyon, California fatality, breathed bad air in gas pocket

Paul Hayden (38) and his brother entered the cavern at about 11:00 a.m. through an abandoned well shaft, crawling about 15 meters through the tunnel and then 9 meters down a slope to reach a water-filled room. Hayden anchored a rope at the edge of the water for use as a guideline, and prepared to begin his dive. He told his brother that he had two hours of air, and to get help if he did not return within that time. When he did not respond to tugs on the rope, his brother went for help, calling authorities at about 1:20 p.m.

Hayden's body was recovered from a 1-meter diameter tunnel immediately below a gas pocket. A videotape recovered from his camera indicated that Hayden had poked his head into the gas pocket and removed his regulator from his mouth. The camera then recorded a fall to the bottom and no further movement. Hayden's body was recovered with 170 Bar in his air cylinder. Hayden was an experienced open-water diver and a member of an elite Air Force rescue team, but had no cave diving training or certification. 1. Jeffrey Bozanic, "Cave Diving Fatalities in 2000, "

Comments: Bozanic notes that while Hayden violated several classic rules of cave diving safety (exceeding his training and certification, and lacking a proper guideline and cave diving lights), the videotape indicates that the fatality was caused by breathing gas from an "air" pocket that was either too low in oxygen or contained some other gas in a level sufficient to cause immediate loss of consciousness. He observes that the incident underscores the potential hazards of breathing from air pockets in caves.

2 November 2000

Ceita Core, Brazil fatality, deep diving on air

Gustavo Sallum (21) was lost when he failed to return from a solo dive to -60 meters on air. Two other divers were also in the cave exploring a side tunnel, and Sallum was expected to rejoin them at the exit following his dive. When he did not return, the other divers attempted to locate him, but were forced to call their dive due to depth and air supply constraints.

Sallum was later recovered from a depth of 105 meters. When found, he had 110 Bar of air in his tanks and his equipment was all operational. His regulator was out of his mouth, his fists were clenched, and the permanent dive line was tangled around his neck. He had apparently been alert and functioning at -80 meters, because he had negotiated a restriction in the passage at that depth in order to continue. Sallum was certified as an NSS-CDS Full Cave Diver. 1. Jeffrey Bozanic, "Cave Diving Fatalities in 2000, "

Underwater Speleology, v28n2, 2001, p. 7. 2. "Analise do acidente ocorrido em Bonito na caverna Ceita Core," www.scubadu.com.br/acidenteembomto.htm, undated.

Comments: Bozanic notes that the cause of most cave fatalities of experienced cave divers has been diving to excess depth on air. He observes that the clenched fists, air remaining in the cylinders, and regulator out of the mouth all indicate either a convulsion or unconsciousness at depth, possibly due to oxygen toxicity, deep water blackout, or other factors.

23 November 2000

Vortex Spring, Florida fatality, cause unknown

A male diver (age approximately 70) died during a dive in Vortex Spring. He was reportedly in shallow water, and had 190 Bar of air in his double tanks when recovered. It was not clear whether he was in the spring pool or in the overhead environment of the cavern when he died. Jeffrey Bozanic, "Cave Diving Fatalities in 2000, " Underwater Speleology, v28n2, 2001, p. 7.

2001 Cave Diving Incidents

18 February 2001

Royal Springs, Florida two fatalities, no guideline, out of air

Mark Granger (19) and William Ridenour (34) entered Royal Springs at about 4:30 p.m. Both held certifications for open water diving, but neither had any training or certification for cave or cavern diving. Granger had just received his open water diving certification that morning. The men came to the spring in the company of their diving instructor and another diver, planning to spend some time exploring the spring pool while the instructor retrieved a concrete anchor from the pool.

The instructor and his partner made one dive and retrieved the anchor. Each team then took a flashlight and prepared to dive, intending to explore the spring pool. As they descended, the instructor's partner had trouble equalizing, so the instructor stayed with him. By the time they got down, Ridenour and Granger had entered the cave, and visibility in the cavern zone was zero.

The instructor found the entrance to the cave and had his partner stay there while he swam a short distance inside to try to find the other divers. When he was unsuccessful, he and his partner surfaced, and the partner was sent to call for help. The instructor returned to the cave entrance where he waited, flashing his light and banging rocks in the hope that Ridenour and Granger would hear or see the signals and make their way out. He kept signaling for about 45 minutes until rescue divers arrived to relieve him.

The rescue diver tied off a line and searched the cavern zone (still in zero visibility) and about 12 meters into the cave. He then tied off his reel and left it for the two missing divers to exit on if they should find it. Additional cave divers entered the water at about 6:30 p.m. and searched the first 90 meters of passage in the cave, but did not find the missing pair. Due to the poor visibility, elapsed time, and concerns for the safety of the rescue divers, rescue efforts were suspended until the next day.

When the search was resumed the next morning, the recovery divers found indications that Ridenour and Granger had entered a small side tunnel about 100 meters into the cave, accessible only with side-mount gear. When the tunnel was searched, Granger's body was found about 150 meters into the cave, with Ridenour about 12 meters beyond, at the end of the small tunnel. Their air cylinders were empty. Recovery divers brought both men to the surface. 1. Gordon Jackson, "Two die in Suwannee cave dive, "

Jacksonville Florida Times-Union, 20 February 2001.

2. Gordon Jackson, "Diver says pair knew risks, "

Jacksonville Florida Times-Union, 23 February 2001. 3. Cindy Swirko, "Two cave divers are found dead in area springs, " Gainesville Sun, 21 February 2001. 4. Accident Report, International Underwater Cave Rescue and Recovery, Underwater Speleology, v28n3, 2001, p. 4.

Comments: The incident report notes that the two men violated several basic safety rules. They were untrained in cave diving, and were diving beyond their training and certification. They did not run a continuous guideline from open water, and did not reserve adequate air for emergencies. They had only one light between them.

26 February 2001

Cenote Escondido (Mayan Blue), Mexico fatality, left guideline, out of air

Ron Fraga (46) drowned after running out of air when he apparently was unable to find his way out of the cave during a solo dive. He had completed an earlier dive of the A-Tunnel and the parallel Death Arrow Passage with his wife Nancy, and decided to make a second dive solo with a fresh set of tanks. His stated intention was to dive the A-Tunnel until he reached his 2/3 air mark and then exit. Fraga started his dive at 2:18 p.m. When he had not returned two hours later, his wife became concerned and went for help. Rescue divers were called, and arrived at the cave at about 5:30 p.m. After agreeing on a plan of action, they entered the cave, following Fraga's primary line along the A-Tunnel. They encountered an abnormal amount of cloudy water, which was attributable to two earlier dives in the A-Tunnel that day.

About 330 meters into the cave and 21 minutes into the dive, they spotted Fraga's body. He was about 21 meters from the main Gold Line in an area where several offshoot lines separate from the main line. His double tanks were empty. He was lying on top of one of the offshoot lines, facing toward the Gold Line. The water was clear. There was no temporary jump line connecting to the main line.

The divers followed the offshoot line 75 meters down the passage to a room where it looped back to join the A-Tunnel. There was also no temporary jump line at that location. 1. Incident report, International Underwater Cave Rescue and Recovery, 27 February 2001. 2. "Cave Diving Accident at Cenote Mayan Blue, " www.scubadu.com/br/acidente_em_tulum.htm.

Comments: The incident report notes that no one can be sure what happened, but it appears that Fraga became disoriented and could not find his way out. He had failed to maintain a continuous guideline to the surface, and was not fully equipped for a solo dive. Fraga was a certified cave diver, having completed his certification four years earlier, and had logged 125 cave dives.

26 February 2001

Clarksville Cave, New York fatality, stuck, inexperience, out of air

Robert Svensson (23), Jonathan Allison (23), Joseph Baj (24), and Michael Chu (22) entered via the Ward Entrance at about 7:00 p.m. planning to clear rocks and debris from the entrance to the sump passage in the Lake Room leading to Pauley's Avenue. All were experienced in dry caving, but none had any training or certification in cave diving. Allison and Baj had been certified in open water diving less than a year earlier, and Svensson had not yet completed his open-water certification. Chu was not a diver. Svensson had reportedly completed two sump dives at another location.

The group carried their diving equipment through about 300 meters of dry passage to the Lake Room, where a 3 meter deep pool hides the 100 cm X 50 cm high opening to Pauley's Avenue. Svensson, Allison, and Baj each used knife straps and a waist belt to fashion a thigh attachment system for a pony air bottle, regulator, octopus, and console. Other than masks, wetsuits and a single 4-AA flashlight strapped to the forearm, no other diving equipment was used.

The three divers took turns in the pool clearing debris from the passage opening. There is little flow in the sump, and the water was soon full of suspended silt, with zero visibility. Allison went down several times, and Svensson and Baj each made two trips into the pool. Allison had 25 Bar showing on his tank (1/7 full) and Baj had 115 Bar (3/5 full) on his. Svensson had 80 Bar (1/3 full) remaining, and decided to make one more dive.

Svensson was down for several minutes when his bubbles stopped coming to the surface. The others were not alarmed at first, figuring that he had gone into the passage and that the bubbles were being captured there. When several more minutes passed with no sign of activity, they became concerned. Allison went into the water and searched for Svensson, feeling around until his tank was empty and he had to surface. Baj then entered the pool and also searched for several minutes, but could not find Svensson.

Chu left the cave to call for help, while Allison took Baj's tank and continued to search. This time he was able to find Svensson's feet in the entrance to the passage. He was able to move Svensson about a foot, but could not get him out. After two more attempts to get Svensson out, Allison's air supply was again exhausted. He made several more free dives, trying to pull Svensson out of the passage, before determining that the situation was hopeless.

Fire department and cave rescue personnel soon arrived, and called in trained cave divers to assist. Svensson was jammed in the tight passage, and his body was not recovered until three days later, after pumps were used to lower the pool and expose the entrance of the passage. Rescuers were then able to free his body and bring him out of the cave.

It was not clear how Svensson became trapped, but from the position of his body it appeared to rescuers that he became stuck when he tried to back out of the tight passage. This could have been due to rocks or obstructions shifting in the passage, or it could be that he was unable to maneuver his body around the bends and turns or past the overhang at the entrance to the passage. Unfortunately, he did not have enough air to allow him much time to deal with the situation. 1. Mike Martuscello, "Clarksville Cave Dive Accident Profile," *Northeastern Caver*, v32n1, March 2001, p. 11. 2. Mike Martuscello, "Clarksville Cave, NY Death Accident Profile," *Underwater Speleology*, v28n2, 2001, p. 19. 3. Jake Ko-walski and Jill Bryce, "College student dies in cave: Divers attempt to recover body," *Schenectady Daily*

Gazette, 28 February 2001, p. A1. 4. Bruce A. Scruntion, "Divers enter cave to recover body," *Albany Times Union*, 27 February 2001. 5. Bruce A. Scruntion, "Diver's body trapped in cave," *Albany Times Union*, 28 February 2001. 6. Bruce A. Scruntion, "Diver's body pulled from cave," *Albany Times Union*, 7 March 2001.

Comments: Martuscello notes that "virtually every cave diving rule was broken on this dive." The divers were exceeding their training and certification. They did not run a continuous guideline from the surface. Svensson had only one light source, and did not follow the standard cave diving rule of thirds for air management. Martuscello further notes that the rule of thirds is not considered to be conservative enough for Northeastern sump diving, where a rule of sixths is often used, and that Svensson's air level indicated that it was time to exit the water, not begin a dive.

The incident report notes that the choice of equipment was not entirely unusual for the circumstances, explaining that the very restrictive, cold, and zero-visibility passages require one to use very specialized methods to safely dive such sumps. The goal is to get through the water-filled portion and into dry passage safely, and weights, buoyancy compensators, fins, etc. are sometimes considered luxuries. Svensson did not have the necessary training to safely use the techniques and equipment he was using or to dive safely in the environment where he died.

1 March 2001

Andros Blue Hole, Bahamas fatality, cause unknown

A diver entered the Blue Hole wearing double 12 liter back-mounted tanks. When he failed to return in a reasonable time, the captain of the diving vessel alerted authorities. A recovery diver was dispatched to the scene, where a guideline was found leading into passage at a depth of 78 meters. The end of the line appeared to be frayed. A search of the immediate area failed to locate the diver. Incident report. Internat

ional Underwater Cave Rescue and Recovery, www.iucrr.org, 2 March 2001.

5 May 2001

Emerald Sink, Florida fatality, inexperience, lost, out of air

Jason Bums (23) was diving with a group of friends and was about 90-100 meters into the cave when the divers turned out their lights to see how dark it would become. When they turned the lights back on, Bums' dive partner saw a light ahead of him and thought it was Bums. When the group reached the entrance, they realized Bums was missing and re-entered the cave to search for him. When they were unsuccessful, they left the cave to call for help. They encountered a group of divers from the Woodville Karst Plain Project at the entrance. The WKPP divers made two attempts to locate Bums. His body was found the next morning, about 300 meters into the cave, lying on the main guide line. He had run out of air. 1. Rosanne Dunkelberger, "Body of missing diver found,"

Tallahassee Democrat, 7 May 2001. 2. Incident report. International Underwater Cave Rescue and Recovery, www.iucrr.org, 7 May 2001.

Comments: Bums was certified as an open-water diver, but neither he nor any of his companions were cave or cavern certified.

7 May 2001

Devils Ear Spring, Florida fatality, out of air

Steve Berman (40) failed to return from a solo mapping and exploration dive to a remote section of Devils Ear at Ginnie Springs. Recovery divers found his body about 1000 meters into the cave at a depth of 33 meters. He had apparently run out of air.

Berman was found next to his guideline, with all his lights and equipment in working order, but with his air tank empty. His dive propulsion vehicle was about 40 meters away, in the direction of the entrance. A stage bottle of air was clipped to the scooter. Another stage bottle was found clipped to the main guideline about 700 meters into the cave. 7. Incident report, International Underwater Cave Rescue and

Recovery, www.iucrr.org, 10 May 2001. 2. EdDady, "For the Bermeister, " Underwater Speleology, v28n4, 2001, p. 4. 3. Kathy Ciotola, "Prominent cave diver found dead in Gilchrist, " Gainesville Sun, 9 May 2001. 4. Mike Branom, "Cave Divers Get Thrills, Dangers, " Associated Press, 5 August 2001.

Comments: Berman was a cave diving instructor with over 13-years of cave diving experience and more than two thousand cave dives in his log, including hundreds at Ginnie Springs and Devils Ear. He had all the right equipment, carried three diving lights, maintained a continuous guideline, and had all the training and experience in the world. He chose to dive solo, as many cave divers do, so no one knows what happened. Something went wrong, and he didn't make it back.

23 June 2001

· Ginnie Springs, Florida fatality, inadequate equipment, intoxication

Christopher Hill (23) and two friends decided to go swimming in the spring sometime after 11:00 p.m. Hill wore a mask and fins, and carried a handheld flashlight. When his friends got tired and left the water. Hill stayed in. The friends became concerned and called for help when Hill failed to surface and they could no longer see his flashlight. A diver was summoned to search the spring. Hill's body was found in 10 meters of water at the mouth of the cave. Witnesses told police that he had been drinking prior to the incident. 1. Gordon Jackson, Another drowns at Florida cave site, "

Jacksonville Times-Union, 25 June 2001. 2. Karen Voyles, Graduate student dies in springs dive, "

Gainesville Sun, 26 June 2001. 3. Thomas B. Pfankuch, Underwater caves carry enormous risk to divers, " Jacksonville Times-Union, 2 July 2001.

5 August 2001

· Great Blue Hole, Belize fatality, cause unknown

Dr. Rueben Delgado (43) and his two sons were diving with a group exploring the Great Blue Hole at Lighthouse Reef. All the divers in the group were accounted for at -40 meters and again at -80 feet during the ascent. At about -8 meters one of Dr. Delgado's sons noticed that he was missing and notified one of the dive masters. The dive master began an immediate search, and was joined minutes later by other divers from the dive boat. Their search was unsuccessful, as were later searches using a mini-submarine. The Great Blue Hole is over 120 meters deep. 1. Press Release, Ramon 's Village Resort, 6 August 2001. 2. "Miami Physician Dies in Blue Hole Diving Accident, "

Belize First, www.belizefirst.com/current.html, 8 August 2001.

26 October 2001

· Jackson Blue Spring, Florida fatality, cause unknown

Jonathan Gol (46) had completed a dive in the cavern zone and was decompressing at -6 meters when he lost consciousness. He was quickly pulled from the water, but could not be revived. He had used compressed air during the active portion of his dive, and switched to another bottle for decompression. Later examination of the decompression bottle suggested that it might have been filled with 100 helium rather than oxygen. The valve had come loose, however, and the bottle was empty and had apparently become contaminated with air before it was tested, so no definitive answer could be determined. There was some concern that Gol might have had a problem related to a serious illness he had suffered several weeks earlier. An autopsy reportedly found no indication of physical problems that might explain the incident. Incident report, International Underwater Cave Rescue and Recovery, www.iucrr.org, 2 November 2001.