



Handout for Electric Shock Drowning; A Silent Killer

Presented by:
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Objectives



- Understand Electric Shock Drowning (ESD), and what causes it.
- Review codes and standards in place to minimize risk.
- Discuss strategies to improve personal safety around docks and marinas.

Handout Material



- Handout materials include:
 - Electric Shock Drowning Incident List
 - An anecdotal compilation of injuries and fatalities in and around water due to electricity.
 - There is no official database or listings for this area.
 - “In-Water Shock Hazard Mitigation Strategies”
 - A USCG study to evaluate the nature of electrical current leaking into the water around docks and marinas.
- A full copy of the final presentation will be made available after the conference.
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Thank You

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Electric Shock Drowning Incidents – Marinas©

(In-Water electrocution fatalities included)

Rev. 3/24/14

Jim Shafer, the originator of this list is currently unable to participate in this area. Contact David Rifkin for more information.

Low level ground fault leakage in the marina AC shore power system can cause lethal potentials to appear on any underwater metal surface – either on a boat or on the dock. In fresh water the electric field surrounding this surface can paralyze a swimmer. There is no warning that this condition exists, and it has resulted in a number of drownings. Further, there is no post-mortem evidence that electric shock was the cause. Therefore, many of the fatalities listed below are only the *known* electric shock caused drownings, which were investigated because of circumstantial evidence, i.e., multiple deaths, eye witnesses, considerable distress, cries for help, shock sensation reported by rescuers, etc.

Our studies have shown that, in salt water, the high voltage gradients required for electric shock drowning could not be established with the available fault current levels. In no cases can we attribute cause of death to electric shock drowning in salt water.

We do not know the exact wiring errors or ground faults that created some of the incidents listed below, but it can be assumed that an energized AC conductor (L1 or L2) came in contact with a bonded (grounded) metal object, and coincidentally, this object was *not* connected to the shore bonding (grounding) system. This caused a voltage to appear on these under-water metal objects (both on boats and docks). This created a lethal electric field around the object (a person in this electric field can be paralyzed leading to drowning, or electrocuted directly). This was true in every case that was investigated.

No database has been found that catalogs “Electric Shock Drowning” – our term for this phenomenon. The incidents listed below came from various sources, i.e., investigation, press, third party, and eye witness reports. Dates and details are missing for some. There is no way to know what fraction of the total fatalities this listing represents, but it may be reasonable to assume that it could be small. We have no reports of fatalities in salt water due to electric shock drowning.

Some of the fatalities listed here were actually caused by ventricular fibrillation (electrocution), because the victim’s head was reported not to have been submerged. They are technically not drownings but are listed here since the causes are similar to drowning by electric shock.

ELECTRIC SHOCK DROWNINGS

1. July 25, 2013 Ellijay, GA. A 19 year old girl was electrocuted after a power outage at a home where she was watching a 5 year old girl. A power line came down about 25ft from the house. She went outside to investigate the power outage and either stepped in puddle of water or soggy ground. The voltage gradient from the downed power line was enough to electrocute her.
2. July 19, 2013 Syracuse, NY. A 12 year old girl was electrocuted while filling an inflatable pool in her backyard. Witness say she picked up an extension cord or electric pump plugged into a receptacle, and began shaking. She then fell into the pool. Rescuers received shocks trying to get her out of the pool. Although not mentioned, it was likely that the receptacle was not protected by an operable GFCI as required by the National Electric Code for all outdoor receptacles.
3. July 17, 2013 Davidson County, NC. An 11yo girl was electrocuted in a swimming pool. It was reported that a power line wire came down in the parking lot near the pool. The girl touched the ladder of the pool and was shocked. Rescuers trying to help the girl were also shocked. Electricity was likely flowing from the downed wire into the earth, and passed through the pool enroute to its source.
4. July 4, 2013 Eagle Lake in Orrick Township, Sherburne County, MN. A man was holding a plugged-in battery charger while standing in 20" of water. He was preparing to connect the charger to his houseboat. He slipped and immersed the charger which resulted in a severe electrical shock. He died on 7 July. A woman who went to his aid was also shocked and unconscious but was revived at the scene. It is unknown whether the charger was properly grounded.
5. June 30, 2013 Pulaski County, KY, near South Fork of Lake Cumberland near Garland Bend. A man swimming at a private dock reaches up to pull a ladder down to exit the lake. The ladder contacted a frayed electrical wire energizing the ladder. The man was electrocuted, but was able to move his 2yo son out of danger. Others felt shocks trying to help the man.
6. May 20, 2013 Grayson County, KY, Rough River Lake. A 36yo man and one of his dogs were lost near a marina boat slip. He jumped into the water when the dog was having problems. Witnesses report the man's eyes rolled back and he went under the water suddenly. Inspectors found a shore cord (with a submerged coupling between two cords) was energized and reported this was the cause of the electrocution. The man was reportedly 10-15ft from the houseboat. They found multiple NEC violations at the marina.
7. Sep, 2012 Americus, GA, South Georgia Technical College. A 19 year old woman was electrocuted in a fountain pond while retrieving her young son's ball. Efforts to assist her were thwarted by others receiving electrical shocks. Investigators found 17 violations in the electrical supply to the pond. One month earlier another student reported shocks (the pond was only drained and cleaned as a result).
8. Aug 30, 2012 Bingham County, Idaho. Two men and a woman were electrocuted in an irrigation ditch. The woman went in to rescue a dog, and the 2 men tried to rescue the woman. A faulty irrigation pump was responsible for this tragedy.
9. Aug 22, 2012 Los Angeles, CA. A man speeding in a car hit a fire hydrant and electrical pole. The energized from the pole ended up in the large puddle created by the broken fire hydrant. 2 women were electrocuted when they entered the puddle to try and assist the driver.

10. July 25, 2012 Tampico, IL. A 14 year old boy and girl were electrocuted while detasseling corn in an IL cornfield. A lightning strike is suggested to have destroyed the grounding system for an irrigation pump. A fault in the pump then leaked electricity into the ground creating electrical gradients across puddles and other wet areas.
11. July 25, 2012 Cohasset, MN, Pokegama Lake. Two men and a woman were shocked by an extension cord in the water, presumably from a boat lift. One of the men could not be revived and died. The other two were hospitalized in serious condition.
12. July 7, 2012 Lake of the Ozarks, MO. A 26 year old woman was swimming with her 2 stepbrothers when the brothers felt a tingling. The boys swam to one dock and were unharmed. The woman swam to a different dock, apparently where there was faulty wiring. She may have been electrocuted when she touched something metallic on this dock. She could not be revived at the scene.
13. July 4, 2012 Lake of the Ozarks, MO. A 13 year old girl and her 8 year old brother were killed by electricity while swimming near a private dock. Officials said the dock was not protected by a GFCI as required. The electrical fault may have come from a boat lift or a water slide pump.
14. July 4, 2012 German Creek Marina on Cherokee Lake, Bean Station, TN. A 10 year old and 11 year old boys were killed by electricity in the water at a TN marina while swimming between 2 docked houseboats. An 8 year old girl also swimming with the boys was shocked but pulled to safety. Several adults and another 12 year old boy were shocked trying to rescue the 2 boys. Faulty houseboat wiring on one of the boats is believed to be one of the causes.
15. June 27, 2012 Celebration, FL. An 11 year old girl was electrocuted when she reached into a mini golf pond at an Orlando, FL resort to retrieve a golf ball. A man trying to help her was also shocked. The cause was faulty pond pump that was not protected by the required GFCI. Water came in contact with the pumps windings and electrified the small cement pond on the mini golf course.
16. May 5, 2012 Lake Sinclair, Putnam County, GA. A 25-year-old woman was apparently electrocuted when she reached from the water and touched either a box or bare wire on the dock (it was being worked on at the time). Another woman in the water was shocked when she pulled the 25 year old away from the dock and held her head above water. She could not be revived at the scene.
17. Aug 15, 2011 Traverse City, MI, Clinch Marina. An 18 year old boy died in West Arm Great Traverse Bay when an electrical fault (reportedly from dock wiring) caused current to enter the water where the boy and a friend were swimming. The friend reported feeling electricity in the water. "No Swimming" signs were posted in some locations in the marina.
18. May 28, 2011 Lake City, MN. A 50 year old man was electrocuted in Lake Pepin near a boat lift which had exposed wiring. His dog was in the water and was shocked and began to sink. Another man jumped in to rescue the dog but was shocked (he escaped the water). The 50 year old man then jumped in for his dog and appeared to have been electrocuted.
19. July 26, 2010 Lake Freeman, Carroll County, IN. A 13 year old boy was swimming with 3 other children when they started to feel a tingle. The 13 year old attempted to exit the water at the dock but fell back into the water. The other children managed to exit the water. A water-soaked electrical junction box was located on the dock nearby and is the likely source for the electrical current in the water.

20. July 14, 2010 Pella, IA. Two boys, 15 and 16 years old drowned in a local swimming pool. The electrical supply for the pool lights has been suspected as being faulty. The lights were supposedly secured several years before. The boys were non-swimmers. Electric shock is a possible cause of death in this case. The investigation continues.
21. July 10, 2010 York, SC. A 54 year old man died after jumping into a swimming pool to help his granddaughter. The granddaughter was receiving a shock from the pool's railing when the man jumped in to help her. He grabbed the pool's railing and reportedly "stuck" to it. His grandson reported that he had felt electricity in his chest when near the edge of the pool (until a light was turned off). Electric shock is the probable cause of death.
22. June 21, 2010 Smith Lake, Birmingham, AL. A 16 year old boy was climbing a dock ladder when he suddenly fell back into the water. He was immediately unresponsive when recovered by friends. Electrocutation (from an energized dock ladder) is suspected as a possible cause of death.
23. June 2010 Lake Waccamaw, NC. A boy was killed swimming near a boat lift. A the owner was told by another child that he was feeling tingles in the water. The owner reached up, touched the boat lift and was shocked. He told the other kids to get out of the water. After exiting he noticed one boy face down in the water. He could not be revived at the scene. There was an open ground in the lines from the house to the dock, and one of the small junction boxes under the dock was filled with water. The cause may have also been a fault to the lift motor.
24. May 29, 2010 Stonewall Jackson Lake, WV. A 15 year old boy was climbing onto the swim platform of a boat. When he touched the ladder he received an electrical shock and he fell back into the water and reportedly drowned. A girl still in the water felt the shock and was treated and released from a local hospital. Cause was improper repair of the pedestal end of shore cord (hot and ground were reversed). It is likely this was an electrocution rather than a drowning.
25. August 23, 2008 Lake Hamilton, Hot Springs, AR. 14 year old girl swimming near a metal swim ladder with a 7 year old boy and his mother near by. Without warning the boy began to scream and his mother became incapacitated on the swim ladder. As the girl attempted to help the boy she sank out of sight. The boy's father pulled him to safety and helped his wife onto the dock. Preliminary investigation revealed an unbonded metal pole, welded to the dock, on which was mounted a halogen light, which had just been turned on by its photo cell, and had an AC fault due to chafed wires which energized the dock frame and ladder. Boy and mother required hospitalization. Voltage to ground on the ladder measured at 103 VAC. The girl was recovered later that night.
26. July 28, 2007 Lake of The Ozarks, MO Twenty four year old female attempted to exit the water using a metal ladder at the end of a private dock. She apparently experienced a paralyzing electric shock which caused her to fall back into the water and drown. Several people had reported being shocked by the ladder and the dock owner had gone to shut the power off. The dock power wiring termination was found submerged under the dock near the exit point.

27. July 24, 2006 Lake Lanier, Cumming, GA. Seventeen year old boy in water near a private dock, working on a jet ski with two friends, was overcome by electric shock. Extension cord with damaged insulation caused the metal dock to become energized. Friends also shocked, and partially disabled, could not help their friend. Father of victim fought paralyzing shock and pulled unconscious son away from dock – he could not be resuscitated. Investigation planned.
28. July 14, 2006 River Street Marina, Port Huron, MI. A 20 year old man jumped, or fell, into the water from the pier behind a 29' boat, moored stern too. He became disabled as he attempted to climb onto the swim platform. Two friends attempting to pull him onboard reported being shocked. He could not be resuscitated. Shock induced ventricular fibrillation likely cause of death. The next day an inspector reported 107vac in the water behind the boat. Subsequent investigation confirmed the voltage behind the boat. The cause was an AC to DC fault in the battery charger energizing the underwater gear and no AC to DC bonding connection.
29. June 24, 2006 Brady Mountain Resort, Lake Quachita, Hot Springs, AR. A 14 year old boy died from electric shock while swimming near a houseboat. A friend was also shocked and taken to a hospital and released. A man jumped in to help and was rendered unconscious but was unharmed after regaining consciousness. The cause appeared to be inserting a shore cord with a 30A/125V (L5-30) plug (with the grounding pin bent back) into a 50A-125/250V receptacle in such a way so as to energize the neutral, which was connected to the bonding system, thereby energizing the hull.
30. June 10, 2006 Lake Michigan, Racine Harbor, WI. A 56 year old man was killed when he went swimming from the stern platform of a boat. Inquest listed death as "Accidental Electrocution" and did not establish a root cause. Victim's wife stated that the Reverse Polarity light flickered on and went out when power applied to vessel. Comment: A reverse polarity situation along with a grounded neutral can energize underwater metals on a boat.
31. May 22, 2006 Weiss Lake, Cherokee County, AL. A 24 year old young man was killed while in the water near a pier. He was attempting to rescue his friend who had become paralyzed by an electric shock while trying to exit the water via a metal ladder. Another friend was also disabled by shock as he entered the water to assist. The two young men, who were shocked, were not seriously injured. There was an electric windmill on a metal tower attached to the ladder, and was apparently powered by an incorrectly modified extension cord, and which may have been connected to a non-functioning GFCI outlet. A bystander on the dock pulled the power cord just in time, or there may have been two more victims. Investigation underway.

32. Mar 18, 2006 Summerset Lake near Desoto, St. Louis, MO. In the early evening a teenage boy became paralyzed by electric shock, and drowned, while attempting to swim toward a metal ladder attached to a private dock. Two friends were rendered unconscious but were resuscitated and required hospitalization. During several investigations, initially and over the next months, it was determined that the dock wiring was properly installed, the metal dock frame and ladder were bonded, and no loads were operating at the time of the accident. However, clamping the dock supply cable with an AC ammeter disclosed 10 amps flowing (likely in the ground wire) and 4-6 VAC was measured approximately 2 ft. away from the ladder on several separate occasions. The subsequent legal action resulted in a jury finding the local utility at fault. It seems that a near-by underground power distribution cable had a defective (or missing) neutral which caused the neutral current to seek a path back to the substation through the earth and into the lake. This earth leakage current concentrated at the bonded swim ladder resulting in a lethal gradient of more than 2 V/Ft near the ladder. These earth leakage currents are fairly common but this is the first serious incident we have recorded due to this phenomenon.
33. June 27, 2005 Scott's Creek Marina at Cave Run Lake, Moorhead, KY. A 19 year old girl drowned, while in the water near a houseboat, due to electric shock caused by a battery charger in the engine compartment which had become partially submerged and energized the hull. Owner had rewired the boat with no bonding system. Another girl sustained burns on her legs while reaching into the water to help the victim. A nearby rescuer swam toward the scene and was shocked and paralyzed by the electrical field. Only two feet from the victim he had to turn around and swim out of the field to survive.
34. Sept. 2004 Lake Of The Ozarks, MO 22 year old male stepped on an electrical cable upon exiting the water after swimming behind a private residence – fell face down into water unconscious – could not be revived. No information on cable.
35. Sep 13, 2004 Ross Barnett Reservoir, Ridgeland, MS. A 16 yr old boy was swimming in the marina when he approached a houseboat. He screamed as if in pain and disappeared under the water. He could not be revived after divers recovered his body. A friend in the water also felt a shocking sensation. The cause was a home made shore cord, hard wired to the panel which was passed through a hole in sheet metal siding with no chafe protection. The insulation was cut by boat motion and shorted the hot conductor to the siding. The siding was not adequately grounded to the shore grounding system but was connected to the boat's bonding system, which caused the hull to go up in potential killing the boy.
36. Aug 8, 2004 Lake Travis, Austin, TX. Young man, in good health, swimming, in evening, unobserved, between two sections of marina dock – disappeared. Came to surface two days later. No toxic substance found on post mortem, but Joule marks (electrical contact points) found on right wrist and left leg and shin. Suspected electric shock drowning. Accident under investigation. (See follow-up, last page)
37. June 19, 2004 Lake Waccamaw, NC Ten year old boy drowned while swimming with friends near a private dock boat lift that had just been raised from the water. An adult reported a heavy shock when touching the lift and several children in the water reported being shocked. Victim was noticed motionless face down nearby – could not be revived. Lift frame had become energized and the bonding conductor from the supply panel was not connected.

38. June 5, 2004 Lake Wylie, Charlotte, NC. Two young boys swimming at bow of houseboat called for help. Father of victim and friend rushed forward – boy on ladder said he was being shocked, other boy in water not moving. Friend rushed aft to pull shore cord as father went onto water – his son could not be resuscitated. May not be exact sequence. Causes of energized hull were substantial errors in wiring on the dock as well as on the boat, apparently done by non qualified individuals.
39. Aug 3, 2003 Bull Shoals Lake, Bull Shoals, AR. Diver found Aug. 5 in shallow water 8 ft. from his dock, drowned. Incorrectly wired dock junction box caused 117 VAC to appear on metal dock components. Rescue diver reported feeling shock sensation 20 ft. from dock!
40. June, 2003 Allatoona Lake, GA. Six wildlife fatalities (ducks!!) Houseboat pulled away from the dock and still connected shore power cord separated in middle and fell into water. Six dead ducks found floating nearby.
41. May, 2003 Cape Coral, Florida. Double drowning, section of re-bar driven through power cable to back yard boat lift caused line potential to appear on lift frame, salt water. Ventricular fibrillation likely cause of death – not confirmed.
42. May 31, 2002 Lake Cumberland, Monticello, KY. Double drowning, fault on houseboat, fresh water. 125V plug at boat end of shore cord rewired by owner for 220V – L2 connected to “GR” pin - ground lead in 4 wire cord cut and taped off! Hull rose to line potential.
43. March, 2002 Bay Marina Boat Works, Biloxi, MS. Some electrical work had recently been done at this yard, which resulted in reverse polarity connections at the shore cord receptacles for the stored boats. Over a short time period several boat owners reported being shocked as they worked on their boats, and one owner was electrocuted. The possibly of a missing ground combined with a ground- neutral connection on the lethal boat was not investigated.
44. Sept.15, 2001 Farr Shores, Lake Hamilton, Hot Springs, AR. Girl receiving electric shock after water-sliding into water at stern. Man attempting rescue drowns. Reverse polarity, neutral to ground fault in a light fixture on the boat, and poor bonding to the service caused the accident, fresh water. Boat unplugged in time to save girl.
45. June 6, 2001 Residence, Timber Ridge Dr., Dumfries, VA, Lake Montclair. Two young boys entered water near pontoon boat. Battery chargers (2) connected to modified extension cord from house. Electric shock drowning – cause of energized hull not reported.
46. May, 2001 New Orleans, Electrocutation – Boy using conveyor to transfer shrimp – no ground, salt water.
47. Apr 10, 2001 Norris Lake, Lafollette, TN. Two teenage boys swimming behind house boat. One boy climbed onto swim platform complaining of feeling severe shock – other boy fell back from ladder– his head *not* below water (ventricular fibrillation?). Could not be resuscitated. Damaged power cable to boat, black lead energized hull, ground wire burned in two – breaker did not trip due to incorrect connection (may not be exact sequence).
48. 2000 or 2001 Put-in-Bay, Ohio, Grand Banks 42. Owner’s prescription sunglasses went overboard. Young bystander disappeared while trying to retrieve glasses, electric shock drowning.
49. Sept.30, 2000 Tims Ford Lake, Winchester, TN. Two boys (21&22). Electric shock drowning. Rescue diver felt electric shock Live wire in water near dock.

50. Aug 1, 1999 Multnomah Channel, Portland, OR. 8yr old boy tubing with friends in freshwater marina along slow moving river. Boy decides to swim to dock (was wearing type 3 life vest). Suddenly he rolled over on back near the stern of a boat. Mother enters water and helps get boy on dock (she felt tingle in water). Diagnosed as electrocution (head was above water almost all the time). Cause was AC to DC short on boat and no connection between AC ground and DC ground. 84vac measured behind stern upon subsequent investigation.
51. July, 1999 Lake Mohave, AZ. Young man swimming toward stern of a house boat became disabled and drowned, fresh water. Boat had a neutral-ground bond. Home made shore cord "Y" became partly disconnected causing hull to become energized. 17vac measured behind stern-drive.
52. July18, 1999 Cedar hill Lake, Smithville, TN. Two young boys, with flotation devices, were discovered in water, face down, a few feet behind a houseboat. 7 year old could not be revived. 8 year old recovered. Electric shock drowning suspected.
53. July, 1999 S. Carolina, single drowning – 3 feet of water, woman in great distress, husband attempts rescue and drowns, fresh water.
54. Approx. 1999 Rio Vista, CA. Several boys reported a tingle while swimming in this fresh water marina and got out of the water. A short time later two other boys, 8 – 10 years old, drowned at the same spot. Forty-year-old power wiring running under moored boats found to have substantial fault to ground because of insulation failure.
55. Sept., 1998 Lake Sonoma, CA. Single drowning, young girl in great distress, fault on dock, fresh water.
56. Approx. 1998 AF Base, Washington, DC, boy walking on ice slipped and grabbed exposed wires on dock that were supposed to have been de-energized, electrocuted.
57. July, 1997 Lake Mead, NV. Single drowning, fault on houseboat, freshwater.
58. Feb. 1995 Bolling AFB, Washington, DC. Young boy reaches from water and grabs support structure for electrical junction boxes receiving lethal shock. Bare energized wires found touching metal case inside junction box. Grounding wire had been cut and never reattached to the junction boxes.
59. Approx. 1994 Texas, single drowning, fault on boatlift, salt water. Cause of death not available.
60. Sept., 1993 Oklahoma, single drowning, fault in submersible pump, fresh water.
61. August 1993 Alexandria Bay, NY. Double drowning. Two teenage girls snorkeling near dock were paralyzed by electric shock and drowned. Fault was in dock wiring knawed by rodents. Two bystanders entered the water to lend assistance, but were shocked by the voltage in the water (they were treated at hospital and released).
62. July, 1993 Oklahoma, single drowning, fault in dock lights – energized dock frame, fresh water.
63. May 11,1991 Lake Hamilton, Hot Springs, AR. A canoe carrying four young boys tipped over a few dozen yards from a dock. As they swam toward the dock they felt a light tingle. Three of the boys diverted away from the dock while the fourth boy continued into the electric field and drowned. Cause was broken insulation on a dock wire hanging in the water.
64. July, 1991 Oklahoma, single drowning, fault in dock wiring, fresh water.
65. Dec., 1989 Oklahoma, single drowning, fault in submersible pump, fresh water

66. April 23, 1988 New York State University at Albany. Sophomore waded into a pond on campus and was electrocuted. Several others injured in rescue attempt. Cause was broken electrical cable under the ground.
67. July, 1988 Park Township, MI, Lake Macatawa, Bay Haven Marina. 18-year-old boy falls off dock, in great distress, two attempts to assist thwarted because of severe electric shock as rescuers entered water.
68. 1987 or 1988 A) Gross Pointe Yacht Club, single drowning, diver, fresh water
B) Petosky, MI, single drowning, diver, fresh water. NOTE: Both incidents relayed 3rd hand.
69. July 29, 1986 Harrods Creek, Lexington, KY – Ohio River. About 2030 two dogs jump into water from owners 20 ft. runabout, and were observed to be in great distress. Owner’s wife jumps in to help and was immediately in trouble. Husband goes in to save his wife – both drown. Rescuers felt strong electric shock and could not approach victims, but were able to rescue dogs later. Faulty light switch and missing ground on nearby houseboat determined to be the cause.
70. June 8, 1986 St Croix River, Prescott, Wisconsin. 44 year old swimmer dove off of the dock near his 28’ power boat. As he approached the swim platform he said he felt like he was being shocked, and was becoming numb, and then disappeared below the surface. Recovery and attempted resuscitation in a matter of minutes were unsuccessful. Battery charger had faulted to its metal chassis, and the boat’s mfr. had deliberately **not** installed the AC grounding wire to the boats bonding system – as required – causing AC potential to appear on the underwater metal gear.
71. Date Unknown Community swimming pool in Oklahoma, 10 year old electrocuted while inserting coins in a soda vending machine. Power cord damaged by one of the 4 legs, grounding pin on plug missing, machine chassis later measured at nearly line voltage, NO GFCI.

ELECTRIC SHOCK – NEAR MISSES

(Additional ones included above)

1. June 18, 2013 Scott City, MO. After the neighborhood became flooded, a woman went down her flooded basement attempted to rescue a cat. She began unplugging electrical cords when she began getting shocked. She rescued the cat and got on top of some floating furniture until rescued. Likely the circuits involved were not protected with GFCIs.
2. May 27, 2013 Lake Lanier, Gainesville, GA. A man and his 6yo daughter were swimming 10ft from a dock when the man received an electric shock in the arm. He grabbed his daughter, swam to the dock and lifted her to safety. Then he was shocked at least 2 more times, but survived. Appears to have been an intermittent problem possibly correlated to a power outage in the vicinity. Cause is unknown.

3. Aug 14, 2012 Garden Grove, CA. Two girls (15yo and 23yo sister) were swimming in a swimming pool when the teenager called out and went face down in the pool. The older sister's legs and arms went numb. The father was able to get the girls out of the pool (and was also shocked when pulling the girl out). Paramedics were able to restore the teenager's breathing and pulse. She is expected to make full recovery. Cause unknown but work had just been done on the pool which had underwater lights.
4. Aug 4, 2012 Gravois Arm of Lake of the Ozarks, MO. A woman received a shock as she reached for a dock ladder while swimming. She swam away from the dock. Her husband did the same and confirmed the shock. They both swam away and exited the water at a neighbor's dock because of awareness following 3 deaths from electric shock a month earlier.
5. July 23, 2012 Lake of the Ozarks, MO. Two children and one adult were swimming near a dock undergoing electrical repairs. They all felt an electrical shock in the water. Power to the dock was turned off. The swimmers exited the water without serious injury. Exact cause is under investigation.
6. July 4, 2012 German Creek Marina on Cherokee Lake, Bean Station, TN. A 10 year old and 11 year old boys were killed by electricity in the water at a TN marina while swimming between 2 docked houseboats. An 8 year old girl also swimming with the boys was shocked but pulled to safety. Several adults and another 12 year old boy were shocked trying to rescue the 2 boys. Faulty houseboat wiring on one of the boats is believed to be one of the causes.
7. June 27, 2012 Celebration, FL. An 11 year old girl was electrocuted when she reached into a mini golf pond at an Orlando, FL resort to retrieve a golf ball. A man trying to help her was also shocked. The cause was faulty pond pump that was not protected by the required GFCI. Water came in contact with the pumps windings and electrified the small cement pond on the mini golf course.
8. May 28, 2012 Lake of the Ozarks, MO. 3 women were shocked while swimming near a dock. Someone turned off the power fast enough to save them. One needed CPR at scene. All survived. The older dock had no GFCI protection and an "inadequate ground wire from dock to shore".
9. August 28, 2011 Near Shady Beach, Norwalk, CT. A dog was electrocuted in floodwater from recent storm (Hurricane Irene). The two women walking their dogs felt electrical shocks (other dog, leashed, survived). Witnesses report "water boiling" where a grounding cable was entering standing water. This is indicative of electrical current in the water.
10. June 21, 2011 Charleston, Kanawha River, Lou Wendell Marine, WV. A woman entered the water via a boat ladder for a swim. She was overcome by electrical current and reportedly could not escape, then sunk below the water for approx 90 seconds before being rescued. An electrician reportedly found a grounded neutral in the pedestal, but the exact fault is unknown.

11. March 18, 2011 Houston, TX. A dog jumped into a neighborhood retention pond with fountain and was killed by an electric current in the pond. A man went in after the dog but when he was ankle deep he could feel the strong electric current in his feet so he retreated. Power was secured to the fountain. Comment: Had the man dove into the pond, he could have become a casualty as well.
12. September 5, 2010 Lake at Perrine Wayside Dog Park, Miami, FL. Man playing fetch with dog threw object into a lake. The dog jumped in and swam toward a fountain in the center of the lake. The dog began yelping and struggling. The man went in the water to help his dog, but was stopped by electric shocks and could not reach the dog. The dog died, the man survived. The fountain was turned off but it was still putting electrical current into the water. It was removed for inspection.
13. September 5, 2010 Hartwell Lake, Anderson, SC. A 12 year old girl was playing in the water near a dock with a friend. She grabbed an electrical wire and went into cardiac arrest. She was resuscitated by her father and airlifted to a hospital. The police report stated that there was a grounding problem on the dock.
14. August 8, 2010 Green River Lake, Campbellsville, KY. A woman swimming behind a houseboat was seen arching back and sinking in the water. She surfaced long enough to scream for help. A man on the boat attempted to pull her out but was badly shocked as he was trying to help. Another man on the boat was able to pull both of them out of the water using a rope after turning off the boat's power. Another houseboat owner attempted to swim to them but was turned back due to the electrical current in the water. The woman and man pulled from the water were treated and released from the hospital.
15. July 31, 2010 Lake Champlain, VT. A father and his two 13-year-old sons were shocked, but survived. No further information.
16. July 3, 2010 International Harbor, Friendsville, TN. Three females, 12, 20, and 30 years old were shocked while swimming near a docked boat. When the boat's power was turned off, the electrical current went away. Two of the three swimmers were injured and required hospitalization. One was not breathing when EMS arrived. They were able to revive her. A 63 year old woman was shocked trying to assist the other three in the water. She also required hospitalization. The cause was never determined.
17. June 24, 2010 Lake Travis, TX. A 15 year old girl and her 8 year old sister were swimming by a private boat dock when they were shocked in the water. The older sister was unresponsive at the scene and was in critical condition in the hospital. Shoddy wiring of boat lift resulted in direct hot to frame short with no grounding connection. Girls survived.
18. May 24, 2010 Clear Lake, IA. A man was throwing balls to his dogs from the dock behind his house. One dog approached the boat lift and went under. The man jumped in and received an electrical shock in the water. Family members quickly turned off the dock power. The man survived, the dog did not. Exact cause of fault not known.

19. Sep 2007 Franklin Lock Campground on the Caloosahatchee River, FL. Boat docked in freshwater marina receiving AC shore power. Owner was cleaning prop shaft under the boat using a metal scraper. As his foot touched the bottom and the scraper connected the shaft and the strut he felt an electric shock which caused his “teeth to clench and muscles to contract”. He also saw blue sparks at the scraper. After the shock he was able to exit the water and observed that one of two 30amp shore power breakers had tripped. He was not wearing a wetsuit.
20. August 28, 2007 Private pond, Eden, NY 22 year old male entered the pond in an attempt to rescue his dog, which was in great distress, and was thrown back and lay unresponsive. His father dragged him from the water and started CPR which was continued by the rescue squad on the way to the hospital, where he is still recovering as of 9/1. Submersible irrigation pump was considered likely cause.
21. July 20, 2007 Lake Arcadia, Edmond, OK Adult male entered water at the end of a private dock and was immediately paralyzed by electric shock, and began to sink. His wife, reaching from the dock, kept his head above water. A bystander, entering the water from his boat was also shocked so he got back into the boat and assisted the wife in pulling the man onto the dock. High water had submerged the electrical outlets at the end of the dock.
22. July 01, 2007 Collins Bay, Lake Ontario, Kingston, ON. As a SCUBA diver, with no wet suit, approached a moored sail boat he felt a tingling sensation. Approaching closer he experienced a moderate electric shock so he backed away. Later examination disclosed damage to a steel dock section at the boat’s stern and the battery charger was found to have a “short circuit”. The condition of the bonding system was not reported.
23. August, 2006 Lake Michigan, Racine, WI. Owner decided to check underwater as he was having vibration on one engine. He donned scuba gear and jumped in water. When he touched the bronze prop he was hit with current that almost paralyzed him causing great difficulty in breathing. He was able to get away from the zone of danger. Cause is thought to be the boat in the next slip. A yellow barrel connector on the water heater Neutral #16 wire was loose, due to the terminal being the wrong size and not correctly crimped. It heated up which burnt terminal insulation and shorted the hot to the grounded case. As the phase did not see excessive current, the breaker did not trip. The neutral dock pedestal socket pins had corroded due to poor connection and the ensuing heating so that eventually only intermittent connection was made. The diver’s wetsuit may have saved his life. He was only inches from the neighboring boat when touching the prop on his boat (which provided the path back to the source).
24. July 2, 2006 Lake L’Homme Dieu, Douglas County, MN. Three men were nearing an aluminum dock in an outboard boat (aluminum hull?) when the prop caught on an extension cord laid under water (powered a boat lift), and were severely shocked as they entered the water. Possibly two of the three men entered the water to rescue the third man who had fallen face down into the water, half out of boat, and was not moving – exact sequence not known. A bystander unplugged the cord. The third man spent several days in the hospital. No investigation planned.

25. July, 2005 Brooklyn, NY. A diver went into the water behind a boat in this small, private marina. He surfaced seconds later complaining about tingling and pain in his arm. A probe in the water measured 40vac to ground behind the boat. Cause was determined to be a neutral-ground short on a recently installed water heater (although there was most likely a bad ground too at that pedestal to cause this). He was wearing a short, spring wet suit.
26. July, 2004 Sahauro Lake, AZ, a man-made, freshwater lake near Phoenix. A man was diving to perform maintenance on a dock structure. He left the water after feeling a tingling sensation in the water near a pontoon houseboat. The shore cable was disconnected from the boat and the diver resumed his work without further incident. The cause may have been an improperly wired battery charger on the boat.
27. July, 2004 Sacramento River, CA. Man entering water around several boats (being supplied by genset power from one of the boats) receives shock in water. Two other men jump in to rescue man. One of the 2 rescuers became imperiled. Generator secured immediately. Incorrect wiring on one boat caused a ground fault which introduced current into the water between boats.
28. May 31, 2004 Lake Barkley, Grand Rivers, KY. After receiving permission from marina two adult women went swimming near their rented houseboat. As they started back to the boat from the swim slide entry point both felt a strong electric shock sensation, and had the presence of mind to *swim away* from the boat! A relative entered the water and felt the same thing – which disappeared when the boat was disconnected from shore power. Close call was brushed off by staff so no action was taken to locate source of fault current. A fatality waiting to happen!
29. August, 2003 Green River, Campbellsville, KY. Marina manager using Hioki clamp-on ammeter checking shore cords for leakage and discovered one houseboat with 4 amps on one of two shore cords. Hull potential to dock ground 8 VAC and owner commented that one of his children reported a tingle in the water!! Boat had just been reassembled after being trucked from Texas and problems were being experienced with 120 VAC deck light. Deck lights were rewired and neutral / ground fault in inverter was cleared – leakage current no longer exists.
30. July, 2002 Allatoona Lake, GA. Three swimmers in great distress near houseboat, bystander pulls shore cord, all saved, one spent several days in hospital, fresh water, and fault on boat.
31. Fall, 2002 Lake Murray, SC. Swimmer reports strong tingle, hi-level fault currents in dock frame, fresh water.
32. Date Unknown Man jumps into water to rescue dog, feels high level tingle, cause unknown, fresh water.
33. 2002-2003 Florida, interviews with divers – many reports of high level tingle while cleaning bottoms, all salt water, and no fatalities.

