Field Investigation of Recreational Diving Accidents

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- Certified sport diver - 1965
- Scuba instructor - 1970
- Masters degree Ergonomics-Human Factors 1976 - UCSB
- SBCC Marine Tech 1976
- Worked in North Sea & Gulf of Mexico - 1976 - 1983
- Worked full-time Kirby Morgan 1983 - 1987
- Worked full-time Viking - America 1987-1989
- Dive industry consultant since 1989
There is nobody who is an expert in all aspects of diving

- Too many specialties
- Too broad a field
- Most investigators need help with certain issues
Different agencies have different motivations for investigations

- Dive industry
- Police/Sheriffs
- U.S.C.G.
- OSHA
Unless accident involves instruction, many dive accidents do not get fully investigated

- Insurance drives industry investigations
- Some municipalities, no one qualified to investigate diving accidents
- He’s dead, he’s wet, he drowned
Assumption

- Most investigations take place after the body has been recovered
- If body is recovered, a rescue is usually attempted
- Sometimes body is not recovered for days
Diving accident investigation, not underwater crime scene investigation

- Only in rare cases is underwater crime scene approach necessary
- Only in rare cases are underwater crime scene techniques possible
Tasks in an Investigation

- Interviewing people
- Site Inspection
  - Physical site
  - Vessel
  - Dive shop
- Equipment Inspection
  - Dive gear
  - Emergency Gear
- Document collection
- Interacting with public agencies
Skills for Dive Accident Investigators

- Ability to get people to help you
- Ability to write narrative report
- Ability to take good photographs
Skills for Dive Accident Investigators

- Critical thinking
- Ability to shift gears as information changes
- Be sensitive to non-verbal cues
- Tenaciousness
Be relentless

- Follow up on all leads
- Keep going back - like Columbo
- Ice-pick mentality
Physical Tools

- Digital camera
- Video
- Laptop with network card
- Smartphone
- Color printer
- Flatbed scanner
- Charts/maps
Additional Tools

- Voice Recorder
- Magnifying Glass
- Chalk
- Handheld GPS
- Oxygen Analyzer
- Gas Sample Kit
More Tools

- Fiberglass tape (100 Ft.)
- Vernier calipers
- Jumpsuit
- Scale (hand-poured weights)
- Gloves (work, latex)
- Gear inspection checklist
- Interview Questions
Voice Recorder

- Ask permission
- Always record interviews if possible
- Carry charger or back-up batteries
Magnifying Glass

- Essential to see small serial numbers
- Use in conjunction with chalk
Handheld GPS

- Create chart of site
- Used to establish position
  - Distances
  - Speed
Oxygen - Mixed-Gas Analyzer

- Essential for tech diving
- Essential for mixed gas commercial diving
Gas Sample Kit

- Laboratory analysis
  - Looks for CO
  - Looks for oils
  - Other impurities
- May need to sample cylinders or direct from compressor
Fiberglass Tape

- Dimensions of vessels
- Site measurement
Vernier Calipers

- Dimensions of gear
  - Damage to gear
  - Small items
Delays in investigations following diving accidents

- May be days after accident
- Gear is gone
- People have left
- Boat has moved
- Body may be recovered or missing
Internet Research

- Newspaper accounts of accident
- Background on victim & others
- Background on sport dive boats, shops
Selecting People to Interview

- **Sport Diving**
  - Recreational
  - Technical
- **Professional Diving**
  - Public Safety
  - Seafood divers
  - Marine scientists
Setting Up Interviews

- May have to make appointment
- Interviews should be done in person
- Some people will want to do interview over phone
People to Interview in Sport Diving Accidents

- Buddy
- Divemaster
- Instructor
- Dive Store Owner
- Vessel Captain
- Deckhands
- Other divers on boat
People to Interview in Public Safety Diving Accidents

- Dive team leader
- Dive buddy
- Tender
- Other team members
Interview Questions

• Anticipate in advance what questions to ask
• Make a list
• Be prepared to ask new questions
Preparing Interview Questions

- Start from what you know
- Prepare a chronology
- Think through the sequence of events
- Seek people who can help you with what you don’t know
Pre-Dive Questions (all dives)

- Training?
- Equipment?
  - Rented?
- Gear functioning?
- Diver’s health?
- Use of drugs, alcohol?
- Weather?
- Dive plan?
During the Dive - Sport Diving

- Max depth?
- Buddy separation?
- Visibility?
- Where did problem develop?
- Where was body found?
- How long until body found?
Post Dive Issues - All Diving

- When did the event occur?
- Time to recover the body?
- Position body was in when found?
- Who recovered body?
Post Dive Issues - All Diving

- Resuscitation?
- Recompression?
- Equipment location?
- Diver’s logbook?
Gear Inspection Checklist

• Used to ensure nothing is missed
• May or may not know what gear to expect
• Equipment Log
• Record information
  – Serial numbers
  – Condition
  – Inspection tags
  – Test date
Cooperation of Public Agencies

- Law Enforcement
  - Sheriffs
  - Police
- Fire Department
  - Lifeguards
- USCG
  - Records via FOIA
Interviews

- Conduct interviews separately
- Must gain trust
- Don’t cue the witness
- Avoid criticism
- Show compassion
- Survivors often emotional
Interviews in Sport Diving Cases

- Instructional Accidents
  - How many students?
  - How many certified assistants?
  - Training activity?
- Circumstances
  - Separation
  - Panic
  - Health
  - Equipment
Recovery Diver Interview

- Time to locate diver?
- Position of diver on bottom?
- Position of weight belt?
- Regulator in mouth?
- How diver brought to surface?
- Gear ditched?
- Time to start CPR?
Site Inspection

- Access to water
- Access to emergency aid
- Hazards
- Oxygen availability
- Night vs. day
Vessel Inspection

- Line of sight to dive deck
- Crew training
- Appropriate safety guards
- Geometry of deck
Sea Conditions

- Most people are not good at estimating/evaluating sea conditions
  - Especially true for underwater visibility
Dive Shop Inspection

- Overall shop appearance
- Inspect training records
- Inspect rental gear records
- Purchase receipts
- Inspect compressor
  - Recent air testing?
Inspection vs Testing

- Inspection is non-destructive
- Testing may be destructive
Preparing for Equipment Inspection

- Make list of all known gear
- Make list of suspected gear
- Identify items to check
- Download user manuals if available
- Check recalls - CPSC
Equipment Inspection
- Sport Diving

- Inspect everything!
- Most critical items
  - Buoyancy compensator
  - Regulator
  - Cylinder
  - Dive Computer
  - Dry suit
  - Weight system
Tech Diving Gear

- Need analyzer & calibration gas
- Need person qualified in specific rebreather
Buoyancy Compensator

- Does it hold air?
- Does over-pressure relief work?
- Does power inflator work?
- Serial # - other marks?
- Does weight release work?
Regulator

- Manufacturer?
- Condition of first stage filter
- Hose condition?
- Function?
- All hoses connected?
- Serial #
Cylinder

- General Condition
- Size?
  - Volume
  - Pressure
- Hydro
- Serial #
- VIP current?
- Air sample?
Dive Computer

• Make & model?
• Battery status?
• Log status?
• Serial #
• Download software & hardware
Dry Suit

- Manufacturer?
- Type of material?
- Model?
- Condition of seals?
- Inflator Valve?
- Exhaust Valve?
- Zipper condition?
- Leaks?
Document Collection in Recreational Diving

- Log book
- Training Records
- Rental Forms
  - Rental Maintenance Records
- Sales Receipts
- Boat Manifest
- Police Report
- Autopsy
- Many others....

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Testing of Dive Gear

- Few facilities to test gear
- Most dive shops not equipped, write misleading reports
- U.S. Navy - Panama City
End Product of Investigation

- Written report
- Only report facts
- Report includes
  - TOC
  - Summary
  - Individual Narratives
  - Charts
  - Documents
  - Photos
Questions?