

SAFEMED III Seminar on Marine Accident Investigation

Evidence collection



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General Principle

During the investigation,
investigators should aim to gather
and record all the evidence and
factual data which may be of
interest within the scope of the
investigation

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General Principle

- Initial stages of investigation, gathering evidence to determine
 - Who?
 - What?
 - When?
 - How?
 - and crucially Why?
- Evidence crucial to support findings
- Beware of danger of reaching conclusions too early!



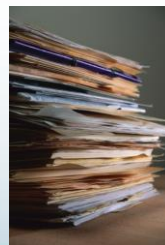
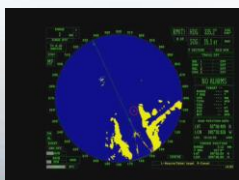
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Types of evidence

- Human or testamentary evidence
- Physical evidence (equipment, parts, debris, hardware)
- Documentary evidence (reports, procedures, certificates)
- Electronic evidence (VDR's, CCTV, VTS)



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Preserving and controlling evidence

- Evidence photographed and documented in situ
- Label and log evidence collected (Evidence log)
- Evidence log started and maintained, including:
 - date, time, location and who seized evidence
 - where item is stored
- Evidence controlled by signature transfer in log
- Secure storage for evidence provided
- Restricted access to store
- Care with electronic evidence



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Witness evidence



- Interviews should be performed by persons skilled in interviewing techniques to reveal information from witness
- Planning of the interview is essential for a successful outcome. It should include:
 - Time and location
 - Need of interpreters
 - Make-up of interview team and members' roles
 - Particular needs of the witness
 - Topic areas to be explored

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Physical evidence collection

- Examples of physical evidence
 - Equipment
 - Tools
 - Materials
 - Scatter debris
 - Pattern, parts and properties of physical items
- Less obvious example
 - Liquid and gas samples

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Documenting and sketching



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- Plotting and sketching
- Document what is found

Photography



- Vital tool in evidence collection
 - assist with recall
 - add clarity when included in investigation report
- Areas to photograph
 - general layouts
 - views from positions of key witnesses
 - damaged areas, fractures (before repair etc)
 - instrument and control settings
 - documents if photocopying is unavailable
- Always take more photos than you think you need!

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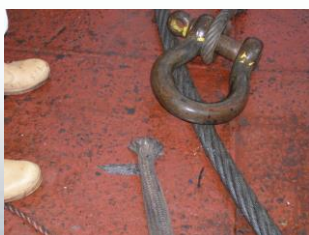


Equipment

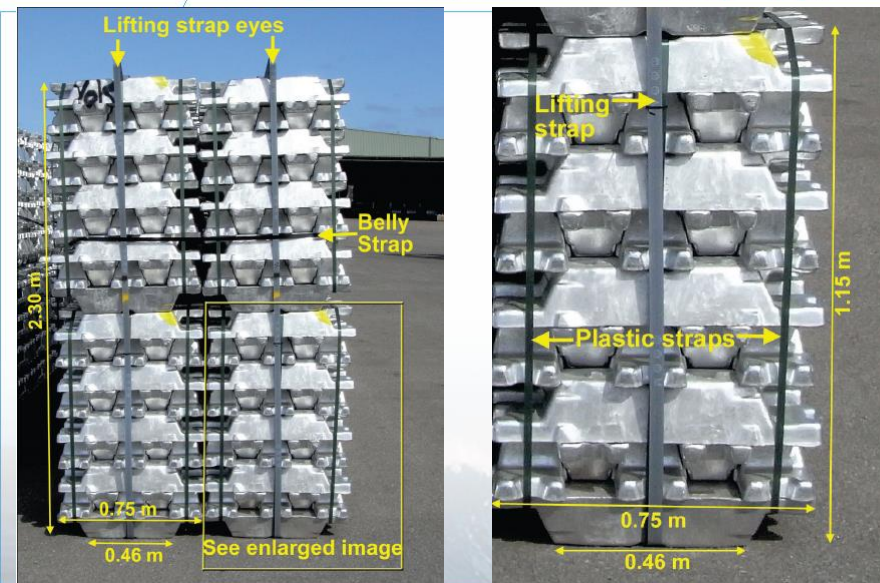


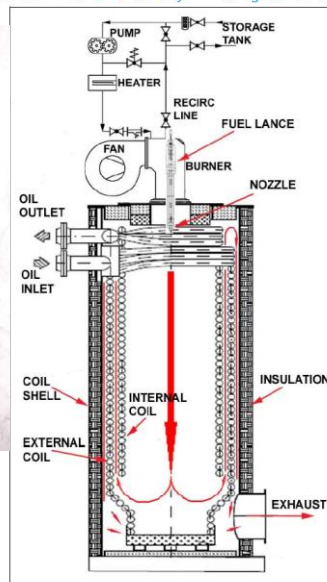
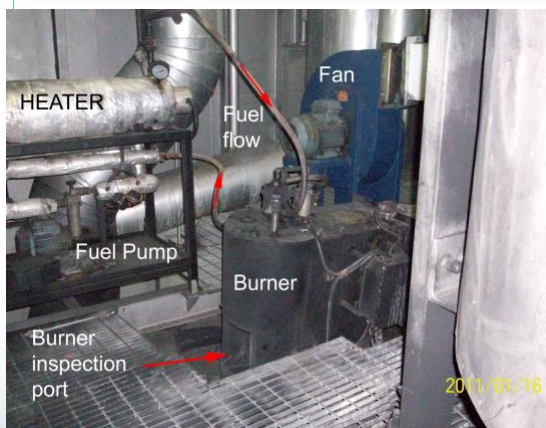
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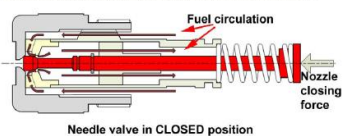
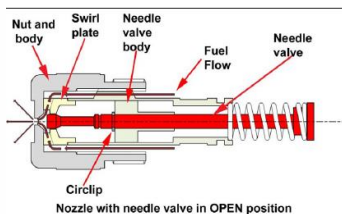


Failed components

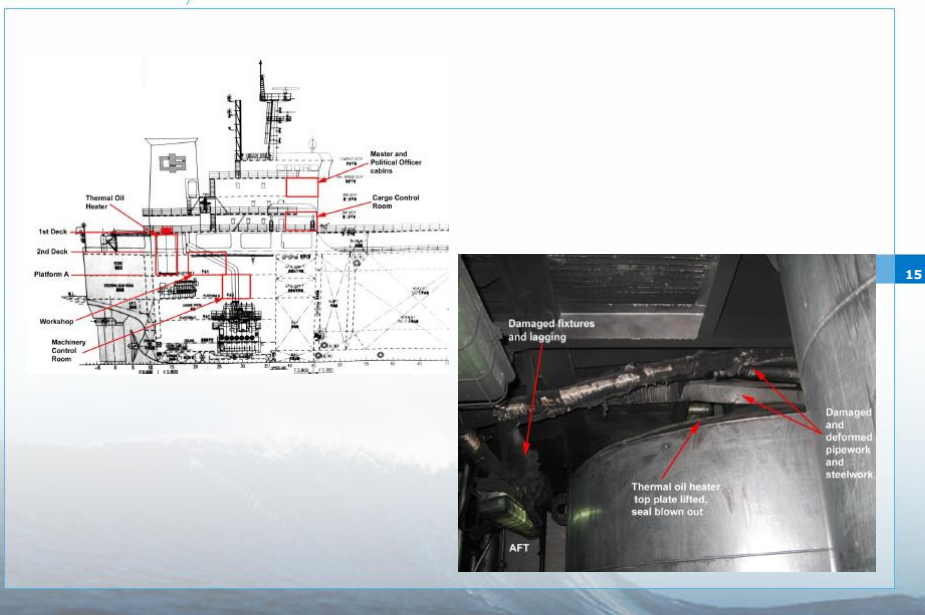




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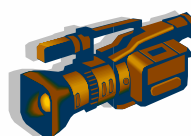
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Video recording

- Can greatly assist with
 - recording layout
 - reconstructions
- Ensure reference points are included
- Commentary allows easier understanding later
- Cameras
 - Often video and still photography now combined
 - Digital photography enables high quality and the ability to take numerous photos
 - Practice to ensure familiarity with equipment



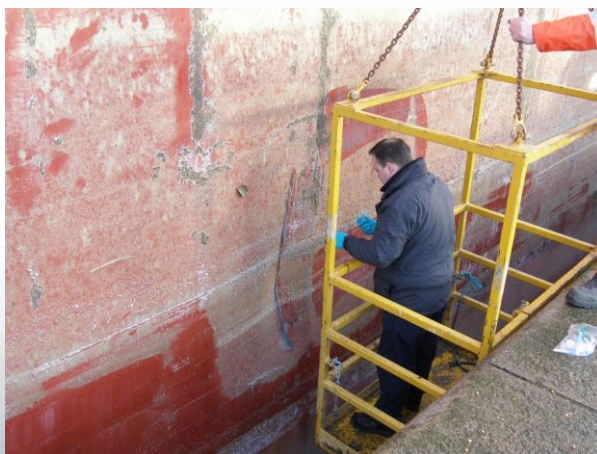
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Removing physical evidence

- Normally, extraction should not start until witnesses have been interviewed, since visual reference to the accident site can stimulate one's memory
- Extraction and removal or movement of parts should not be started until position records
- Be aware that the accident site may have been sufficiently damaged to make it unsafe to collect particular evidence
- Locations of removed parts should be marked. Care during extraction and preliminary examination is necessary to avoid defacing or distorting impact marks and fracture surfaces
- There must be agreement with other interested before extraction takes place

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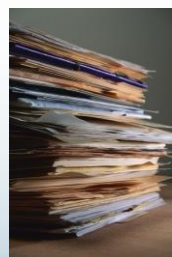
Example- paint sampling



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Collecting documentary evidence

- Examples of documentary evidence
 - Logbooks
 - Equipment readouts
 - Equipment manuals
 - Licenses
 - Certificates
 - Photos
 - Procedural documents
 - Check lists
- Sometimes available in electronic form
- Ensure photocopies are truly representative



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Electronic evidence- Voyage Data Recorders

- 'Black Box' of the seas (VDR & Simplified-VDR)
- Can provide:

	(Items below not required for S-VDR)
– Date & time	– Main alarms
– Position	– Rudder order and response
– Speed	– Engine order and response
– Heading	– Hull openings
– Bridge audio	– WT and fire door status
– Comms audio	– Accelerations & hull stresses
– Radar (+AIS)	– Wind speed and direction
	– Echo sounder
- Data storage- minimum of 12 hrs of data

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VDR equipment



• VDR cabinet

Save button-



VDR capsule-



-Removable hard-drive



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Electronic evidence- GPS Devices

- Different approaches required to secure data:
 - Wet GPS devices
 - ♦ Volatile memory- all data is lost
 - ♦ Non volatile- rinse with FW get to test house within 48hrs
 - Dry or waterproof devices
 - ♦ Depends on device but do not turn on until advice has been sought as this may clear memory
 - Devices that are still operating
 - ♦ Seek advice but may be able to interrogate in situ or transfer track data to removal memory



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Electronic evidence- Other sources

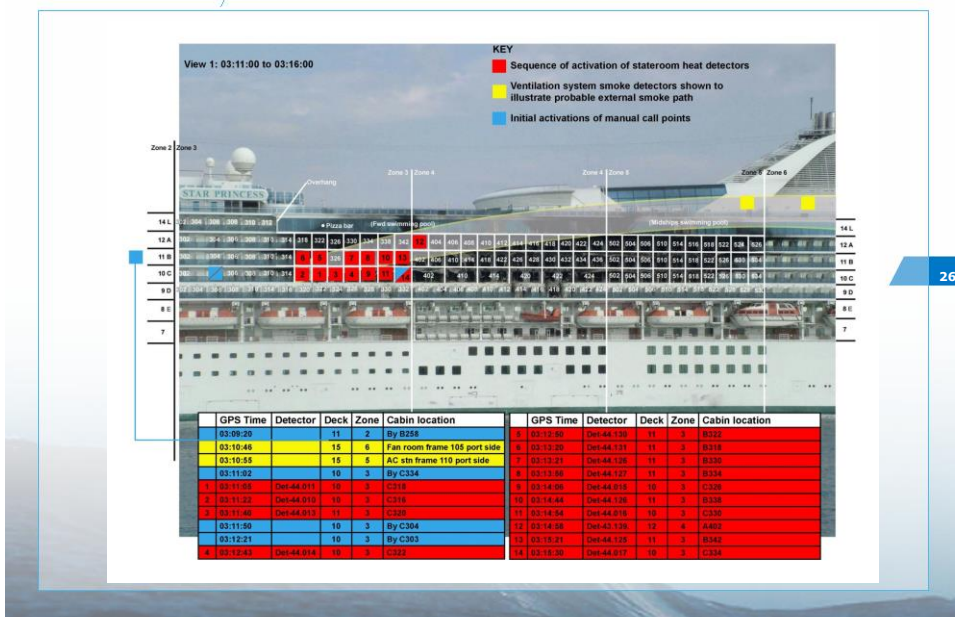
- Potentially stores of data:
 - Electronic Chart Display and Information Systems (ECDIS)
 - ♦ Transas, OLEX.
 - Integrated Bridge Systems (IBS)
 - generally will need to consult manuals/manufacturers
- AIS data from coastal States
- VTS radar and VHF recordings
- CCTV footage/web cams
- Mobile phones

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Other bridge & engine room recording equipment

- These may include:
 - Fire protection systems
 - Communications systems
 - Security cameras
 - Electronic log books
 - Engine management systems
 - Planned maintenance
 - Safety management systems

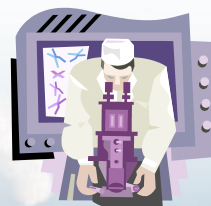
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Specialist studies and testing

- Investigators cannot be experts in everything!
- Early assessment of the need for specialist services essential to:
 - find appropriate contractors
 - determine what preservation steps are needed
- Ideally have some common specialist contacts and/or enabling contracts



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Material testing

- Tensile testing
- Shear testing



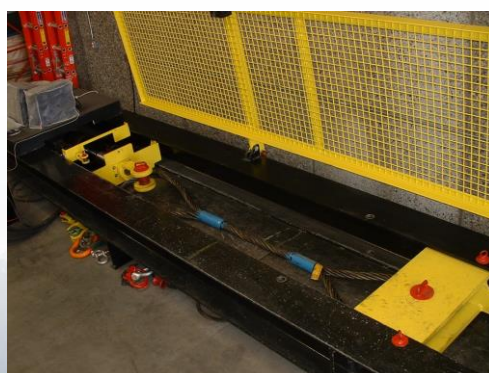
- Microscopic examination
- Failure mechanism,
 - brittle/ductile fracture?
- Fatigue testing



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Cable and rope testing

- Determining failure mechanism
- Load to failure prediction
- Rope/cable condition
- Rope properties



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Independent testing

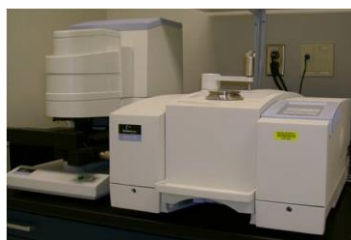
- Lifejackets
- Liferrafts
- EPIRBs
- Testing against ISO standards



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Forensic services

- Paint sample analysis
- Material composition
- Toxicology
- Document restoration
- Computer hard drive data retrieval
- (Fire investigation)

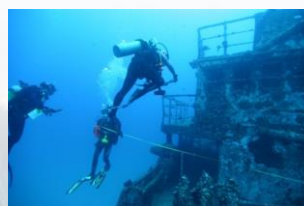
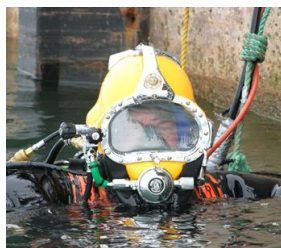


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Underwater Surveys- using divers

- Brief diver fully as to what is required
- The investigator must understand the limitations of the diver, e.g. dive time, visibility, current
- Give as much information on any known hazards and beware of client responsibilities
- Ideally head mounted camera feeding back to the surface should be available with communications to allow some direction of the diver
- Brief diver not to interfere with the wreck
- Interviewed diver about what was found



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Salvage Operations

- Expensive/complicated
- Salvors have single aim, not accident investigation
- Important to get alongside salvors
- Witness operation (time consuming)
- Determine thorough survey before salvage
- Log/document salvors actions



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Questions?

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