

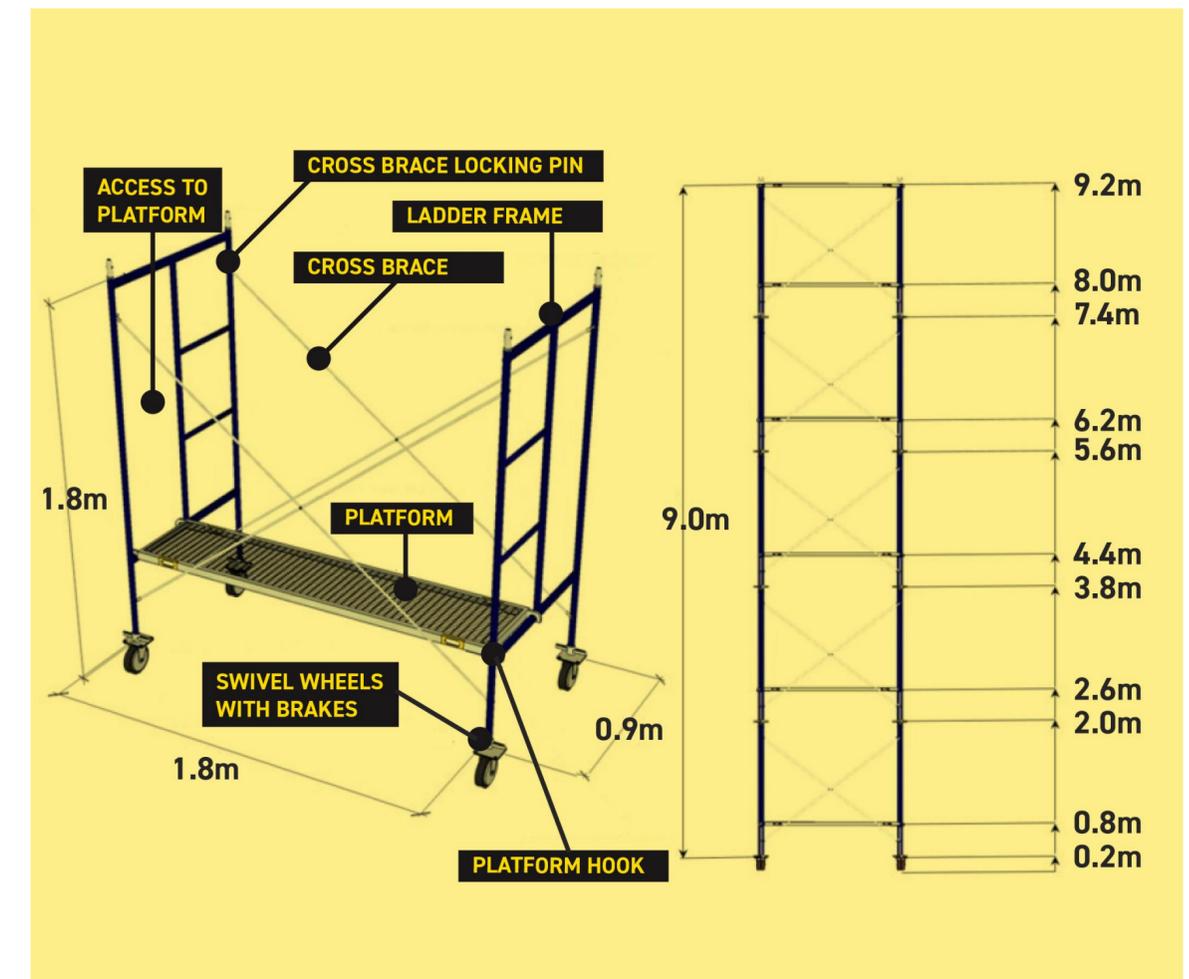
Scaffolding fall causes serious injuries



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BACKGROUND

- A geared bulk carrier was at anchor awaiting a berth while the crew were carrying out various routine duties.
- Shortly after 0800, the chief officer (C/O) briefed the bosun about the day's work, which included painting work in cargo holds No.1 and 4.
- At about 0830, the C/O, the bosun, two able seamen (AB2 and AB3), the ordinary seaman (OS) and the deck cadet (cadet) began work in No.1 hold.
- This required them to use the ship's portable modular scaffold tower in order to access the upper aft bulkhead and topside tank about 6-9m above the tank top.
- The crew members assembled five sections of scaffolding, which were held by two guy ropes that had been run up out of the hold and secured on deck.



Scaffold construction components and dimensions

Source: Australian Transport Safety Bureau (ATSB)

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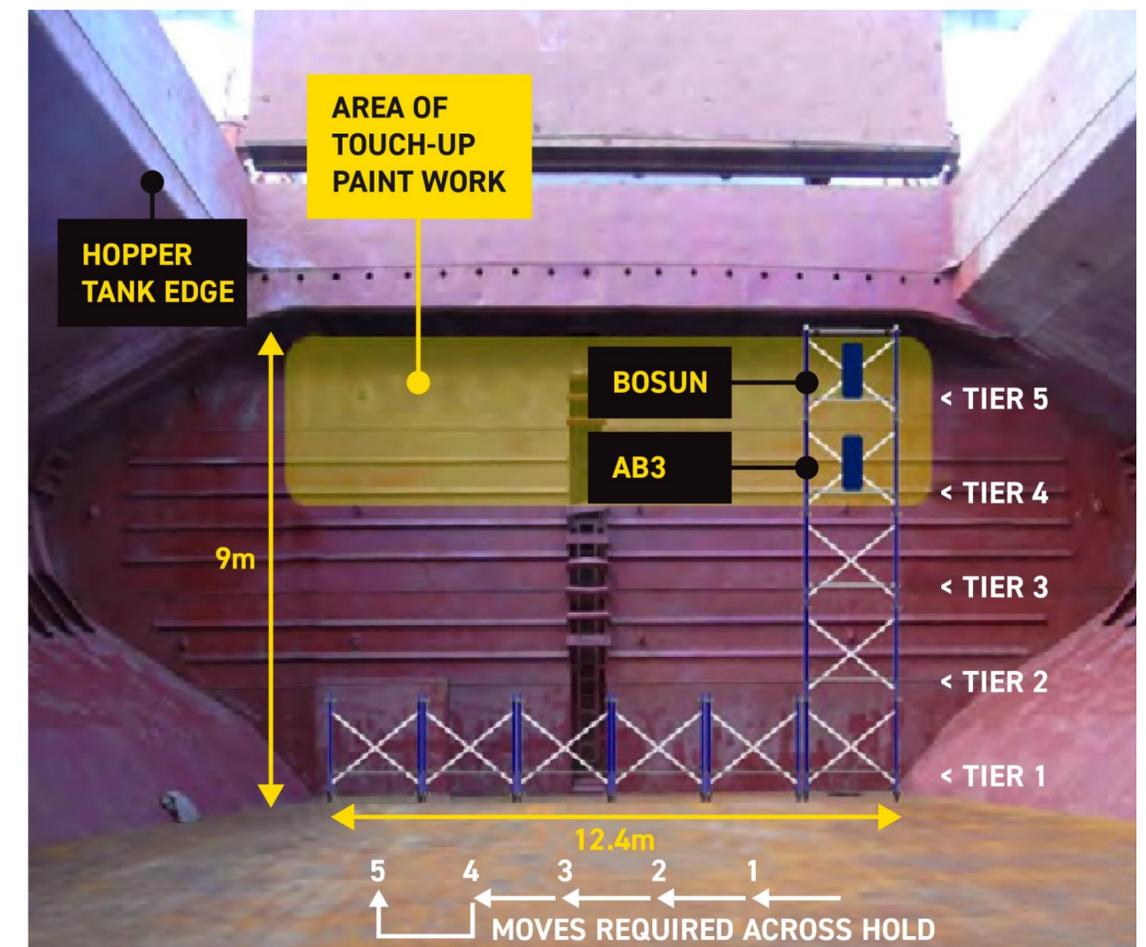
THE INCIDENT

- **The C/O, as the supervisor, oversaw the work in hold No.1 from the tank top, as the bosun and AB3 painted from the scaffold tower.**
- **Both were wearing safety harnesses with safety lines secured on the ship's deck.**
- **The remaining crew members were assisting, which included handling the security and safety lines.**
- **As each section was completed, the tower needed to be repositioned to access the next area, which required the bosun and AB3's safety lines to be released and they climbed down from the scaffolding.**
- **The scaffold tower's securing lines were then released and it was repositioned and resecured. The bosun and AB3 then climbed up the tower, resecured their safety lines and restarted painting.**
- **This process was followed all morning and by 1130, the touch-up painting work in hold No.1 was finished.**
- **The scaffold tower was disassembled and moved to hold No.4 ready to work there after lunch.**
- **At midday, the bridge watch changed over and at about 1300 the bosun, AB1, AB3, cadet and OS went to hold No.4. The C/O was resting. The second officer was on duty on the bridge.**

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THE INCIDENT (continued)

- The scaffold tower was assembled and equipment prepared.
- As before, the bosun and AB3 painted from the scaffold tower and the remaining crew members assisted.
- A similar work sequence to the morning was followed. However, this time, the bosun and AB3 remained on the tower while the OS and cadet repositioned the scaffolding.
- The bosun was on tier five, about 8 m above the deck, and AB3 was one tier below, facing aft, about 6m above the deck.
- Unlike in the morning, neither the bosun nor AB3 wore safety harnesses or used safety lines.
- The work proceeded from port to starboard across the hold, with the scaffolding moved five times.



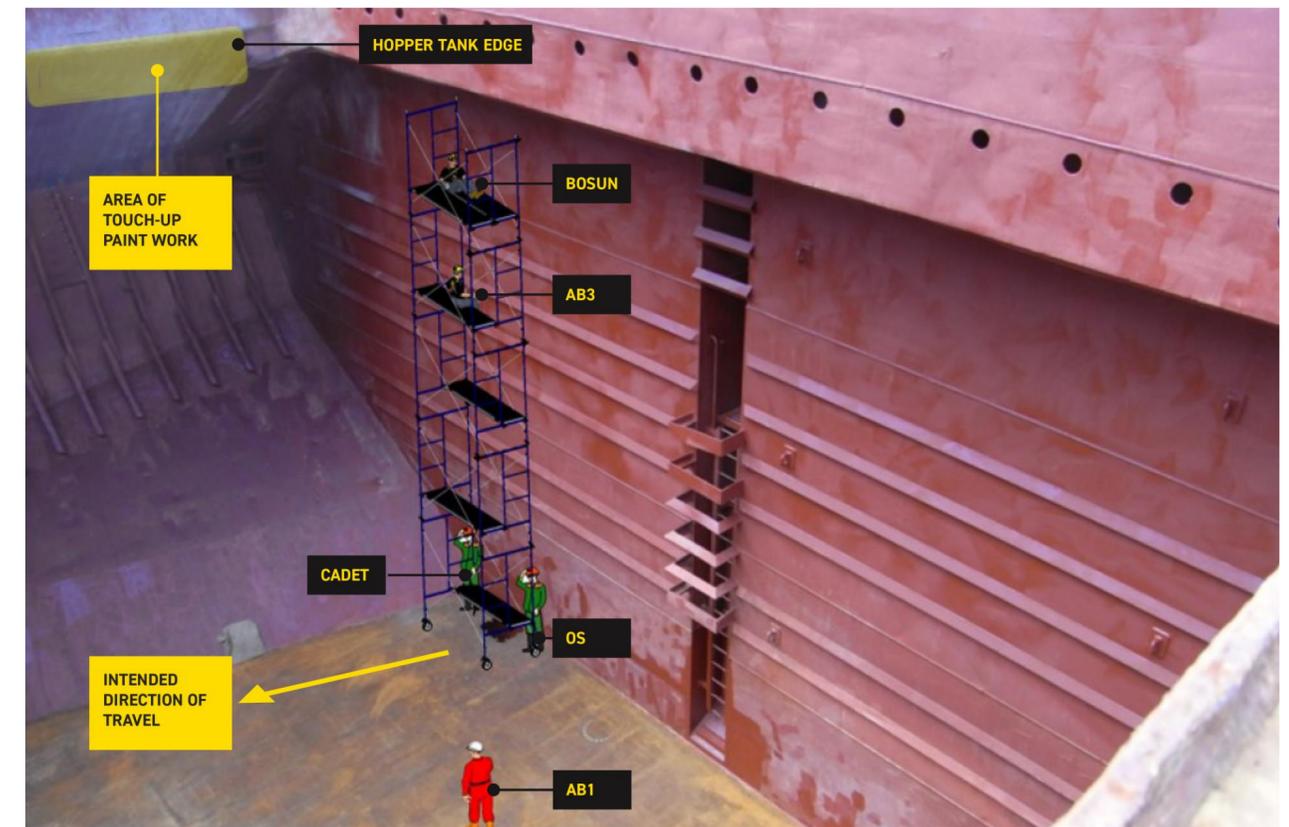
Hold No.4 showing the scaffold tower moves and the of crew member positions on the tower viewed from forward

Source: Australian Transport Safety Bureau (ATSB)

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THE INCIDENT (continued)

- Having finished the aft bulkhead, the bosun decided to touch up the hopper tank edge. He instructed the OS and cadet to move the tower forward; the AB3 was aware.
- The cadet and OS released the securing lines and went down into the hold.
- At about 1410 they released the wheel brakes and started to push the structure forward with the bosun and AB3 still in position near the top of tower.
- The tower moved about 0.5m when it suddenly toppled forward on to the deck, along with the bosun and AB3.
- The tower came apart on impact with the tank top and the bosun and AB3 were entangled in the scaffolding.
- AB1, the OS and cadet went to assist, while the master, who had been in his cabin, went on deck to investigate.



Hold No.4 showing the position of scaffolding tower, crew members and direction of movement

Source: Australian Transport Safety Bureau (ATSB)

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THE INCIDENT (continued)

- The bosun and AB3 were given first aid on the tank top deck, before later being moved to the main deck.
- Between about 1700 and 1830, they were airlifted by helicopter to hospital.
- The bosun received multiple injuries to his pelvis, chest and arm and AB3 sustained a fractured sternum and back injury. They remained in hospital for 19 and 8 days respectively.
- Subsequent inspection of the scaffolding identified that it had no manufacturer's identification plate, and all components showed signs of regular use, wear and tear, damage and some repairs.
- This included missing securing pins on some connections, loose and bent cross bracing, loose cross brace locking pins and inoperative swivel wheel brakes on three of the four wheels.



Loose scaffolding cross brace locking pins



Inoperative scaffolding swivel wheel brake

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REFLECTIVE LEARNING

The questions below are intended to be used to help review the incident case study either individually or in small groups:

- **What do you think was the immediate cause of the incident?**
- **What other factors do you think contributed to the incident?**
- **What do you think were the barriers that should have prevented this incident from occurring?**
- **Why do you think these barriers might not have been effective on this occasion?**
- **How would you confirm that any mobile/portable equipment used for working at height on your ship, such as scaffolding, ladders, etc. is approved/certified and fit for the intended purpose?**
- **What training have you received in working at height? Have you received specific training in the use of mobile/portable equipment used for working at height, such as scaffolding or mobile elevated work platforms?**
- **What do you think are the biggest risks associated with the use of mobile scaffolding on board a ship?**
- **What type of working at height equipment is available and used on your ship? Does this include full body harnesses and fall arrest devices? Are adequate anchorage points always available if you are working at height?**

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LESSONS LEARNED

The following lessons learned have been identified based on the available information in the investigation report and are not intended to apportion blame on the individuals or company involved:

- **Incident cause** – The bosun and AB remaining on the unsecured scaffold tower while it was being repositioned would have made it top-heavy and unstable and therefore would have contributed to it toppling.
- **Supervision** – The absence of formal supervision in the afternoon, along with a likely desire to expedite the task in difficult working conditions, probably led to the crew members remaining on the unsecured scaffolding as it was repositioned.
- **Scaffolding condition** – The incident could not be directly attributed to any of the identified defects on the scaffold tower. However, these would have exacerbated the instability of the structure. Scaffolding should always be in good condition and fit for purpose. It should also comply with relevant standards and be suitable for the work to be carried out.
- **Scaffolding guidance** – Guidelines for the provision, care and use of the scaffold tower were not supported by suitable on-board documentation. The only documentation available was for a different design of scaffolding. However, this did state that scaffolding should not be moved with people on it. The incident would probably have been prevented had this precaution been followed.

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LESSONS LEARNED

The following lessons learned have been identified based on the available information in the investigation report and are not intended to apportion blame on the individuals or company involved:

- **Safety equipment** – Although safety harnesses and associated safety lines were used by the crew members on the scaffolding in the morning, they were not being used at the time of the incident. The use of safety harnesses and lines would have prevented the crew members from falling while on the tower.
- **Risk Assessment/Working Aloft checklist** – The required risk assessment and working aloft checklist for the task may only have been completed after the incident. The proper completion of these documents before the work started should have identified and mitigated the risks associated with moving the scaffolding with personnel on it. This would have included detailed consideration of the effective use of fall protection adequate for the circumstances.
- **Stop Work Authority** – An effective onboard SWA programme should have prevented the incident by enabling any of the attending crew members to challenge the unsafe practices, especially given that the company procedures had reportedly been followed in the morning.

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HIERARCHY OF BARRIER CONTROLS		EXAMPLES OF POSSIBLE RISK MITIGATION CONTROL MEASURES RELATED TO THE CASE STUDY
MOST EFFECTIVE	ELIMINATE THE HAZARD	<p>ENSURE no personnel are on scaffolding while being repositioned.</p> <p>AVOID working at height through use of alternative equipment, arrangement, as far as function and design permit.</p>
	SUBSTITUTE THE HAZARD	<p>MOBILE ELEVATED WORK PLATFORM/APPROVED CRADLE used instead of scaffolding.</p> <p>PROVISION of permanent walkways or gantries, if permitted by function and design.</p>
	ISOLATE THE HAZARD	<p>PHYSICAL CONTROLS/BARRIERS</p> <p>ENSURE adequate protection provided against falling, e.g. guardrails, safety netting, screening, toe boards.</p> <p>ADEQUATE securing/anchoring of scaffolding.</p>
	INFLUENCE BEHAVIOURS	<p>ADMINISTRATIVE CONTROLS/BARRIERS</p> <p>BEHAVIOURAL/SKILL CONTROLS/BARRIERS</p> <p>PERMIT TO WORK/RISK ASSESSMENT including Toolbox Talk. SUPERVISION formally provided. APPROVED/FIT FOR PURPOSE scaffolding used.</p> <p>MEANS of avoiding complacency. STOP WORK AUTHORITY programme. TRAINING in working at height/scaffolding use.</p>
	PROTECT	<p>PPE CONTROLS</p> <p>CORRECT use of safety harness, safety line, fall arrest and safety helmet with chin strap when working aloft.</p>
LEAST EFFECTIVE		

The suggested barriers/controls above are provided to help generate reflective discussions, and should not be considered as conclusive/definitive or comprehensive for the provided case study. The risk and control measures relating to any similar scenario or activity must always be appropriately assessed based on the specific onboard arrangement and circumstances.

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CONCLUSIONS

This incident appears to be the result of the decision by the two crew members to remain on the scaffolding while it was being repositioned, which led to the tower becoming top-heavy and toppling. This was despite them having followed established best practices earlier in the day by dismounting the tower each time it was moved.

Both crew members were experienced and the reason for their decision to deviate from the safe practices used earlier was not determined. It is possible that the lack of formal supervision by a dedicated officer, as required by the company procedures, led to the previous process being circumvented to save time.

Neither crew member was using the available safety harnesses while working on, or moving around, the scaffolding at the time of the incident. An effective assessment of the risks for the work on the scaffolding should have considered the most appropriate ways of attaching safety lines for all aspects of the task.

The safe and successful completion of onboard tasks, such as hold maintenance, relies not only on the actions, behaviours and relationships of the people involved in the task, but also the effectiveness of the SMS, including processes for non-conformity and near miss reporting, auditing and verification.

This incident serves as a reminder of the inherent risks of moving scaffolding while people or materials are on the structure and highlights the importance of adhering to procedures and best practices to help ensure safety.

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QUESTIONS