

Incident Report

Switchboard Fire

San Enterprise

18 September 2006



NARRATIVE

At 0400 hours, on 18 September 2006, the 2nd Mate woke the 1st Mate for the watch handover. **San Enterprise** was at anchor off Port Timaru waiting to enter port at 0700 hours that morning (See Figure 1).

At 0415 hours, the 2nd Engineer started the main engine (M/E) to be ready to weigh anchor at 0515 hours.

At 0420 hours, the 1st Mate arrived on the bridge. The 2nd Mate then handed over the watch.

At 0425 hours, the 2nd Engineer who was in the Engine Control Room (ECR) informed the bridge that he would be running the M/E up to operational speed and clutching in. He then proceeded to synchronise the shaft alternator with the main bus bar. He did this successfully without any problems.

He tripped No.2 port auxiliary off the board and then tried unsuccessfully to trip No.1 starboard alternator off the board. The motorised breaker on the starboard alternator made a very loud chattering noise. He believed that at that stage the starboard auxiliary was trying to run the shaft alternator so he tripped the shaft alternator off the board. He stopped the auxiliary engine after trying repeatedly to trip it off the board; he then hit the generator stop to isolate the breaker and the power supply to the main bus bar from the starboard auxiliary. At this stage the vessel lost all power.

At 0435 hours, the M/E was shut down. The loss of power caused the bridge alarms to sound. The bridge immediately put all bridge electronics to standby and shut down. The 2nd Engineer called from the ECR to say he needed assistance from the Chief Engineer.

The 2nd Mate went to wake the Chief Engineer, however he found he was already on his way to the ECR.

At 0440 hours, the Chief Engineer arrived in the ECR. The 2nd Engineer went to stop the main engine manually at the fuel rack.

The Chief Engineer tried to re-establish power with the port auxiliary. Both engineers then noticed smoke coming from the starboard auxiliary breaker. They removed the cover to the breaker, which revealed an electrical fire in and around the motorised breaker for the starboard auxiliary. They stopped No.2 port auxiliary and extinguished the fire with a CO2 extinguisher.

At 0445 hours, the Loop 4 (engine room) fire alarm sounded on the bridge. The 2nd Mate went to investigate. On hearing of the fire and that it had been put out (but there was still a reasonable amount of smoke) the 2nd Mate organised a fire team of on-watch crewmembers to establish a Breathing Apparatus (BA) and extinguisher dump (an area where BA and extinguishers could be collected for use) for the engineers use. The team remained on standby throughout the incident.

After gaining control of the situation the Chief Engineer went to the bridge to brief the Skipper. The 2nd Engineer remained in the ECR. The residual heat from the copper bus bar and the breaker caused a secondary fire to reignite in and around the bus bar and the breaker. The 2nd Engineer used a 2nd CO2 extinguisher to extinguish the fire.

At 0455 hours, the bridge was informed that there had been a main switchboard fire and that it had been extinguished. The Skipper was woken and informed of the fire.

The two engineers suited up in BA sets to continue to assess the situation in the ECR. After a period of cooling and ventilating the Chief and 2nd Engineer cleared all potential hazards from the switchboard to negate the possibility of the fire re-igniting.

At 0500 hours, the Skipper arrived on the bridge and assumed control. He phoned the vessel manager via cellphone and informed him of the situation.

At 0615 hours, the Skipper called Timaru Pilots on VHF Channel 9 and informed them of the vessel's situation, that the vessel had no power and may require a tug to enter port.

At about 0645 hours, a Pilot from Port Timaru boarded the vessel to assess the situation.

The vessel required an electrician to see if they could bypass the board in order to regain power. The pilot boat went back to port to pick up an electrician and return to the vessel.

As the vessel was close to port and could utilise the assistance of the tugs it was decided that the best course of action would be for the vessel to be towed into port and then commence work on the main switchboard. This would be the best option as trying to re-establish power could cause irreparable damage to the switchboard.

At 0805 hours, the tug was made fast alongside.

At 0820 hours, the anchor cable was cut in position 44 24.174 S, 171 19.511 E.

At 1035 hours, *San Enterprise* was made fast alongside San Won Wharf and repair work commenced on the main switchboard.

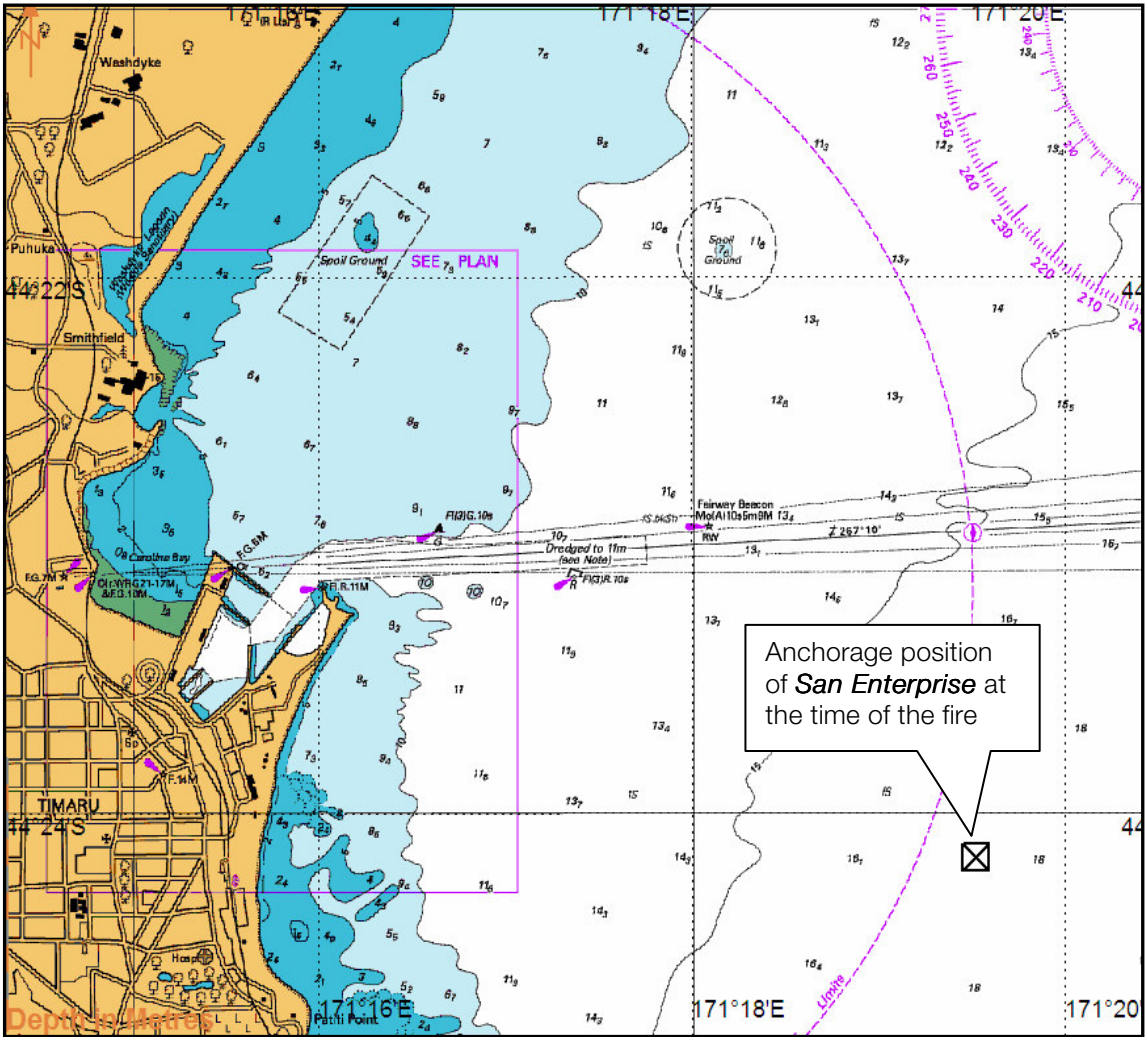


Figure 1

Chart extract from Land Information New Zealand LINZ chart NZ 6422

COMMENT & ANALYSIS

Analysis

Each generator supplies electrical power generated on three phases. The generators supply that electricity via a common bus distribution bar system. Each generator has its own main control and main breaker system to allow it to be synchronized and connected to the distribution bus bars.

The breakers are housed in their own cabinets within the main switch board. (See Figure 2). The contactors in the breakers are closed by energising a coil drawing the three supply contactors simultaneously to close against the output contacts (See Figure 3).



Figure 2

Photograph of undamaged cabinet within the main switch board

Once the contacts are closed they are held in by the energised closing and hold on coil. Electricity can then flow from the generator to the distribution bus bars. To open, the breaker contacts and stops the flow of electricity. The hold on coil is de-energised; the spring loaded contacts then open rapidly.

The rapid movement of the contacts is very important to minimise any chance of arcing of electrical current across the still open contact surfaces, while closing or opening.

The arcing between mated contacts, if it takes place, is the same as electric arc welding. Very high temperatures are generated as the electric current jumps across the air gap. Metal surfaces are molten and can result in contacts welding themselves together, or they continue arcing which generates very high temperatures in surrounding material and cable insulation, sufficient to cause combustion.

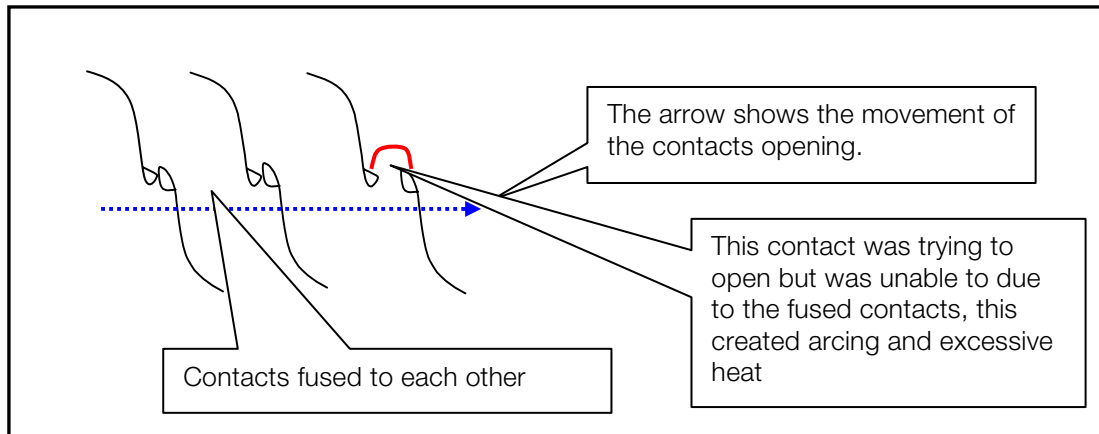


Figure 2

Diagrammatic representation of affected breaker

The reasons for contacts to arc include: poor adjustment, worn surfaces due to prolonged use, contamination of surfaces, dirt, corrosion, oxides and loose components due to vibration.

The loud chattering sound heard by the Engineer prior to the fire is a common sound heard when a contactor is opening and closing rapidly, usually due to at least one contact remaining closed and re-energising the hold on coil time and time again.

FINDINGS

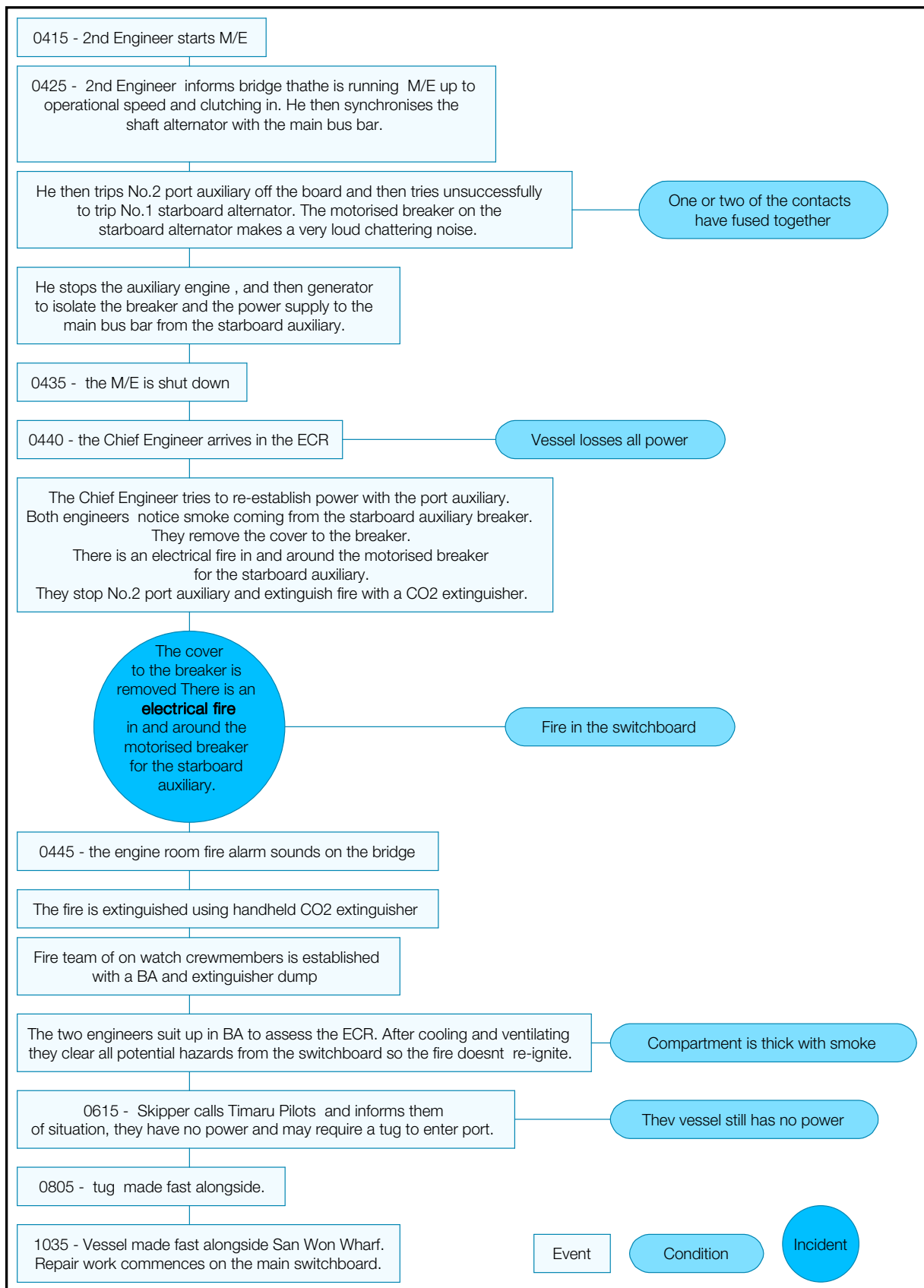
The fire was caused by intense heat as a result of one or two of the contacts fusing. When the coil was de-energised (to open the fused coils) these contacts could not open which caused the third contact (which was trying to make the connection - producing the chattering sound) to arc and produce intense heat.

OUTCOME

The vessel is one of five sister ships operating out of New Zealand. Sanford own and operate two of the vessels. The fishing companies Amaltal and Sealord own and operate the other vessels. After the fire Sanford immediately contacted these two companies to make them aware of the problem. It has been found that as the vessels were all built within a similar timeframe that when a component fails on one vessel the same components often fail in quick succession the other vessels.

The affected components have been replaced onboard **San Enterprise** and her sister ship.

TIME LINE



VESSEL DETAILS

Ship Name:	<i>San Enterprise</i>
Ship Type:	Fishing vessel
Certified Operating Limit:	Unlimited
Port of Registry:	Timaru
Flag:	NZ
Built:	1990
Construction Material:	Steel
Length Overall (m):	64.05
Gross Tonnage:	1899
Registered Owner:	Sanford Limited
Ship Operator/Manager:	Sanford Limited
Classification Society:	Det Norske Veritas
Accident Investigator:	Zoe Brangwin/ Colin Perkins