

**EDUCATION, SCIENCE AND TRAINING**

**SENATE LEGISLATION COMMITTEE - QUESTIONS ON NOTICE  
2007-2008 BUDGET ESTIMATES HEARING**

**Outcome** CSIRO

**DEST Question No. E027\_08**

Senator Brown provided in writing.

**Question:**

Could you please also provide a full table showing all scheduled maintenance work on the vessel over the past four years together with a copy of the work done, the budgeted cost and the actual cost of this work.

Can you also include in this table a complete list of all unscheduled or emergency maintenance and repairs, together with date, location, nature and cost of the work? Can you also identify whether this work had to be carried out on the vessel itself or the research equipment fitted to or on the vessel?

**Answer:**

*CSIRO has provided the following response.*

*Southern Surveyor*

Please see attached Table 1 outlining Scheduled Maintenance and Table 2 outlining Unscheduled or Emergency Maintenance. Items listed in the unscheduled or emergency maintenance table are to be expected with a vessel that was constantly in use over four years. Over half the items listed cost CSIRO less than \$500 to repair.

E027\_08: Table 2 Unscheduled maintenance 2003-2004

Incident No	Date of incident	Loc'n of incident Sea (S) Port (P)	Approx Costs (\$)	Details of Incident	Why Incident Occurred	Action Taken to Prevent Reoccurrence	Vessel (V) or Research Equipment (R)
SS0075	13-Jul-03	P	<\$500	Transformer burnt out causing loss of ventilation	Insufficient ventilation	Repair and replacement of existing gear	V
SS0076	28-Jul-03	P	<\$500	Main engine shutdown	Failure of salt water cooling system	Check and renew pipework	V
SS0084	28-Oct-03	S	\$0	Side A frame would not operate	Hydraulic pump had been left operating. Oil had become hot	Reinforce operator instructions for using hydraulic pumps	V
SS0092	27-Jan-04	S	\$5,000	Bolts sheared from pivot point on port side of A frame	Unusual noise heard while using A frame. Grease was applied. When used again 4 bolts were found on outboard retaining plate	Shipboard maintenance procedure to be reviewed and updated	V
SS0096	10-Apr-04	P	\$1,400	Blocked fuel filters	Dirt or water in fuel led to clogging of fuel filters. Filters changed a number of times before fuel tank emptied and new fuel bought onboard	Check sources of fuel. Ensure adequate spare filters are carried onboard	V
SS0097	14-Apr-04	S	\$5,000	Loss of Sonardyne beacon due to line cut in thruster on retrieval	Poor communication between deck and bridge. Poor vision at night	More detailed information in Job Hazard Analysis. Where possible, ensure gear technician involved in onboard mooring deployments	R
SS0098	23-Apr-04	S	\$800	Clutch disengaged reducing main engine to idling position only	Fault in interlock solenoid	Temporary repairs until main engine can be shut down for scheduled overhaul	V
SS0099	6-May-04	S	<\$500	Steel hose on Geoscience Australia's compressor failed	Reason for failure investigated by equipment owner (Geoscience Australia)	Compressor overhauled. Hoses replaced. Protective guards fitted.	R
SS0102	23-May-04	S	\$35,000	Corroded elbow in main LP hydraulic system developed leak	Elbow became corroded	Deck system machinery to be visually inspected monthly. To be included in inspection procedures	V
SS0104	25-Jun-04	S	<\$500	Black out of vessel after 24 volt wire completed earth with an unidentified fault	Earth fault in main engine. Fault to be identified in Hobart lay-over	Fit indicator to monitor 24 volt earth system and prepare procedure	V

E028\_08 Table 2: Unscheduled maintenance 2004-2005

Incident No	Date of incident	Loc'n of incident Sea (S) Port (P)	Approx Costs	Details of Incident	Why Incident Occurred	Action Taken to Prevent Reoccurrence	Vessel (V) or Research Equipment (R)
SS0105	12-Jul-04	P	\$0	Wire on crane swage damaged	Inadequate procedures for purchasing, receipt and inspection of wires	Revise procedures for purchasing, receipt and inspection of crane wires	V
SS0106	1-Aug-04	S	\$5,000	CTD deploying wire raised CTD hard against travel beam, damaging niskin bottles	Not enough slack in wire from CTD drum. Winch driver unaware that wire had become taut.	Paint markings on Geoscience Australia and Oceanographic wires to alert winch operator when all slack has been used.	R
SS0107	23-Jul-04	S	\$0	Outboard motor not operating correctly	Lack of 2 stroke oil in fuel tank	Review Job Hazard Analysis. Write clear procedures for dosing fuel tanks and ensure tanks clearly marked.	V
SS0109	10-Aug-04	P	\$1,500	Pressing up SW ballast tanks after bunkering operations, both vents sprung leaks	Corrosion of vent pipes	Replace corroded vent pipes	V
SSNF04	27-Jul-04	S	\$0	Recovering CTD after deployment. Found that LADCP battery pack was open. Battery no longer working	LADCP battery vent cap left open before deployment	Check battery vent cap closed before deployment. Amend standard operating procedure	R
SSNF04	2-Aug-04	S	<\$500	Front cross member of frame and EZ yoke bent and unusable	During deployment of EZ net, unit became entangled with something on seabed.	Revised Job Hazard Analysis	R
SS0111	20-Oct-04	S	\$0	Broken strand in trawl warp wire during deployment of dredge	Possible fatigue of trawl warp wire	Inspect wire. Possible replacement of wire	V
SS0112	25-Oct-04	S	\$1,000	Strong smell of sewerage. Bilge/green room alarm sounded	Flexible hose from sewage plant overflow had come loose allowing sewage to overflow into green room	Check hoses	V
SS0114	27-Oct-04	S	\$0	Main engine shut down after standby pump was shut off	Assume lubricating oil pump failed to pick up suction	Amend procedure to notify possibility of LO pump not picking up suction	V
SS0115	2-Nov-04	S	\$500	Small fuel leak in main engine room hotbox	Deterioration of sealing o-ring	Check tightness of hotbox securing screws and renew and monitor piping and clamps as required	V
SS0116	4-Nov-04	S	\$500	Failure of the main engine jacket water inlet to engine flexible flanged coupling	Deterioration of internal lining of flexible coupling	Inspect internal condition of Jacket water outlet flexible coupling & LT in/out couplings	V

E028\_08 Table 2: Unscheduled maintenance 2004-2005

SS0121	7-Jan-05	P	<\$500	Hydraulic oil leaking out of crack in hose while GP winch was being used to stow equipment in net store	Deterioration of flexible hose outer coating allowed salt water to corrode braided inner steel hose	Amend procedure to include inspections of flexible hoses to detect those that have perished	V
SS0122	7-Jan-05	P	\$0	Forward stores crane wires severely kinked	Wire wound on drum the wrong way	Check that all wires for cranes are properly wound onto drums	V
SS0123	13-Jan-05	S	\$500	Deep water grab slammed into block during retrieval	Using a too powerful pump pack to retrieve equipment	Use appropriate sized pump when retrieving equipment	R
SS0124	18-Jan-05	S	\$5,000	Hydrophone was used during ROV operations. Hydrophone not recovered following recovery of ROV	Hydrophone not recovered and probably became entangled with propeller	Amend Job Hazard Analysis to specify requirement to recover hydrophone and assign responsible person	R
SS0134	3-Apr-05	S	\$1,000	25 navigation/signal light bulbs have blown	problems with wiring led to lights blowing	Repair wiring. Fix external ladder hoops to improve access	V
SS0136	12-Apr-05	S	\$0	starboard trawl winch continued working after winch controls moved to zero position, so winch was still being driven.	Operator stopped winch immediately but there were about 30 loose turns on the drum already	Control lever has since been serviced and is back in normal operation.	V
SS0141	24-May-05	S	\$2,000	Sensor on CTD damaged during deployment and retrieval	Thought to have happened due to ship rolling in retrieval process	Amend Job Hazard Analysis. Ensure staff onboard closely observe deployment and retrieval of equipment	R
SS0142	29-May-05	P	\$2,000	Damage to stanchions	Due to tide variations in Darwin harbour, vessel had risen to a point where it's shore end was being supported by hand rail and its own weight which caused damage to 2 stanchions.	No action recommended	V
SS0143	6-Jun-05	S	<\$500	Workboat swamped by wake when vessel thrusters activated. work boat became swamped. Cutting stern painter freed the boat and pushed it away from stern thruster area.	Workboat was tied alongside with painters awaiting recovery when foam mooring marking buoys were sighted to on stbd side. These buoys were expected to be on port side. Vessel put in DP to prevent movement towards buoys, causing thrusters to react and work boat became swamped by wake.	Amend Job Hazard Analysis. Ensure staff onboard closely observe deployment and retrieval of equipment	V

E028\_08 Table 2: Unscheduled maintenance 2004-2005

SS0145	7-Jun-05	S	\$0	A frame power pack pump would not start due to thermal overload relay for the main pump motor being tripped.	A frame power pack left running and the oil tank and electric motor were hot. After being turned off would not restart as the thermal overload relay for the main pump motor had tripped	A frame pump left to cool overnight. Job Hazard Ananalysis to be reviewed to ensure pump not left running	V
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E028\_08 Table 2: Unscheduled maintenance 2005-2006

Incident No	Date of incident	Loc'n of incident Sea (S) Port (P)	Approx Costs	Details of Incident	Why Incident Occurred	Action Taken to Prevent Reoccurrence	Vessel (V) or Research Equipment (R)
SS0148	26-Jul-05	S	\$34,000	Trawl deck A Frame, three 20 mm retaining bolts securing bottom inboard pin plate sheared off	Seizure of bottom Ram pin bearing	Contractors repaired A frame and inspected remaining bolts to ensure all bolts are properly lubricated	V
SS0149	01-Aug-05	S	\$3,000	Violent squall tilted ship 10 degrees to port and sudden wind lifted long gangway from its stowed position and deposited it at Aft end on its side	Gangway not fully secured during rough weather	Ensure all equipment stowed securely when not in use	V
SS0154	06-Oct-05	S	\$1,000	Winch operator noticed sudden jerking of wire during deployment of CTD	Wire had come off guide sheave below spooling rollers and jammed in its support bracket.	Nil	V
SS0155	02-Oct-05	S	\$12,000	Deep sea camera system lost during deployment	Heavy swell	Review Job Hazard Analysis	R
SS0156	21-Oct-05	P	-\$500	Loss of ship supplied UHF radio	Dropped overboard	Secure equipment to person by belt or lanyard	V
SS0157	31-Oct-05	S	\$5,000	Loss of dredges	Weak link chains seem to have failed	Installed additional weak link chains and replace safety chain with appropriate wire	R
SS0158	22-Nov-05	S	-\$500	Pin in block on main frame not tightly secured	Inappropriate shackle fitted on main frame	Replace with appropriate shackle. Review Job Hazard Analysis	V
SS0160	29-Nov-05	S	\$40,000	Damage to spooling wire on the port trawl winch between 1,000 metres and 3,500 metres	Wire unspooled while at sea and inability to maintain correct tension on the wire in the depth of water in which wire was unspooled	External contractor with knowledge of spooling to be contracted to fix wire spooling on port trawl winch	V
SS0162	08-Dec-05	S	\$0	OOW unable to switch between helm positions	Auto steering activation lead to system locking out all other operations from this position.	Modify procedures to include "unlock" procedure	V
SS0167	01-Feb-06	S	\$5,000	Windings on number 2 hydraulic pump earthed causing breaker to trip	Hydraulic pump shows as 415 earth fault	Motor to be repaired in Port Lincoln. All motors to be overhauled in 2006 lay-up	V
SS0169	03-Feb-06	S	\$2,000	Loss of sanitary water onboard vessel	Sanitary water pump seized resulting in loss of charge to system	Pump to be serviced more regularly. System to be overhauled in Hobart.	V
SS0172	17-Mar-06	P	-\$500	Loss of ship supplied UHF radio	Dropped overboard	Secure equipment to person by belt or lanyard	V
SS0175	31-Mar-06	S	\$500	Spare industrial battery for GMDSS broke free from fastenings resulting in damage to battery casing and spill of acid contents	Heavy weather led to battery breaking free from restraints	Better restraining of heavy items in severe weather and heavy seas	V
SS0176	05-Apr-06	S	\$0	Main engine overspeed tripped	Heavy weather led to over revving	Mechanical trip corrected by CE	V
SS0181	13-Apr-06	S	\$0	Main engine overspeed tripped	Main Engine still over revving. Mechanical trip corrected by CE	Subsequent investigations indicated unserviceable pressure reducing valve and I/P converter. Both items have been repaired/replaced.	V
SS0182	15-Apr-06	S	\$6,000	Main engine overspeed tripped	Main Engine still over revving. Mechanical trip corrected by CE	Subsequent investigations indicated unserviceable pressure reducing valve and I/P converter. Both items have been repaired/replaced.	V

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SS0183	17-Apr-06	S	\$2,000	Main switchboard earth leakage alarm sounded when #1 bow thruster started.	Sea water damage to both servo pump motors causing a breakdown of insulation to the ships hull.	Replace servo pump motors on return to port. Both motors were unservicable with no spare onboard resulting in the loss of the #1 bow thruster.	V
SS0184	03-May-06	S	\$500	Damage to incubation tank (scientific equipment) being used on deck	Insufficient deck inserts for lashing equipment to deck during heavy weather	Provide sturdy brackets to allow equipment to be lashed securely	R
SS0189	04-Jun-06	S	\$500	Main engine closed down to effect repairs to a leaking mechanical seal on the evap heating water circulating pump	Pressure to the pump could not be reduced sufficiently by closing the isolating valves	Stop the the Main Engine HT circ pump to reduce pressure at the evap circ pump.	V
SS0190	11-Jun-06	S	\$0	Sudden wave deposited significant water on shelter deck. Some of this water was deposited in a cable tray carrying electrical wires for scientific equipment. Some water leaked through bulkhead into operations room, landing on a laptop	Rough weather resulting in deck becoming covered in water	Revise Job Hazard Analysis	R
SS0192	21-Jun-06	S	\$8,000	Serious oil leak in gearbox	Broken section of inner seal zinc ring	Initial action to top up gear box oil and to install a drip tray under leak to prevent safety/environment issue. When vessel reached port the gear box was stripped and inspected. Spare parts were installed and gear box was reassembled.	V

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Incident No	Date of incident	Loc'n of incident Sea (S) Port (P)	Approx Costs	Details of Incident	Why Incident Occurred	Action Taken to Prevent Reoccurrence	Vessel (V) or Research Equipment (R)
SS0199	21-Sep-06	P	\$10,000	Small oil leak in hydraulic pump # 5	oil slowly seeping from the pipe through a patch of accumulated rust	Oil was drained down from the system. A temporary repair was effected, hydraulic system was refilled and left overnight. Repair inspected following morning, no oil had leaked from the repair. A test was conducted using # 6 & #2 hydraulic pumps again no leaks were observed. #4 hyd pump remains isolated & tagged out.	V
SS0200	25-Aug-06	S	\$500	Leak from flange of # 1 lubricating oil pump suction pipe resulted in shut down of Main Engine and subsequent total vessel blackout	Main Engine lubricating oil consumption high. Pipe flange bolts were tightened and Main Engine restarted	Nil recommended	V
SS0201	06-Sep-06	S	\$8,000	Loss of trawl wire and dredge	Retrieving dredge after total trawl wire extension. Trawl wire bitter end retrieved but no dredge	Rig new sacrificial wire and replacement dredge	R
SS0202	11-Sep-06	P	\$0	Loss of power to MSB and steering pump motors when alternator # 3 alternator tripped off the MSB.	Problems with changing over of alternators.	Nil recommend. Incident occurred when trying to address equipment failure encountered previously.	V



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SS0203	01-Oct-06	S	\$200,000	At beginning of deployment the CTD, wire parted and the CTD was lost overboard.	CTD instrument had been raised off the deck and was suspended off the side A frame just below sea surface in a depth of approx 700m. When Operations gave the instruction to commence lowering the CTD towards the seabed it rose rapidly to the block almost immediately and the wire parted causing the loss.	Re-write Job Hazard Analysis for CTD deployment procedure. All CTDs now to be lowered at least 10 metres below the surface before being suspended. This should clear/expose any loose turn on the winch barrel that has escaped detection.	R
SS0205	19-Oct-06	S	\$6,000	Dredge hooked up during dredging operation. When heaving ship backwards in attempt to free dredge, the sacrificial wire parted resulting in loss of chain bridle, weight, hammerlock, swivel, dredge and about 300m of sacrificial wire.	Suspect sacrificial wire fouled obstruction on seabed. Instruments indicated that strand(s) parted under load whilst heaving ship backwards with the shock causing the dredge to come momentarily free but then fouling again immediately. The final strand(s) parted with only 4.5T load indicated.	Review Job Hazard Analysis for dredging operations. Replace sacrificial wire	R
S00214	02-Jan-07	P	<\$500	Plastic tool case lid touched front of switchboard which resulted in a sudden, major blow-out	Switchboard was blacked out for refit, all bus bars and terminal on switchboard were cleaned, inspected and retightened	All work stopped and area cordoned off. All door fastenings inspected and suspect lugs removed	V
S00217	01-Feb-07	P	\$6,000	Work boat was being used regularly during vessel refit. Work boat was found to be missing from back of National Facility	Boat was tied behind vessel and was reported stolen. Issue of theft from wharf previously reported because of public access. Boat subsequently retrieved but minus motor.	Boat to be hoisted onboard each night at end of work	V
S00218	25-Feb-07	S	<\$500	Leak in main engine high temperature jacket cooling water inlet flexible coupling	Notice by 2nd engineer	Leak caused by normal wear and tear. Repaired.	V

E028\_08 Table 2: Unscheduled maintenance 2006-2007

S00219	25-Feb-07	S	\$0	GA winch experienced a power failure. Despite increasing the ship's speed, the sidescan impacted the seabed and was lost	The GA winch had experienced several power failures the previous evening but had been working reliably for about 2hrs prior to the incident. A fail-safe system to recover the instrument in such circumstances also failed to operate as designed.	GA to check fail-safe systems for equipment deployment and recovery.	R
S00221	27-Feb-07	S	<\$500	While recovering corer from a depth of 1500m, winch driver heard a different noise coming from the winch. He stopped the operation and discovered that the spooling gear was not functioning properly	A build up of wire against the drum cheek had occurred which had eventually 'fallen in' to the valley alongside resulting in buried turns of wire on the drum. The only way to clear this was found to be running the wire out at speed. Eventually the corer was recovered	Equipment design issues resulting in failure of spooling gear. Failure of tension controller	V
S00222	01-Mar-07	S	<\$500	Chief Steward reported loss of MSIC card	Assumed that it was lost from its neck lanyard during stores loading stores in Port Lincoln.	Replace MSIC card	V
S00223	09-Mar-07	S	<\$500	Retrieving a core sample when the spooling gear stopped moving on the coring winch	It was first thought the guide vane in the spooling carriage had failed, however further investigation revealed the drive chain from the drum to intermediate sprocket had broken a link and parted	Realign the complete drive train and do it before it is next required for use. Ensure adequate spare chain and breakable links are carried	V
S00224	10-Mar-07	S	\$0	While retrieving a core, chatter was heard on the inboard brake with 2100m of wire still out	The brake drum was not riding smoothly over the brake shoes while hauling in and clearance of the brake shoes to the drum was insufficient.	Adjustment was made to the brake shoe clearance and the operation recommenced 1106, without the chatter.	V

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S00225	10-Mar-07	S	<\$500	Loss of power from the pumps 1 and 5 on the coring winch	Control of the winch was transferred to the local station on the winch itself which corrected problem. Control was then transferred to the remote station in the dog box which again corrected problem.	believed to be an electronic control problem rather than hydraulic. Work with this winch has stopped	V
S00226	18-Mar-07	S	<\$500	While retrieving the vibro-corer tower the ship pitched causing a sudden shock loading to the wire. This shock loading broke a hold down bolt used to secure the winch to the deck, using the starboard forward deck mounting plate. The broken bolt and diminished holding force appeared to start a chain reaction tearing the weld holding the port forward mounting plate.	Force applied by the load on the wire bent the two remaining mounting plates and stripped the threads from the bolts allowing the winch to come free and fall over. The winch was brought to an upright position using the ships crane and made secure with two chain blocks and the wire on the net drum. The load was then retrieved from the water	Winch was welded directly to the deck without the use of bolt down mounting plates. Two chains and dogs were also attached to the winch and to two eye bolts screwed into the deck. Design of mounting procedure to be reviewed and upgraded.	R
S00228	29-Mar-07	S	<\$500	Recovering surface buoy connected to the weight on the end of the extended line from the sonardyne apparatus, the weight became taut and parted immediately resulting in loss of sonardyne. Sonardyne was successfully recovered within about 2hrs. Total equipment loss amounted to weight, a length of chain, 2 shackles, 2 small floats and perhaps 100m of light line.	The light line between the buoy and the weight had become fouled in either the main propeller or No 1 stern thruster.	Nil. Incident occurred regardless of taking all known hazards into account.	R
S00230	13-Apr-07	P	\$0	ME blackout caused by Shaft Alt breaker tripping out on frequency fault	The cause probably due to a combination of the high prop pitch, rudder angle & ships heavy rolling	Nil recommended	V

E028\_08 Table 2: Unscheduled maintenance 2006-2007

S00231	18-Apr-07	S	\$3,000	Ship experienced a sudden steering gear failure, which resulted in the steering gear becoming inoperable even in the emergency steering from Steering Flat mode	The failure was due to the main hydraulic pipe connection to the forward ram blowing off which caused the rams to move to the hard over to port position. The hydraulic oil supply pipe to the ram was completely separated from the inlet connection to the forward ram.	Inspect all similar connection on the system and correct any problems. Repair failed hydraulic pipe connection. Repair valve block mounting	V
S00234	23-May-07	S	\$5,000	While steaming at 8kts main engine experienced a higher running speed. Governor was not able to be operated. Controlled blackout was arranged and governor serviced	No apparent cause	Organise to overhaul governor at next opportunity.	V