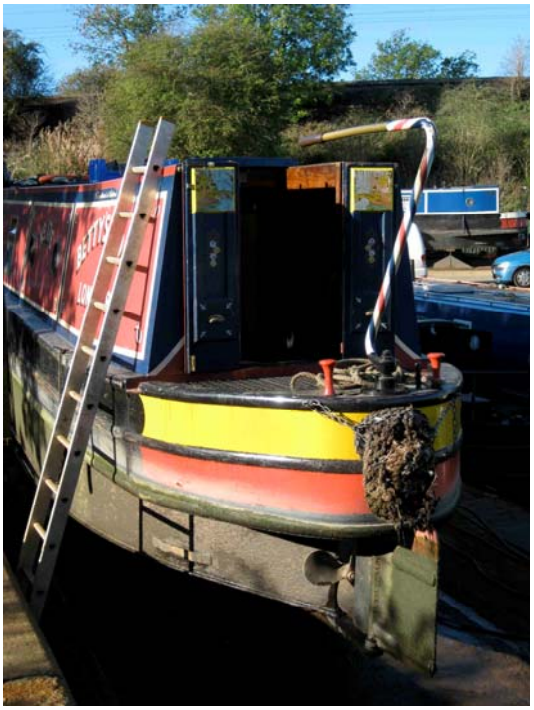
Pre Purchase Survey Report No: CHE0008

Name of Vessel: [redacted]



Survey Commissioned by:
[redacted]

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1. About the Survey and this Report

This survey was carried out by Hugh Ellacott at the request of [redacted], who is a prospective buyer of the vessel.

Scope of Survey

This is a pre-purchase survey and its purpose is to establish the structural and general condition of the vessel. Where items of equipment have been tested this is stated in the text.

Limitations

- This report has been prepared for the use of the commissioning client and no liability is extended to others who may read it.
- The hull could not be inspected where the vessel lay on shores or under the trolley that prevented access to the bottom in the middle of the narrowboat.
- In some cases it is not possible to detect latent and hidden defects without destructive testing which was not possible without owner's consent.
- A general inspection of the engine and its installation was be made and it was briefly run, but not under load. It should be appreciated that some components may appear serviceable but may be defective when the engine used for navigation.
- Electrical and electronic equipment was not tested, though in some cases equipment was switched on to see if it powered up.
- The engine compartment bilge was flooded at the time of the survey, which hampered my ability to inspect this part of the vessel.

Conditions of Survey

The survey took place on [redacted] October 2011 while [redacted] was lying ashore at [redacted] Northamptonshire.

The weather on the day of the survey was fine and sunny.

Methods

<u>Thickness Gauging</u>

The thickness of the steel hull was measured using a Cygnus 3 multiple echo ultrasonic gauge. The use of multiple echoes provides readings that are accurate and reliable without the need for grinding. Protective coatings such as paint and resin need not be removed as the gauge will measure through such layers but not include their thickness in the reading. The calibration of the gauge was checked against a test piece at the start of the survey.

One probe was used in taking the measurements:

- 2.25 MHz, three quarter inch large diameter probe

Where scale, dirt, or loose coatings were present, they were removed using a scraper or chipping hammer.

Measuring Pit Depth

Pit depths were measured using a Sealey VS0563 digital tyre tread depth gauge, which is VOSA approved. The gauge has a resolution of 0.01mm and an accuracy of ± 0.01mm. However, measurements in this report have been rounded to the nearest tenth of a millimetre. Prior to the start of the survey the gauge was zeroed.

Conventions

Numbered items in the text are referred to from forward to aft, e.g. frame 4 is the fourth frame aft of the stem and forward of frame 5.

Recommendations

Recommendations in this report fall into two categories, which are explained below.

Recommendations
Recommendations are limited to those defects which should be rectified before the vessel is used (or within a given time span if specified) or may affect the ability to obtain insurance for the vessel.

Advice
Advice is given concerning defects that do not restrict the use of the vessel or her safe use. These defects may be cosmetic or concern actions that will prevent more serious defects developing in the future. Although these defects may be considered minor, do not assume repair costs are low.

Recommendations and advice made in the body of the report are both printed in italic font. A table of all recommendations and advice is reproduced at the end of the conclusions.

2. Particulars of the Vessel

[redacted] was constructed by Stoke-on-Trent Boat Building Co Ltd. Broker information indicates the year of construction was 1991. The narrowboat has a traditional stern with an elliptical counter over a swim. Forward there is a well deck covered by a cratch with a typically-shaped Stoke-on-Trent bow. The cabin is constructed of steel.

- Length Overall 50' 0" (measured)
- Beam 6' 8" (measured, excluding rubbing bands)

Identifying Numbers

- Builder's No. [redacted]
- BW Index No.

No documents were available on the boat at the time of the survey. Broker information stated the following details.

- Boat Safety Certificate (BSC) Valid to Feb 2013

Advice
Confirm presence of BSC prior to purchase. Ascertain whether licence will be transferred to new owner.

3. Hull

According to the broker's information the hull had been blacked in July 2011 and the condition of the blacking is consistent with this statement. Blacking appeared to be in the form of a bitumen-based coating. A red oxide coating appeared to underlie the blacking. Blacking included the topsides, hull sides below the waterline and uxter plate[1], but not the bottom or weed hatch tunnel.

Advice
Black weed hatch tunnel when hull is next blacked.

The hull was hammer sounded (but not where access was prevented by the trolley) and no defects were detected. A dent most likely caused by an impact was noted at the waterline on the starboard side below the forward window. There is also some minor abrasion to blacking of topsides on the forward part of the hull.

The tables in Appendix A show the results of gauging the thickness of the hull plating. Thickness measurements were taken as described in Section 1. Readings were taken every 1.5m on both sides of the hull, but not under the narrowboat where it lay on the trolley. Measurements were taken at the waterline, the foot and midway between the two points where appropriate. Measurements on the bottom plate were taken approximately 150 mm inboard of the chine and on the centre line. At the stern additional readings were taken on the uxter plate and swim plate.

The nominal thickness of the plates when constructed are assumed to be:

- Bottom plate and uxter plate - 10 mm
- Hull sides and swim plates - 6 mm

The table reveals there has been negligible diminution of plate thickness.

Recent blacking of the hull sides and uxter plate prevented visual examination for pit corrosion. However, no pits were noted where small areas of blacking were scraped (50mm x 50mm) in order to carry out the ultrasonic thickness gauging.

The bottom plate does not appear to have been blacked in the recent past. No evidence of any blacking was found. Widespread shallow pit corrosion was noted on the bottom plate in all parts that it was possible to view (it was not possible to gain access to the bottom plate where the narrowboat lay on the trolley). Pit depths were measured the deepest being 1.1mm, but the majority were in the range 0.3mm to 0.7mm.

[1] Sometimes called the counter bottom plate as it forms the bottom of the counter stern which is above the propeller.

Advice
At the next haul out prepare (grit blasting would be best) and black bottom plate.

The sacrificial chine, which is formed by the bottom plate where it extends beyond the width of the hull sides, was examined. Along the sides of the narrowboat the chine extended between 12mm and 20mm and at this width it provides adequate protection for the hull.

The thickness of the steel comprising the weed hatch was gauged in two locations as follows; 5.8mm and 5.7mm. The hatch and the fastening mechanism was visual inspected and hammer tested and found to be secure.

No weld defects were noted.

4. Hull Internal

No access was possible beneath the cabin sole (the floor). However, there was a small access hatch on the starboard side just forward of the engine compartment. Approximately 5mm of water were visible in the bilge at this point and the interior of the bottom plate was red with rust. The source of the water was not clear, as no water should drain into the cabin bilge. Water could be coming from leaking plumbing, but there were also repairs noted to the bath; it is probable that it leaks and is a potential source.

Advice
Remove water from cabin bilge, inspect regularly and remove water as necessary.

5. Deck

The foredeck and aft are painted red with black cants[2]. Paintwork was in good condition.

The side decks were painted black and were textured to improve grip. In a few places the paint had lost its adhesions, though was not flaking away.

Advice
Remove loose paint from side decks, remove any rust that may be present, treat with rust inhibitor and paint.

A hard-wearing carpet was laid over the well deck. This has caused water to be retained and caused rusting of the upright sections of the lockers on either side of the well deck. On the port side the locker has rusted right through and has been cut back to good steel; consequently the port locker is no longer weather tight.

Advice
Remove carpet from well deck, grind rusted areas of deck and lockers back to good steel, treat with rust inhibitor and paint.

[2] A raised outer section of a deck normally to the fore and counter decks.

6. Skin Fittings and Other Through Hull Apertures

There were no below waterline hull apertures. The above waterline apertures listed in the tables below were identified.

PORT		
To Bow*	Height Above WL	Function
1.0m	100mm	Gas locker drain
2.5m	200mm	Well deck scupper
8.2m	200mm	Galley sink discharge
8.5m	200mm	Bathroom basin discharge
9.1m	200mm	Bath discharge
13.0m	280mm	Balanced flue, assumed to be for Eberspacher
13.3	300mm	Unknown
13.5m	300mm	Unknown
14m	450mm	Aft deck drain

STARBOARD		
To Bow*	Height Above WL	Function
1.0m	100mm	Gas locker drain
2.5m	200mm	Well deck scupper
14m	450mm	Aft deck drain
14.7m	350mm	Bilge pump discharge
14.8m	350mm	Engine exhaust

*Estimated

All through hulls were examined and found to be secure apart from, the bath discharge which was behind panelling, apart from the Eberspacher flue which was not accessible and unknown through hulls which again were not accessible.

Advice
Check security of skin fittings that could not be accessed during survey. Identify unknown through hulls and check that the skin fittings are secure. If skin fittings are not in use they should be blanked off.

7. Stern Gear

The right hand propeller appeared to be cast in manganese bronze with an estimated 18 inch diameter. There was no evidence of dezincification, but the tips of the blades had suffered from minor damage due the propeller hitting underwater objects. The propeller was fastened by means of a nut secured with a split pin. The nut was hammer tested and found to be secure.

The propeller shaft was non-magnetic and appeared to be manufactured from marine grade (austenitic) stainless steel. There was some but acceptable play in the outboard bearing. The propeller turned freely by hand.

A traditional packing gland was fitted at the inboard side of the propeller shaft tube. The bolts securing the gland were hammer tested and found to be secure. The gland

was fed by a remotely located stern tube greaser. There was a considerable accumulation of grease around the gland.

At the time of the survey the engine compartment bilge was flooded to a depth of approximately 200mm of water. The most likely source of the water was a leaking stern tube gland. A River Canal Rescue handbook was found on the narrowboat. It noted that the engineer was called out to bleed the fuel system on 2/8/11. At the same time the handbook notes the engineer adjusted the stern gland, tested it and found it to be "OK". The fact the engine compartment flooded indicates that there is may be a chronic problem with stern gland; it may need repacking or, more seriously, the propeller shaft could be worn which would be an expensive item to replace.

Advice
Draw the propeller shaft to inspect wear by way of the inboard gland. If worn replace, if not refit and pack stern tube gland.

8. Rudder and Steering

The rudder is supported on a skeg. It was estimated to be made of 10mm steel. Its movement was free and there was hardly any noticeable play of the rudderstock in its tube or in the cup bearing on the skeg. The rudder tube passes through the integral fuel tank and it was not possible to inspect. There are no stops on the movement of the rudder; its travel to port and starboard is limited by the fin hitting the rubbing band protecting the counter. There was some wear to the rubbing band, but it will be many years before it wears through.

The narrowboat is steered by means of a simple tiller. A removable brass tiller bar is secured by means of a brass pin.

9. Cathodic Protection

Four anodes were welded to the narrowboat by means of straps. Two anodes were position on either side of the bow and a further two were located on the hull sides forward of the swim and are therefore vulnerable to being hit by underwater obstructions. The anodes were approximately 20% wasted and at the time of the survey were not in need of replacement.

10. Cabin

The cabin is constructed of steel; four ultrasound measurements were taken of the roof and cabin sides which confirmed that the nominal thickness is 4.00mm

The cabin sides have painted panels. The panels are dark red on a navy ground with a cream coachline between. The paint has faded but was otherwise in good condition. The cabin roof was painted blue with a slight texture to improve grip under foot. The paint condition was good.

Handrails are integral to the steel structure. There is a single drain point on either side at the low point of the cabin. However, there was some rust under the paint just aft of the drain point to starboard and it is likely water lies at this place.

A cratch covers the well deck. The timber was in good condition, but the bottom part of the triangular cratch board appeared to have been previously replaced and was held to the other part of the structure by two steel plates. Some paint was loose and the putty holding the glass was in poor condition.

The cratch cover was in good condition, but some of the elastic toggles needed replacing.

11. Access to Accommodation

Access to accommodation at the bow is through glazed double doors that were secured by a Yale-type lock. The doors and surrounding timber was in good condition.

Aft there are traditional double doors and sliding hatch. The doors are of mild steel but lined with timber on the inside. The hatch is of mild steel and slides freely on its brass runners.

There is a side hatch on the starboard side opposite the bathroom. The doors fitted well, but the mild steel hatch was slightly warped and difficult to bolt closed.

12. Windows and Ports

There are four anodised aluminium hopper windows in the saloon/galley. The windows were in good condition and there were no obvious signs of leaks.

There is a yacht style hatch set in the cabin roof above the galley. It appears to be made of anodised aluminium and can be securely fastened from inside the narrowboat. Inspection of the timber trim around the interior of the hatch indicated it may be subject to minor leakage and it was noted that the rubber seal around the hatch had lost its elasticity.

The aft cabin is lit by four port lights. There was mastic at the bottom of each suggesting that there may be a problem with the ports leaking, which could be fixed by resealing.

A pigeon box is set in the cabin roof above the double bunk. Each wing has two small port lights. The locking mechanism had become rusted and the port wing, in particular, was difficult to open and close.

13. Mooring Arrangements

There is a mooring tee on the bow and two mooring bollards on the cant at the stern. All are strong. In addition there is a mooring loop welded to the cabin roof in the middle of the narrowboat. Also on the roof, there is a rack for storing a barge pole and gangplank. Both the plank and the pole were suffering from decay and were unserviceable.

A 15.8 kg CQR anchor was stowed in the well deck. It had no chain.

The rope bow fender was in adequate condition, but that on the stern was rotten. There were various other fenders for the side of the boat, but a complete set of four was not identified.

Advice
Replace stern fender.

14. Navigation Lights

A tunnel light was fitted forward of the cratch; it was tested and was seen to light. The horn was tested and it sounded.

There were no navigation lights fitted. A narrowboat while navigating on canals at night, i.e. between the hours of sunset and sunrise, is required to show a white light in the forepart of the vessel. The tunnel light is not considered suitable means of complying with this requirement as it can dazzle on-coming steerers.

15. Bilge Pumping Arrangements

A single bilge pump was fitted in a small compartment beneath the stern tube gland. It was tested and pumped a considerable volume of water from the engine compartment. It was operated by a simple on/off switch and does not have an automatic setting. An automatic bilge pump would have prevented the flooding of the engine compartment bilge.

Advice
Fit bilge pump with an integral float switch so that water entering the narrowboat through the stern tube is automatically discharged by the bilge pump.

16. Firefighting Equipment

The following firefighting equipment was found on board the narrowboat.

- Adjacent to stove, 2kg dry powder fire extinguisher, rating 13A-70B-C
- Fire blanket, galley
- Galley, 2kg dry powder fire extinguisher, rating 13A-70B-C,
- Aft cabin, 2kg dry powder fire extinguisher, rating 13A-89B-C
- Engine room, 1kg dry powder, rating 5A-34B

All fire extinguishers had gauges that were in the green sector. The combine rating of the fire extinguishers meets the requirements of the Boat Safety Scheme (BSS).

17. Emergency Equipment

Emergency equipment was limited to a lifebuoy stored on the cabin roof. Neither a carbon monoxide monitor nor a smoke detector were noted in the accommodation.

Advice
Fit CO monitor and smoke detector.

18. Engine and Installation

The engine is a Thornycroft. Inspection of the engine was hampered by water in the engine bilge. The engine particulars are:

- Engine Serial No. [redacted]
- Engine No. 26990
- Engine Hours 7369

The gearbox is a PRM 120D; it had the following numbers on its plate 1200859 and 120D 2.5

The engine is mounted on strong fore and aft girders using flexible mountings. Three of the four engine bolts were hammer tested and found to be secure. Cooling is by means of a skin tank welded to the port swim plate. Exhaust is emitted from the starboard side of the counter via an automotive type box lodge on top of the port uxter plate. The engine is fitted with twin alternators.

The following checks were made.

- Oil checked under filler cap for dirt and emulsion; none found
- Oil dipstick checked to reveal correct oil level; no untoward odour, colour or emulsion seen in oil.
- Coolant level in heat exchanger was low and needed replenishing.
- Fan belt tension loose, especially so on starboard alternator.
- Three bolts on shaft couple hammer tested and found to be secure.
- Hoses and clips were examined (where possible) and no defects were noted.

The engine was started and run briefly but not under load; it started easily. The rev counter operated, as did the alternator warning light which lit then extinguished when the alternator commenced charging.

It was noted that the oil pressure gauge read 72 psi while the engine was running. This is abnormally high even though the engine had not been brought up to normal operating temperature. This may be a fault with the gauge or, more unlikely, it could indicate a pressure relief value stuck closed. The pressure gauge is an important diagnostic for monitoring operation of the engine, so the fault should be investigated and rectified.

Advice
Investigate and rectify high oil pressure reading.

The single lever engine control was operated and found to move smoothly and actuate the throttle control on the engine and the gear change.

19. Fuel System

Fuel is stored in a built in tank in the counter stern. The steel was gauged at 3.8mm. There is also mild steel tank welded on the starboard part of the uxter plate and directly abutting the tank in the stern. It is assumed that the two form one single L-

shaped tank, but this could not be confirmed. There was a drain point in the starboard section of the tank. There was a filler point and air vent on the counter.

Fuel is delivered from the tank via copper pipe, which is fitted with a fuel cock near the off take from the tank. The fuel line feeding the engine was well supported and included a length of rubber hose labelled ISO 7840 and therefore suitable for this use.

There is an inline primary fuel filter, however it is positioned after the "T" feeding the Eberspacher heater and therefore the heater does not benefit from the protection from contaminated fuel it provides.

Advice
Rerun fuel line for Eberspacher so that its fuel passes through primary filter.

The copper pipe serving the Eberspacher is poorly supported and includes a short section of stainless steel braided hose that does not meet the requirements of ISO 7840.

Advice
Improve support of fuel to Eberspacher and replace braided hose with hose that conforms to ISO 7840.

20. General Accommodation

This report does not describe the interior accommodation in detail. Walking through the narrowboat from the forward access there is a saloon, galley, passage with bathroom to port and an aft cabin with a double berth that gives access to the engine room. The accommodation was clean, tidy and very well maintained, including curtains and cushions.

21. Gas Installation

The gas system was examined with the aim of finding visually identifiable deficiencies in the gas system. There may be other defects in the system that cannot be found by visual examination. The visual examination does not constitute any kind of gas safety certificate, which is only obtainable in the UK after comprehensive pressure testing and assessment by a qualified person registered by Gas Safe (www.gassaferegister.co.uk).

There is a gas locker built into the narrowboat forward of the well deck. The locker has adequate drain holes. A Calor Gas Type 766 regulator was noted connected to flexible gas hose that in turn was connected to a bulkhead fitting. No defects were apparent.

There were two gas appliances located in the galley

- A four burner hob
- A cooker with a grill and oven

The copper gas pipe runs through the cabin under the deck to port. It was estimated to be of 1/2 inch diameter and was well supported. The gas pipe passes within

approximately 200mm of the flue pipe for the solid fuel stove. There was no insulation material present to protect the pipe from excessive heat, though no signs of scorching on nearby timber trim. This arrangement meets the requirements of the BSS; however, I would advocate improving the insulation of the gas pipe, as it is easy to achieve.

Advice
Improve insulation of the gas pipe in the vicinity of the stove flue.

A label ("Gas Tap") stuck to the rear panel of the locker under the sink indicates that there is an isolation valve behind the panel, but it is not easily accessible.

Advice
Improve access to gas isolation valve under the galley sink.

22. Fresh Water and Sanitation

An integral water tank is constructed under the well deck forward of the cabin. A filler point labelled "diesel" is located on the port side deck and it is assumed that this is the filler point for the water tank.

Advice
Confirm location of water tank filler and label "water".

All taps were opened and water was seen to flow. The water pump (Jabsco Waterpuppy 2000) was heard to operate. It is located under the sink in the galley. At some time in the past its pressure switch has failed and it has been bypassed using an independent pressure switch. The water was tasted and found to be fresh.

A hip bath has been installed in the bathroom and its taps are fitted with a shower diverter. The bath is plastic and has been damaged and though repairs have been attempted I believe the bath, as seen during the survey, would leak.

The bathroom is fitted with a Mansfield Traveller toilet with associated holding tank and pumpout outlet located on the port side deck.

23. Electrical Installation

<u>230/240 volt AC</u>

A 240 volt mains shoreline can be connected to a bulkhead mounted plug located on the port side of the aft cabin bulkhead. What appeared to be a residual current device (RCD) was located in the port side locker in the engine room. Mains 240 volt sockets were located throughout the accommodation.

A Victron Energie Atlas Combi 12/1500 charger/inverter has been installed. The battery charging function works in combination with an Adverc battery management system. The Atlas Combi inverter function was switched on and it powered up.

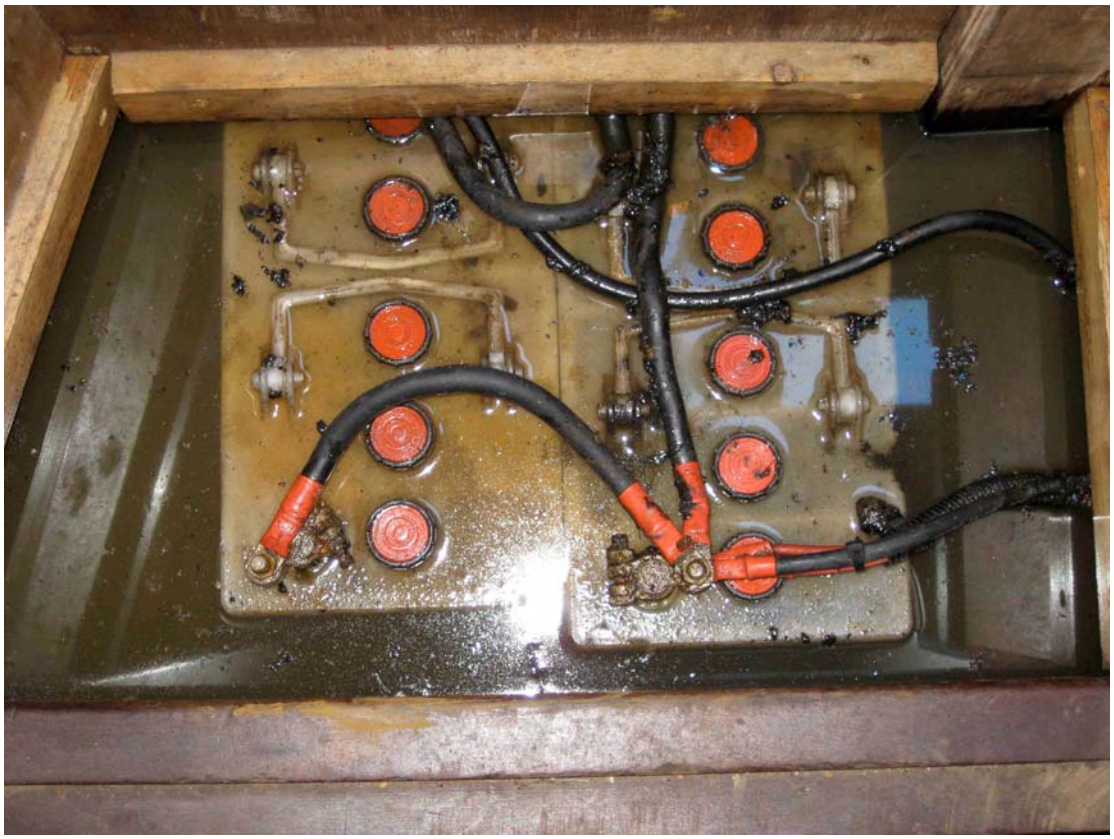
The following 240 volt mains equipment was present on [redacted]

- Zanussi fridge

- 2 kW immersion heater. (The inverter is not powerful enough to operate the immersion heater.)

12 volt DC

At the time of the survey, water in the battery compartment was level with the top of the batteries, which hampered the survey (see photo).



There were three domestic batteries and one engine battery onboard [redacted] The batteries are charged by means of twin alternators.

A digital voltmeter measured a voltage of 12.89 volts across the terminals of the domestic batteries. When the measurement was taken the battery selector switch was set to "BOTH" so the reading is an average for all batteries including the engine battery. The reading is indicative of a healthy battery condition, though a load test would need to be performed to provide more conclusive evidence of battery condition. There were no covers isolating the domestic battery terminals; this is a requirement of the Boat Safety Scheme (BSS).

Advice
Fit covers to domestic battery terminals.

It was not possible to access wire for the 12 volt system, which was assumed to be behind the engine control panel. A 12 volt fuse box was located in a locker to the port of the engine room. The box was a domestic consumer unit made by Hager and the breakers are designed for operation in 240/415v installations.

Advice
Replace consumer unit with fuses or breakers specified for 12 volt operation.

The following12 volt equipment was present on [redacted] (both located in locker opposite stove.)

- A1 Omnicron 2000 alarm system. (I believe this system works off 12 volts rather than mains). It was not tested and it was not apparent whether it was operational.
- Radiomobile radio cassette player.

Lights switches in the accommodation were turned on at random and all those selected were found to operate.

Electrical cables were noted clipped to the diesel fuel lines in the engine room; this contravenes BSS guidance and the cable should be re-routed.

Advice
Re-route electrical cables that are clipped to fuel lines in the engine room.

24. Heating and Ventilation

A Little Squirrel solid fuel stove, made by Morsø, was installed in the saloon. It was in a dangerous condition and should not be used until it has been serviced. The main fault was that the blanking plate in the rear panel of the stove had completely disintegrated and when lit the stove would fill the saloon with smoke. The seal between the top plate and the flue had also failed and would also emit smoke into the saloon (see photo).

The main door of the stove could only be closed by applying strong pressure to the door, which would not be possible, when the stove is hot. It was not possible ascertain why the door was difficult to close - it may because of the seal, or there may be deformation to the front panel or door. The rear firebrick had broken in half.

The stove was solidly secured in place.

Recommendation
Service solid fuel stove before it is used.

In addition to the faults to the stove, rust stains were noted where the flue passes through the roof. It is common for leaks to occur here and the joint between the collar and the flue should be resealed. The chimney was in good condition.

[redacted] was also fitted with central heating fired by a diesel-fired Eberspacher. The Eberspacher was installed in the engine room on the port. Access to the unit was difficult and it could not be examined closely. The on/off switch is located in a locker above the unit. The unit was switched on and heard to start its ignition programme. Further testing was not carried out. The Eberspacher heats four radiators in the aft cabin, bathroom, galley and saloon. The Eberspacher also provides hot water for the narrowboat.

Three vents were fitted in the cabin roof and there were a further two low level vents in the doors giving access to the well deck.

CONCLUSIONS AND RECOMMENDATIONS:

Conclusions

Inspection of the hull of [redacted] indicates it was in good condition for its age, though widespread, shallow pitting was affecting the bottom plate. The accommodation was well cared for and in good condition.

Two significant defects were identified. Firstly, the Morsø stove was in need of servicing and cannot be used in its current condition; secondly, the stern tube gland was leaking and information on board the boat indicates this is a chronic problem. Repacking the gland may solve the leak, but it would be prudent to draw the propeller shaft to ensure the leak is not related to wear.

When these two defects are rectified and other more minor deficiencies are dealt with [redacted] represents a well-appointed narrowboat with many years of life ahead of her.

Hugh Ellacott, [redacted]

List of Recommendations

The recommendations made in the report are listed below with their respective page numbers. All recommendations should be carried out before use of the vessel.

Recommendation
Service solid fuel stove before it is used.

List of Advice

The advice notes given in the report are listed below with their respective page numbers. It is not necessary to carry out advice before use of vessel.

Advice
Confirm presence of BSC prior to purchase. Ascertain whether licence will be transferred to new owner.

Advice
Black weed hatch tunnel when hull is next blacked.

Advice
At the next haul out prepare (grit blasting would be best) and black bottom plate.

Advice
Remove water from cabin bilge, inspect regularly and remove water as necessary.

Advice
Remove loose paint from side decks, remove any rust that may be present, treat with rust inhibitor and paint.

Advice
Check security of skin fittings that could not be accessed during survey. Identify unknown through hulls and check that the skin fittings are secure. If skin fittings are not in use they should be blanked off.

Advice
Draw the propeller shaft to inspect wear by way of the inboard gland. If worn replace, if not refit and pack stern tube gland.

Advice
Replace stern fender.

Advice
Fit bilge pump with an integral float switch so that water entering the narrowboat through the stern tube is automatically discharged by the bilge pump.

Advice
Fit CO monitor and smoke detector.

Advice
Investigate and rectify high oil pressure reading.

Advice
Rerun fuel line for Eberspacher so that its fuel passes through primary filter.

Advice
Improve support of fuel to Eberspacher and replace braided hose with hose that conforms to ISO 7840.

Advice
Improve insulation of the gas pipe in the vicinity of the stove flue.

Advice
Improve access to gas isolation valve under the galley sink.

Advice
Confirm location of water tank filler and label "water".

Advice
Fit covers to domestic battery terminals.

Advice
Replace consumer unit with fuses or breakers specified for 12 volt operation.

Advice
Re-route electrical cables that are clipped to fuel lines in the engine room.

Appendix A: Ultrasonic Thickness Gauging

PORT

Distance from Bow	Hull Wall			Bottom		Uxtter Plate		Swim Plate		
	Waterline	*Mid*	*Foot*	*Outboard*	*Centre*	*Outboard*	*Inboard*	*Top*	*Mid*	*Foot*
1.0	5.9	5.9	5.9	9.9	9.8	n/a	n/a	n/a	n/a	n/a
2.0	5.9	5.9	5.9	9.8	9.7	n/a	n/a	n/a	n/a	n/a
3.0	5.8	5.8	5.8	9.9	9.6	n/a	n/a	n/a	n/a	n/a
4.5	5.8	5.8	5.9	9.6	9.8	n/a	n/a	n/a	n/a	n/a
6.0	5.9	5.9	5.8	no access	no access	n/a	n/a	n/a	n/a	n/a
7.5	5.8	5.9	5.8	no access	no access	n/a	n/a	n/a	n/a	n/a
9.0	5.8	5.9	5.7	no access	no access	n/a	n/a	n/a	n/a	n/a
10.5	5.8	5.8	5.8	no access	no access	n/a	n/a	n/a	n/a	n/a
12.0	5.8	5.7	5.8	9.9	9.8	n/a	n/a	n/a	n/a	n/a
13.5	n/a	n/a	n/a	9.6	9.9	9.8	9.7	5.8	5.9	5.9
15.0	n/a	n/a	n/a	9.8	9.8	9.8	9.7	6.0	5.9	5.7

STARBOARD

Distance from Bow	Hull Wall			Bottom		Uxtter Plate		Swim Plate		
	Waterline	*Mid*	*Foot*	*Outboard*	*Centre*	*Outboard*	*Inboard*	*Top*	*Mid*	*Foot*
1.0	5.9	5.9	5.9	9.9	see above	n/a	n/a	n/a	n/a	n/a
2.0	5.9	5.8	5.8	9.8	see above	n/a	n/a	n/a	n/a	n/a
3.0	5.8	5.8	5.8	9.7	see above	n/a	n/a	n/a	n/a	n/a
4.5	5.8	5.8	5.8	9.8	see above	n/a	n/a	n/a	n/a	n/a
6.0	5.8	5.8	5.8	no access	no access	n/a	n/a	n/a	n/a	n/a
7.5	5.7	5.8	5.8	no access	no access	n/a	n/a	n/a	n/a	n/a
9.0	5.8	5.8	5.8	no access	no access	n/a	n/a	n/a	n/a	n/a
10.5	5.8	5.8	5.7	no access	no access	n/a	n/a	n/a	n/a	n/a
12.0	5.9	5.8	5.7	9.4	see above	n/a	n/a	n/a	n/a	n/a
13.5	n/a	n/a	n/a	9.8	see above	9.8	9.8	5.9	5.9	5.9
15.0	n/a	n/a	n/a	9.7	see above	9.9	9.8	5.8	6.0	5.8

Measurements in millimetres, excepting stations which are in metres
n/a - not applicable
"-" no reading obtained