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# Recycling of **Ex-HMS Endurance**

## Disposal Services Authority



*HMS Endurance during her patrol of the Antarctic Peninsula in 2007.*

Equipping and Supporting our Armed Forces  
**Defence Equipment & Support**

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The Royal Navy's Antarctic patrol ship HMS Endurance is pictured leaving her Portsmouth base on Wednesday November 28th 2007 for the longest mission in her history to patrol and survey the Antarctic & South Atlantic.

# Executive Summary

Former HMS Vessel Endurance A171 was declared surplus to the MOD requirements and made available for disposal to the DSA in June 2015. In July 2015 the DSA gave advance notice of the vessel for further use or recycling, noting that 'parties interested in acquiring the vessel for future use should be aware that it would require considerable investment due to the ship suffering extensive flooding in 2008 causing significant damage to machinery and the accommodation. In accordance with the UK Governments Ship Recycling Strategy and following an open competition in September 2015 for the recycling of Endurance, the Disposal Services Authority awarded preferred bidder status to the Turkish company LEYAL Ship Recycling Ltd whose formal proposal was to conduct the recycling of this vessel at their dedicated ship dismantling facility in Aliaga, Turkey.



The former HMS Endurance affectionately known as 'Red Plum' departed from HMNB Portsmouth under the tow of Spartan on her final voyage to the ship dismantling facility in Aliaga, Turkey on the 1 June 2016.



# EX-HMS Endurance

## Background

### General particulars



<b>Date and Place of Build</b>	<b>HMS Endurance</b> was a Class 1 icebreaker that served as the Royal Navy ice patrol ship between 1991 and 2008. Built in Norway in 1990 by Ulstein Hatlo for Rieber Shipping as MV <i>Polar Circle</i> , she was chartered by the Royal Navy in 1991 for eight months as HMS <i>Polar Circle</i> , before being purchased outright and renamed HMS <i>Endurance</i> in October 1992.
<b>Date ceased operational service</b>	April 2012
<b>Type of Vessel</b>	Antarctic Patrol Ship. Built as Passenger Ship – Icebreaker ICE05. Modified by UK MoD.
<b>Displacements &amp; Weights in Tonnes</b>	Lightship: 4050 tonnes
<b>Estimated metal weight</b>	3200 tonnes
<b>Current Draughts</b>	5.6m Fwd. 5.8m Mid. 6.6m Aft. Ship upright.
<b>Length</b>	OA 91m. W/L 82.5m
<b>Beam (moulded)</b>	17.9m Bridge wings overhang 20.9m
<b>Mainmast-head height</b>	31m

## Historical Interest

HMS Endurance deployed annually to the Antarctic, her operating area for 7 months of the year. Her base port was Portsmouth which was also the ship's affiliated town. The Ship's motto is "Fortitudine Vincimus" meaning 'By Endurance We Conquer'. The motto originates from that of the great Antarctic explorer, Sir Ernest Shackleton who made history in his ship, 'Endurance' in his expedition south in 1914-15.

Her Mission was "To patrol and survey the Antarctic and South Atlantic, maintaining Sovereign Presence with Defence Diplomacy and supporting the global community of Antarctica". This involved close links with the Foreign Office, United Kingdom Hydrographic Office and the British Antarctic Survey. She supported British interests in the South Atlantic and Antarctic waters where she worked alongside members of the British Antarctic Survey Team carrying out hydrographic surveying, meteorological work and research programs. She was fitted with modern hydrographic surveying equipment, which was put to good effect in waters which were largely uncharted; the data that was gathered was processed by the Hydrographic Office.

Civilian Scientists for the British Schools Expedition Group were onboard HMS Endurance as guests of the Royal Navy when it nearly sank off Chile in December 2008. She suffered extensive flooding to her machinery spaces and lower accommodation decks resulting in the near loss of the ship. She was laid up in Portsmouth from 2008, following serious damage caused by flooding following an error during routine maintenance on a sea suction strainer.

# Background on the Disposal Services Authority (DSA)

- The DSA has delegated authority to dispose of all UK MOD surplus equipment in the UK and overseas.
- The DSA's role is to dispose of surplus assets identified by the owner for release into the commercial market.
- The DSA is the only Government Organisation offering a completely managed service for the Re-use, Recycling and ultimately disposal of surplus government assets.

The DSA's primary aim is to sell surplus ships for further use but where this is not possible (for instance, when ships are no longer seaworthy and only suitable for recycling) its objectives are to ensure that the vessel is recycled in a safe and environmentally sound manner, and in compliance with its legal responsibilities as a producer of waste.

## Introduction

The DSA conducted a tender exercise for the recycling of the former HMS Endurance in September 2015 and the vessel was sold on an 'as seen as lying' basis for recycling within the organisation for Economic Co-Operation (OECD) and in full compliance with the principles of the Basel Convention and all other associated EU & UK legislation including Regulation (EC) No 1013/2006 of the European Parliament and the Council of 14th June 2006 on Shipments of Waste.

# Competition

## Information and Requirements

The preparation for HM Vessels is carried out by the MOD's Disposal Reserve Ship Organisation (DRSO) in Portsmouth who play a vital part in the process producing an Inventory of hazardous materials (IHM) highlighting the hazardous material on board along with an independent Asbestos Management Survey provided by Lucion Environmental Ltd, both of which were included as part of the tender documents. The activity conducted by DRSO demonstrated to ship owners the value in investing in the preparation of vessels for disposal which is of enormous benefit to the UK MOD as it continues to set standards for the dismantling of Government owned vessels.

Prior to the planned removal date of the vessel, the purchaser who is responsible for arranging the removal of the vessel submits a towing plan. DRSO play an important part in supporting the towing and rigging preparations on deck and contributed to the successful sale and departure of this vessel whose disposal preparations can take many months of hard work to complete. All the necessary formalities for departure including Export Licence Clearance are also the responsibility of the purchaser.

Tenders were limited to bidders from within the EU and the OECD – as recommended by the UK Ship Recycling Strategy (SRS).

The recycling of ships is covered by a range of UK and EU legislation for which Department for Environment, Food and Rural Affairs (DEFRA) is the lead department in the UK. This Legislation includes but is not limited to:

- The Waste Shipments Regulation (EC)
- No 1013/2006 of the European Parliament and of the Council of 14 June 2006
- Parts of the Radioactive Substances Act 1993
- Environmental Protection (Duty of Care)
- Regulations 1991 SI 2839
- Hazardous Waste (England and Wales)
- Regulations 2005 SI 894
- Health & Safety at Work etc 1974
- Control of Asbestos at Work Regulations 2006

# Ship Recycling Evaluation

Following the recommendations of the SRS, the DSA once more convened a Ship Recycling Evaluation Committee, involving representatives the Maritime Coastal Agency (MCA), DRSO and the DSA to assess the tender responses against set criteria called for in the Strategy. Prospective purchasers were required to produce a detailed Ship Recycling Plan, demonstrating their understanding of all the requirements involved in Ship Dismantling against each of the following:

- Facilities & dismantling methodology
- Health & Safety
- Environmental plans
- Operations, sub-contractors
- Licences & permits
- Media and Trans-Frontier Shipment of Waste (TFS)

The Ship Recycling Plan is paramount to the consideration of offers to purchase and should provide evidence to enable the Evaluation Committee to score against.

## Award of Preferred Bidder Status

The DSA awarded preferred bidder status to LEYAL Ship Recycling Ltd and a formal contract was awarded in January 2016 once the appropriate consents were obtained, in accordance with the provision of the EC Waste Shipments Regulation 1013/2006.

## Recycling of Ex-HMS Endurance

LEYAL Ship Recycling Ltd was required to provide a monthly breakdown of the outturn of metals and waste during the recycling programme.

Audits were conducted by DSA staff during the life of the project which involved a physical inspection of the yard in Aliaga Turkey, together with an audit of weighbridge tickets, licences and consignment notes which were checked against the reported outturn.

Photographic evidence was provided at key stages of the dismantling process, which ensured that the DSA could be confident on the method and manner in which the Vessel was dismantled and recycled in accordance with the aims of the SRS.



# Photographic Evidence

The photographic evidence shows the dismantling progress and this coincides with the monthly reports, Demo Schedule and the sales progress.



June 2016 – Ex-HMS Endurance at the yard prior to pre-cutting.



1 July 2016 - First stages of dismantling of the keel section. Heavy Machinery is used to remove large pieces of the vessel for processing.



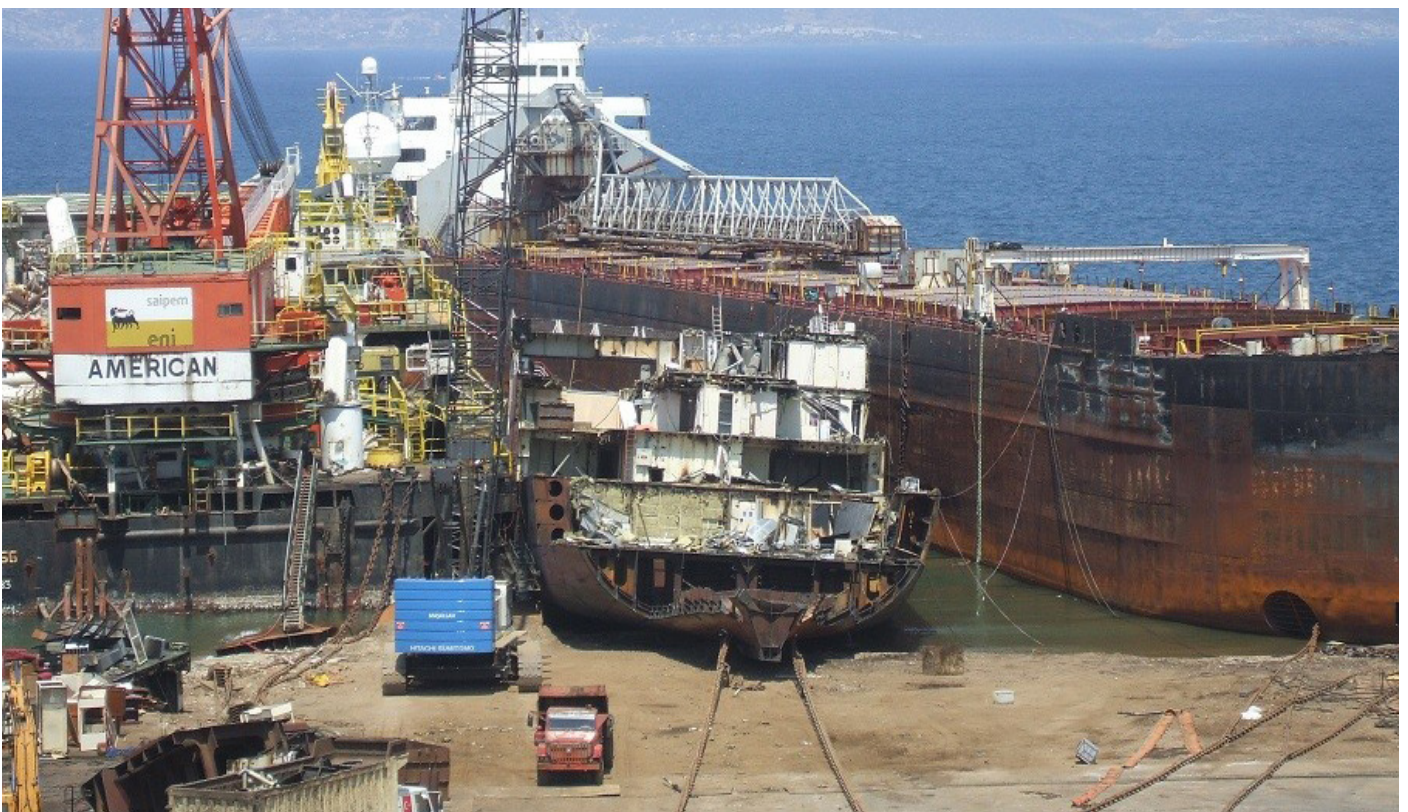
7 July 2016 - showing stages of pre-cutting ready for the hull to be winched up the dry slipway.



7 July 2016 - The vessel is dismantled from 'top to bottom' while afloat and from 'bow to stern' on the dry slipway.



19 July 2016 - Showing remains of the engine room. Heavy lift cranes are used to remove large parts of the machinery. Secondary cutting and further processing and material separation takes place.



26 July 2016 - Once the ship is on the slipway the accommodation & superstructure are removed.



6 Aug 2016 - Demolition works nearing completion.

# Final Outturn

At the start of the project an Inventory of Hazardous Materials (IHM) is produced, the purpose of this was to identify what hazards were contained in the vessel which is then compared with the final outturn figures reported to the DSA by LEYAL Ship Recycling Ltd.

A detailed outturn of materials (ferrous, non-ferrous, plastics, asbestos, oils etc) is recorded by the company and this information is communicated to the DSA on a monthly basis, with hard copies available for inspection during the regular visits by DSA personnel.

A summary of this information made by LEYAL to the DSA is presented in the tables below.

(All figures in Tonnes)	Expected	Actual	Destination
<b>Ferrous Metals</b>	3,500	3,533.94	Recycled
<b>Non-Ferrous Metals</b>	30	47.02	Recycled
<b>Cables</b>	10	13.22	Recycled
<b>Other Products</b>	20	109.46	Sale/Recycled
<b>Waste</b>	122	193.45	Disposed
<b>Total</b>		<b>3,897.09</b>	

Final Destination	Tonnes	Percentage age of Total
<b>Sold or Recycled</b>	3,703.64	95.04%
<b>Disposed</b>	193.45	4.96%
<b>Totals</b>	<b>3,897.09</b>	<b>100%</b>

The prevailing regulation on Waste Management of Turkey entered into force on 2nd April 2015. This regulation based on European legal texts (namely, Directive No. 2008/98/EC and Decision No. 2000/532/EC), aiming for synchronization of the Turkish law with the EU acquis. This regulation has abrogated three previously valid Turkish regulations and unified them in a single legal framework, according to the EU waste framework. Turkey, in its continuous efforts to improve its standards regarding Environmental management, has launched an extensive accession program that has been implemented in co-operation with the European Commission. Turkey being an OECD Member, an EU Member candidate and party to major international conventions (such as The Basel Convention, The Stockholm Convention and the Rotterdam Convention) has established a robust legal framework and industrial infrastructure that is broadly equivalent to relevant international and EU standards.

While the vast majority of the materials originating from the dismantling process are recycled/recovered (95.04%), the operation also yields a small fraction of non-hazardous and hazardous wastes streams. These materials are identified, removed, handled and temporarily stored with the support of the Ship Recyclers' Association of Turkey, which is an organization specifically licensed for this activity by the Ministry of Environment and Urban Planning and the Ministry of Transportation, Maritime Affairs and Communications of Turkey (i.e. the two competent authorities in Turkey regarding this recycling and waste management). At the same time the final disposal of wastes is done by specialized waste facilities which are also licensed for certain waste disposal methods and accepting corresponding waste categories. Both the DSA and the Environment Agency of the UK review the proposed waste disposal routes in Turkey prior to granting permission for the export of the vessel, with the process being controlled by the Environment Agency of the UK under the TFS waste shipment regulation (European Regulation (EC) No.1013/2016) pre-informed consent export procedure.

The main waste recovery and disposal methods utilized in relation to ship recycling in Turkey	Materials	Weight
D1/D5: Regular/Industrial engineered Landfill	Asbestos, Insulating Materials, Remnant Waste, General wastes & recyclables	186.03 tonnes
D10: Incineration at high temperature for disposal	Fluorescent lamps & Lights	1 tonne
R1: Incineration for power generation	Fuel/Oils (liquids)	7.42 tonnes
R4: Metal reclamation/seperation	Metal reclamation, including Electric & electronic waste, Batteries & Cables containing hazardous insulation	3,702.64 tonnes

*The Waste related activities classed as (R) or disposal (D) are defined in the EU Waste Framework Directive 2008/98.*

# Conclusion

Ex-HMS Endurance was completely recycled on the 29 August 2016 with 95.04% of the vessel being sold or recycled.

The DSA have now successfully conducted the sale of 29 vessels in which all have complied with all international agreements and principles concerning environmentally sound management of waste. Since 2008 LEYAL Ship Recycling Ltd has won 12 Recycling projects which included 2 Aircraft carriers Ark Royal & Invincible, 4 RFA Tankers Oakleaf, Bayleaf, Fort George & Orangeleaf and Type 22 Frigates Cumberland, Campbeltown & Chatham.

LEYAL have also successfully recycled 11 Type 42's which include Cardiff, Newcastle, Glasgow, Exeter, Southampton, Nottingham, Manchester & Liverpool, York, Gloucester & Edinburgh.

The report will be sent out to senior internal stakeholders and a growing number of other foreign Governments as they view the UK MOD as the lead when it comes to recycling warships.

**The report can be found on the DSA website**

**<https://www.gov.uk/government/collections/dsa-ship-recycling>**



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*The Ice Patrol Vessel returned from Antarctica in June 2007 where she had helped to gather vital information on climate change and global warming. HMS Endurance surveyed uncharted waters a haven for tourists on cruise ships, and carried out a fur seal study for the British Antarctic Survey. Pictured in the upper right of the shot are the two Lynx helicopters that are no longer in service carried by the ship, with their distinctive red nose cones.*