THE EXPLOSIVE CARGO
of the
USS "RICHARD MONTGOMERY"

Note: this document relates to SS "Richard Montgomery" not USS

A study into the developing hazard from a marine wreck
in the Thames Estuary between Sheerness and
Southend-on-Sea

www.ssrichardmontgomery.com

DAVID A. ATKINSON
Councillor for the County Borough of Southend-on-Sea
Member of the Kent and Essex Sea Fisheries Committee

RICHARD ANTHONY BAKER
Hon. Secretary, Rochford Hundred Historical Society

DAVID F. COTGROVE
Chairman, Local Affairs Committee
Southend-on-Sea and District Chamber of Trade and Industry

This study outlines the circumstances of the stranding
and loss of the "Richard Montgomery" and her subsequent
history as a marine wreck. The condition, environment
and security of the hull are discussed and the explosive
hazard is assessed in the light of a complete inventory and
description of the remaining cargo. It finds that the
officially published statements relating to the wreck are
wrong and also draws attention to the inadequate level of
interest and concern displayed by the several departments
involved in the matter.

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1.0 INTRODUCTION

1.1 The Background

In the House of Commons, on April 23rd 1952, Dr. R.F. Bennett, Member for Gosport, asked the First Lord of the Admiralty "what responsibility he holds in respect of the "Richard Montgomery" wreck. What action he has taken, or intends to take, with regard to the vessel and her cargo, and what steps he is taking to ensure that the cargo does not blow up".

Commander Noble replied "The answer to all three parts of the question is none. The responsibility lies with the Port of London Authority".

Dr. Bennett's question was the first of many occasions on which the subject was to be raised in the House, and much has been written and said elsewhere during the past twenty years, but to no avail.

The wreck, with its explosive cargo, still lurks off the Sheerness shore in the full view of the communities which it threatens.

There has only been one fundamental change in the whole situation since Dr. Bennett's question. The high explosive is now 20 years older.

1.2 The Intention of this Study

Since it is incredible that such a concentration of high explosive could be allowed to remain in this situation, it seems reasonable to enquire into the matter and establish the facts and circumstances of the last voyage of the USS "Richard Montgomery", her stranding, and her subsequent history as a marine wreck, and to compare this data with the officially published material to test its accuracy and publicly criticise weak arguments and unsound policies.

1.3 Procedure and Method

Our first objective was to gather the officially published material, mainly through the indices to Hansard and "The Times". This was entered in chronological order into the "Calendar of Events", which formed the principal record.

We then collated the official statements and extracted the factual content, which became the principal material for investigation and comment in this study.

1.4 Public Response to our Enquiries

Our lines of enquiry were guided by our local knowledge of the history and background of the various activities in the Thames and Medway Estuaries. We received every assistance from the persons we interviewed in the way of advice, information, and the loan of documents, and many people expressed their satisfaction that we were undertaking a serious study of the subject. It is noteworthy that none of those who had important information on the subject had ever been asked about the matter in any way.
THE HISTORY OF THE "RICHARD MONTGOMERY" WRECK

2.1 Wartime Wrecks in the Estuary

After the war ended, a number of wrecked ships remained in the Estuary, and were, for a variety of reasons, visited by watermen, fishermen and yachtsmen returning to the shore. The majority of these vessels were salvaged and removed, but the "Richard Montgomery" remained, half submerged at low water, still recognisable as a Liberty ship, with her characteristic funnel, ventilators and Oerlikon cannon housings. She became a centre of attraction when the weather and tide were right; and a list of her visitors would number into hundreds, if not thousands.

2.2 A Quarter Century of Peace

The sea and weather have removed the funnel, ventilators and most of the fittings from the midships island, but although she is barely recognisable as a Liberty ship, the three masts remain, and the slings and nets of the stevedores continue to dangle from the cargo booms as relics and reminders of brave men who raced against time to get the bombs out, before the sea overtook them.

2.3 The Growth of Public Concern

Although many of the marine community of the Estuary knew of the vague rumour that some sort of explosive cargo remained aboard the wreck, it was not until April 23rd 1962 that the matter was first raised in the House of Commons by Dr. R.F. Bennett, an ex naval officer, following a discussion with Sir Stephen McAdden, Member for Southend East. This stimulated the first official assessment of the problem.

A further twelve years were to pass before one version of the story of the "Richard Montgomery" and her cargo appeared in somewhat horrific form entitled "The Doomsday Ship" as an article in the "Wide World" Magazine published in the autumn of 1964. It contained some factual material and appears to have been stimulated by two news features on the wreck which had appeared in the "Daily Sketch" in 1962. Parliamentary questions which followed this article precipitated the second survey of the wreck, and the formation of a Parliamentary Working Party. The issue has remained active ever since.

3.0 THE OFFICIAL VIEW OF THE SITUATION

3.1 Public Statements

The condition of the wreck and its contents, the degree of hazard, and other matters of importance have been conveyed to the public via ministerial statements, parliamentary answers to questions, letters to M.P.'s and departmental statements and press releases. A study of the material shows that the statements cover the following subjects, and is listed below as a summary of the quotation, the individuals involved, and the date.
3.2 **The Date of the Stranding**

The "Richard Montgomery" was wrecked on August 20th 1944.
Mayhew (Sec. of State for Defence) - Boston 18/3/65.

3.3 **Responsibility for the Wreck**

3.31 First Lord of the Admiralty was asked what responsibility he holds in respect of the wreck. Answer - none - responsibility lies with P.L.A.
Noble (First Lord Admiralty) - Bennett 23/4/52.

3.32 Board of Admiralty has suggested to P.L.A. that it should re-investigate the risks involved in leaving a wrecked ship full of bombs in the Thames Estuary.
Earl Jellicoe (Minister of Defence for Navy) - Boston 10/10/64

3.33 The legal position as to who is responsible for the wreck is complicated, although it is clear that the Ministry of Defence legally has no responsibility.
Mayhew (Sec. of State for Defence) - Braine 27/10/65

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3.4 **The Environment of the Wreck**

3.41 Divers had found that the two halves of the ship had sunk bodily into the mud. They also found that heavy silting in the holds had probably engulfed the remainder of the cargo.
Mayhew (Sec. of State for Defence) - Boston 24/11/65

3.42 The wreck has now sunk deep into the sand and mud.
D.T.I. Press Notice 12/11/71

3.5 **The Security of the Wreck**

3.51 We have written to the P.L.A. and to Medway Conservancy Board asking them to keep a sharp look out for anyone attempting a private survey and to check.
Mayhew (Sec. of State for Defence) - Boston 24/11/65

3.52 We have decided not to attempt salvage, but to continue with the comprehensive precautions to ensure that the wreck is not tampered with.

The Kent Constabulary is ready to remove by force, if necessary, anyone trespassing on the wreck - in addition, the Medway Conservancy Board keep constant radar watch and conduct daily patrols.
Foley (Under Sec. of State for Navy) - Burden 14/12/67 Boston

3.6 **The Explosive Cargo**

3.61 Cargo was 8687 tons of bombs and detonators, of which about half was recovered in 1944.
Mayhew (Sec. of State for Defence) - Braine 27/10/65
3.62 It is estimated that some 1445 tons of T.N.T. are still in the wreck.
Foley (Under Sec. of State for Navy) – Boston 14/12/67

3.7 The Explosive Hazard

3.71 Chances of explosion were remote if wreck were left alone.
Earl Jellicoe (Min. of Defence for Navy) – Boston 15/9/64

3.72 Likelihood of explosion no greater than in 1952, possibly rather less.
Mayhew (Min. of Defence for Navy) – Braine 27/10/65

3.73 The risk of spontaneous explosion is decreasing slightly as time
passes.
Foley (Under Sec. of State for Navy) – Boston 13/12/67

3.8 A Summary of the Official Statements

The ship was wrecked on August 20th 1944. Of the original cargo of
8687 tons of bombs and detonators about half, containing 1445 of T.N.T.,
remains in the wreck which is in two halves and sunk deep into the sand and
mud. The risk is remote and decreasing as time passes, provided it is
left undisturbed, and it is continuously guarded by a comprehensive
security system under the responsibility of the Department of Trade and
Industry. It is not in any way the responsibility of the Ministry of Defence
(Navy).

3.9 A Commentary on the Official Statements

As far as we know, the statements in this section represent the total
information to be released from official sources. Nearly all this material
consists of estimates and opinions which are hedged with uncertainty. We
do not know whose opinions they are, neither do we know what weight to
place on them. Furthermore, it does not appear evident that any great
efforts have been made to discover the basic facts of the matter.

The following sections of this study outline the results of our investigations,
as described earlier (Sec. 1. 2 & 3).

Although the question of responsibility is part of the issue, we discuss this
later, and instead commence with the details of the ship and the circumstances
of her loss.

4.0 THE LOSS OF THE USS "RICHARD MONTGOMERY"

4.1 The Liberty Ships

In 1941 the American shipyards undertook a vast programme of expansion
to build the enormous tonnage of expendable merchant ships which would be
required for the war which was sure to come. The original design was
British and, as the result of tremendous efforts and innovations by the
shipyards, about 2700 were built. (See Fig. 1, for layout). They were
nearly all named after men and women notable in the life and history of
the United States.
The 7th of 32 dry cargo (type EC2-S-C1) Liberty ships to be built at Jacksonville, Florida, by the St. Johns River Shipbuilding Company, and launched July 1943. Her crew would have numbered approx. 52, together with some 30 gunners. She was named after an Irish soldier, born Dublin in 1738 who finally settled in America, was elected to Congress, and fought in the war against the British in Canada. He helped capture Montreal and was killed in the assault on Quebec on Dec. 31, 1775.

Her Last Voyage

After taking on bombs and munitions at Hog Island, Philadelphia, she sailed from the Delaware river to the Thames Estuary, to await a convoy for Cherbourg. On arrival off Southend, she came under the authority of the Thames Naval Control at H.M.S. "Leigh", which was in fact, Southend Pier. The King's Harbormaster, who controlled all shipping movements and anchorages in the Estuary, ordered her to a berth off the north edge of the Sheerness Middle Sand in about 33 feet of water at low water, where she lay at anchor until she went aground.

The Circumstances of the Stranding

Clearly, the berth to which she was directed by the King's Harbormaster was most unsuitable for a vessel of her size, particularly since she was trimmed to a draught of 31 ft. aft, nearly 3 ft. more than was usual for a Liberty ship. If the wind fell northerly, at low water she could not avoid touching the shoal, even with the minimum possible scope of anchor cable.

We are informed that she went aground on Sunday August 20th 1944. She was stranded on top of the Sheerness Middle Sand at the height of the spring tide, so that she was beached until the next good spring tide, due about September 5th, could refloat her, provided that a substantial proportion of her cargo could be removed in the time, and also provided that she survived intact.

As the tide ebbed, the strain on her hull caused some of the welded plates to crack and buckle with an explosive snap as loud as a gunshot. This sudden noise was heard and remarked upon by the crew of the M.L. "British Queen", who were fishing at over a mile distance away. They then saw the crew of the "Richard Montgomery", naturally apprehensive of the noise, and of the hazardous nature of their cargo, conduct an emergency evacuation of their ship via the life boats and rafts.

The crew and the Master, Captain Wilkie, were taken to Southend and provided with quarters, while the emergency salvage operation was prepared.

The Emergency Salvage Operation

Messrs. Watson and Gill, Shipbrokers, of Rochester, Kent, were instructed by the Department of the Director of Salvage at the Admiralty to mount an emergency salvage operation for the removal of the explosive cargo where she lay. The job of arranging the unloading was given to Mr. T. P. Adams, Master Stevedore, who was called out at 3.00 a.m. on Tuesday, August 22nd, to inspect the condition of the ship and its cargo, and check the stowage plan, which was given to him by the "Richard
Montgomery"s Chief Officer when he came aboard. The vessel did not appear to be damaged or taking water, and the cargo hatches had not been broached or interfered with in any way.

He engaged stevedores from Rochester to carry out the operation, which commenced at about 10.00 a.m. on Wednesday 23rd August, using the ship's own cargo handling gear, the winches being powered by steam line from the vessel alongside.

At 3.0 p.m. on Thursday 24th August her hull cracked open at the fore end of No. 3 hold, which flooded through to No. 1 and No. 2 holds, and she finally broke her back on Friday Sept. 8th, leaving her irrevocably stranded. Salvage continued until Monday Sept. 25th, when the after holds, Nos. 4 and 5 had been cleared, while the remaining contents of the forward holds have remained completely submerged to this day.

The USS "Richard Montgomery" was then abandoned and ignored. Her wreck was one of many in the River Thames. There was a war on.

4.6 The Enquiry into the Loss

A Board of Enquiry was held aboard the "Richard Montgomery" about a week after the stranding, under the Presidency of a Lieutenant Commander, United States Navy (or Coastguard). The Board sat in the ship's saloon and the proceedings lasted from 10.00 hrs. to 16.00 hrs. without a break, amid "the all pervading stench of leaking fuel oil", while outside the unloading of her explosive cargo proceeded apace.

The King's Harbourmaster gave evidence of the berth which he had allocated, and the Pilot confirmed that she had been anchored in this position. The Board established that look-outs on a number of ships in the vicinity had seen the "Richard Montgomery" swinging toward the shoal in the pre-dawn light and blew their sirens in warning, while the Chief Officer, on being asked why he did not rouse the Master, who was asleep in his cabin, replied, "I don't know".

The Board found that the Master had hazarded his ship, and he and the Chief Officer were suspended for twelve months. It had sat under emergency conditions and had operated in foreign territory under difficulties. It also did not hear all the evidence relating to the stranding of the "Richard Montgomery".

4.7 Background to the Evidence

The Court did not hear evidence that the Assistant King's Harbourmaster had questioned the suitability of the Harbourmaster's choice of anchorage for the "Richard Montgomery" as being too shallow for a ship of her size and draught and that on being directed to carry out the order, had requested that it be given to him "in writing". Neither did the Court hear evidence that the argument grew heated, and attracted the attention of the Harbourmaster's superior officer who listened to the dispute. The Assistant Harbourmaster suggested that the "Richard Montgomery" should interchange positions with another ship of 24 ft. draught, lying in much deeper water, and due out in the same convoy. The superior disregarded the Assistant's suggestion and chided him for questioning a decision made by an officer of great experience in the matter.
The Assistant withdrew from the room and the order was carried out. The Assistant was posted to another section two days later, and did not attend the Enquiry.

5.0 THE ENVIRONMENT OF THE WRECK

5.1 The Study by the Hydraulics Research Station

The first requirements for any assessment of the security of the wreck and its explosive hazard is a full description of its condition and environment. We have therefore attempted to obtain a copy of the report of studies which were conducted by The Hydraulics Research Station, Wallingford, Berks, at the request of the Ministry of Defence (Navy). This report (Ref. Ex 508) is entitled "An investigation into proposed schemes for protecting the wreck of the S.S. "Richard Montgomery", off Sheerness".

Our applications were refused on the grounds that it was "not proposed to publish such technical material".

5.2 Environmental Data for the Wreck Area

In the absence of this report, we have conducted a limited study of the wreck and its environment at minimum cost, using the following data:-

5.2.1 Photographic material covering the period 1944-72
5.2.2 Admiralty Chart 3683 "Sheerness and Approaches". Editions B6, B8, B12, C1, C4.
5.2.3 Medway Ports Authority Charts No.1000 and No.1001.
5.2.4 High altitude photos showing "Turbidity Boundaries" and tidal eddies.
5.2.5 Personal visits to the wreck, 18 June 1949 and 7 Feb. 1972.
5.2.6 Echo-Soundings recorded in the vicinity of the wreck.
5.2.7 Discussions with masters of local fishing vessels.
5.2.8 Daily reports of the emergency salvage operation 23 Aug. - 25 Sept. 1944.

(Courtesy of S.C.L.S.E.R.P. and Fairey Surveys Ltd.)

5.2.11 Meteorological Register, Shoeburyness, August - September 1944. The Meteorological Office.
5.2.12 Tidal Predictions, Sheerness. August - September 1944 Institute of Coastal Oceanography and Tides.

5.3 The Development of the Wreck's Environment

The "Richard Montgomery" went aground across the ridge of the shoal, her bows very nearly due north. A few days after the stranding, her hull cracked transversely at the forward end of No. 3 hold, and flooded the forward section of the ship.
As the cargo was removed from the holds No. 4 & 5, the buoyancy of the stern increased until by September 20th it was hinging on the bow section at deck level and tilting with the tidal movement, such that the whole of the skeg and propeller showed at high water. After finally flooding, the stern section separated and moved approximately 50 feet southwards and pivoted some 120° clockwise about the after mast before completely losing buoyancy and settling firmly on the ground. The interaction between the wreck’s two sections and the tidal stream induced a scouring effect which quite rapidly modified the sea bed topography over a considerable area.

A further transverse break in the bow section between the forward mast and the forward end of No. 2 hatch occurred in the early 1960’s.

5.4 Direction and Strength of the Tidal Streams

Because the rivers Medway and Thames can differ considerably in relative turbidity, any "interface" between "Medway" and "Thames" water can show itself as an abrupt colour discontinuity in aerial photographs when conditions are suitable. (See Fig. 2). We have examined two successive frames, (numbered 2, 079 and 2, 080, part of a high altitude aerial survey by Fairey Surveys Ltd.,) which show such an "interface" approaching the wreck area in the ebb tidal stream at 12.06 hrs. B.S.T. on May 30th 1966. The tidal situation was 1 hr. 56 minutes after predicted high water 10, 10 hrs. B.S.T. of predicted height 16.9 ft.

The irregular boundary at the interface exhibited several distinctive features which could be identified in both frames, enabling the velocity and direction of the tidal stream to be estimated by measuring the displacement of these features in the known time interval of 45 seconds.

Our measurements show that the wreck had a considerable effect on the velocity and direction of the tidal stream for some 1500 ft. downstream, and about 800 ft. on either side of the wreck.

To the north of this zone we found 068°T, 1.33M/Sec while to the south we found very nearly the same, 069°T, 1.35M/Sec. Within the zone, close to the west side of the wreck, velocities varied enormously, in general much lower, and tending to the direction 083°T, while the east side is dominated by the rip of eddies generated by the intensity of the current which flows through the main break at No. 3 hold and proceeds for some 1000 ft. in the direction 083°T before conforming to the general direction of flow 069°T. (see Fig. 3).

We have not obtained any further data, but it would appear reasonable to suppose that the flood tide phenomena would be of a similar nature, although of reversed directions.

5.5 The Wreck on the Sea-Bed to-day

A perspective impression of the wreck on the sea-bed is shown in Fig. 4, while Fig. 5 shows sections through the wreck and adjacent ground.

It can be seen that the submerged sections of the hull lie listing to starboard in an irregular depression in the sea-bed. Banks of silt and sand have built up against the hull in places, while elsewhere it is exposed almost down to the turn of the bilge.
The main break between the principal sections passes between the severed parts of No. 3 hold and carries a powerful rip of current at half tide. There is therefore a strong probability that some of the bombs in No. 3 hold are exposed on both sides of the break, while access to the contents of No. 2 hold is available via the adjacent crack in the hull.

We consider that the wreck and its surroundings form a stable configuration, which will continue indefinitely, provided that the integrity of the hull is maintained.

6.0 THE SECURITY OF THE WRECK

6.1 The Range of Hazards

The condition and situation of the wreck is such that an assessment of the factors which could result in a dangerous disturbance is required. These could range from the continuous movement of the waves breaking over it, through the processes of natural decay, right up to human intervention motivated by malice.

6.2 Types of Disturbance

6.2.1 Natural break-up and collapse of the hull, deck, cargo, masts and spars as corrosion proceeds within.
6.2.2 External disturbances by heavy seas, tidal currents, movement of sand banks and similar sources of stress.
6.2.3 Accidental impact by heavy flotsam, "drifting ships", irresponsible navigation and ships "off course" at speed.
6.2.4 Visitors and sightseers clambering aboard.
6.2.5 Clandestine attempts to salvage valuable parts of the wreck.
6.2.6 Clandestine removal of part of the cargo.
6.2.7 Malicious attempts to detonate the cargo "in situ".

6.3 Instances of Disturbance

Most of the subsequent material was obtained from persons known to us who were questioned in a friendly and informal manner and can only be a sample of the total activity aboard the wreck during the past 27 years. The following comments refer to the relevant item in Sec. 6.2.

6.3.1 A comparison between recent and early photos of the wreck shows that very considerable deterioration has occurred. Seven cargo booms have fallen on to the wreck below, while five more booms and the three masts have yet to fall. The loading plan shows that the lower hatch covers of No. 1 and No. 2 holds were never opened, and the 2153 bombs weighing 297 Imp. tons can fall 1 foot on to the bombs in No. 1 lower hold, while 2883 bombs of 176 Imp. tons can drop 10 feet on to those in No. 2 lower hold when the tween decks collapse.
6.3.2 The hull crack at No. 2 hold, aft of the forward mast, probably results from a combination of stresses due to sand movements and tidal scour together with the tension from the long scope of anchor cable causing failure of the corroded hull plating.

6.3.3 We have been given an account by an eye witness of a small motor cargo ship (a 71 ton barge) passing over the wreck between the masts. Many instances have been reported to us of the practice of "dumping" munitions close to the wreck by fishermen who find bombs brought up in their gear when fishing in the vicinity.

6.3.4 Our records show at least 25 persons known to us who have visited the wreck, some supplying us with photos and cine film of the occasion. The total number of visitors during the lifetime of the wreck must be immense.

6.3.5 Much of the copper "degaussing" cable was stripped from the hull in 1956. Among remaining items of value is the four bladed bronze propeller, 18\frac{1}{2} ft. in diameter, and valued in the neighbourhood of 5000 dollars (U.S.) in 1968.

6.3.6 Our informant (Ref. 6.3.5) also mentioned that several bombs were visible at low water, lying under water against the scuppers of the forward section on the starboard side. If his identification was correct (he says that he did not touch them), the question of how they got there is highly relevant, since Mr. T. Adams, in charge of the emergency salvage operation, states definitely that the deck was clear of bombs in 1944. These could have been "dumped" (Ref. 6.3.3), in which case they would still be there, if the bulwarks are intact.

6.3.7 A threat to "blow up" the ship was made by students in January 1969 as part of a rag day "jape" to gather funds for a charity. Not surprisingly this resulted in the immediate interrogation of the ring-leaders by the police. Parliamentary questions were asked and divers checked the wreck for signs of interference.

6.4 A Security Check

The probability that a determined individual would be deterred from tampering with the wreck and its contents seems small, and at present neither the means nor the will exists to detect any such activity if it is conducted in a clandestine manner.

We have ourselves visited the wreck on February 7th, 1972, and stayed in the very close vicinity for 2 hours (09.15-11.15 hrs.), taking photographs and noting its condition. This was done openly and without any attempt at concealment.

Our presence was reported to the Medway Port Authority by the Coxswain of the Sheerness life-boat, who had been fishing in the vicinity.

We do not consider the wreck to be secure.
7.1 The Stowage Plan and Salvage Reports

The original cargo as loaded at Hog Island, Philadelphia, consisted of 6862 short tons of munitions for the United States Army Air Force. A full description showing quantities, weights and disposition in the ship is given in the stowage plan (Fig. 6). We have also studied the daily reports of the emergency salvage operation, which were loaned to us by Mr. T.P. Adams, the Master Stevedore. These describe each item handled, state the hold from which it was taken, and its disposition in the vessel alongside. By referring to both these documents, a complete inventory of the cargo remaining aboard was prepared. Some indication of the magnitude of the quantity and type of material involved is given in the following summary, while the full inventory of original and remaining cargo is given in Fig. 7.

7.2 Summarised Inventory

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<th>Original Tonnage</th>
<th>Present Tonnage +</th>
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<tr>
<td></td>
<td>Short</td>
<td>Imp</td>
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<tr>
<td>Loose Bombs G. P. Various</td>
<td>3045</td>
<td>2719</td>
</tr>
<tr>
<td>&quot;  &quot;  &quot;  S. A. P.  &quot;</td>
<td>2564</td>
<td>2289</td>
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<tr>
<td>Cases &quot; Cluster Frag.</td>
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<td>562</td>
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<td>&quot;  &quot;  &quot;  Smoke White Phos.</td>
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<td>95</td>
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<td>&quot;  &quot;  &quot;  Demol'n. 100 lb.</td>
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<td>81</td>
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<td>77</td>
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<td>2</td>
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<td>&quot;  &quot;  Signals</td>
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<tr>
<td>&quot;  &quot;  Non Explosives (Fins)</td>
<td>2304</td>
<td>236</td>
</tr>
</tbody>
</table>

TOTALS 6862 6127 - 3552 3173 -

*Some of these items may have been incorrectly described in the salvage data, and could be reduced by 39 tons U.S. We have assumed that all the small arms ammunition was removed.

+The relatively small quantity of ammunition in the ship's magazine for her own defence was not known and is omitted.
7.3 The Loose Bombs

By far the largest classes of remaining material are the G.P. (General Purpose) and S.A.P. (Semi-Armour Piercing) bombs which have a combined weight of 2770 imp. tons, and comprises over 88% of the remaining cargo.

The remaining G.P. 250 lb. bombs are stowed all across the forward end of No. 1 Tween Deck hold, and the after end of No. 2 Tween Deck hold. All other G.P. and S.A.P. bombs are stowed in the lower holds, with the exception of a stack of G.P. 500 lb. bombs, across the after end of No. 1 Tween Deck hold.

In the lower holds, these bombs are stowed with their axes lying "fore and aft" and are layered in stacks across the width of the holds, with dunnage boards interspersed to ensure secure packing. The depth of stacks is about 15 ft. above the floors of the holds.

The position of the contents of the after portion of No. 3 hold is not precisely known. As stated in section 5.3, the stern section of the hull pivoted with the rise and fall of the tide and could have tilted at some 15 degrees to the horizontal. All or some of the contents could have piled on to the sea bed and now lie under the ridge of sand which passes between the two principal sections.

We have also referred to the break in the bow section at the forward end of No. 2 hold, which is evident in the aerial photos taken in 1966. This break has not increased substantially and we are of the opinion that no bombs have emerged through it.

7.4 Fuses and Bursters

All the fuses and bursters were cased and stowed separately in No. 3 Tween Deck hold, (all bursters were salvaged) and it seems unlikely that the remaining cases of fuses could have survived.

7.5 Cluster Fragmentation Bombs

We have received very little information concerning the cluster fragmentation bombs which are individually packed in wooden transit cases and appear to have an integral arming system.

7.6 The Non Explosive Cargo

The white phosphorus smoke bombs seem to provide a potential toxic hazard of indefinite life span, while the remaining material does not seem well suited to remain active after 27 years of total immersion.

7.7 The Principal Explosive Material

As stated in section 7.3, the G.P. and S.A.P. bombs (comprising of 5558 and 4103 units respectively) altogether weigh 2770 Imperial tons and comprise over 88% of the total remaining cargo.
The condition of these bombs is therefore fundamental to the whole issue, since their detonation alone would produce very considerable damage nearby, while if they are no longer capable of detonation, all the other groups of explosive assembly in the wreck present a hazard which is trivial by comparison.

7.8 The General Purpose Bombs

All were made to the same general design and consist of a steel case with a hole at each end for insertion of the arming assembly (fuses, detonators, gaines, etc). The explosive filling was cast into the case, which was then sealed for storage or shipment by means of waterproof plugs which were screwed into the arming holes. Although the types of explosive filling are not known, they are almost certainly T.N.T. based. The tail fins are not fitted, neither are the bombs armed. We are advised that the high explosive content of this type of bomb is approximately 40% of its nominal weight.

<table>
<thead>
<tr>
<th>Nominal Weight</th>
<th>Number</th>
<th>Total Weight</th>
<th>G. P. Bombs</th>
</tr>
</thead>
<tbody>
<tr>
<td>250 lb</td>
<td>2021</td>
<td>212 Imp. Tons</td>
<td>High</td>
</tr>
<tr>
<td>500 &quot;</td>
<td>1407</td>
<td>301 &quot; &quot;</td>
<td>Explosive</td>
</tr>
<tr>
<td>1000 &quot;</td>
<td>1844</td>
<td>730 &quot; &quot;</td>
<td>647 Imp. Tons</td>
</tr>
<tr>
<td>2000 &quot;</td>
<td>286</td>
<td>245 &quot; &quot;</td>
<td>Approx.</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>5558</td>
<td>1488 &quot; &quot;</td>
<td></td>
</tr>
</tbody>
</table>

7.9 The Semi Armour-Piercing Bombs

Essentially the same method of manufacture was employed as that used for the G. P. bombs, except that the forged steel cases have a different shape and thickness, and are probably of a tougher grade of metal. They are similarly filled and sealed with a waterproof plug in the single arming hole, located at the rear end. Again the high explosive is probably T.N.T. based, but it only represents about 35% of the nominal weight. There are two sizes of this type of bomb aboard the wreck, as follows:

<table>
<thead>
<tr>
<th>Nominal Weight</th>
<th>Number</th>
<th>Total Weight</th>
<th>S. A. P. Bombs</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 lb</td>
<td>1925</td>
<td>402 Imp. Tons</td>
<td>High</td>
</tr>
<tr>
<td>1000 &quot;</td>
<td>2178</td>
<td>880 &quot; &quot;</td>
<td>Explosive</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td>4103</td>
<td>1282 &quot; &quot;</td>
<td>491 Imp. Tons</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Approx.</td>
</tr>
</tbody>
</table>
7.10 The Effectiveness of the High Explosive Fillings (G. P. & S. A. P.)

Certain types of T. N. T. based explosive, such as amatol, contain additives which render them hygroscopic and liable to deterioration by absorbing moisture from the atmosphere. It is for this reason that all the bombs, irrespective of the filling, were plugged and made waterproof during manufacture. Since the cases are of thick steel, and are mostly in their original stacks in the hull of the wreck, it must be considered probable that they have remained watertight and that their contents are dry and effective.

7.11 The Result of "Aging" on High Explosive

Any particular explosive material is manufactured to conform with a specification which defines its sensitivity and stability. These particular qualities may vary with age, and after a suitable period it is normally destroyed because it is considered unsafe.

The "safe" lifetime of the material aboard the wreck is not known, but all similar high explosive of the same age must have been disposed of very many years ago for reasons of safety.

We must therefore assume that the explosive fillings are not as safe as they were on manufacture, and therefore the risk of explosion is not decreasing as time passes.

CONCLUSIONS

8.1 The Explosive Hazard of the USS "Richard Montgomery"

We have established that the principal source of explosive hazard lies in the huge concentrations of G. P. and S. A. P. bombs in the forward section. Their explosive fillings are certainly effective and it is almost certain that the detonation of any one of these bombs will "set off" the remainder. The wreck is subject to a variety of disturbances, and since it is not physically secure against any type of interference, we can only conclude that the nearby centres of population are exposed to a serious explosive hazard which will continue undiminished so long as the bombs remain.

8.2 The Accuracy of the Ministerial Statements (Sections 3.1 to 3.7)

It is now obvious that our findings are in fundamental disagreement with the statements made by Ministers in the House of Commons and elsewhere. In accordance with Section 1.2, we find as follows:

8.1.1 The original cargo was 6,127 tons; not 8,687 tons.

8.1.2 The remaining cargo is 3,173 tons; not approx. 4,340 (half of 8,687).

8.1.3 The remaining H. E. weight is very nearly 1,200 tons; not approx. 1,445 tons T. N. T.
8.1.4 The wreck is in three sections; not two sections.

8.1.5 The wreck is not sunk deep into the sand and mud.

8.1.6 The wreck is not secure against disturbance.

8.1.7 The risk is not decreasing as time passes.

8.1.8 By comparison with absolute safety, the chances of explosion are not remote.

(* As the result of our enquiries, the Marine Division of the Department of Trade and Industry informed the clerk to the Kent and Essex Sea Fisheries Committee by letter dated March 10th, 1972, that our statement is correct. We would mention that our photos show this break in 1966).)

8.3 The Quality of Official Knowledge

We consider that the several departments which concern themselves with the affair of the "Richard Montgomery" have never striven for a real understanding of the circumstances of the wreck and a full knowledge of the quantity, description and stowage of the remaining cargo.

Instead, they have gathered a weak collection of wrong and inadequate information which has been used to generate incorrect advice, bad decisions and frame unsound policies which are unrelated to reality.

This situation has arisen because the problem has been confined to closed groups whose "expertise" has never been exposed to public discussion and criticism.

If discussion had been open, the material contained in this study would undoubtedly have come to light in the normal course of events. It has always been available, but never sought.
ILLUSTRATION OF CURRENT VELOCITIES & DIRECTIONS IN THE NEIGHBOURHOOD OF THE WRECK OF THE USS RICHARD MONTGOMERY (COMPUTED FROM AERIAL PHOTOGRAPHS)

FIG 3
PART OF MEDWAY PORTS AUTHORITY CHART No 1001
ESTUARY MEDWAY APPROACH CHANNEL
NOT TO SCALE

www.ssrichardmontgomery.com
'View' of Wreck from North East