

The Explosion of the Maine

A Forensic Examination of the Explosion of the U.S.S. Maine

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Summary:

This lesson is designed for a 7th grade history curriculum. It is to be taught over a course of two class blocks, approximately 90 minutes each. The objective of the lesson is that students will learn that American leaders, in a rush to judgment, mistakenly blamed Spain for a terrorist act against an American battleship, and the loss of 266 American sailors. Students will watch a film, and complete a study guide as they do so. Afterwards, they will complete a five-paragraph essay regarding what they learned.

The classes will be broken down as follows:

Lesson 1

- Have students complete a KWL chart about their knowledge of the explosion of the U.S.S. Maine. Cover sections K & W with them.
- Have students complete the U.S.S. Maine Forensic Examination Prep Sheet exercise.
 - Students will detail the physical evidence they would expect to find as a result of an underwater mine exploding beneath the ship.
- Watch the first 25 minutes of the film
 - Students will complete a study guide as they watch the film
 - It will be necessary to stop the film periodically to make sure that all students correctly answered questions from the film.

Lesson 2

- Watch the last 25 minutes of the film
 - Students will complete a study guide as they watch the film
 - It will be necessary to stop the film periodically to make sure that all students correctly answered questions from the film.
- Students will write a timed five-paragraph essay (time restrictions are set by each teacher, as they deem necessary).
- After the essay is complete, process the “L” section of students KWL chart that they began in the previous class.
- The teacher will grade the essays & return them the following class.

The work in this lesson is focused on creative writing. Students are being asked to watch a film about the forensic examination of the explosion of the U.S.S. Maine. After completing the study guide while watching the film, students will be expected to use that study guide to assist them in writing a five-paragraph essay on the question: “How has modern science cleared up the mystery over the explosion of the U.S.S. Maine?”

Florida Sunshine State Standards Applicable To This Lesson

SS.A.1.3.1. understands how patterns, chronology, sequencing (including cause and effect), and the identification of historical periods are influenced by frames of reference.

SS.A.1.3.2. knows the relative value of primary and secondary sources and uses this information to draw conclusions from historical sources such as data in charts, tables, graphs.

SS.A.1.3.3. knows how to impose temporal structure on historical narratives.

SS.A.5.3.1. understands the role of physical and cultural geography in shaping events in the United States since 1880 (e.g., western settlement, immigration patterns, and urbanization).

SS.A.5.3.2. understands ways that significant individuals and events influenced economic, social, and political systems in the United States after 1880.

SS.B.1.3.1. uses various map forms (including thematic maps) and other geographic representations, tools, and technologies to acquire, process, and report geographic information including patterns of land use, connections between places, and patterns and processes of migration and diffusion.

SS.B.1.3.3. knows the social, political, and economic divisions on Earth's surface.

SS.B.1.3.4. understands how factors such as culture and technology influence the perception of places and regions.

SS.B.1.3.5. knows ways in which the spatial organization of a society changes over time.

SS.B.1.3.6. understands ways in which regional systems are interconnected.

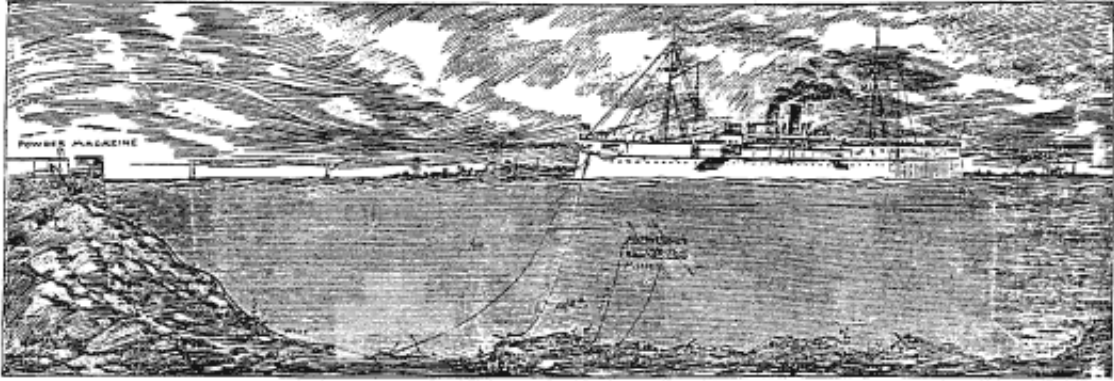
References

"Unsolved History: The Death of the U.S.S. Maine" is a film by the History Channel. It is available for purchase; however because of being out of print, it tends to be rather expensive when found on Amazon.com and other Internet sites. The film is readily available for rent via Netflix. Please follow the following link to order the film:

http://www.netflix.com/Movie/Unsolved_History_Death_of_the_USS_Maine/70019886?Inkctr=src_hrd-sr&strkid=878916707_0_0

Forensic Examination Prep Sheet – U.S.S. Maine

It has been suggested that the U.S.S. Maine exploded in Havana Harbor, as a direct result of an exploding mine that was positioned beneath the ship (as pictured below). If that is true, what evidence would you expect to find during your forensic examination of the ship? On a scale of 0 – 9 (0 representing least likely to have occurred, and 9 representing most likely to have occurred), list your expectations of the following items of evidence.



NAVAL OFFICERS THINK THE MAINE WAS DESTROYED BY A SPANISH MINE.

Parts of the iron hull bent inward.	0 1 2 3 4 5 6 7 8 9
Parts of the iron hull bent outward.	0 1 2 3 4 5 6 7 8 9
Signs of shrapnel from the mine, embedded on the iron of the ship's hull.	0 1 2 3 4 5 6 7 8 9
Black powder burns on the outside of the ship near where the mine exploded.	0 1 2 3 4 5 6 7 8 9
The rivets of the hull would be ripped out in a way that scientifically shows the explosion came from outside of the ship.	0 1 2 3 4 5 6 7 8 9

Using complete sentences, explain, in detail, the evidence you would expect to find from a mine that exploded from underneath the ship.

**Unsolved History: The Death of the U.S.S. Maine
Student Study Guide – Answer Sheet**

This film examines the sinking of the U.S.S. Maine, an American battleship that mysteriously exploded in Havana Harbor in February of 1898. After an investigation, it was determined that an exterior mine exploding caused the ship to sink. The sinking of the U.S.S. Maine largely led to the war between the United States and Spain.

Two later investigations resulted in differing opinions as to the cause of the explosion. This investigation uses 21st century science to explain how the explosion occurred.

As you follow along with the film, please answer the questions on this study guide. At the conclusion of the film, you will use this study guide to complete a five-paragraph essay about what was learned through this film.

1. How many American sailors died when the U.S.S. Maine exploded in Havana Harbor on February 15, 1898? **266**
2. Of the initial investigators who examined the wreckage of the U.S.S. Maine, how many of them were trained in naval ship building and engineering? **Zero**
3. During the initial investigation, how did the investigators identify that a piece of the bottom of the ship's hull was bent inward? What were the physical qualities of this piece of steel?
The piece was painted with a slippery, greasy, green paint. This type of paint was only found on the bottom portion of the ship's hull.
4. A second investigation into the sinking of the U.S.S. Maine was conducted in 1911, as the ship was being prepared for a burial at sea. In this investigation, Investigator William B. Ferguson took detailed photos of the ship. He drew diagrams of the debris field, and located the large, 100 square foot, flap of steel, clearly bent inside of the ship; he referred to this as "Section 1". The film mentions two types of political pressure that Ferguson would have faced during his investigation. What were those two forms of pressure? **A) The United States would not want to admit that the event that led to war was misinterpreted in 1898. B) The Navy did not want to acknowledge that its ships were unsafe and that the U.S.S. Maine was destroyed by negligence.**
5. What did William B. Ferguson's investigation provide to future investigations that would prove to be very valuable? **His investigation provided photos of the wreck for future generations to use in their investigations.**
6. In 1974, Admiral Hyman Rickover led a team that conducted another investigation of the explosion of the U.S.S. Maine. This investigation did not face any political pressure. One of

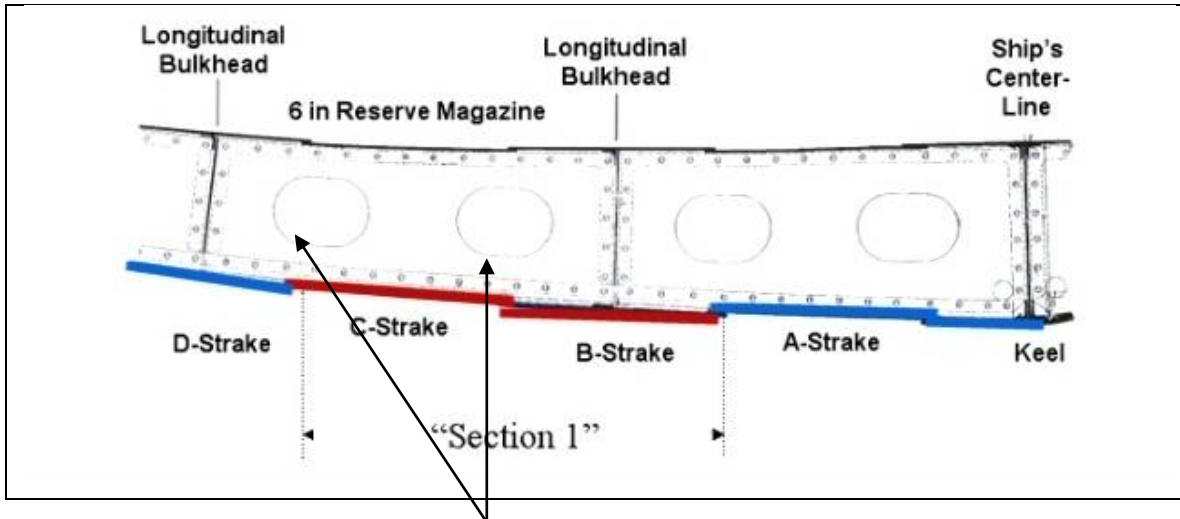
the first things they were able to prove was that the initial explosion on board the ship occurred in an area that held large amounts of gunpowder and ammunition shells. This area is called: **The six-inch reserve magazine.**

7. One of the investigators, Ib Hansen, noted that if a mine (shown at the right), containing about 100lbs of gunpowder, had exploded on the outside of the U.S.S. Maine, they would have expected to find a powder burn radius of about **10 to 20** feet in diameter; They found no such evidence.



8. Admiral Rickover's investigating committee concluded that the explosion was caused by the **spontaneous combustion of coal** from a bunker that was directly next to the six-inch reserve magazine that contained gunpowder & shells.
9. 21st century investigators focused their investigation on the relationships between the two rooms: the six-inch reserve magazine and the coal bunker A-16 which was next to it. They discovered that the wall that separated these two rooms was made of **1/4 -inch thick mild steel.**
10. In their test, investigators determined that if the bulkhead wall were heated to a temperature of **500**degrees, that the heat would be transferred from the metal wall to the bags of gunpowder & shells in the 6-inch reserve magazine, causing an explosion. This backed up the conclusion of the Rickover committee report.
11. The investigators also found that undetected coal bunker fires were **common** on ships built in that era.
12. Naval engineer, Otto Jons, noted that Section 1, "looked in a way that a mine-damaged plate (piece of steel hull) **couldn't possibly look.**"

13. On the drawing below of Section 1, as it lies in place with other overlapped/under lapped strakes. Section 1 is made up of strakes B & C. Draw an arrow to show where an exterior explosion would have only affected strake C—causing it to be ripped at its rivets. It can be proven that there was no exterior explosion, because the rivets were left undisturbed on the right side of strake C.



The student's arrow should point approximately here.

14. Otto Jons also noted that Section 1 showed the stresses of **tension** forces, of how the strakes and the rivets had been pulled away from another strake.
15. Dr. Robert Asaro, a professor of structural engineering, showed through his testing that the tension Otto Jons spoke about could be proven by re-creating the symptoms of the explosion. Dr. Asaro's testing of the metal strakes proved that the type of distortion found in Section 1 could only have been caused by **an internal explosion**.
16. Otto Jons further explained that the photos of Section 1 clearly show that the steel frame was subjected to **omni-directional** tension, or tension coming from all directions: tension caused by an internal explosion.
17. Otto Jons went on to explain that this type of tension in all directions, is similar to when a person **blows up a balloon** until it pops. When the explosion occurred, Section 1 was forced outward to a maximum point, by the force of the explosion from within the ship.
18. So how did Section 1 end up being bent back inside of the ship? According to Otto Jons experiment, it was forced back inside by the onrush of water, flowing at even a slow rate of about **five** feet per second.
19. Otto Jons summed up his opinion by saying that "clearly it was **an internal explosion**."
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Name _____

Period _____

**Unsolved History: The Death of the U.S.S. Maine
Student Study Guide**

This film examines the sinking of the U.S.S. Maine, an American battleship that mysteriously exploded in Havana Harbor in February of 1898. After an investigation, it was determined that an exterior mine exploding caused the ship to sink. The sinking of the U.S.S. Maine largely led to the war between the United States and Spain.

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20. How many American sailors died when the U.S.S. Maine exploded in Havana Harbor on February 15, 1898? _____

21. Of the initial investigators who examined the wreckage of the U.S.S. Maine, how many of them were trained in naval ship building and engineering?

22. During the initial investigation, how did the investigators identify that a piece of the bottom of the ship's hull was bent inward? What were the physical qualities of this piece of steel?

23. A second investigation into the sinking of the U.S.S. Maine was conducted in 1911, as the ship was being prepared for a burial at sea. In this investigation, Investigator William B. Ferguson took detailed photos of the ship. He drew diagrams of the debris field, and located the large, 100 square foot, flap of steel, clearly bent inside of the ship; he referred to this as "Section 1". The film mentions two types of political pressure that Ferguson would have faced during his investigation. What were those two forms of pressure?

24. What did William B. Ferguson's investigation provide to future investigations that would prove to be very valuable? _____

25. In 1974, Admiral Hyman Rickover led a team that conducted another investigation of the explosion of the U.S.S. Maine. This investigation did not face any political pressure. One of the first things they were able to prove was that the initial explosion on board the ship occurred in an area that held large amounts of gunpowder and ammunition shells. This area is called: _____.

26. One of the investigators, Ib Hansen, noted that if a mine (shown at the right), containing about 100lbs of gunpowder, had exploded on the outside of the U.S.S. Maine, they would have expected to find a powder burn radius of about _____ feet in diameter; They found no such evidence.



to

27. Admiral Rickover's investigating committee concluded that the explosion was caused by the _____ from a bunker that was directly next to the six-inch reserve magazine that contained gunpowder & shells.

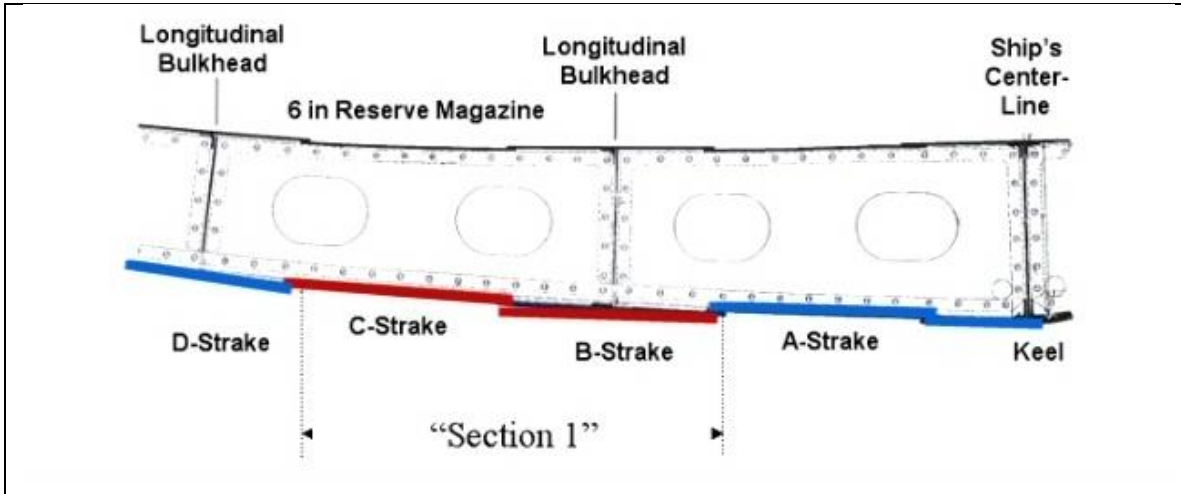
28. 21st century investigators focused their investigation on the relationships between the two rooms: the six-inch reserve magazine and the coal bunker A-16 which was next to it. They discovered that the wall that separated these two rooms was made of _____ -inch thick mild steel.

29. In their test, investigators determined that if the bulkhead wall were heated to a temperature of _____ degrees, that the heat would be transferred from the metal wall to the bags of gunpowder & shells in the 6-inch reserve magazine, causing an explosion. This backed up the conclusion of the Rickover committee report.

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35. Otto Jons further explained that the photos of Section 1 clearly show that the steel frame was subjected to _____ - _____ tension, or tension coming from all directions: tension caused by an internal explosion.
36. Otto Jons went on to explain that this type of tension in all directions, is similar to when a person _____ until it pops. When the explosion occurred, Section 1 was forced outward to a maximum point, by the force of the explosion from within the ship.
37. So how did Section 1 end up being bent back inside of the ship? According to Otto Jons experiment, it was forced back inside by the onrush of water, flowing at even a slow rate of about _____ feet per second.
38. Otto Jons summed up his opinion by saying that "clearly it was _____

