



**NAVAL AIR STATION LAKEHURST:  
Part I: Beginnings and USS SHENANDOAH (ZR 1)  
Part II:  
The Last Two Lakehurst US Navy Dirigibles,  
USS AKRON (ZRS 4) and USS MACON (ZRS 5)**

**By Captain Lawrence B. Brennan, U.S. Navy (Ret.)**

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**By Lawrence B. Brennan**

- **Part I ALMOST A CENTURION: Beginnings and USS SHENANDOAH (ZR 1)** Feb 2019
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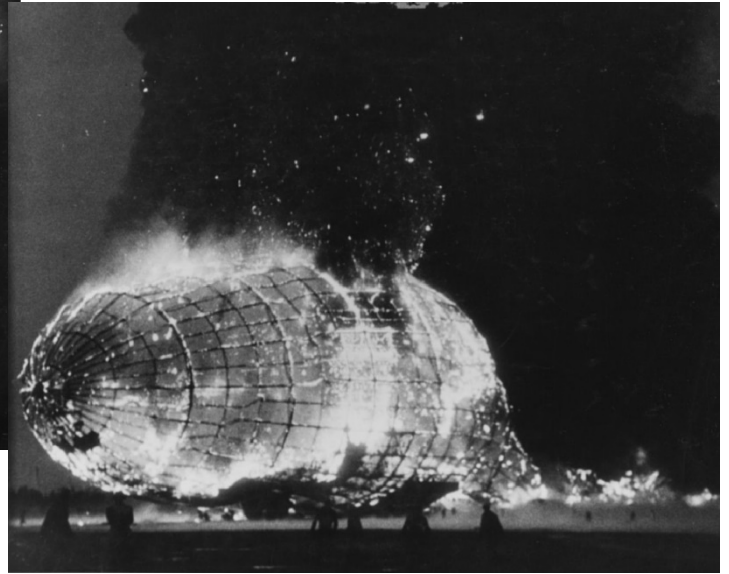


## NAVAL AIR STATION LAKEHURST-ALMOST A CENTURION<sup>1</sup>: Part I By Captain Lawrence B. Brennan, US Navy Retired<sup>2</sup>

This series is an introductory overview of nearly 10 decades of naval aviation progress in the New Jersey Pinelands. Best known for the fatal explosion and crash of the German dirigible *Hindenburg* 6 May 1937, Lakehurst has enjoyed a multipronged naval career.



Naval Heritage & Command photos NH 57965 & 57964<sup>3</sup>



*Fig. 1 & 2: Lakehurst's most memorable heritage: HINDENBURG burning and about to crash at NAS Lakehurst, New Jersey on 6 May 1937. <sup>4</sup>*

Lakehurst's 20 years primarily dealt with the development and ultimate failure of the concept of international dirigibles for military and civilian aviation purposes. The second phase was the two decades, beginning with World War II to the early 1960s, when Lighter than Air (LTA) blimps were engaged in anti-submarine warfare. The third phase, which began before the end of blimps, was the development of rotary wing aircraft (helicopters) for naval service.

This third period began to evolve at the end of the Second World War and continued as Navy deployed helicopters ashore and in anti-submarine missions on board specialized fleet aircraft carriers (CVSs) for two decades between the 1950s and mid-1970s. In addition to shore-based roles, Navy and Marine Corps helicopters were used in amphibious assault roles, first assigned to *Essex*-class fleet aircraft carriers converted to amphibious assault ships (LPHs) and new construction assault ships. The large-hull, flat-deck ships began to appear in the late 1950s and continued in service nearly three decades. Beginning in the mid-1970s they have been replaced by two classes of large-hulled, flat-deck amphibious assault ships (LHAs and LHDs) which continue the tradition of sea to land warfare and also support Vertical/Short Takeoff and Landing aircraft (VSTOL).

The fourth, and current, phase has been primarily a long-term education and testing mission which can trace its origins to the beginning of naval aviation and continues today. Occasional tests of blimps resumed in 2006; other special purpose aircraft are being operated and tested.

We will address these phases in a series of articles detailing the Lakehurst legacy.

## BEGINNINGS

Naval Aviation involvement with the current Lakehurst Naval Support Activity began in 1921, when Navy obtained Army's Camp Kendrick<sup>5</sup> which had begun its military career as a munitions-testing site for the Imperial Russian Army in 1916. On the recommendation of Lieutenant Commander Lewis H Maxfield, US Navy, Acting Secretary of the Navy Franklin D. Roosevelt initiated the deal to acquire 7,400 acres (later expanded) from the US Army during the summer of 1919 for \$13,099. The cost of the first hangar was nearly \$3 million.

Construction of major hangars began soon after commissioning in 1921; Lakehurst Naval Air Station became the hub of naval lighter-than-air activity. Interest in airships in the United States had begun early in the twentieth century. The Lakehurst Naval Base presently occupies 7,400 acres of flat lowlands just north of Lakehurst, New Jersey. Lakehurst Maxfield Field is the naval component of Joint Base McGuire–Dix–Lakehurst (JB MDL), a joint base headquartered in Manchester Township approximately 25 miles east-southeast of Trenton and eight miles northwest of Toms River. The only body of water within its boundaries is Lake Horican, about the size of a football field. The base is surrounded by fish and wildlife management areas.

Originally known as Manchester, the community of Lakehurst became a separate municipality in 1921. During the American Revolution, the area was a major industrial center for iron and charcoal. Settlement flourished until 1850, when these industries disappeared. In 1860 the arrival of the railroad revived Manchester's economy. It became a resort town by the beginning of the 20th century.<sup>6</sup>

Now, Lakehurst primarily is home to Naval Air Warfare Center Aircraft Division Lakehurst, although the airfield supports several other flying and non-flying units as well.



Fig. 3: Location of Naval Air Station, Lakehurst.<sup>7</sup>

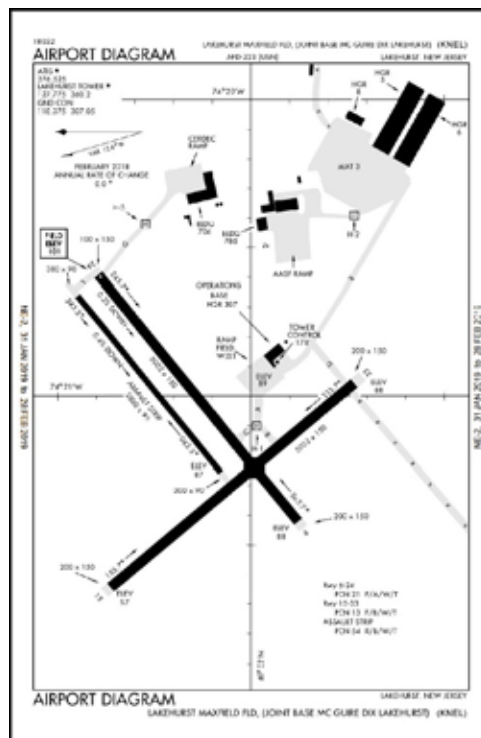


Fig. 4: Airfield diagram of Maxfield airport (KNEL)<sup>8</sup>.

On 6 January 1944, the field was named in memory of Commander Louis H. Maxfield, US Navy<sup>9</sup> who lost his life when R-38/USN ZR-2 airship crashed during flight 24 August 1921 near Hull, England. Commander Maxfield, Naval Aviator (LTA) 17, was the prospective commanding officer of the British-built ZR-2 which was due to be delivered to the US Navy. Along with British Air Commodore E.M. Maitland, Leader of Airships, and 16 Americans, Commander Maxfield was among the 44 men lost when the airship broke in two on a test flight and crashed to earth. Five men survived the casualty. The tests disclosed multiple problems with the airship.



Fig. 5: Commander Louis Henry Maxfield, born Nov. 1883, and died in a test flight of ZR-2.<sup>10</sup>

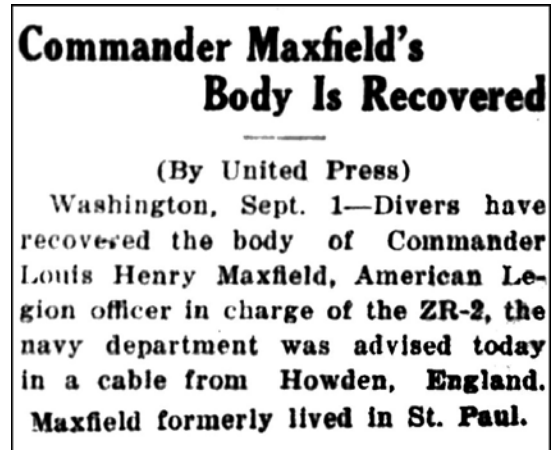


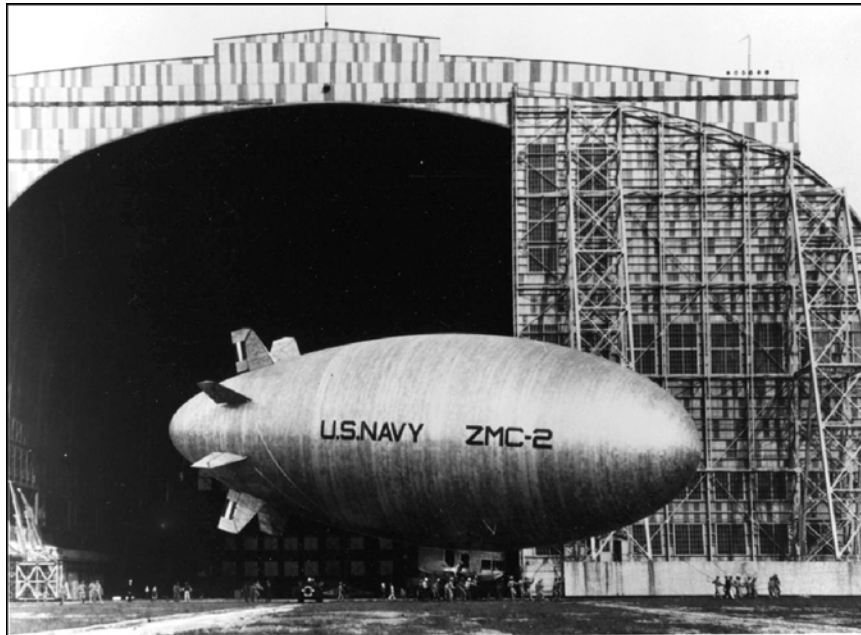
Fig. 6: Newspaper article noting the death of Maxfield on Sept. 1, 1921. Maxfield airport at Lakehurst was named for him.<sup>11</sup>

On 23 August, R-38 left Howden on another test flight. After spending the night over the Channel, it attempted a high-speed rudder drill when the girders cracked during a sharp turn. The fuel and hydrogen in the forward section exploded and burned. The crash of the R-38 was the worst aviation disaster in history to that time.

The initial practical American lighter than air craft was *California Arrow*, built by Thomas S. Baldwin in 1904. The U.S. Army purchased the first US military airship from Baldwin five years later. Germany was the pioneer in the manufacture of rigid airships (dirigibles) which had the gas containers enclosed within compartments of a fixed fabric-covered framework — and during World War I maintained a fleet of Zeppelins, which it used primarily for patrolling and secondarily for bombing missions. The success of these airships prompted interest in the United States in developing them for coastal patrol, to detect enemy submarines and mines and as a scouting arm for naval fleets.

Navy was dilatory in the use of blimps (non-rigid airships); it only ordered its first one in 1915, two years before the US became a combatant. By the end of combat in November 1918, Navy recognized the utility of blimps and used several for offshore patrols for long range German U-boats. No convoy supported by blimp surveillance ever lost a ship but this probably was due to numerous factors in addition to the blimps.

Between the wars, it was decided that the Army would use non-rigid airships to patrol the coasts while Navy would use its aluminum hulled, helium-inflated rigid airships for long-range scouting and fleet support. In 1937, the Army transferred all its remaining non-rigid blimps to Navy.



*Fig. 7: ZMC-2, a U.S. Navy airship with a rigid metal skin strengthened by internal pressure, seen leaving a hangar at the Lakehurst Naval Air Station c.1929.<sup>12, 13</sup>*

Navy ended its construction and employment of the rigid airships in the 1930s after three ships crashed: USS *Shenandoah*, USS *Akron*, and USS *Macon*. The German-built USS *Los Angeles* had been decommissioned in 1932 but was briefly recommissioned in 1933 following the crash of USS *Akron*. She was struck from the Navy List in 1939. In Part I we will deal with *Shenandoah*; future sections will follow on the other ships

During the late 1920s, Lakehurst became internationally known as a port for commercial lighter-than-air flight. It was the only stopping place in the United States for German airships, and in 1929 it played host to *Graf Zeppelin*, then in the process of making the first round-the-world trip. However, of the rigid airships eventually owned by the United States after World War I, all but one--the German-built *Los Angeles* – crashed, and many US officials were skeptical of the desirability of continuing the program. Nevertheless, Navy and public support remained, largely because of the success of the German Zeppelins. Change occurred in 1937, when *Hindenburg*, the largest airship ever built, was destroyed while landing at Lakehurst. Thirty-six passengers died and the crash of *Hindenburg* marked the end of commercial airship travel and the end of experimentation with hydrogen as a lifting device.

**WING OF GOLD**



14

*The Dirigible/Balloon Pilot Insignia*

## LAKEHURST NAVAL AIR STATION

The National Parks Service, which includes Hangar No. 1 Lakehurst Naval Air Station among its National Registry of Historic Places, publishes a helpful description of the hangars and structures at Lakehurst, “*Aviation: From Sand Dunes to Sonic Booms*” which is the primary basis for the following description.<sup>15</sup>



Fig. No. 8: Hangar No. 1, Lakehurst.<sup>16</sup>



Fig. No. 9: Hangar No. 1 still looming over the NAES installation today<sup>17</sup>.

The first major facility at Lakehurst was Hangar No. 1, a gigantic structure built in 1921 to house the helium-filled dirigibles. It measures 961 feet long, 350 feet wide and 200 feet high. At each end are two pairs of massive steel doors, mounted on railroad tracks. These double doors are structurally separate from the hangar itself. Each door weighs 1350 tons and is powered by a pair of 20 horsepower motors, although provisions were made to open the doors manually, which required the assembled manpower of nine men.

Inside it, Navy engineers assembled the first American-built rigid airship, *Shenandoah*. On 4 September 1923, the ship made its maiden flight from Lakehurst. Navy obtained its second rigid airship in 1924. Built in Germany and delivered to the United States as part of the reparations, *Los Angeles* shared Hangar No. 1 with *Shenandoah*. Navy used [this] dirigible extensively for experimental work on flight and mooring problems--it was the first US airship developed to catch and release airplanes in flight. Lakehurst was also the home of USS *Akron* and USS *Macon*.

In addition to Hangar No. 1 there were five other hangars in two clusters, which have been converted for training and testing activities. Hangar Nos. 2 and 3 housed blimps; Hangar No. 4 housed balloons; Hangars Nos. 5 and 6 housed either rigid air ships or blimps. The area between the two clusters of hangars formerly had been used for mooring the airships and maneuvering them into the hangars.

This article will discuss *Shenandoah*'s history and postal history only; the history of *Akron* and *Macon* will follow in later issues.

The Norman-Gothic Cathedral of the Air was erected at Lakehurst by the American Legion in 1932:

*to serve as a place of worship for the nearby military base, but also to do something considerably rarer: commemorate the history of aviation on its incredible stained glass windows.*

*Shining from the colorful stained glass are beautiful depictions of humanity's quest to reach the heavens. It begins with the myths of Pegasus and Icarus' wax wings. The 18 panels then gradually lead along the history of human flight, from experimentation with lighter-than-air travel such as zeppelin airships to the Wright Brothers pioneering airplane flight.*

*The chapel is located near the Naval Air Station in Lakehurst...an active military base, it is also a destination for visitors to Hindenburg crash site, which tragically caught fire while attempting to land at the base. Surrounded by pine trees, the beautiful chapel is an unexpected gem at the air station. Aside from the stained glass windows, at the front of the church near the entrance are memorials to the [men] who lost their lives in the tragic crashes of the USS Akron and USS Shenandoah airships, two military dirigibles that had been based at the Lakehurst air station.<sup>19</sup>*



**Fig. 10: Cathedral of the Air, Lakehurst, NJ.<sup>18</sup>**

Our voyage of New Jersey philatelic aviation history will focus on the airships: *Shenandoah*-the first, *Los Angeles*-the only survivor, and *Akron* and *Macon*-the near sisters who were lost at sea during the early 1930s. Also, we will touch upon the mail from the German commercial airships *Graf Zeppelin* and *Hindenburg*. We will explore some mail from Lakehurst and the World War II blimps until their last flights nearly 60 years ago.

### **USS *Shenandoah* (ZR 1)-The First<sup>20</sup>**

USS *Shenandoah* (ZR 1) was the first of four US Navy rigid airships. It was constructed during 1922–23 at Lakehurst Naval Air Station, and first flew in September 1923 but had an operational life of just two years. It developed the U.S. Navy's experience with rigid airships, and made the first crossing of North America by airship. On the 57th flight, *Shenandoah* was destroyed in a squall line over Ohio 3 September 1925.

*Shenandoah* was originally designated FA-1, for "Fleet Airship Number One" but this was changed to ZR-1. It had a range of 5,000 miles and could reach speeds of 70 mph. *Shenandoah* was assembled at Hangar ONE Naval Air Station Lakehurst during 1922–1923, from parts fabricated at the Naval Aircraft Factory in Philadelphia. *Shenandoah* was the first rigid airship to join the fleet.

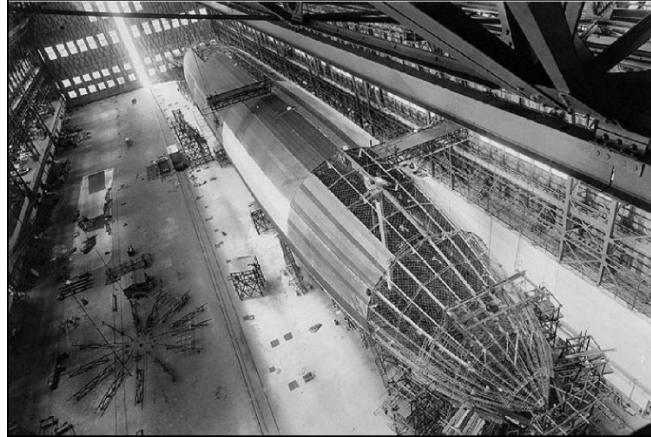
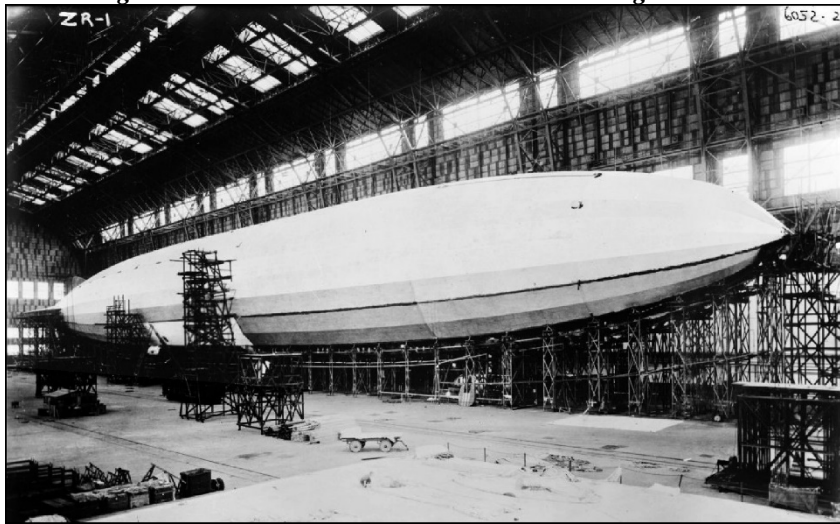


Fig. 11: *Shenandoah* under construction in Hangar No. 1.<sup>21</sup>



Library of Congress photo, call number: LC-B2- 6052-2. Bain Collection.<sup>22</sup>

Fig. 12: *The future USS Shenandoah (ZR-1) newly completed, in a photo dated 25 August 1923.*

The first rigid airship built in the United States, *Shenandoah* was designed by the Bureau of Aeronautics and was intended primarily for naval purposes. It also was expected that it would serve as an experimental prototype for commercial airships. Design work began in Sept. 1919 and was completed in early Oct. 1921.

Helium, chemically inert, was substituted for hydrogen, a gas with one of the widest explosive ranges, during her construction. This greatly improved the airship's safety against explosions and fires but reduced her lifting capacity and range. Helium was difficult to obtain and expensive; its use limited *Shenandoah's* employment with the fleet and caused operational problems.

The design was based on Zeppelin bomber L-49 (LZ-96), built in 1917. L-49 was a lightened Type U "height climber," designed for altitude at the expense of other qualities. The design was found insufficient and a number of the features of newer Zeppelins were used, as well as some structural improvements. The structure was built from a new alloy of aluminum and copper known as duralumin. An outer cover of high-quality cotton cloth was sewn, laced or taped to the duralumin frame and painted with aluminum dope. Girders were fabricated at the Naval Aircraft Factory. Whether the changes introduced into the original design of L-49 played a part in *Shenandoah's* later breakup remains questionable.

As the first rigid airship to use helium rather than hydrogen, *Shenandoah* had a significant edge in safety over previous airships. Helium was relatively scarce at the time, and the *Shenandoah* used much of the world's reserves just to fill its 2,100,000 cubic feet volume.

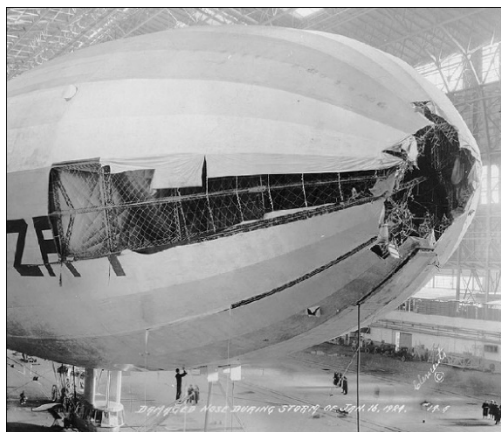
*Shenandoah* was powered by 300 hp (220 kW), eight-cylinder Packard gasoline engines. Six engines were originally installed, but in 1924 one engine (aft of the control car) was removed. The first frame of *Shenandoah* was erected by 24 June 1922; fourteen months later, 20 August 1923 – soon after the death of President Harding, the completed airship was floated free of the ground.

Less than two weeks later, 4 September 1923, *Shenandoah* first flew. It was christened and simultaneously commissioned six weeks later, 10 October 1923, with Commander Frank R. McCrary, US Navy in command.

*Shenandoah* was designed for fleet reconnaissance of the type that had been performed by German naval airships during World War I.



*Fig. 13: Commander McCrary, the ship's commander, is shown at the wheel in 1923.<sup>23</sup>*



NH 96212

*Fig. 14: Damaged nose of Shenandoah, torn away from her mooring mast in Lakehurst on 16 January 1924.<sup>24</sup>*

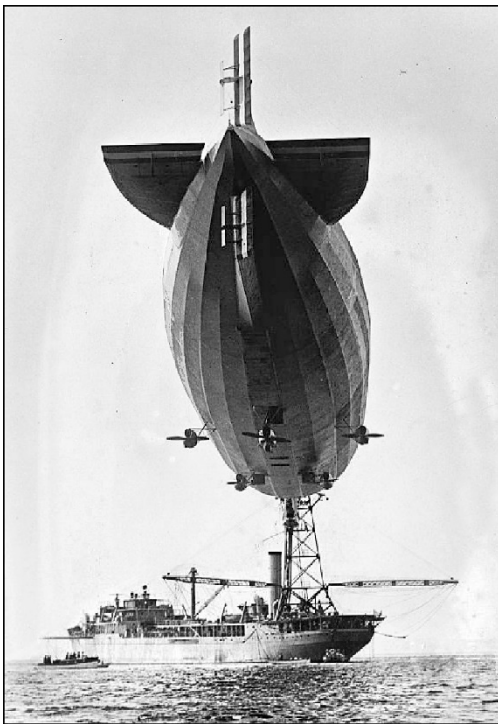
Its pre-commissioning trials included long-range flights during September and early October 1923, to test airworthiness in rain, fog and poor visibility. On 27 October, *Shenandoah* celebrated Navy Day with a flight down the Shenandoah Valley and returned to Lakehurst that night by way of Washington and Baltimore, where crowds gathered to see the new airship in the beams of searchlights.

At this time, Rear Admiral William A. Moffett, Chief of the Bureau of Aeronautics, a staunch advocate of airships and carriers, considered the possible use of *Shenandoah* to explore the Arctic. He believed such a program would produce valuable weather data, as well as experience in cold-weather operations. With its endurance and ability to fly at low speeds, the airship was thought to be well-suited to such work. President Coolidge approved Moffett's proposal, but *Shenandoah's* upper tail fin covering ripped during a gale on 16 January 1924, and the sudden roll tore her away from the Lakehurst mast, ripping out her mooring winches, deflating the first helium cell and puncturing the second. Zeppelin test pilot Anton Heinen rode out the storm for several hours and landed safely while the airship was being blown backwards. Extensive repairs were needed, and the Arctic expedition was scrapped.

Repairs were completed in May, and the summer of 1924 was devoted to work with its engines and radio equipment to prepare for fleet duty. In August 1924 *Shenandoah* reported for duty with the Scouting Fleet and took part in tactical exercises. It discovered the “enemy” force but lost contact in foul weather. Technical difficulties and lack of support facilities in the fleet forced it to depart the operating area ahead of time to return to Lakehurst. Although this marred *Shenandoah*’s role in the exercises, it emphasized the need for advanced bases and maintenance ships.

In July 1924, the fleet oiler USS *Patoka* (AO 9) entered Norfolk Naval Shipyard for modifications to become the Navy’s first airship tender. An experimental mooring mast 125 feet above the water was constructed; additional accommodations both for *Shenandoah*’s crew and the men who would handle and supply the airship were added; facilities for the helium, gasoline, and other supplies necessary for airships were constructed, as well as handling and stowage facilities for three seaplanes. *Shenandoah* engaged in a short series of mooring experiments with *Patoka* to determine the practicality of mobile fleet support of scouting airships. The first successful mooring was made on 8 August. During October 1924, *Shenandoah* flew from Lakehurst to California and north to Washington State to test newly erected mooring masts. This was the first flight of a rigid airship across North America.

*Shenandoah* did not fly again until 26 June 1925, when it began preparations for summer fleet operations. In early July, it participated with USS *Patoka* in the Governor’s Conference in Bar Harbor, Maine. During July and August, it again operated with the Scouting Fleet in its primary scouting mission.



*Fig. 15 & 16: Shenandoah moored to the mast aboard USS Patoka. This is true in the Bar Harbor photo as well (Patoka is behind the pagoda and trees), at the Governor’s Conference July 3-4, 1925.*

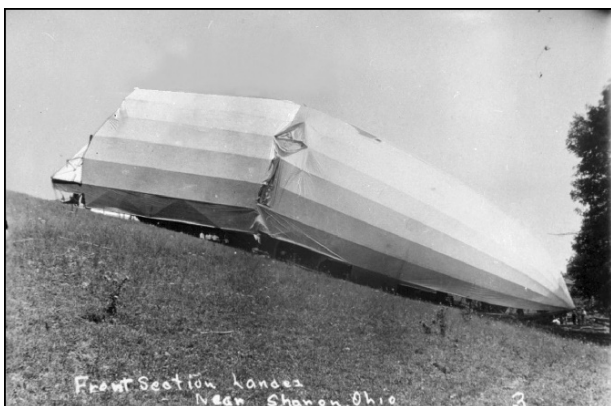
LOC photo LC-F8 31898

## NAVAL AIR STATION LAKEHURST: Part I~ Capt. Lawrence B. Brennan

For the final time, on 2 September 1925, *Shenandoah* departed Lakehurst on a promotional flight to the Midwest scheduled to include flyovers of 40 cities and visits to state fairs. Testing of a new mooring mast was scheduled at Dearborn, Michigan. While passing through an area of thunderstorms and turbulence over Ohio early in the morning of 3 September, during its 57th flight, the airship was caught in a violent updraft that carried it beyond the pressure limits of its gas bags. It was torn apart in the turbulence and crashed in several pieces near Caldwell, Ohio.

Fourteen crewmen, including Commander Zachary Lansdowne, were killed. This included every member of the crew of the control car (except for Lieutenant Anderson, who escaped before the car detached and fell from the ship); two men who fell through holes in the hull; and several mechanics who fell with the engines. There were twenty-nine survivors who succeeded in riding three sections of the airship to earth. Eighteen men made it out of the stern after it rolled into a valley. Four others survived a crash landing of the central section. The remaining seven were in the bow section which Commander (later Vice Admiral) Charles E. Rosendahl, US Navy, managed to navigate as a free balloon. In this group was Anderson who—until he was roped in by the others—straddled the catwalk over a hole.

The first theory of the cause of the loss was that the gas cells over-expanded as the ship rose, due to Lansdowne's decision to remove the ten automatic release valves, and that the expanding cells damaged the framework of the airship and led to its structural failure.



NH Photo 42044

*Fig. 17: Bow section of Shenandoah which was navigated to the ground as a free balloon by Commander Rosendahl, with 7 survivors.*

NH Photo 42038 & 42031<sup>25</sup>

*Fig. 18a & b: Stern section of Shenandoah – two views. Eighteen men survived the crash landing of this section. Another four survived the middle section landing.*



Zeppelin test pilot, Anton Heinen, according to the *Daily Telegraph*, placed the mechanical fault for the disaster on the removal of eight of the craft's 18 safety valves, saying that without them he would not have flown on her "for a million dollars". These valves had been removed in order to better preserve the vessel's helium, which at that time was considered a limited global resource of great rarity and strategic military importance; without these valves, the helium contained in the rising gas bags had expanded too quickly for the bags' valves' design capacity, causing the bags to tear apart the hull as they ruptured (the helium which had been contained in these bags became lost into the upper atmosphere).

A Lakehurst dispatch to the *New York Times* reported:<sup>26</sup>

Checking up of the stories told by survivors of the Shenandoah indicates that a "twister" or cyclonic disturbance which wrenched the nose off the Shenandoah was responsible for the wreck. The theory advanced by Capt. Anton Heinen, former Zeppelin pilot, that the removal of eight of the sixteen safety-valves was responsible, is [doubted] by all of the remaining crew of the dirigible.

All agree that the actual breaking-up of the ship occurred at or near the 3,500-foot level when the cells were only normally inflated, and point out that had the break been due to the bursting of one or more gas-cells, it would have occurred when the *Shenandoah* was shot up by an "air geyser" to a height of 7,000 feet.

Lieut. Joseph B. Anderson, aerological officer of the ship, states that as the airship started up after coming down from her highest altitude, Commander Lansdowne ordered gas to be valved, but when she shot downward again he tried to steady her by loosing some of the water ballast. He then gave orders to point her nose down and drive through the storm, but at that moment the ship seemed to be seized by two parallel currents of air, one of which was traveling upward at a far greater speed than the other.

Another correspondent, writing from the scene of the accident:

Just what caused the accident is still a matter of doubt tonight, but there were two theories put forward by survivors of the ship. One was that the radio cabin and control cabin, which were wrenched loose and fell to the ground clear of the ship, left holes in the outer covering of the vessel through which the night gale rushed, ripping the helium bags to bits and causing unequal stresses which broke the ship in two. The other was that the gas-tanks broke loose, and in sliding through the ship smashed girders and so weakened the structure that it collapsed.

Capt. Anton Heinen thus explains his theory that the disaster was due to the reduced number of safety-valves for the escape of the helium gas:

Those fourteen gallant men need not have been killed. An airship might possibly go through her whole career without ever being subject to an emergency such as that which arose on the fateful third of September. Yet it is for just such emergencies that the system of safety-valves is provided. At the time that her extremely able constructors turned her over to the Government of the United States, she was provided with safety-valves sufficient in number to withstand any kind of weather conditions which our past experience had encountered.

I am afraid that a false feeling of security has brought about a change in the construction of the all-important safety-valve device, which was to safeguard the most precious thing aboard the ship—human lives—from destruction. From a device used for the protection of human life it has been changed to a device for saving the valuable helium contained in the gas-bags.

## NAVAL AIR STATION LAKEHURST: Part I~ Capt. Lawrence B. Brennan

The referred-to change in the plan and construction of the safety-valve system is the primary and only cause of the terrible disaster. As a result we have been deprived of many splendid friends and promising airmen. Then, too, we have lost the wonder ship, *Shenandoah*, that has found a glorious but unnecessary place in the disaster list of airship history.

In spite of what has happened, the airship, when properly constructed, handled and cared for, is the safest way of human transportation. Years that are to come will prove this to be so. And in the passing of years, with the greater and more pronounced success of airship transportation, will come the realization that the apparent greater regard for the safety of the helium than for the lives of those now our heroes has brought about this ghastly situation.

Time will show that the inexcusable change in the construction of the *Shenandoah* has caused the loss of part of her crew and the ship itself, which was such a tender part of my heart and my life, and the pride of all who watched her float among the clouds.”<sup>27</sup>

According to an Associated Press dispatch, Commander Lansdowne of the *Shenandoah*, before starting on the trip, had criticized the new water-recovery system which was installed some weeks ago. One man quotes him as saying, “I don’t like it. It’s going to cause trouble in a high wind.” The change involved is explained as follows:

The original water-recovery system distributed the water recovered from exhaust gas of the engines to ballast bags scattered throughout the ship to counteract the loss in weight from gasoline consumption.

The new system, installed at Section 110, near the place where the dirigible is said to have broken, concentrated a great part of the recovered water in a canvas bag holding three tons at the spot where the ship broke.

Not only is it believed that the new system concentrated too much weight in one part of the ship, but in addition it is believed that the cutting of one of the main circular ribs of the ship and an intermediate rib for installation of the new system resulted in further weakness. These formed the main structure of the ship.

The two ribs, or rings, as they are called in dirigible construction, were reunited by a square connection instead of the original circular form, and this also was criticized by Commander Lansdowne in private conversations just before departure of the ship.<sup>28</sup>

Weather also may have contributed to the casualty. Commander Lansdowne, a native of Greenville, Ohio, had warned the Navy Department of the violent weather conditions that were common to that area of Ohio in late summer. His pleas for a cancellation of the flight only caused a temporary postponement; his superiors were keen to publicize airship technology and justify the cost of the airship. As Lansdowne’s widow maintained at the inquiry, publicity rather than prudence won the day.

[M]any of the survivors, we are told, say that the accident was caused by “the most feared of storms to an aviator, a “line squall,” [perhaps a “microburst” or “wind shear?]] which no craft, once caught in its clutches, could have survived. “The line in a line squall,” explains Prof. Henry J. Cox, forecaster for the Chicago weather bureau, “is defined by the sudden clash of temperatures or of winds blowing from different directions.” Mrs. Lansdowne is quoted as saying that her husband had grave misgivings about taking the *Shenandoah* over Ohio at this season, knowing the prevalence of such disturbances in that region.<sup>29</sup>

**Capt. Lawrence B. Brennan ~ NAVAL AIR STATION LAKEHURST: Part I**

After the disaster, airship hulls were strengthened, control cabins were built into the keels rather than suspended from cables, and engine power was increased. More attention was also paid to weather forecasting.

The crash site attracted thousands of visitors in its first few days who reportedly looted the wreckage and remains. No one was prosecuted. Several memorials remain near the crash site. There is another memorial at Moffett Field, California, and a small private museum in Ava, Ohio.<sup>30</sup>

Covers associated with the short life of *Shenandoah* follow.

These two covers are from 1924, in conjunction with *Shenandoah's* cross-country flight. She flew to San Diego, and then north to Seattle, Washington, before returning to Lakehurst.



Siegel Auction lot 2138, Sale 871<sup>31</sup>

**Fig. 19: 1924, Oct. 8-12 -- U.S.S. "Shenandoah" (ZR-1), Transcontinental Flight (AAMC Z-500). 1c pair tied by U.S. Naval Sta. Lakehurst Oct. 8, 1924 duplex on cover to San Diego, receiving duplex, "U.S.S. Shenandoah" straightline.**

Siegel Auction lot 2139, Sale 871<sup>32</sup>

**Fig. 20: 1924, Oct. 12-28 -- Return Flight, U.S.S. "Shenandoah" (ZR-1), Seattle to Lakehurst (AAMC Z-501a). San Diego U.S. Naval Sta. Oct. 11, 1924 duplex, purple handstamped flight cachet for Seattle dispatch, 2c tied by Lakehurst Oct. 28 machine cancel for return mail to California.**



**NAVAL AIR STATION LAKEHURST: Part I~ Capt. Lawrence B. Brennan**

The following July, *Shenandoah* participated with *Patoka* at the Governors' Conference, held July 3-4, 1925 at Bar Harbor, Maine.



Siegel Auction lot 2141, Sale 871

**Fig. 21: 1925, Jul. 3 -- Governors' Conference Flight, U.S.S. "Shenandoah" (ZR-3), Lakehurst to Bar Harbor Me. (AAMC Z-502). 2c tied by Lakehurst Jul. 3 machine cancel, purple handstamped cachets and U.S.S. Patoka receiving duplex.**



Siegel Auction lot 2142, Sale 871

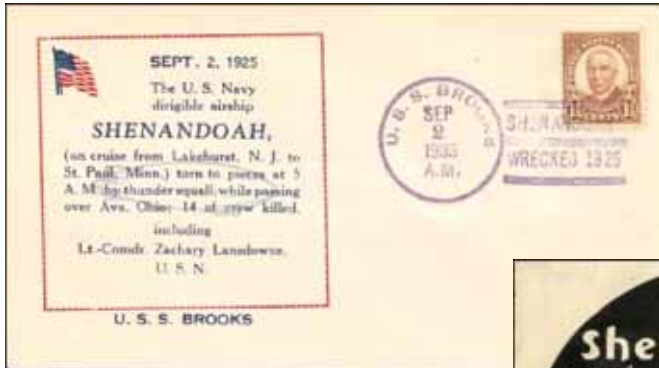
**Fig. 22: 1925, Jul. 4 -- Governors' Conference Return Flight, U.S.S. "Shenandoah" (ZR-3), Bar Harbor Me. to Lakehurst (AAMC Z-503). 2c Norse-American tied by Bar Harbor Jul. 4 machine cancel, purple handstamped cachets and U.S.S. Patoka receiving duplex.**



Siegel Auction lot 2242, Sale 906 (Mar 2006)

*Fig. 23: 1928, Jul. 4 -- Governors' Conference Return Flight, U.S.S. "Shenandoah" (AAMC Z-503). 2c Lexington-Concord tied by "Air Mail Service via U.S.S. Shenandoah" circular handstamp and "U.S.S. Patoka Jul. 4, 1928 P.M./Governors' Conference" duplex on cover to Roessler.*

Other memorial cacheted covers follow:



*Fig. 24: A 1935 cacheted cover from the USS Brooks circular cancel with Shenandoah/Wrecked 1925*

*Fig. 25: A 10<sup>th</sup> anniversary memorial cover from USS Monaghan 3 September 1935.*



*Fig. 26: An Ava, Ohio memorial cover with a 4-bar cancel dated Sep 3, 1935.*

ENDNOTES:

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- <sup>1</sup> “Centurion” is a term of art for naval aviators-most commonly used for an aviator who has 100 traps (arrested landings) on a carrier or in a type of aircraft. They often then get centurion jacket patches or cakes.
- <sup>2</sup> Copyright MMIXX by Lawrence B. Brennan. All moral and legal rights reserved. This may not be republished in any form, except for brief quotes and academic use, without the prior express written consent of the copyright holder.
- <sup>3</sup> <https://www.history.navy.mil/content/history/nhhc/our-collections/photography/numerical-list-of-images/nhhc-series/nh-series/NH-57000/NH-57964.html>
- <sup>4</sup> <https://www.history.navy.mil/content/history/nhhc/our-collections/photography/numerical-list-of-images/nhhc-series/nh-series/NH-57000/NH-57965.html>
- <sup>5</sup> Pace, Kevin, Montgomery, Ronald, and Zitarosa, Rick, *Images of America NAVAL AIR STATION LAKEHURST* (Charleston, South Carolina, 2003, Arcadia Publishing), pp. 17-18.  
<https://www.worldwar1centennial.org/index.php/nj-wwi-related-locations/647:camp-kendrick-lakehurst.html#>
- <sup>6</sup> See, Encyclopedia Britannica <https://www.britannica.com/place/Lakehurst> and <https://www.history.com/this-day-in-history/navy-opens-a-blimp-base-in-new-jersey>
- <sup>7</sup> NAVAIR Lakehurst: One-Stop Shop for the Fleet - Naval Aviation News (March–April 2003), SkyVector aeronautical chart for KNEL, FAA Airport Diagram (PDF), effective January 3, 2019  
[https://en.m.wikipedia.org/wiki/Lakehurst\\_Maxfield\\_Field](https://en.m.wikipedia.org/wiki/Lakehurst_Maxfield_Field)  
<http://www.airnav.com/airport/KNEL>
- <sup>8</sup> Both map and diagram from <http://www.airnav.com/airport/KNEL>.
- <sup>9</sup> Commander Louis H. Maxfield, USN, who was in charge of the U.S. Rigid Air Detachment in training at Howden, and who was to be the Commanding Officer of the ill-fated airship on the flight to America, was born in 1883 at St. Paul, Minnesota. He was a 1907 graduate of the US Naval Academy and one of 13 members of that class recognized in Memorial Hall. He entered the Naval Aviation service in 1914, and was promoted to Temporary Commander in 1918. During the War he was in command of the U.S. Naval Station at Painbaeuf, France. During a flight in the French airship “Capitaine Caussin” he dived overboard from a great height and rescued an enlisted man who had fallen overboard. Commander Maxfield was decorated by the Italian Red Cross with a silver medal for distinguished work during the Messina earthquake, with the French Naval Life-saving Medal (Silver), was an Officer of the Legion of Honour, and was decorated by the U.S. Government with the Navy Cross and the Victory Medal.  
<https://navy.togetherweserved.com/usn/servlet/tws.webapp.WebApp?cmd=SBVTimeLine&type=Person&ID=531243>  
Louis was survived by his wife and two children; he is buried in Arlington National Cemetery. Three other Naval Academy graduates also were lost when ZR-2 crashed: Valentine Bieg ‘10, Emory Coil ‘12, and Henry Hoyt ‘14.  
The USNA 1907 *Lucky Bag* entry reads:  
An enthusiastic ex-student of Boston Tech. who recites with such vigor that the people of Annapolis wonder if the Brigade is having cheer practice. Was made adjutant of the Plebe Battalion because he had parallax of the eyes, and could dress the companies by the intersection of his two lines of sight. Commanded the Nevada in fine style First Class cruise. ... Made himself eligible for Royalty at the class supper and was crowned by Dr. Grady the next week. Has rosy cheeks, a debonair manner and a hearty way about him ....  
*The Lucky Bag*, his headstone, and all contemporary references spell his name “Louis.” Memorial Hall has “Lewis.”
- <sup>10</sup> <https://www.findagrave.com/memorial/57196722/louis-henry-maxfield>, Photo added by Michael Belis, Sept.2018.
- <sup>11</sup> [https://www.newspapers.com/clip/12694050/louis\\_henry\\_maxfield\\_body\\_recovered/](https://www.newspapers.com/clip/12694050/louis_henry_maxfield_body_recovered/)
- <sup>12</sup> <https://www.history.navy.mil/content/history/nhhc/our-collections/photography/numerical-list-of-images/nhhc-series/nh-series/80-G-1027000/80-G-1027200.html>.
- <sup>13</sup> ZMC-2, built at Naval Air Station Grosse Ile (Michigan). See <https://en.wikipedia.org/wiki/ZMC-2>.
- <sup>14</sup> Naval aviator wings LTA from Wikipedia [https://en.wikipedia.org/wiki/Dirigible\\_Pilot\\_Badge](https://en.wikipedia.org/wiki/Dirigible_Pilot_Badge)  
The badge first appeared in Navy Uniform Regulations in 1922, during which time the Navy was experimenting with lighter-than-air craft, as opposed to conventional, fixed-wing aircraft.  
The Dirigible/Balloon Pilot Insignia was issued well into the 1970s, with occasional awards, on a case-by-case basis, to the end of the 20th century. The 1978 U.S. Navy Uniform Regulations removed the Dirigible/Balloon Pilot Insignia from the authorized list of aviation breast insignia. Although the Dirigible/Balloon Pilot Insignia is considered obsolete, it may still be found on various insignia and badge charts promulgated through U.S. Navy instructions and publications.
- <sup>15</sup> <https://www.nps.gov/articles/hangar-no-1-lakehurst-naval-air-station.htm>

- <sup>16</sup> Hangar No. 1 Lakehurst on Flickr. Photo by Earl Leatherberry:  
<https://www.flickr.com/photos/23711298@N07/21915828989/in/photostream/>
- <sup>17</sup> Aerial view at <http://thedrive.com/the-war-zone/17748/the-navys-giant-hangar-that-housed-the-hindenburg-hides-a-mock-aircraft-carrier-inside>
- <sup>18</sup> Wiki Commons, photo by Acroterion (<https://commons.wikimedia.org/wiki/User:Acroterion>) (cropped) at [https://commons.wikimedia.org/wiki/File:Cathedral\\_of\\_the\\_Air\\_NJ2.jpg#/media/File:Cathedral\\_of\\_the\\_Air\\_NJ2.jpg](https://commons.wikimedia.org/wiki/File:Cathedral_of_the_Air_NJ2.jpg#/media/File:Cathedral_of_the_Air_NJ2.jpg).
- <sup>19</sup> <https://www.atlasobscura.com/places/cathedral-in-the-air>
- <sup>20</sup> *The Hindenburg, Graf Zeppelin, U.S. Navy Airships and other Dirigibles*, <https://www.airships.net/us-navy-rigid-airships/>. A large part of the material here appears on Wikipedia which uses *The Dictionary of American Fighting Ships* as its source. As the *DANFS* is a work of the U.S. government, its content is in the public domain, and the text is often quoted verbatim in other works (including in some cases Wikipedia articles). Many websites organized by former and active crew members of U.S. Navy vessels include a copy of their ships' *DANFS* entries. ([https://en.wikipedia.org/wiki/USS\\_Shenandoah\\_\(ZR-1\)#cite\\_note-p64-4](https://en.wikipedia.org/wiki/USS_Shenandoah_(ZR-1)#cite_note-p64-4)). Other sources include Naval History and Heritage Command at <https://www.history.navy.mil/research/histories/ship-histories/danfs/s/shenandoah-ii.html>.
- <sup>21</sup> [https://en.wikipedia.org/wiki/File:USS\\_Shenandoah\\_Bau.jpg#file](https://en.wikipedia.org/wiki/File:USS_Shenandoah_Bau.jpg#file).
- <sup>22</sup> Photo available on LOC site at <http://cdn.loc.gov/service/pnp/ggbain/36300/36328v.jpg>, or Navsource at <http://www.navsource.org/archives/02/99/02990133.jpg>
- <sup>23</sup> Shenandoah ZR-1 on Wikipedia, [https://commons.wikimedia.org/wiki/File:Shenandoah\\_controls.jpg](https://commons.wikimedia.org/wiki/File:Shenandoah_controls.jpg).
- <sup>24</sup> National History & Heritage photo NH96212.
- <sup>25</sup> Naval History & Heritage Command, at <https://www.history.navy.mil/our-collections/photography.html>.
- <sup>26</sup> <http://www.1920-30.com/aviation/dirigible-shenandoah.html>
- <sup>27</sup> *Literary Digest*, September 19, 1925. <http://www.1920-30.com/aviation/dirigible-shenandoah.html>
- <sup>28</sup> *Literary Digest*, September 19, 1925. <http://www.1920-30.com/aviation/dirigible-shenandoah.html>
- <sup>29</sup> *Literary Digest*, September 19, 1925 <http://www.1920-30.com/aviation/dirigible-shenandoah.html>
- <sup>30</sup> Hayward, John T., VADM USN "Comment and Discussion" *United States Naval Institute Proceedings* August 1978; "The Shenandoah Adventure" *A Brief Official Account of the Accident Flight 21 February 1924*; USS Shenandoah at Airships.net: Photos and History; history.navy.mil: USS *Shenandoah* (ZR-1); Naval Historical Center Article and Images of Construction; See generally, *Dictionary of American Naval Fighting Ships*, (excluding airship USS *Shenandoah*) <https://www.history.navy.mil/research/histories/ship-histories/danfs.html>; "Aviation: From Sand Dunes to Sonic Booms, a National Park Service Discover Our Shared Heritage Travel Itinerary"; Swanborough, G. and Bowyers, P. M. *United States Navy Aircraft Since 1912*. London: Putnam, 1976 (2d ed.) ISBN 0 85177 838 0; *Shenandoah Crash Sites*, National Park Service, "Shenandoah is looted of all valuable parts". *St. Petersburg Times*. 43 (248). St. Petersburg, Florida. 5 September 1925.:1; "U.S. raids private homes to recover loot from *Shenandoah*". *Milwaukee Sentinel*. 17 September 1925. p. 3; *Pittsburgh Press* June 27, 1937; Death of a Dirigible [www.americanheritage.com](http://www.americanheritage.com); *Shenandoah* Crash Site [www.nps.gov](http://www.nps.gov); *Shenandoah* Airship Disaster, [www.roadsideamerica.com](http://www.roadsideamerica.com); "Noble Local School District". Noble Local School District; Dalhart, Vernon, Carson Robison, and Elmer S. Hughes. "The Wreck of the Shenandoah: Song" New York: Shapiro, Bernstein & Co, 1925. OCLC 43456313; Massey, Guy, and Carson Robison. *Wreck of the Shenandoah*. [U.S.]: Pathé Actuelle, 1925; MacSwords, J. R. "15 dead in blimp disaster: lightning flash, terrific storm; Shenandoah wages losing battle with elements." *The Times Recorder*, Zanesville, Ohio 4 September 1925; Wood, Junius B., "Seeing America from the 'Shenandoah' ", *National Geographic*, January 1925; *Ill Wind: The Naval Airship Shenandoah In Noble County, Ohio*. Gray, Lewis. Gateway Press: Baltimore, 1989; Robinson, Douglas H., and Charles L. Keller. *Up Ship!*: *U.S. Navy Rigid Airships 1919–1935*. Annapolis, Maryland: Naval Institute Press, 1982. ISBN 0-87021-738-0; Keirns, Aaron J. "America's Airship Disaster": *The Crash of the USS Shenandoah*, Howard, Ohio: Little River Publishing. ISBN 978-0-9647800-5-7.
- <sup>31</sup> Siegel Auction 871 (December 2003): Siegel descriptions used.
- <sup>32</sup> Siegel Auction 871 (December 2003), Lot 2139: [https://siegelauctions.com/lots.php?sale\\_no=871&lot\\_no=2139](https://siegelauctions.com/lots.php?sale_no=871&lot_no=2139). Siegel description used.