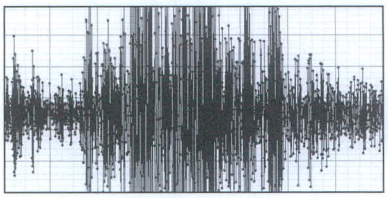
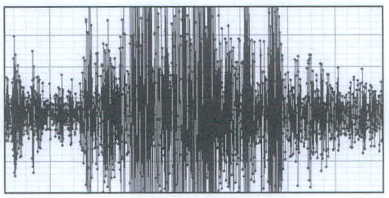
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LIGHTHOUSES AND THE GREAT SHAKE OF 1886



Part I of II

By Ellen Henry,
Curator, Ponce de Leon Inlet Light Station



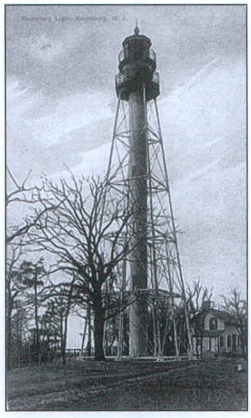
It began quietly enough. Disturbances in South Carolina's Abbeville County during the spring of 1886 sounded as if artillery were being detonated underground. Slight tremors of the earth were felt in the Charleston area in June of 1886. Two months later, a moderate tremor was felt by the lighthouse keeper at the Waackaack Light Station on New York Bay in New Jersey. The date was August 10, 1886, and the time was 2:10 p.m. The event lasted less than a minute and was accompanied by a low, rumbling noise.

On August 23, the keeper at New Jersey's Absecon Light Station recorded in a memorandum some strange events in the sky:

> First seen, 7:50 p.m., as a bright light in the northern horizon; 8:30 p.m., brilliant taking the form of an arc; 10 p.m. auroral arc first seen, altitude 10 degrees above horizon; dark clouds below arc extending from northwest to northeast; 11:05 p.m., brilliant streamers shooting up from north to northeast; 12:15 a.m., 24th, aurora obscured by high fog from east. 8:10 p.m., several flashes of lightning seen in eastern horizon; 9 p.m., very brilliant meteor shooting from east to northern horizon; 11:05 p.m., one from north to northwest; 11:30 p.m., one from north to west; 12 p.m. one from north to northwest; 12:15 a.m., 25th, high fog from east.

If those were not signs of something to come, other warnings followed a few days later when the village of Summerville, South Carolina, was shaken by a tremor on the morning of August 24. On August 27, Summerville again experienced a moderate earthquake at 1:30 a.m. Another and stronger event followed at 8:30 a.m. To the north in Maryland, the keeper at the Solomon's Lump Light Station on the east side of the Chesapeake Bay recorded two silent earthquake tremors on August 29, one at 9:50 p.m. followed by the second at 10:05 p.m. His house shook and the windows rattled.

The main event soon followed on Tuesday, August 31, 1886, when the Great Charleston Earthquake rocked the East Coast at 9:51 p.m., creating shocks that were felt from Toronto to Key West. It was estimated to have been a 7.3 magnitude quake on the modern Richter scale, with an intensity of X on the Modified Mercalli scale, which ranges from I (barely felt) through XII (total destruction). This was possibly the most powerful earthquake ever to strike east of the Mississippi River. It hit the village of Summerville full force, leaving every house uninhabitable. Virtually every building in the nearby city of Charleston was damaged or destroyed, and hundreds of people were killed or injured. Some victims were so panic-stricken that they committed suicide or died of fright. Most residents were left homeless. Aftershocks continued for months after the August 31 quake. The frequency of these gradually declined, but seismic activity in the Charleston and Summerville areas has continued to be reported up to the present day.



Waackaack Rear Range Light, 1894 tower. Author's collection.

In the preface of his book *City of Heroes*, Richard N. Côté writes:

> Ten seconds after it started, at 9:51 p.m., Charleston was in chaos. Within forty-five seconds, most of the damage was done. Within minutes the entire population…save for the dead, injured, or those too infirm to move, had fled into the streets. Within a few days after the first shock, at least 40,000 of the city's 60,145 residents were sleeping in the streets and public parks every night.

The United States Light-House Establishment had a strong presence in the city, which was the administrative center for the establishment's Sixth District. There was a supply depot at Castle Pinckney in Charleston Harbor as well as offices in Charleston itself for the Sixth District inspector, engineer, and other staff. After the quake, communications were disrupted for a few days. On September 3, the Sixth District clerk, L. D. Mills, was able to send a telegram to the chairman of the Light-House Board in Washington, D.C. "Office badly wrecked and unsafe…no information received as yet from Light Stations." But lighthouse officials did not have long to wait. Another telegram sent on the same day by Mills to the board reported that the Charleston Lighthouse on Morris Island had sustained serious damage but was operational as was the light at Cape Romain. The lens at Bulls Bay had been thrown off its pedestal, and the district engineer had given instructions to replace it. Mills also reported that the tender *Wistaria* was in port but was undamaged.

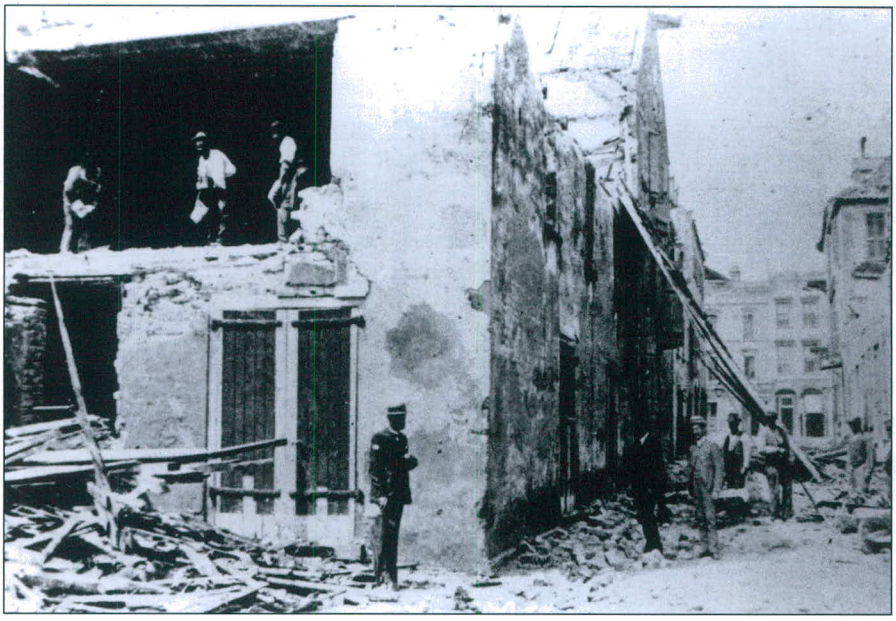


Absecon Light Station, c. 1900. Library of Congress photo.

News of the Charleston quake spread across the world, and on September 3, 1886, England's Queen Victoria sent this telegram to Grover Cleveland, the president of the United States:

> I desire to express my profound sympathy with the sufferers by the late earthquakes, and await with anxiety fuller

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Damaged warehouse in Charleston, 1886. Photo courtesy St. Louis University Department of Earth and Atmospheric Sciences website.

intelligence, which I hope may show the effects to have been less disastrous than reported. THE QUEEN

The Light-House Establishment had moved quickly to bring help to displaced residents of Charleston. According to a lengthy October 4th report made by Sixth District Inspector B. P. Lamberton, Henry Brown, master of the buoy-tender *Wistaria*, felt the violent shaking of the August 31 quake and left the ship to see what had happened. He found the streets filled with terrified men, women, and children. The city was shrouded in a ghostly haze created by the dust from pulverized masonry, and the smell of sulphur fumes released from underground was everywhere. Fires were beginning to rage, and the traumatized survivors were in a state of heightened terror from the continuing aftershocks. Brown offered shelter to as many as could get on board the *Wistaria*. Another tender, the *Pharos*, was also in port for repairs at Samuel J. Pregnall & Bros. Shipyard and was likewise made available as an emergency shelter for the homeless.

Regarding the Light-House Board's other property, the lighthouse depot at Castle Pinckney was reported to be in good order, although some minor repairs were eventually made in the keeper's dwelling. These were not identified as having been caused by the earthquake. However, the district inspector's and engineer's offices in Charleston were in a shattered and unsafe building, and both the engineer and inspector risked their lives to recover and remove records.

In an October 9, 1886, report from James F. Gregory, engineer for the Fifth and Sixth Districts, to the chairman of the Light-House Board, Gregory wrote that the earthquake shock on the night of August 31, "greatly injured the building in which this office was located. The office was unusable, and the building's janitor had been killed by falling walls. The front and rear walls of the house being unsafe, authority was asked and obtained from the Light-House Board to rent office rooms at a cost not to exceed $25 per month. Suitable rooms were secured for that price on Southern Wharf, and the office furniture and records moved to them early in the month."



Charleston's Hibernium Hall. Photo courtesy St. Louis University Department of Earth and Atmospheric Sciences website.

The year 1886, with the Charleston quake and its aftershocks, was such a rich one for earthquakes that the United States Light-House Board published descriptions of damage to lighthouses as an appendix to the *Annual Report to the Secretary of the Treasury, Fiscal Year Ended June 20, 1886*. Seismic activity was so widespread that the appendix began with information for lighthouse keepers on how best to report the details of such events which, hopefully, most keepers had already recorded in their log books. These instructions had already appeared as a circular issued by the United States Geological Survey in which it asked observers for specific kinds of information as to the effects of earthquakes. The circular was sent to lighthouse keepers throughout the affected regions of the east coast by mid-September 1886.

Circular No. 2
Department of the Interior,
United States Geological Survey
Washington, D.C., September 10, 1886

The following list of questions has been prepared for distribution among those who may have volunteered their services in collecting information of the occurrence of earthquake shocks.

Immediately upon the occurrence of a shock, it is desired that the observer will collect such information as will enable him to answer the questions here propounded, and transmit his answers without delay to the Division of Volcanic Geology, United States Geological Survey, Washington, D.C.

If any other trustworthy information relating to the subject should be in his possession, it is requested that he will communicate it at the same time. It is extremely desirable that the nearest possible approximation should be made to the exact time of the occurrence, and this should be the first care of the observer who may feel the shock. If the only timepiece at hand is an ordinarily good watch or house clock, it would be advisable to compare it with standard time at the earliest practicable moment, which can now be done at most railway stations.

Please keep this list of questions where it can be referred to at all times. Whenever a shock occurs, please write answers to the questions upon a separate sheet, sign it, and mail it in the addressed envelope sent herewith.

J. W. Powell,
Director

[Write on one side only of this paper. Date your communication, give year,

post office address, and then write "Answers to Circular No. 2." State the observer's situation (whether in a house or out of doors, up stairs or down, sitting, standing, walking, reading, etc.); also, if possible, the character of the ground, whether solid rock, clay, sand, or loam. Then answer the following questions, referring to them by number only.]

1. State whether an earthquake was felt recently at your place, naming place of observation. [Negative answers to this will be of great interest from any points within the disturbed area, and especially from points near its limits.]

2. At what time or times, giving hour, minute, and second of standard time, was it felt? [When this can be accurately given, it is of the greatest importance. Be careful to state whether it is standard (railway) time or local time; whether the watch or clock was compared with some standard clock at a railway station or elsewhere, when, what the error was, and whether you corrected your observation by this comparison or not.]

3. How long did the perceptible motion continue?

4. Was it accompanied by any unusual noise? If so, describe it.

5. Was more than one shock felt? If so, how many?

6. Which of the following measures of intensity would best describe what happened in your vicinity?

No. 1. Very light – Noticed by a few persons; not generally felt.

No. 2. Light – Felt by the majority of persons; rattling windows and crockery.

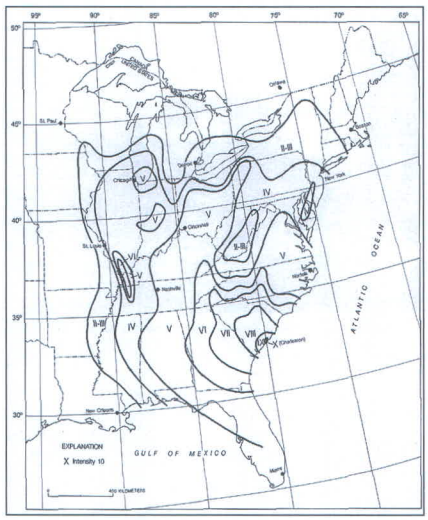
No. 3. Moderate – Sufficient to set suspended objects, chandeliers, etc., swinging, or to overthrow light objects.

No. 4. Strong – Sufficient to crack plaster in houses, or to throw down some bricks from chimneys.

No. 5. Severe – Overthrowing chimneys and injuring the walls of houses.

No. 6. Destructive – Causing widespread devastation.

7. Do you know of any cause other than an earthquake for what was observed? Give also any further particulars of interest, stating whether they are from observation or from hearsay. For instance, whether the shock seemed like a tremor or jar or an undulatory movement, and whether it seemed to come horizontally or vertically. If a chandelier was noticed to swing, describe it and state direction and amount of swing. If pictures swing, state direction of wall, and whether pictures on other walls at right angles to the first were also put in motion. If doors were closed, or opened by the shock, state the direction of the wall in which they are set. If a clock was stopped, give the time it indicated (and anything known as to how fast or how slow it was), its position, the direction in which it was facing, and the length of the pendulum. If any changes occurred in the ground, such as depressions or elevations of the surface, fissures, emissions of water or sand, describe them fully. Mention any unusual condition of the atmosphere; any strange effects on animals (it is often said that they will feel the first tremors of a shock before people notice it at all); character of damage to buildings, general direction in which walls, chimneys, etc., were overthrown. Springs, rivers, and walls are often noticeably affected by even slight shocks, and information in regard to such changes will be valuable.



Isoseismal damage map shows the various levels of destruction from the 1886 earthquake. Photo courtesy St. Louis University Department of Earth and Atmospheric Sciences website.

Question number 2 asks that the time of the earthquake be given in "standard time." For most of human history, timekeeping was based on the position of the sun in the sky, with midday being indicated when the sun was at its highest point. The problem was that it could be noon in one town but could appear to be before or after noon in other towns relatively close by. This method of timekeeping was sufficient for slow-moving agricultural societies, but with the development of train travel, the invention of the telegraph, and the literal speeding up of life in the 19th century, a precisely coordinated and standardized way of keeping time was needed.

In the United States, an 1853 railway incident in Rhode Island helped galvanize the movement to establish this kind of standardized time. Two railway trains on the same track and traveling towards each other collided, resulting in the deaths of 14 passengers and serious injury to 30 or 40 more. The conductors of each train had different times set on their watches, resulting in both trains using the same track at the same time. This was not the first such occurrence, and the *New York Daily Times* article about the Pawtucket crash began, "Disagreeable necessity obliges us to shock the sensibilities of our readers, by the recital of another terrible calamity from a collision of Railway trains."

A committee of railway companies was formed to agree on train scheduling, and a variety of solutions were examined. During the negotiations, a surprising number of dissenters around the country expressed their resentments concerning the perceived governmental interference with their personal experience of time. On November 17, 1883, an article in the *Sentinel* newspaper of Indianapolis protested standardized time, stating that citizens would be forced to "Eat sleep work…and marry by railroad time."

Those who objected to standardized time for the railroads lost their battle. Standard Railway Time was introduced at noon on November 18, 1883, and was maintained voluntarily until it was incorporated into federal law in 1918. This system was based on four continental U.S. time zones, each measuring 15 degrees of longitude. (A fifth time zone was added in Canada.)

Despite this standardization of time, it took years for every small town and remote locality to accept the new regulation. Lighthouses were often and famously located in remote places, and keepers would have to travel to the nearest railway station to find the difference between Railway Time and their local clocks. Once this was known, question number 2 on the earthquake survey could be most accurately answered.

Appendix No. 3 of the Light-House Board's 1886 *Annual Report* to the Secretary of the Treasury was entitled "Report Showing the Effects of the Earthquakes of 1886 Upon Certain United States Light-Stations, Compiled from the Reports of the Light-Keepers." This appendix was added to the completed

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Annual Report for 1886 as ordered in a session of the Light-House Board held on September 24, 1886. Reports that came in from all affected lighthouses were included. The individual accounts were condensed and arranged in order by location as given in the *Light Lists*, beginning with the First District. Each report indicated the height of the tower. This height was not the total height of the structure but the measurement from the base of the tower to the focal plane of the lantern.

Naturally, lighthouses in the vicinity of Charleston had the most serious damage. At Cape Romain Light Station, keeper John Robertson was sick in bed with malaria. He



Cape Romain Lighthouses, c. 1900. U.S. Coast Guard photo.

noticed, as did the keeper at the Absecon Lighthouse, that on the night of August 31 an unusual show of meteors appeared in the clear sky. At 9:50 p.m., he heard a low rumbling noise in a west-southwest direction.

> The noise grew louder and louder, sounding something like a battery of artillery or a troop of cavalry crossing a long bridge. In less than a minute came the shocks, the first one lasting about two minutes, the next one about as long, with about two minutes interval. Shocks only a little less severe than the first two were felt at intervals during the night. The shocks did the tower no injury, but its vibration was great. Everything on the shelves of the tower was thrown down, the doors of the machinery-case were burst open, and a trap-door that leaned back at an angle of nearly 45 degrees was torn down. The revolving machinery stopped only during the two heavy shocks, but went regularly afterwards. Nothing happened to the tower or the lantern to prevent a proper illumination of the station. All of the shocks seemed to be of a quick rotary motion. The clocks were all stopped in both tower and dwellings. Everything, such as vases and crockery, was thrown down and broken. It seemed a miracle that the tower and dwellings are now standing with little or no damage done to either, with the exception of a chimney thrown down and others cracked. The plastering in the dwellings is more or less cracked, and that is all the damage that has been done.

A letter of September 8, 1886, from the Sixth District's Assistant Engineer B. B. Smith to James Gregory, Fifth and Sixth District engineer, identified the damage at Cape Romain to include one downed chimney on the assistant's dwelling and another badly damaged, the dwelling itself was leaning, and its plaster was badly cracked.

The Cape Romain keeper remarked at how horrible and unnatural this event seemed, and he noted that about a thousand cranes that were nesting nearby began to fly about, making a "fearful noise." Many of those who experienced the earthquake reported strong sensations of nausea and panic.



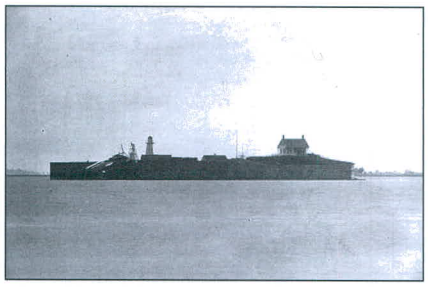
The Charleston main lighthouse (Morris Island) developed a slight lean to the northeast, possibly as a result of the 1886 quake. U.S. Coast Guard photo.

Events at the Charleston Light Station (Morris Island) were also dramatic. The first shock came at 9:53 p.m. The keeper was on his way from his dwelling to the tower when the quake hit and the earth moved with a tearing and jerking motion and a deep, rumbling noise. According to the Light-House Board report:

> The tower shook and trembled terribly. The wire net about the lantern and the other iron-work made a great noise, as if ready to tumble down. The first shock lasted about thirty seconds. The second shock succeeded the first not over two minutes. The tower made apparently the same movements as it did during the first shock. The second shock was not quite as severe as the first one. After the second shock he [the keeper] went up 150 feet, into the lantern of the tower. When the third shock occurred its force was such as to almost prevent him from standing on his feet. The lens swung from southeast to northwest back and forward about three or four times in a second. After the third shock there were several moderate ones. He had counted eighteen up to the evening of September 1.

The keeper also reported shocks on October 22 at 5:25 a.m. and 2:45 p.m., and on January 4, 1887, earth tremors and rumbling passed under the light station at 8:45 a.m.

At Fort Sumter, the light station clocks stopped on August 31 at 9:50 p.m. sun time. After that, time could not be recorded for the shocks that continued through the night. The keeper described some particularly strong aftershocks on September 21. A chimney was overthrown and the frame houses were badly shaken. These aftershocks continued to be felt all through the region during the months of October, November, and December, with notable events on October 22 at 5:20 a.m. and 2:44 p.m., and on November 5 at 12:30 p.m. when the house shook and the earth made a growling sound. Another set of aftershocks reported by area lighthouse keepers came on the evening of January 10, 1887, from the Cape Romain, Charleston, and Fort Sumter Light Stations. More tremors came through the area on March 4. J. J. O'Hagan, the keeper at Sullivan's Island, reported shocks and rumbling noises on February 10, March 4, and March 17. The March 17 event was also felt on the *Rattlesnake Shoal* Light Vessel.



Undated photo of Fort Sumter. U.S. Coast Guard photo.

From the Georgetown (South Carolina) Light Station, Acting Keeper Daniel Knight wrote that the first shock was felt at 9:57 p.m.

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The Georgetown Lighthouse. Undated USLHS archive photo.

sun time. He thought he heard thunder, but there was no sign of a storm; and he realized the sound was coming from underground. He felt eight or more shocks that night, and the first tremor stopped the clock. The arches were shaken off the chimney of the keeper's dwelling. The center plate and bolt of the lighthouse lens were damaged, and the lamp inside the lens capsized. The keeper was credited with keeping the lens from falling and for immediately restoring the light. On September 8, he wrote to Assistant Engineer B. B. Smith about



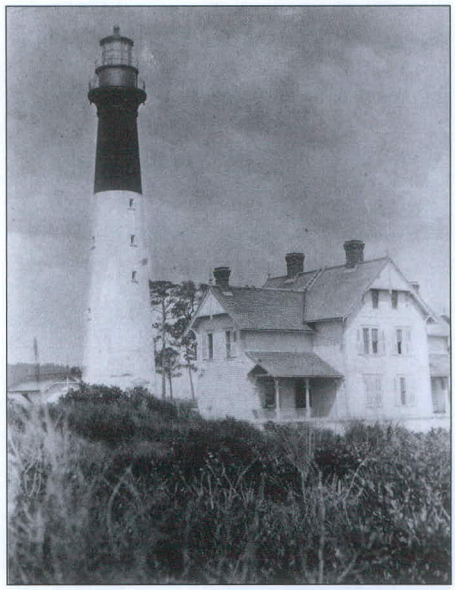
Sullivan's Island Front Range with the rear range in the background, November 1885. U.S. Coast Guard photo.

his temporary repair of the lens. "Respectfull [*sic*] Sir, I have the Illuminating Apparatus blocked up on the Pedestal to level it and wire guys to steady it and it is burning very well but it will need to be repaired."

Shocks continued to be felt at this station all through September with a reportable event on September 27 at 5:05 p.m. sun time. On October 22 he experienced two shocks—one at 5:30 a.m., and one at 2:49 p.m. He reported yet another on October 30 at 3:48 a.m., another on November 5 at 12:29 p.m. sun time, and another on November 7. Knight heard a rumbling noise on November 29 at 3:33 p.m. sun time, but this was not accompanied by a tremor. On January 4, 1887, a light undulation and rumbling noise were experienced at 6:51 a.m. sun time.

From Hunting Island, the keeper reported that the August 31 quake was first felt at 9:50 p.m. local time, and the first tremor stopped the clock. Perceptible motion continued for about four minutes. He did not hear anything unusual, as the accustomed sounds of the sea drowned out all other noises. The first shock was so strong that every item in the dwelling moved, and the clocks stopped in both the tower and dwelling. A bucket of water kept in the tower was emptied by the violent shaking, and the keeper wrote that "I expected to have seen the Tower topple over…." The two assistant keepers were in the tower during the first shock and reported that they were unable to stand without holding on to something. One man was actually on the balcony during the shock and "he was thrown from the dome to the balcony railing back and forth until he was obliged to hold onto the railing for support." The keeper also reported the tremor on the morning of October 22. He remarked that the dwelling was so well built and with such a solid foundation that there was no damage to the structure as a result of the seismic activity—not even the plaster was cracked.

Charles Anderson, keeper at the Parris Island Light Station, reported that the August 31 shocks began at 9:27 p.m. sun time. There was a noise like thunder and seven or eight shocks followed. He wrote, "I was in the house sitting down reading when the

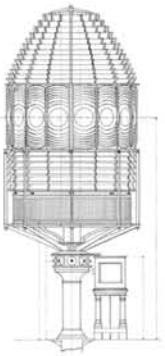


Hunting Island Lighthouse c. 1947. U.S. Coast Guard photo.

first shock came and when I heard the noise I thought the light was coming down and I ran out to see about it. The cows were bellowing before the shock came. The atmosphere was very close and calm." Anderson later reported another event on November 5 at 11:58 a.m.

The Great Charleston Earthquake made its presence felt far from that city. In Part II, events at lighthouses from New York to Florida are examined.

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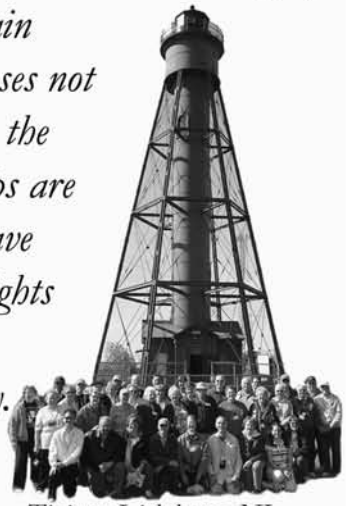
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