

LOG

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- St. George Reef Lighthouse
- The Keeper's Pay

- Only Yesterday – Mile Rocks, CA
- Lighting the Kennebec River

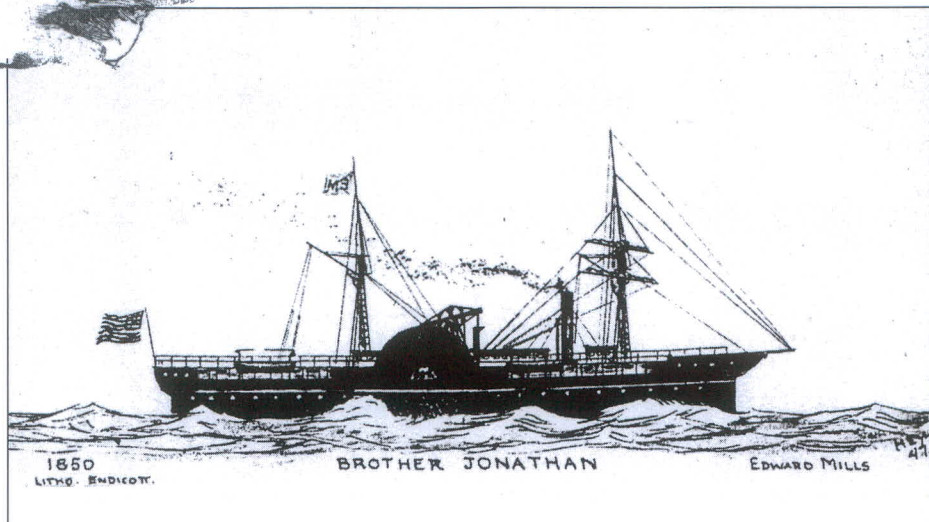
St. George Reef Lighthouse

A Nineteenth Century Engineering Feat

By Wayne C. Wheeler

This article is a repeat of one published in *The Keeper's Log*, Fall 1985. It has been expanded and additional historic photos have been included.

Drawing of the *Brother Jonathan* courtesy of the San Francisco National Maritime Museum Library.



St. George Reef is made up of a series of rocks, pinnacles, and small islets extending into the Pacific Ocean about eight miles from Point St. George in northern California near the Oregon Border. Some of the obstructions are submerged and some are above water, depending on the stage of the tide. The area has long been a critical turning point for vessels navigating along the West Coast.

Coastal navigation continued to increase as the West Coast developed after the Gold Rush, which began in 1849. But lighthouse construction was halted during the Civil War. After the war, funds were spent on the deferred maintenance of existing stations and rebuilding those that had been destroyed by the Confederacy.

1865

For years the Lighthouse Service was well aware of the danger to shipping that St. George Reef posed. The reconstruction that followed the Civil War, the need for other West Coast stations and the difficulty the Service anticipated in constructing a lighthouse on the exposed reef, delayed any proposal for a lighthouse to mark the reef. However, the sinking of the *Brother Jonathan*, in 1865, underscored the hazard that the reef posed and the need

to properly mark it.

The *Brother Jonathan* was a side-wheel steamer constructed in New York in 1851. She was sold to the Vanderbilt shipping line and sailed to the West Coast for service on the Nicaragua Line. She was soon sold again, named the *Commodore* and successfully plied the waters of the West Coast. In 1858, she narrowly foundered off Washington Territory with 350 passengers aboard. She was then acquired by the California Steam Navigation Company. That company spent a considerable sum refitting the vessel, renamed the ship the *Brother Jonathan* and placed her back in service. The vessel was quite profitable carrying cargo between West Coast ports. In that era there was more cargo than vessels to transport it and often ships were overloaded. Such was the situation in July 1865.

The ship was loading cargo at a San Francisco pier when Captain Samuel De Wolf asked the company representative to cease loading cargo as the ship was becoming overloaded and he feared for the safety of his vessel. The agent argued with Captain De Wolf and stated that if he refused to load more cargo he would be relieved of command. The captain acquiesced.

At noon on July 28, the *Brother Jonathan* steamed out the Golden Gate, heavily laden

with 185 passengers and crew onboard. She turned north enroute Victoria, British Columbia. The seas were heavy and the vessel was bucking a strong headwind. On July 30, as the vessel passed Crescent City, California, the seas grew so heavy that the Captain ordered the helmsman to come about and head south to Crescent City to seek shelter. After about six miles the beleaguered ship struck one of the submerged rocks which make up the St. George Reef. Unable to back off the obstruction, the seas eventually slewed the ship around and tore off her keel. Pandemonium reigned as the crew attempted to lower lifeboats with crew and passengers. The first two boats capsized with a resulting total loss of life. Eventually, one lifeboat, with 19 people, made it to shore – 166 died.

The loss of the *Brother Jonathan* brought the need for a lighthouse to mark the reef to the fore, but in the late 1860s the Lighthouse Service was still catching up from the Civil War as well as constructing lighthouses at other neglected sites. Additionally, constructing a lighthouse on one of the larger rocks of the St. George Reef was considered a difficult engineering feat and a very expensive project. Still, something had to be done and the project simmered in Lighthouse Service headquarters.



The St. George Reef station lashed by surf on a fall day, 1963. Even in calm weather the lighthouse was difficult to access, in weather like this, impossible. Official U. S. Coast Guard photo.

1870s

In the Board's *Annual Report of 1874* it stated, "Point St. George, or vicinity, near Crescent City, seacoast of California – This is one of the most important points for a seacoast light on the coast of California. The bluff point is about 130 feet high, with level land for some distance back of it. Off the point, extending some six or seven miles, is a very dangerous reef of rocks, quite a number of which show above water, and many are awash at low tide; others have from three-to-four fathoms of water on them. The passage between the outlying rocks of this reef and Point St. George is quite wide, and is used by the coasting steamers and sailing-vessels. The steamer *Brother Jonathan* was wrecked on this reef some years ago during a fog, and many lives were lost, among them general Wright and staff, with the families of himself and several of his staff. A lighthouse and fog signal should be erected here. An appropriation of \$50,000 is asked to commence the work." The request wasn't approved by Congress and was repeated every year until 1882 when the Board reported, "The sum of \$50,000 was appropriated by Act of August 7, 1882, for beginning this work."

The idea to construct a station on the

mainland, at Point St. George, was scratched when they realized that while one could see a light out at the end of the reef – some 6 or 7 miles distant – it wouldn't sufficiently warn the mariner of his position in regards to the reef. The local district petitioned for a lighthouse on one of the outer islets of the reef, headquarters concurred.

1882

The *1882 Report of the Lighthouse Board* stated, "In October a surveyor was landed upon the rock [the large rock at the western edge of the reef]. The sea began to rise immediately after so that it was necessary to take him off after a stay of only an hour, during which he succeeded in getting a few rough measurements and sketches of the rock. On April 8, 1882, a civil engineer was sent to Crescent City to await suitable opportunities for a landing. Although his attempt was made during the best season and he had a crew of men who had been in the habit of hunting sea lions on the reef, in the four weeks of his stay he was able to make but three landings on the rock. He succeeded, however, of making a good survey, and the results, on his return to San Francisco, were embodied in a plan with three foot contours and a model, both on a scale of 15 feet to the inch . . . hence the rock

can be prepared for the reception of the foundation of the pier, during the time that remains of this working season and in the spring. Contracts can then be made for the entire masonry of the pier. An appropriation of \$100,000 can be profitably expended during the coming year [\$50,000 was appropriated in 1882 and another \$50,000 in 1883]. It is estimated that it will cost \$333,000 to erect and complete the entire structure." This "guestimate" was 46% of the final cost.

Captain A. H. Payson, Army Corps of Engineers and Chief Engineer for the 12th Lighthouse District (California) was in charge of the operation, but A. Ballantyne was the hands-on construction foreman. He had successfully managed the construction of the Tillamook Rock Lighthouse off the Oregon coast, a similar project, which was completed in 1881.

1883

In the *1883 Annual Report*, Captain Payson reported, " . . . Inside the [St. George] Reef, close under Point St. George, is a broad and deep channel, sometimes used during heavy northwest weather by northerly bound steamers, but only in daylight and clear weather, and probably at some risk from sunken dangers not shown on charts.

The position of Point St. George, about midway between Cape Mendocino and [Cape] Blanco, would naturally suggest it as an appropriate location for a first order light; but experience at Cape Blanco, an almost similar situation, shows that the headland itself would but imperfectly serve the purpose.

When there is not actually dense fog, there is usually so much haze in this climate that vessels, forced by the reef to give the point a berth of 10 to 12 miles, would rarely even see a first order light upon it, except when the coast itself was clearly visible; while a fog signal, six miles from the danger it was designed to mark, would be practically useless.

It was thus evident that a site for the light should be sought for on the reef, and, fortunately, the size of the outer most rock justified the hope that upon it a light station might be built, the experience of which would not be inordinate considering the benefits to be gained.

Northwest Seal Rock, the site in question, is nearly two miles outside its nearest inner neighbor, Southwest Seal Rock, with a clear and deep, but unused passage between, and has close to it on all sides, from 18 to 30 fathoms of water [108 to 180 feet] with no outlying dangers . . . [the rock] is extremely hard to drill, and brittle under the action of explosives . . . the superficial area of the rock, at the waterline is 46,000 square feet, and its general form is an oval with a high central ridge running nearly east and west. . . The greatest height of the ridge is 54 feet above sea-level . . . to gain the requisite area for the foundation pier it was necessary to descend fully 30 feet to excavate for the foundation."

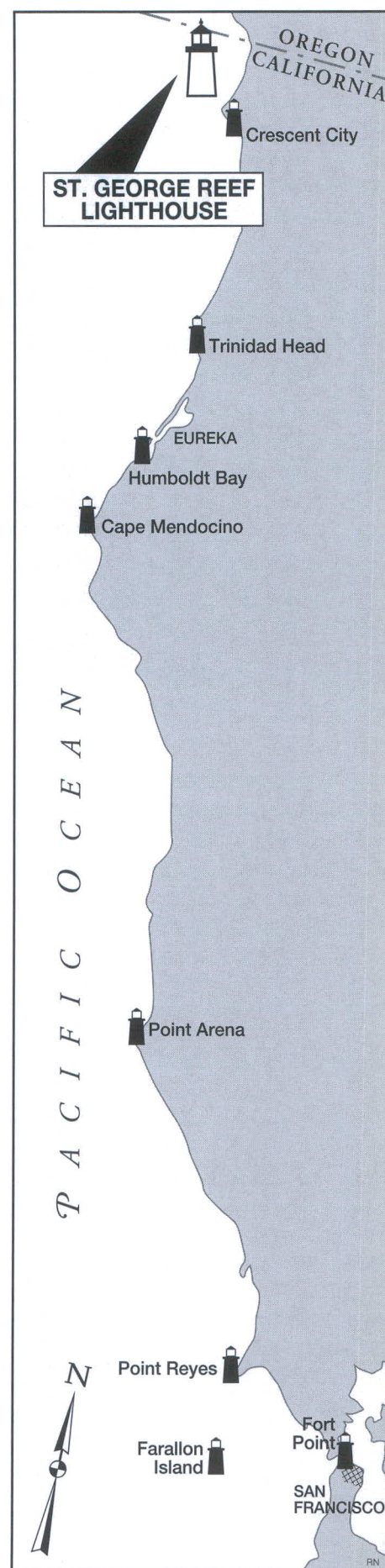
Payton mentioned that the nearest port was Crescent City about 13 miles to the southeast and that it only offered slight protection from heavy weather and then only from middle June to September. The nearest true harbor was Humboldt Bay (75 miles south), " . . . where there is a good sized town and frequent communication with San Francisco. The depth of water on the bar [channel] varies from 14 to 20 feet. This often causes detention, but is not a serious obstacle. Its main drawback as a depot is its distance from Seal Rock, but this is unavoidable, there being no suitable nearer point."

To add to the complexity of the costly and difficult construction project, Engineer Payton was faced with overcoming an incredible logistical puzzle. He needed vast amounts of

granite and other materials. His main depot was far removed and there really was no place on land near Crescent City to conveniently house the work crew.

He solved the quarters question by acquiring the 127-ton topsail schooner *La Ninfa* which he described as " . . . nearly new and very strongly built for carrying copper ore on the West Coast of South America. She has shown her fitness for the purpose by being temporarily used as a lightship at the wreck of the *Escambia*, on San Francisco Bar. New bulkheads were put in to enlarge her fore-castle and to give space for eating and cooking for 25 men. Iron tanks of 6,000 gallon capacity were fitted in her middle hold."

The wrecking steamer *Whitelaw* was chartered to tow the *La Ninfa* from San Francisco and anchor her off the rock. The *Whitelaw* and her tow departed San Francisco on April 3, 1883 under fine weather. But the weather turned sour and forced the vessel to twice return to anchorage in San Francisco before she even reached the San Francisco Bar Channel. Finally, on April 5, the vessel started north and after a rough passage reached the rock on the morning of April 9. The mooring plan called for up to eight cables strung out from the barracks vessel to large buoys and then down to heavy sinkers. Upon arrival, in spite of heavy seas, the steamer managed to lay one 12,000-pound mooring sinker and attach the vessel to it, but had to abandon laying the other moorings as the weather turned bad and they experienced heavy seas. The *Whitelaw* steamed out to sea and rode out the gale from April 9th to the 16th. When the steamer returned to the Northwest Seal Rock, and began setting the other moorings, they discovered that the water was deeper than reported and that the buoys on hand to support the mooring cable were too small. The *Whitelaw* steamed to Humboldt Bay where they sought trees from which to fashion large spar buoys for the moorings. This detained the ship until April 27. Departing Humboldt Bay on that evening the vessel reached the rock on the 28th only to find that the schooner was gone and there was no trace of the one large mooring buoy they had set. The weather turned for the better and the seas became calm. The crew of the *Whitelaw* set the proposed configuration of sinkers and mooring buoys and departed for Humboldt Bay to wire the District Engineer for instructions regarding the missing vessel.



Upon arrival at Humboldt Bay the captain of the *Whitelaw* learned that the Brig *Josephine* had sighted and communicated with the *La Ninfa* off Cape Mendocino. The *Whitelaw* purchased coal and set off in search of the missing schooner. She finally came upon her some 25 miles south of Crescent City on May 6. *La Ninfa* was taken in tow returned to the Northwest Seal Rock and secured to the moorings which had been previously set. A landing was immediately made on the rock and ringbolts set in place and a temporary wire-rope traveler rigged between the rock and the mast of the barracks ship.

The Board approved the project design of an oval outline for the caisson, which required cutting four horizontal terraces for the foot, or bottom, of the outer wall of the caisson or pier. The design called for a great mass of the native rock to remain within the walls of the pier with enough room for cisterns and an engine room.

No sooner had work on the rock begun, than a series of violent northwest storms lashed the area, causing much of the work to be delayed until early July. During this period an arrangement was made with a small coastal steamer to stop by the rock about every ten days to deliver supplies and communications.

On June 2, the *Whitelaw* was chartered again and departed San Francisco for the project. She reached the rock on the 9th, but the weather was such that they couldn't transfer equipment to the barracks vessel. So the *La Ninfa* slipped her moorings and was taken in tow to Crescent City where a donkey engine was placed on board along with coal, water and other supplies. After returning the barracks ship to station the *Whitelaw* departed for San Francisco on June 19. From this point on, to the end of the season, work proceeded without interruption. During this working season there was much parting of lines [ropes] and tackle, and the men often had to be hastily taken off as soon as they were landed on the rock. In spite of the many narrow escapes and some dangerous accidents, no one suffered a serious injury. Work on the north lower level was found to be the most dangerous. Even though it was 25 feet above the sea, the men were almost always drenched with spray and often the ocean broke over the ledge.

The workmen traveled back and forth between the ship and the rock on a cage suspended from a 350 foot-long wire rope, much like a movable clothesline. The apparatus consisted of a wheeled traveler which moved

along the wire rope, the wire rope was anchored to the highest point of Northwest Seal Rock by iron rings and at the other end to the mast of the ship. Three lines descended from the traveler to a cage consisted of a ring of iron four feet in diameter from which heavy lines were suspended to support a wooden platform. The workmen stood on the platform and were hauled from the ship to the rock and back. Originally they were transported by hand, the donkey engine placed aboard in Crescent City, was later used to power the traveler. The engineer reported, "The whole arrangement worked perfectly, and by the aid of the engine, a round trip, taking off six men and return, could be made in three minutes. The shore-end of the cable being some 60 feet above the sea and the lowest point of its curve not over 15 feet, the cage when released from the rock, ran down this slope with great speed."

Taking advantage of this and standing by to haul in with the engine, the men were often taken on board dry when every sea went over the low part of the wire rope. Such confidence did the men gain in their means of retreat, that they . . . didn't think of leaving the work until the sea began to run continuously over all the working levels. Then



Men traveled between the barracks ship (*La Ninfa* and later *Sparrow*) on a platform and "clothes Line" type of rig. Drawing from the 1884 Report to Congress from the Lighthouse Board.

lashing their tools to ring bolts . . . the cage was put in use, and in 20 minutes all hands would be [safely aboard].”

One accident did occur the first year when the traveler rope parted in heavy seas just as a load of men were leaving the rock, but luckily they fell only a few feet to the rock. The engineer reported, “During the gale of the 29th & 30th September, stones over a ton in weight which had been rolled overboard to the west from this bench, were swept like chips up over its whole length and over again on the east end. On the 10th of September while two quarrymen were putting in a hole on the lee side and just below the top of the rock, a tremendous sea swept completely over it, washing them down the steep south side nearly thirty feet, where they fortunately lodged on the south bench, with no injuries beyond a few bruises.”

Shaping the rock was primarily done by blasting. The District Engineer describes it – “It was judged best to store the high explosive, of which at times there were 600 pounds in stock, on the rock itself. The magazine, of heavy timbers, was put in a square excavation, especially made in the very topmost pinnacle, 50 feet above the sea, and additionally secured by a network of 4 inch lines set over its top as tight as possible to ring bolts in the rock; yet the magazine was several times twisted around by the sea under its rope lacing.

The presence of this large quantity of high explosive, in the close neighborhood of the blasting and exposed to flying fragments, was an unavoidable source of much apprehension [one would think!].

The powder was carefully wrapped in many thicknesses of tarred canvas to modify the jar, and fortunately no accident occurred from it.”

Later, on recommendation of the Army Corps of Engineers, the party was furnished with an explosive made by the California Vigorit Company. “It is a glycerine powder . . . and though the foreman was at first much prejudiced against it, he ended up preferring it to any other . . . To avoid . . . frequent changes in the position of the schooner, she was hauled in [as close as possible to the rock]. She was thus necessarily much exposed to flying fragments, which often went over her in showers, smashing the bulwarks and [deck] houses a good deal, but doing no serious damage, save to her appearance.”

“The sailing qualities and trim of the *La*

Ninfa were so bad that had she gone . . . adrift during a southwest gale which on this coast is always accompanied by the heaviest sea, the chances are that she would not have been able to fetch clear of the coast to the north [and would have gone aground], and this fact was the cause of much uneasiness, but luckily [it] never came to actual test.”

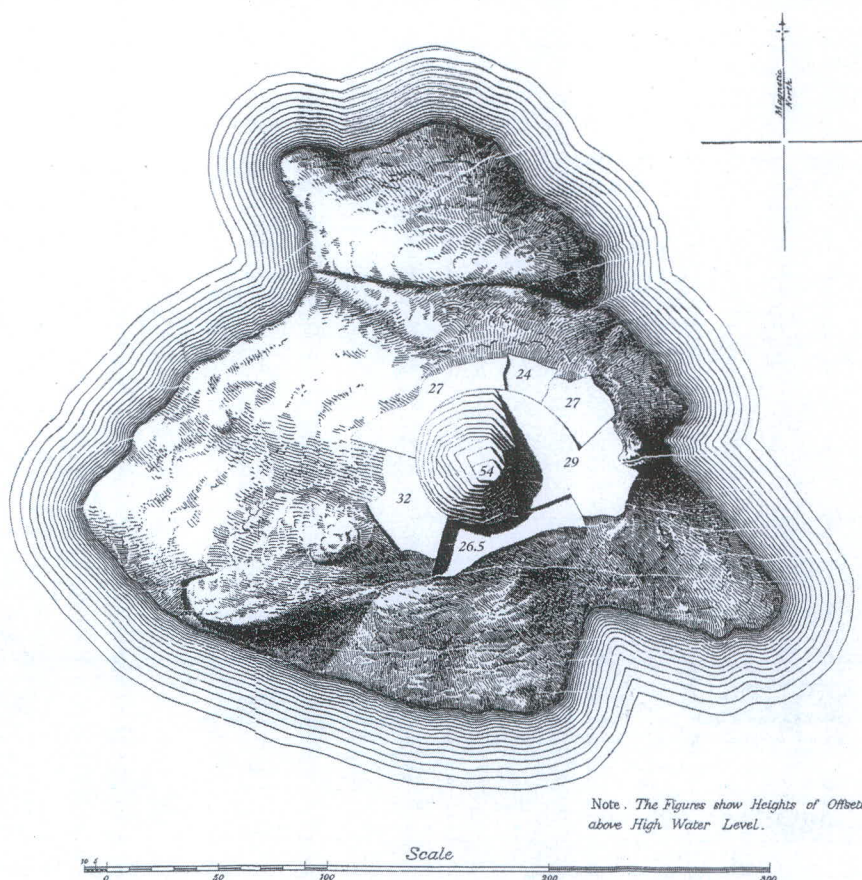
About the middle of August the foundation benches were roughly formed and needed only the finishing touches of the stonecutter. The crew began work on carving out an 11,000 cubic foot cistern.

Work stopped for the season on September 28. Tools were taken aboard that evening and by 2 a.m. the next morning the first winter gale descended on the area and parted all the mooring lines but the one to the outer most buoy. The *La Ninfa* continued to ride out the gale until October 2 when the vessel *Crescent City* came out to assist with securing for the season. As it was too rough to communicate the *La Ninfa* cut her last mooring line and followed the *Crescent City* to a lee under Point St. George where the stone cutters and quarrymen were taken off, the ship then proceeded to San Francisco.

1884

During the winter the District Engineer outlined his plan for the next season; (1) Establish a depot on the north spit at Humboldt Bay with facilities for stone cutting, handling and storage of all materials, a dock and quarters for the workers. (2) Purchase of 10,000 cubic feet of dimension stone in San Francisco and transport it north. (3) Opening a quarry of very good sandstone which had been discovered near Crescent City.

The engineer secured a large unused courtroom in the Appraiser's Building in San Francisco where patterns for the stone were constructed. The pattern for each stone was cut out of zinc, allowing for a joint of 3/16th of an inch between stones for mortar. Plans were also made for the facilities to be constructed on Humboldt Bay's north spit and a contract was awarded to a local Humboldt Bay contractor in December. The project was finished on schedule in February 1884. The District Engineer reported, “ . . . the stonecutter's shed is 120 feet long . . . built of rough lumber and at one end a small room has been finished as an office. The men's quarters is 80 by 22 feet, contains bunks for about 50 men, partitioned into rooms of holding four each, and



a large storeroom for miscellaneous purposes. The mess-house is 20 by 40 feet, with an L 20 by 12 feet used as a kitchen and store room the wharf is L shaped and the straight part 150 feet by 20 feet wide." The total cost for this depot was \$4,000. As soon as the wharf was completed a double set of tracks was laid from the outer end and alongside the stonecutters shed. [rail flat] Cars were supplied and two powerful derricks... set up; one at the end of the wharf and one at the stonecutter's shed. The crew soon learned that violent winds frequented the north spit blowing sand everywhere. Thus, it was necessary to provide 4,000 square feet of flooring for the buildings."

That winter, while the Superintendent of Construction was in the Humboldt Bay area, he heard a rumor that there was a granite quarry on the nearby Mad River. The rumor seemed absurd, as granite deposits were not known north of Point Reyes. However, he visited the quarry and was surprised to find not only an ample amount of granite but also stone of excellent quality. Further, a local railroad passed close to the quarry and terminated in Eureka. This was a truly a stroke of luck. Until this time the plan had been to procure granite in the Sierras, ship it to San Francisco, load it on vessels and ship it north, a costly endeavor. The engineer reported, "I immediately secured offers in writing from the owner of the Mad River Railroad for the

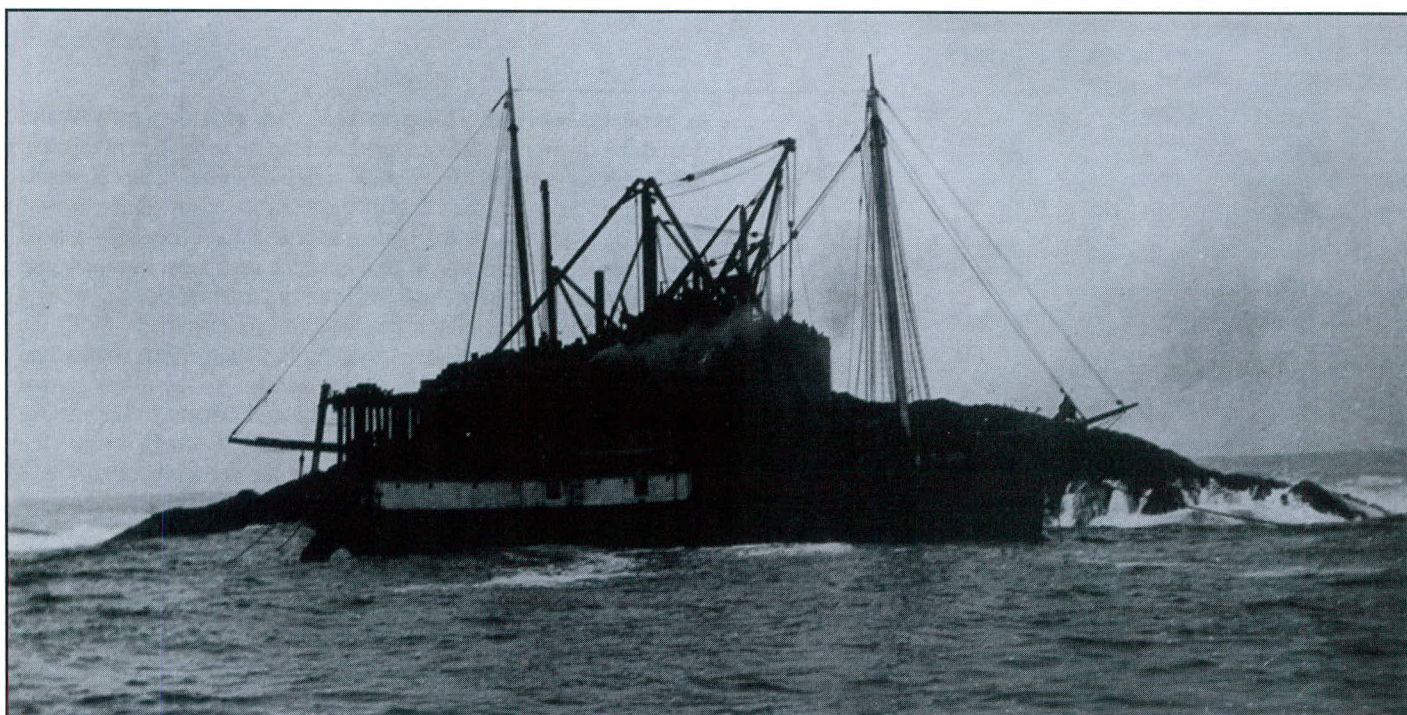
... transportation by rail and lighters from the quarry to the wharf at the depot, including the provision of the necessary outfit, extension of track, & and from the owner of the land for the sole right to quarry upon it at a certain price per foot."

The engineer worked quickly; quarters at the quarry for the workmen were finished by February and a crew hired and working by the 8th. The Superintendent had the railroad construct a spur to the base of the quarry. The cost to transport the stone was \$2 a ton and the railroad transported 200 tons a week to the Eureka area where it was offloaded unto lighters (barges) and taken down bay to the depot wharf where it was loaded onto small rail cars. The final cost for this phase of the project – the 1883 preparation of the site, establishing the depot, quarry preparations and the preparations on the rock for the 1884 season – was \$100,500. The project was out of money and could expect nothing until Congress passed the budget for the fiscal year which began July 1, 1884. The Engineer lamented, "... two good months out of the five of the working would be lost."

The project superintendent began arrangement to prepare for the new working season. The steamer *Whitelaw* reported to Humboldt Bay on June 2 and sailed north on the 5th with new heavier buoys and some Navy anchors to replace the moorings for the *La Ninfa*. She

made the necessary changes and returned to Humboldt Bay on the 14th having set all but more mooring (she lost a spar buoy enroute) and with a broken winch. The repairs were made and she put to sea again on the 20th. The mooring was set and the project was blessed with calm weather and flat seas until July 2. This allowed them to erect a derrick on the rock with a 20-inch square 50 foot-long boom. The Engineer reported that, "... was the most critical task of the entire work, and that it was so rapidly and easily accomplished, even under such favorable conditions of weather, is due to the skill and experience of the superintendent of construction and the zeal of the men, who worked uncomplainingly 14 or 16 hours on each of the important days. In further pursuance of the plan of having everything in readiness by July 1, the schooner *American Boy*, 173 tons ... was chartered and sailed for Humboldt Bay June 10, reaching there on the 18th. Work was begun to fit her up with quarters, water tanks, etc.

All was ready to begin the new working season, They had only to await passage of another appropriation by Congress. On July 7 an appropriation bill was passed to continue work on the St. George Reef Lighthouse, but only for \$30,000. The District Engineer noted, "... it was deemed useless to begin construction with this small amount, and instead



An 1883 photo showing the stiff-legged derricks erected on the rock. Masts of the barracks schooner *Sparrow* can be seen in the background.

the money was directed by the Board to be applied to the preparation of the material with a small force on Humboldt Bay . . . work cannot be carried on to advantage upon the rock at a less expenditure than \$14,000 to \$15,000 per month – which means \$70,000 to \$75,000 for the season.” The Engineer lamented, that although they could make progress in receiving granite at the depot and shape stones for the pier or caisson of the lighthouse, they wouldn’t be able to take advantage of the first two months of favorable weather in the spring of 1886, they would have to wait for passage of the budget for the 1886-87 fiscal year and hope that sufficient funds were appropriated. The amount of \$75,000 in today’s money equals \$1,688,000, a tidy sum indeed especially since they had already expended (in 1884 money) \$100,000, and had on hand \$30,000 for the 1885-86 fiscal year, with no end in sight. One can only wonder if some members of Congress were questioning the project. The Board was requesting \$150,000 for the next fiscal year.

1885

On March 3, 1885, Congress approved a supplemental appropriation, but for only \$40,000. Engineer Payton wrote, “. . . a second suspension of work at the rock became necessary for another year. To provide, however, against further deterioration and the possible loss of the large derrick and moorings, a steamer was chartered, and a working force sent from Humboldt Bay spent the month of June lifting all the mooring buoys except one – which was re-laid and re-buoyed – and in securing and putting in good order the large derrick. The work force also marked the rock with lead plugs indicating where the granite blocks were to be set and placed the zinc patterns (templates) on the rock to ensure that the pattern was correct. Funds on hand allowed the continuation of work at the quarry and depot until October 1885, when the project was secured until spring. The engineer grouched that the meager appropriations allowed certain preparation work, which, when not enough funds were received, caused the work to be repeated the next working season, thus wasting money. The Board again requested \$150,000 for the 1885-86 fiscal year. To the astonishment of the Board no funds were appropriated. With the meager funds remaining from the prior appropriations, the construction superintendent carried on work at the stone-yard (depot)

and quarry. They completed cutting stone for the first eight courses (layers) of the exterior of the caisson or pier. The District Engineer lamented, “The work at the rock, after having been vigorously and successfully prosecuted during one summer, had now been suspended for three seasons for lack of funds. The loss to the government (having to repeat preparation work) has been referred to in previous reports and it does not seem necessary to repeat the facts here. A new appropriation of \$150,000, if made available in March next, will enable the Board during the summer to build the pier high enough for its security, and to use to utmost advantage the good weather on shore in the preparation of building material.”

1886

Congress, probably figuring “in for a penny, in for a pound” provided an appropriation of \$120,000 for 1886-87 fiscal year. The appropriation was passed on March 4. The district advertised for proposals to transport the stone from the Humboldt Bay stone-yard to the

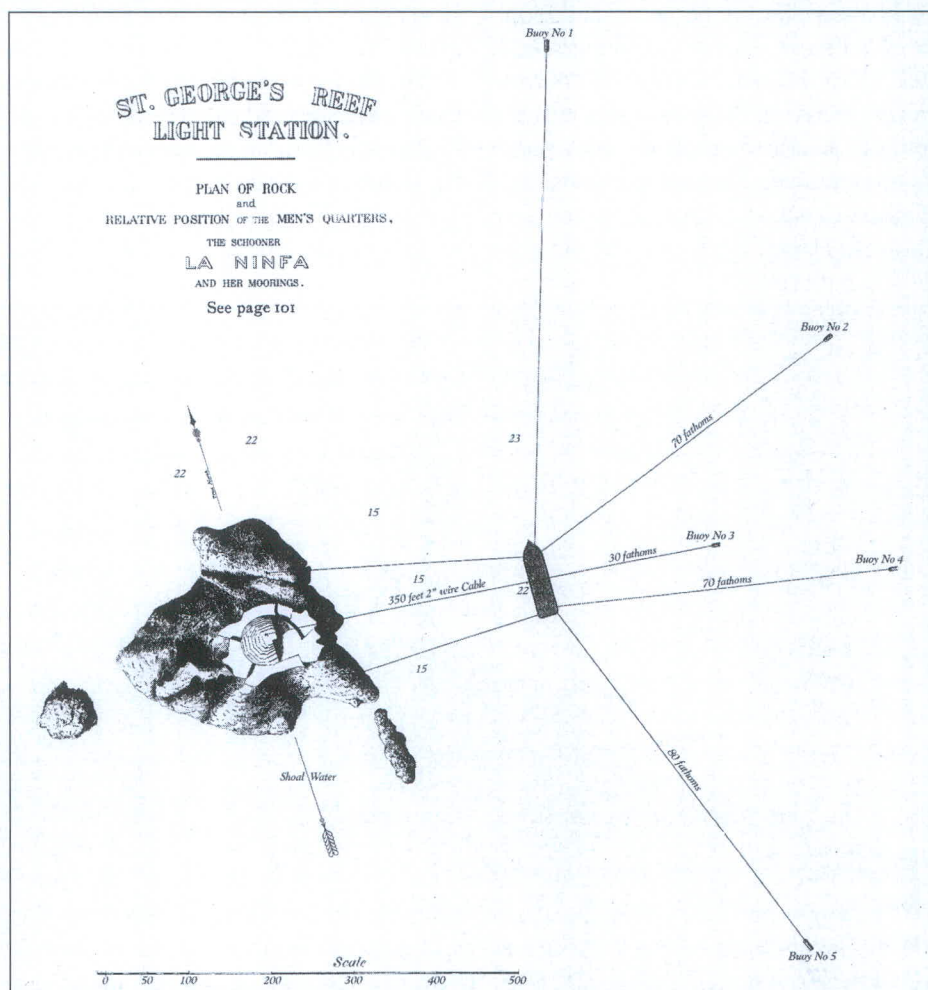
rock and specifications were completed to continue the work on the pier. However, the project suffered more bad news.

Heavy winter rains at the quarry had washed down an immense quantity of earth which almost buried the derricks and covered the rail tracks. Additionally, 1,500 tons of dressed stone, which had been placed by the tracks for shipment of the stone-yard, had slipped down a steep hillside. The piles of the wharf were badly weakened by marine borers (teredo worms) and had to be almost completely rebuilt.

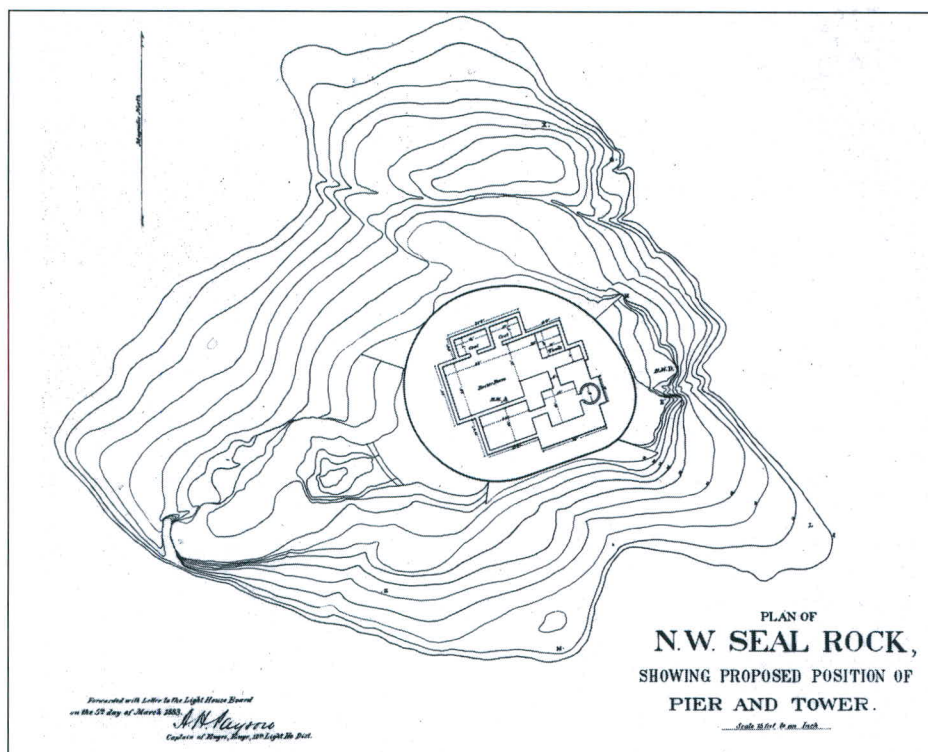
1887

The schooner *Sparrow* of Humboldt Bay was chartered and fitted out as a barracks vessel. The steamer *Santa Maria* was hired to lay moorings and set derricks on the rock. She departed San Francisco on April 5 for Humboldt Bay.

Only two vessels bid on the transportation proposal, the *Alliance* and the *Santa Maria*, the latter was higher for the whole service required by about \$10,000 so the



Access arrangement prior to the barracks being constructed on the reef. Drawing from the 1884 Report to Congress.



Alliance was employed. The *Santa Maria* reached Humboldt Bay on April 7 but was delayed in receiving supplies and completing her task at the rock due to reconstruction of the wharf and bad weather at the construction site. She made one passage, returned to Humboldt Bay for more materials and taking the *Sparrow* in tow headed back to the reef. She finished her contract on May 18, departing and leaving the barracks vessel *Sparrow* on site. The workmen spent the remainder of the month erecting four small derricks on the rock, constructing the landing platform and making other preparations for landing material in the rock.

The *Alliance* was to have sailed from San Francisco on May 19, but a defect in her boilers delayed her departure until May 28. She reached Humboldt Bay and loaded cargo on June 2, but a rough bar channel delayed sailing for the rock until the 4th. When she reached the rock on the 5th, they discovered that the vessel was poorly rigged for the task at hand. Workmen and gear had to be transferred from the *Sparrow* to make the ship ready to land cargo on the rock. Finally, the first base stone, weighing 6 tons, was landed at 10 a.m. on June 7 and set in place the next day. The *Alliance* finished discharging cargo on June 9 and by the 11th the men were out of material and out of work. The Superintendent remarked, "This first voyage . . . proved beyond question that the *Alliance* alone was utterly

unequal to the amount of transportation required, and further, that with the arrangements for shipping, landing and laying stone. There could, barring disastrous accidents, could be easily carried out the project for the season if sufficient transportation were furnished. Authority was therefore given to charter the *Santa Maria* at \$7,000 per month to supplement the services of the *Alliance*. Both vessels were kept busy during this working season, but were often delayed by gales and sloppy weather. On one instance the *Alliance* almost collided with the barracks vessel, *Sparrow*, when mooring lines snapped during a gale. Still, things proceeded and the outer walls of the caisson slowly rose until, at the end of the season, in September, nine courses or tiers had been laid. A small contingent of workers remained employed at the stone yard at Humboldt Bay. The Lighthouse Service requested another appropriation of \$150,000.

1888

In April, 1888 Congress granted the requested appropriation of \$150,000 (\$440,000 to date) and work began in earnest. The 1888 season proved the most productive to date. The *Santa Maria* was again chartered as the sole means of transportation and she often ran day and night delivering cargo to the rock. The men working on the rock now were familiar enough with the conditions that their efforts were smoother and more productive, the same went for the workers at the quarry and

the stone yard. Everything was finely tuned and a season of fairly mild weather assisted the effort. The working season on the rock ended in August with 13 courses or tiers of the caisson completed.

The service requested a final \$200,000 for the 1889-90 season.

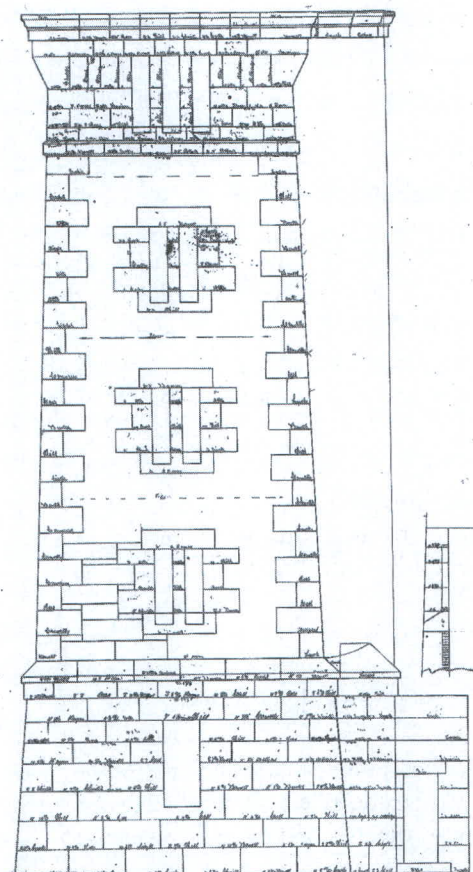
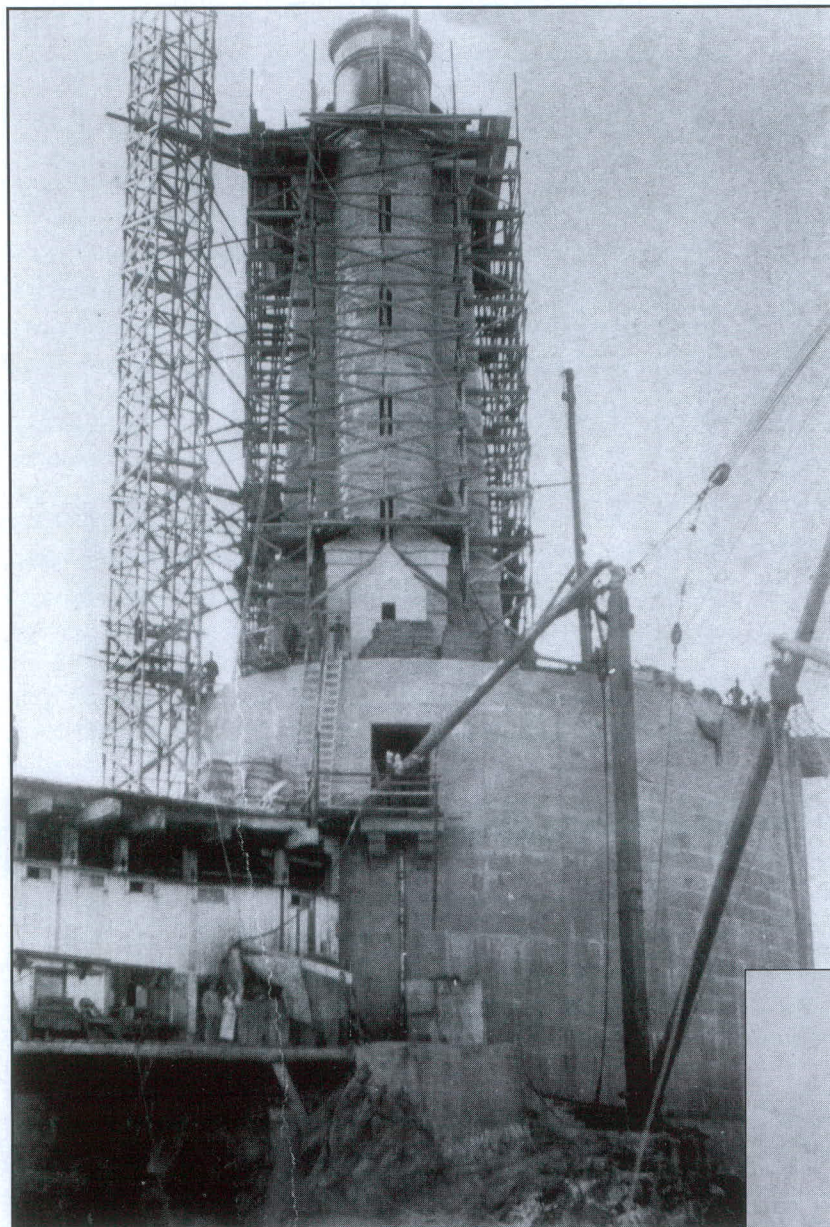
1889

In March, the steamer *Del Norte* was chartered for \$5,000 a month to transport workers and materials. When the working party first reached the rock they discovered that the heavy timber barracks erected on the rock the previous year had been badly damaged by winter storms. Several days were spent repairing the damages.

By the end of June, the seventeenth course of the exterior wall of the caisson was completed. District Engineer Payton reported, "The weather at the rock during the present season was unusually severe; the men's quarters although strongly constructed and braced almost like a ship, were several times washed by the sea and heavily damaged, though fortunately no one was seriously injured. The walls of the engine room, coal house and tower are all within the pier (caisson), and are built up in height as rapidly as the pier progress the walls are now 61 feet above sea level, and yet the spray dashes over the top of the pier to such an extent that it is frequently impossible, for hours at a time, to lay masonry, as the spray would wash the mortar off the beds before the stone could be set. It is hoped that the next season's work will complete the station. The work thus far done has been expensive, as all cut-stone work at isolated places must necessarily be . . . It is estimated that the amount needed in addition to that on hand to complete the work is \$81,000 . . . At the stone yard and quarry all the dimension stones for the pier have been finished with the exception of twenty-three stones. These will be completed and the entire force will commence preparing the flagging for the top [deck of the caisson or pier]."

1890

No funds were allocated for the 1890 season and the district closed the quarry, shipping all equipment to the stone-yard (depot) where everything was placed in storage and the project shut down. The work force was discharged and the depot placed in charge of a watchman. The District Office prepared the specifications for the ironwork (interior staircase, railings and fittings).



Above – 1891 photo of the completion of the tower on the caisson. Structure at lower left is the barracks which replaced the barracks vessel. This structure was often inundated during storms.

Above right – A drawing of the tower. The notations on each block are the dimensions of each block and the name of the stone mason responsible for that block.

Right – St. George Reef early in 1892 prior to the installation of the lens, note the empty lantern room. The lower derrick apparatus was eventually washed off that deck level.

U. S. Lighthouse Society archive photos.



In September 1890, \$81,000 was finally appropriated to complete the station. A contract was let to the Phoenix Iron Company of Trenton, NJ to manufacture the ironwork for the tower.

1891

In early April, 1891, the steamer *Sunol* was chartered as the supply vessel. The ship sailed for Humboldt Bay and then the rock. The usual bad weather delayed a landing on the rock until May. The crew discovered that the workmen's quarters had been "utterly destroyed by the waves and had to be rebuilt."

By the end of the fiscal year, June 30, 1891, the deck of the caisson had been completed and the tower, with its brick lining, was finished up to the third story, above 30 feet above the base. By August 23, the tower was completed

Only one serious accident occurred during the project and that was during the final year of the project. On June 16, one of the riggers, while letting go of the tag line of the derrick boom was carried over the edge of the caisson and killed.

From the end of August to the end of October the work consisted of taking down the scaffolding, erecting iron work, pointing stone-work, laying concrete floors in the rooms of the pier and upper hallways, building the donkey engine house, plastering rooms in the tower, painting iron-work, varnishing woodwork, setting in the fog signal boilers and machinery. All work was finished by the end of October, but due to inclement weather they were unable to remove the men from the lighthouse until November 8. The District Reported, "This completed the work with the exception of the lens, which had not arrived from Europe [1st order flashing Fresnel]." The station was placed in charge of three keepers.

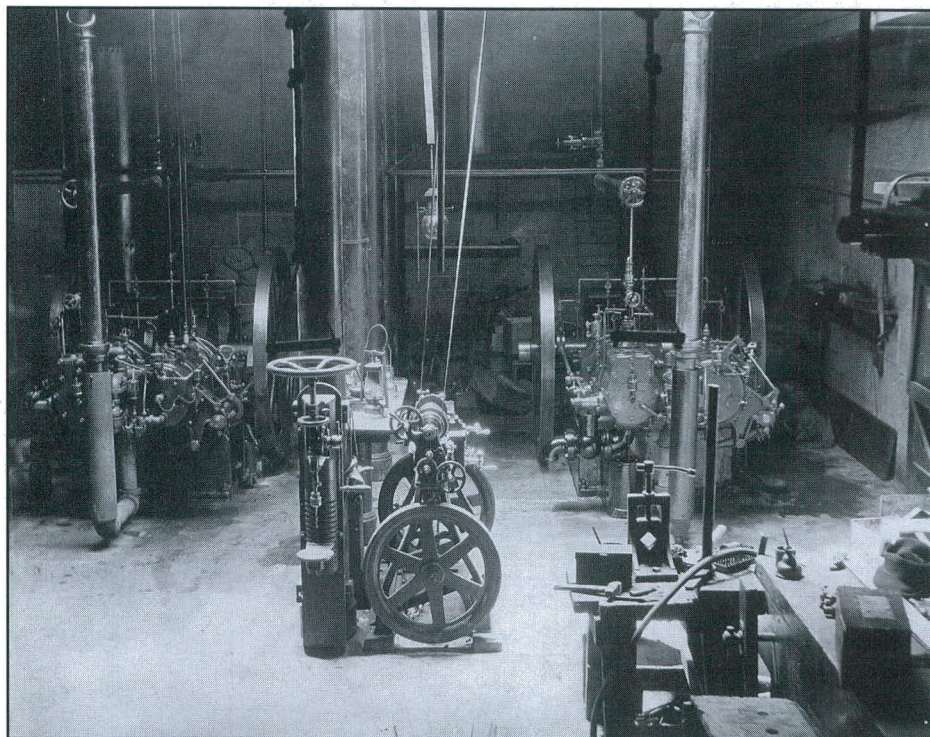
1892

In July 1892, the French lens arrived in San Francisco and was transferred to a tender for transport to St. George Reef where it was landed and erected. It was exhibited for the first time on October 20, 1892 flashing alternately red and white, with fifteen seconds between intervals. In later years the red panels were removed. Red drastically reduces candlepower to the extent that a mariner at, say, 20 miles distant can see the white flashes but not the red.

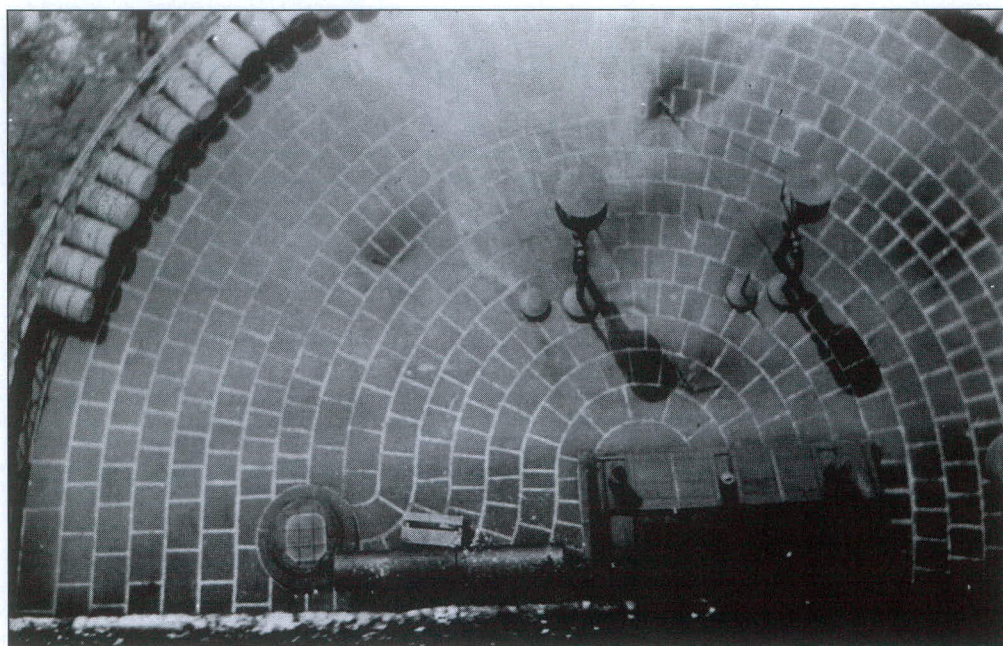
The hoisting engine which had been left on the rock for use in landing supplies broke



The original sound (fog) signal at the lighthouse was a steam-powered whistle, shown above in duplicate. The deck of the caisson was used to collect water which was funneled into a cistern in the caisson. U. S. Lighthouse Society photo.

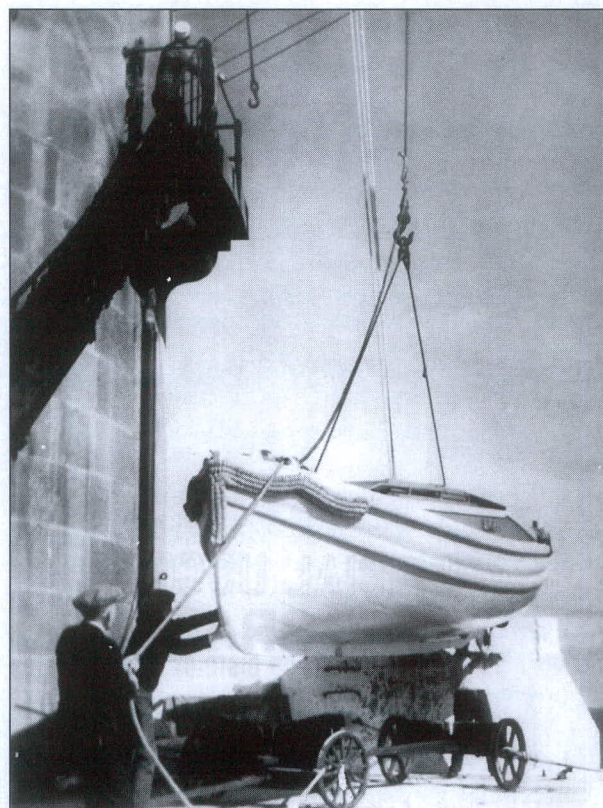


The engine room of the St. George Reef Lighthouse sometime after air compressors replaced the steam engine. The original sound signal was a five second blast every 75 seconds. That must have become very old after three or four days of constant inclement weather. U. S. Lighthouse Society photo.



Left – A bird's eye view of the caisson deck of St. George Reef Lighthouse. Note the fuel oil drums upper left, the mushroom trumpets middle right, and the skylight over the engine room, lower right.

Below left – A crew of five civilian keepers on the lower deck of the lighthouse. Date unknown. Both photos from the U. S. Lighthouse Society Collection.



Above – Lowering the station boat onto its cradle on the lower deck of the lighthouse. Main entrance upper left (two large iron doors).

Left – Bringing the District Inspector aboard the station.

Both photos from the Society's archives.



down and was replaced by a new double drum hoisting engine and boiler, erected on the top of the pier. A small house was constructed over them to protect the equipment from the weather.

The Twentieth Century

Some ten years under construction, St. George reef is one of the premier lighthouse engineering feats in this country and at \$715,000 the most expensive ever built in America. Some of the statistics are impressive; there are 1,339 dressed stones in the exterior of the caisson alone – all weighing from two-to-five tons. This totals 14,000 tons of stone. The caisson is 60 feet high and the top of the tower is 146 feet above water. It is the tallest lighthouse on the West Coast.

The St. George Reef Lighthouse was one of the least sought after stations in the service. Five unaccompanied keepers served there, with their families living in small houses in Crescent City about eight miles to the south-east. . Four keepers were on duty for four weeks, with one keeper ashore. Before the arrival of motor launches the keeper going on leave had to sail to and from Crescent City and one keeper on October 14, 1893 departed the station and was never heard from again. Another keeper, John Olsen, once spent 17 hours in an open boat trying to reach Crescent City, eight miles from the station. On another occasion the launch's motor failed during a supply run and the keeper was adrift 56 hours on the boat, undergoing a perilous experience.

In December, 1923, huge seas broke on the platform of the lighthouse, 70 feet above the water, with such violence as to tear the donkey engine house from its foundation and move it to the edge of the deck. All steam pipes, water pipes and hoisting derrick controls were either broken or badly damaged. The head keeper was ashore at the time and unable to return to the station for two weeks. He did maintain communication with the other keepers via the recently installed radio-telephone.

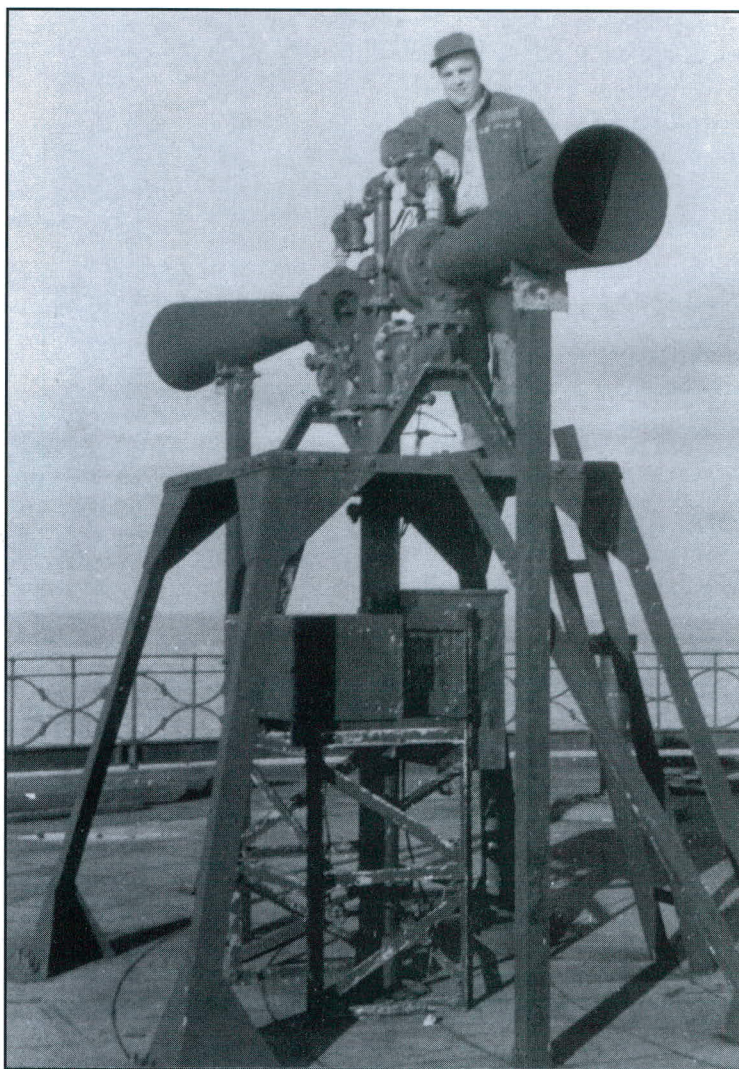
During one period the Lighthouse Service rated stations. They considered factors such as its remoteness, whether it was an accompanied or unaccompanied station, the amount of work involved (a station with a fog signal required considerably more work than one without) and factored salaries accordingly. The lowest paid stations were one family stations in the Great Lakes where the stations closed for the

winter months. The highest paid stations were those like Tillamook Rock, OR, Mount Dessert Island, ME and St. George Reef.

Because of the frequent stormy weather and high seas it wasn't always possible to depart the station on a regular basis. One stretch in 1937 was so bad that the keepers on duty were marooned at the station for 59 days without a break. The servicing buoy tender was unable to land supplies and mail. It was said that the four men on duty under head keeper George Roux did not exchange a sociable word with one another during this period of isolation. Keeper Roux said about the ordeal, "after the first four weeks we were so talked and thought out that just to say 'please pass the salt' or 'lousy day today ain't it' became a serious personal affront. It got so bad that we tried to ignore the pres-

ence of each other to avoid scraps. This despite our being solid friends for years. Toward the end when we opened a can of beans or some kind of can and ate it cold, we would face away from each other – not looking, not talking, just so fed up with each other's company that it was almost unbearable. I've heard of men going stir crazy in prison, well, that's just what almost happened to us. Funny thing the moment the weather pressure let up and life in the tower returned to normal, so did our pressures and we returned to normal, too, We were friends again, talked our heads off."

One 12th Lighthouse District Inspector said about St. George Reef, "It tries and proves men. Show me the man who has put in the required time of service there, and I'll show you a man ... and a lighthouse keeper too!"



The St. George Reef sound signal after the Coast Guard assumed control. The original sound (fog) signal was a steam whistle. This was replaced by an air-powered siren signal in 1912. Sometime after the Coast Guard took over, the signal was changed to a two tone diaphragm horn (shown above). Note the fancy iron railing in the background. U. S. Coast Guard photo.

In 1939, the Lighthouse Service became part of the Coast Guard. As the civilian keepers retired they were replaced by Coast Guard enlisted members. It was always a dangerous station to access. The seas had to be relatively calm for the boat to be brought aboard. A returning boat would maneuver under the station boom and fasten the boom's hook into a ring bolt of the vessel to be hoisted up some 30 feet to a platform. With the exception of the worker killed during construction and the keeper lost going on leave, no other serious accident occurred at the station until April 1951.

Two Coast Guard electrician mates had visited the station to make repairs. At the end of the day they, and three of the station crew prepared to depart. All five donned life jackets and stepped aboard the station launch. As they were lowered to a fairly calm sea a rogue wave suddenly smashed into the boat pushing it toward the wall of the caisson. Then the wave careened off the wall and filled the boat with water adding so much weight that the bow cleat holding the boom wire pulled loose –



Above – The Coast Guard crew prepares to board the station launch.

dumping the five men in the water. Despite the life jackets the men were in danger as survival in the frigid water was limited to minutes. Chief Petty Officer Permenter, the officer-in-charge, reacted instantly. He sent a distress message to the local Coast Guard station then observing that the boat's life raft

Below – From left: Coast Guardsman Vandenburg (ready to unhook when they reach the water), Beckett (sitting on the gunwale), Walker, Costello and Mulcahy. U. S. Coast Guard photos.



was adrift near the caisson, he climbed as near to the water as he was able and jumped the remaining 20 feet into the water and climbed into the raft. Two of the men had grabbed onto a nearby mooring buoy. Figuring that they were temporarily safe he went after the other three. He pulled one, alive but unconscious, into the raft. By this time he was nearly exhausted. He maneuvered the raft toward the fourth man, but he was dead. He was too tired to pull the body into the raft, so he lashed the

body to the side. The weight was now such that he was unable to maneuver the raft and search for the fifth man and he joined the two men at the mooring buoy.

The Coast Guard Group was too distant to send a vessel to reach the site in time. The group duty officer called the Crescent City Lighthouse keeper, Wayne Piland, and he responded with his son, who was home on leave from the Navy. They went to the city wharf where they managed to secure the large

drag fishing boat *Winga* and made for the lighthouse. When they reached the lighthouse they found the Chief and two men at the mooring buoy, another man was alive but unconscious and two men were dead. When they reached Crescent City the unconscious man was taken by ambulance to the local hospital where he was pronounced dead. It was the worst tragedy in California lighthouse history. Because of the tragedy, the Coast Guard implemented new procedures to transfer men to and from the lighthouse. But it was always an expensive lighthouse to maintain and difficult to access. Finally, in 1975, the Coast Guard moored a Large Navigational Buoy near the lighthouse and closed the structure after 83 years of service.



Above – The station launch less than a minute before being swamped and throwing the men into the water. Only Keepers Vandenburg and Mulcahy survived.

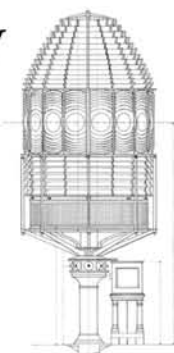
Below – St. George Reef Lighthouse on a fairly calm day. Date unknown. Both photos courtesy of the U. S. Coast Guard.

The St. George Reef Lighthouse Preservation Society is a nonprofit group formed in 1988 dedicated to the preservation of this engineering marvel. Within their scope, there are opportunities to be transported to the remote lighthouse via helicopter, to work for brief periods of time. It is rather expensive, isn't posh, but is rather primitive and dirty, and they do want you to work – cleaning or scraping or painting – but, what an opportunity! Contact the group by writing SGRLPS, P.O. Box 577, Crescent City, CA 95531. Their phone number is (707) 464-8299. The website is: www.stgeorgereeflighthouse.us/index.html.





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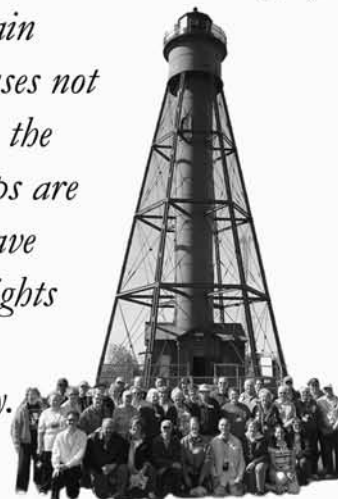
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The Society organizes domestic and international lighthouse tours. Many of our excursions gain access to lighthouses not normally open to the public. These trips are a great way to have fun, see lots of lights and learn about lighthouse history.



Tinicum Lighthouse, NJ