California State Parks

Video Transcript

The Life and Times of an 1870s Lighthouse Keeper at Pigeon Point Light Station State Historic Park

Welcome to Pigeon Point Lighthouse, the tallest operating lighthouse on the west coast. On November 15, 1872, Captain Patterson, the principal keeper at Pigeon Point, first climbed the 136 iron steps leading to the top of the lighthouse into the lantern room and first lit the five-wick lard oil lamp inside the first order Fresnel lens.

Now Pigeon Point was first called Whale Point, because of the very close proximity of migrating gray whales close to the point and the early establishment of a small shore based whaling station here. But on the night of June 6, 1853, that all changed when the clipper ship *Carrier Pigeon*, five months out of Boston on her maiden voyage around the "Horn," laden with goods and merchandise for the merchants of San Francisco, met her doom on the rocks right off of Whale Point. Fortunately, there was no loss of life, but the ship was a total loss. Almost overnight the very sparsely populated area became known as Pigeon Point and, in fact, within a year the local charts and the charts of the government had also changed the name to Pigeon Point from Whale Point.

Contrary to myth, the over 500,000 bricks used in this un-reinforced brick and mortar lighthouse, were not carried from Norfolk, Virginia, around Cape Horn for the building of the lighthouse. They were in fact manufactured locally here. It will be my pleasure to lead you on our tour of the lighthouse. So please step behind me, and let's go inside.

We're inside the watch house. One of the common myths about watch houses, the small attached buildings to many lighthouses, is that's where the keeper lived. Not true—these are functional buildings. We're standing inside the workroom, which is the room on the left side of the corridor as we enter the lighthouse. And this room was used by the keepers as a general-purpose room. There were desks placed inside for keepers to keep copious records, which they had to do, of course, all by long hand, as well as a repair table for doing small projects, and a rack for placing the counterweights, which were used to rotate the clock mechanism. These were, as I say, functional rooms. Across the hall, in an identical configuration, was the oil room and this is where the original illuminant of the light was stored in very large containers called butts, generally 50 to 100 gallons in size. The original illuminant here was lard oil, pig fat, economically found by the Lighthouse Service to be efficient and cheap. We always have to remember that the United States Lighthouse Service was a government agency within the United States Treasury Department. Now let's go inside the base of the tower and check out the great view from the bottom looking up. That's what you're all here for.

Well, come on upstairs and admire what, in my opinion, is the best view in the whole lighthouse. There's no doubt that the view from the top of this building is spectacular, but for those of you who are real lighthouse buffs, "wickies" we call you, the best view in the whole joint is from the bottom looking straight up. This gives you the great view of the interior staircase, all-iron prefabricated in San Francisco, all of these railings prefabricated to specific government design. Each one of the individual steps is attached to the ladder by these nuts and bolts. In fact you'll see the way they designed these buildings for strength—there are actually two nuts connecting each one of the stairs. You have to remember that this building is coming up on its 131st anniversary, and all of this iron is original. Of course, I can't vouch for how many coats of paint are on it, but the fact is that it's still very, very strong.

Now un-reinforced brick-and-mortar lighthouses need to be built strong, so if we look over the stairs that we just climbed, we'll see three arches. We measure the thickness of these three arches—one, two, three—we come out with 4-1/2 feet. This is our cutaway of the base of the lighthouse tower. So the base of this building that we're standing in is 4-1/2 feet thick. The thickness actually will narrow down the further aloft we go, until about 2-1/2 feet at the top of the lighthouse. So they're built kind of like round pyramids, with the strength of the structure at the base to support the weight at the top. Another way of looking at the thickness of the walls is, as we make our climb aloft, to look through the windows, and you'll see the immense thickness of brick-and-mortar. Again no reinforcing steel in lighthouses built in the 1870s. And those of you who are earthquake fans, might pause before you make the climb. But remember that this building has survived many earthquakes, including the famous 1906 and 1989 earthquakes, so they did build them to last.

Now let's talk about this black counterweight that's hanging down the middle of the lighthouse, probably the most important piece of machinery within the lighthouse. The way lighthouses operated is large lenses in the top of the lighthouse were rotated by a clockwork mechanism very similar to a grandfather clock. Grandfather clocks work with counterweights, which are wound, perhaps every 24 hours, 48 hours or even in some cases up to once a week. In fact it's the counterweights, the weights dropping very slowly, connecting to gears within and behind the clock face, which cause the hands to turn and the clock to keep time. Just the same occurs in a lighthouse. This 80-pound counterweight is connected by cable to a winding mechanism called a clockwork at the base of the 8,000-pound Fresnel lens at the top of the lighthouse. As this counterweight drops very slowly, it causes the 8,000-pound lens to rotate at a predetermined rate. The rotating lens then causes the flash to be seen at night.

Now, you can't squeeze this 80-pound weight up through these round guide holes in the center of each of the landings, so the clockwork mechanism is designed to drop very, very slowly into a well, which was in the center of the base of the tower. The well was about four feet deep, and it was surrounded by a rail for safety reasons. The counterweight would take about two hours to make the drop. And the keeper in the watch room, who stood a four-hour watch, would rewind the clockwork every two hours to assure that the light would continue to rotate and the flash be seen by mariners. Fortunately, because this was a four-keeper light-station, keepers stood four hours on, eight hours off, and then four hours on again during any 24 hours a day. Then once a week they would flip the shifts so that the keepers didn't get stuck with the same watch all of the time.

Here we are in the watch room, this is where the keeper is going to spend his four-hour watch. Now the counterweight, which we saw at the bottom of the lighthouse, which weighs about 80 pounds, is connected by cable. The cable is connected to and wrapped around, or wound around, a drum similar to this. You can see that the drum has interconnecting gears, so that when the keeper attaches a crank to the end of the drum he winds that counterweight up from the bottom of the lighthouse up to the first landing and it will stop. There will be a break so that the gear does not drop before the keeper wants it to. Now we need to use our imagination a little bit and imagine this large gear wheel even larger, so that it meshes with this giant gear in the base of the 8,000-pound Fresnel lens. As the counterweight rolls off the drum, the drum begins turning, turning all of the gears in this elaborate grandfather clockwork type mechanism. As this large gear turns, it's connected with the gear in the base of the lens, causing the entire 8,000-pound optic to rotate. It rotates rather slowly, rotating once every four minutes. Why don't we go aloft, and we'll show you the first order Fresnel lens.

Well here we are in the lantern room. This is what you've been waiting for, and we're here right in front of our Fresnel lens. So we better define our terms a little bit. What is a Fresnel lens? Fresnel actually is the name of the French physicist who designed this very elaborate system of prisms, way back in 1822. Now this is a first order Fresnel Lens and that means the largest order, the largest size, that Fresnel designed. He actually designed six sizes, from a first order (8,000 pounds), from base to top about nine feet tall, six feet across with a 1,008 separate glass prisms mounted into 24 vertical panels. A sixth order lens would be a very small harbor lens, perhaps measuring only two feet tall—designed just to show you perhaps the entrance to a small harbor, or perhaps even to identify the end of a large wharf. So these are the biggies, these are the largest of the lenses designed by Fresnel. Designed to be placed in the larger major landing lights throughout the world, as a matter of fact. All of the lenses were manufactured in Europe, principally in France, but also some in England. In the United States, during the early 1900s, we did manufacture a few fourth and fifth order lenses in the glass-making region of New York state.

The system works very simply. Each individual prism is placed within this frame; it has been pre-cut. They're triangular really. So that as light from the light source in the center of the light hits the panels—whether it be here at the center or at the top, called the catadioptric, or at the bottom, also called the catadioptric—the light rays will all be bent from an angle like this or like this, so that they emanate from the prisms parallel to each other. No matter at what height, all of the light will be forced into a very large vertical beam with the intensity focused here at the bull's-eye area, where you will see a pretty intense magnification as well. As the lens turns, rotates once every four minutes, slowly all of these panels of course are moving. And each panel produces a separate beam of light.

As the beams move slowly, you as a mariner on board a vessel, are relatively stationary to this light, you will see the light from each one of these beams, since they are moving as a flash. Then you will see darkness until the center of the focal plane passes by you again as the prisms continue to rotate. And as you see the flash from the lighthouse, the first thing that you will do, probably after breathing a great sigh of relief because now at least you've seen one, is you'll begin counting the elapsed time between the flashes. Each lighthouse has its own specific flash characteristic, so that as you navigate up and down a coastal area, you can tell which lighthouse you are seeing. This is particularly important perhaps if you have never been

here before. And in fact it is the greatest boom that Fresnel offered us from a navigational standpoint.

We tend to think of lighthouses as being safety beacons, and certainly they are. They are generally placed in areas which are unsafe. They might be shoal areas. They might be points such as Pigeon Point. They might be offshore islands or offshore rocks. But equally, if not more important, they are navigational aids. Not only do they tell you where the danger is, but more importantly they do tell you where the danger is, not just the fact that this is a dangerous area. Mariners, once the Fresnel system was in place beginning in the U.S. in the early 1850s, breathed a great sigh of relief that now they had the beginnings of a reliable safety and navigational system.

You know when we pass by a lighthouse, we think of kinder and gentler days and the obviously very easy job of a lighthouse keeper, who was probably just sitting down at the base of the tower by the fire, patting his Labrador dog, perhaps drinking a nice glass of port, and reading that new Emily Bronte novel that just came out, while the light rotates lazily above his head. And every once in awhile he may look out the window to see if everything was all right and then go back to his book. Well let's destroy some of those images for you. This was a tough job and, as we established before, a low paying job.

Now tonight on watch the keeper has to light the light. He has hauled up an iron container of lard oil, containing about three gallons of oil and weighing easily 30-35 pounds. He's actually hauling that up for the keeper tomorrow, to replenish the lard oil that will be burned tonight. But he is going to have to lug all of that up. So he's got his arms full with his dinner pail, his lard oil, perhaps some reading and tools that he's going to be needing on his watch tonight, and he certainly doesn't want to forget anything. The first climb isn't too bad; the second climb can really get to your legs.

Now every night at sunset we must begin lighting the light, and it's a bit of a complex process. The first thing that the keeper has to do is cleaning the windows. These giant windows are called storm panes, to keep the storm out and protect the lamp. Each one of them has to be washed down or cleaned down nightly, so that you don't diminish the intensity of the light when you light it. Not quite as simple a process because we don't have any squeegees here at the time. So how do we get out to this outside gallery or deck in order to clean the outside windows? It's really very simple, downstairs off the watch room, one level below us, is a doorway and that doorway takes you out to a deck one level below where I'm standing now. Connecting the two outer decks or galleries is a ladder on the outside of the tower. So, taking your cleaning equipment, climb up the outside ladder, hoist yourself over the outer rung, and begin cleaning down the storm panes one at a time. Certainly the lower ones and the middle ones are fairly simple and it goes quite quickly. But we do have to clean the upper storm panes as well. How do we do it? After a few days on watch, on duty, you've figured out the shortcut. The shortcut is very simple. What you're going to do is climb up on this outer iron rail and, using the handles that are attached to the outside of the lantern room, hold on, walk around the outside rail with your cleaning equipment, wiping down the outside windows. Of course you're going to do this rain or shine, hopefully mostly shine. Once you've cleaned the outside storm panes, then of course you're going to come back in the way you came out and you'll will be then down in the watch room.

The next step in the process is to begin lighting the five-wick oil lamp, which is in the center of the optic, in the center of the lens. There is a crossover down about half-way up the ladder here to this landing, the keeper just crosses over into the base of the tower and works his way up into the center of the light, where, replacing these very large 1,000-watt light bulbs, would have been a five-wick oil lamp. So the best thing to do is think about the oil lamp that you have at home, which has kind of a flat wick. It's covered by a glass chimney, and when you lose power, you take off the glass chimney and light the wick, and lo and behold you have a great amount of soot that begins developing on the glass when you put it back on because you haven't trimmed off your burnt wicks from the last time you used it.

Instead of a flat wick, we have round wicks, actually five of them in the center, concentrically placed, the outer wick being about the size of my hand. So we have an outer wick, five, four, three, two, one. It looks kind of like a bull's-eye if you were to look inside it. What you're going to do is begin lighting each one of those wicks very carefully, starting with the inner wick. As you light them, you'll trim off any loose ends with a scissor, perhaps one of the most important tools in the arsenal of the lighthouse keeper's tools. Once you've lit the inner wick, then you go to the outer wick. As you light the wicks you begin raising them so that they catch more of the air flowing through the oil lamp. Once you have lit all five wicks and you have then burning nicely and properly, you will close the very large glass chimney that you have inside over the wick.

Now what does it take to have a really good fire? Of course it takes fuel, lard oil, and it takes air. Lighthouse lamps are really operational the same way as a good woodstove. We need to get an airflow going over the wicks in order to burn the oil efficiently. And so in the base of the lighthouse are a series of air vents, and what the keeper will do is adjust the individual air vents to get the proper flow of oxygen flowing through the wicks to get that beautiful white coloration burn that tells the keeper that he has the right mixture of air flowing through. Now the air vents are located throughout the circumference of this room, so you're going to have to adjust more than one vent.

Once the light is burning properly, the first part of your watch is complete, and now you will spend the rest of your watch—it could take you up to about an hour to bring this light up completely and that's why you need to start at sunset because you need to get this light burning brightly by full darkness, which generally occurs about an hour after sunset. Once your light is lit, then you'll go back down to the watch room, and you will spend the rest of your watch there.

Things that you will be doing during your watch will be making certain that the lens is rotating properly. What we mean by that is we want this producing a 10-second flash, not an 11-second flash. So you're going to need to lubricate all of the gears in the rotating mechanism. Make certain it's chariot wheels, upon which this entire 8,000-pound lens rest, are properly lubricated and all turning at the same rate. You need to make certain that your lard oil lamp is burning efficiently. There were times when they clogged up and the lens would become very dim or even go out all of sudden, and if you couldn't relight that or get it cleaned out properly, you would actually remove the lamp and replace it with a spare which you kept in the watch room as well. You would obviously want to do that as quickly as possible.

There were some horrendous evenings here with incredible storms coming in. There where times when some of these panes, these storm panes, were actually shattered. Shattered by a gull or a pelican getting blown through it. Shattered by a piece of wood getting kicked all the way up here by a terrific storm surge. On those nights you were expected to at least temporarily repair the glass, and you kept spare storm panes also with you in the watch room. You would actually have to go outside the outer gallery with a new piece of glass and attach it with special temporary attachment pieces so that the integrity of your Fresnel lens would be protected and so that your light would not be blown out or extinguished. And then after the storm passed, then you would make the permanent repairs. You'd certainly hope that you didn't have to do that very often.

You know it's interesting—the basic requirements of a lighthouse keeper in the 1870s and 1880s: You had to be between the ages of 18 and 50; you had to be able to read and write and keep accounts, there was a great amount of paperwork here; you needed to be able to make mechanical repairs, so you had to be able to operate the mechanics of a lighthouse; and you needed to be able to sail a small boat. Why sail a small boat? This thing isn't going anywhere. Well part of your job description was, if there were a shipwreck close to your lighthouse, you were supposed to go out and aid the mariners who were shipwrecked. And that might necessitate you actually shoving off from your lighthouse and going out off the point to rescue someone in the sea. You had to be prepared to do that. That was part of your job.

That was really part of the code of the sea—that mariners always worked to protect and help each other. And many lighthouse keepers particularly in the early age were retired mariners, who at some point, if they were married, their wives told them that they needed to "swallow the anchor" as it was said. That means, "Stay home. You're not going to sea anymore for six months, or twelve months, or two years. I need you to stay home with the family." Those retired mariners frequently worked their way into lighthouses because they kept this kindred spirit of protecting their fellow mariners or as the Navy hymn says "For those in peril on the sea." This was a very rewarding job for lighthouse keepers. Every night when they went off watch, they could feel that they actually accomplished something.

This concludes our tour of Pigeon Point Lighthouse. I want to thank you for visiting with us here at Pigeon Point Light Station State Historic Park in Pescadero, California, midway between the thriving metropolis of Half Moon Bay and the coastal resort town of Santa Cruz, about 50 miles south of San Francisco. And I certainly hope that we'll be able to see you here real soon in person.

Running Time: 27:09