

View of Moloka'i Lighthouse, ca. 1978, U.S. Coast Guard,
Photograph by Bob Jones, Kalaupapa, Moloka'i

MOLOKA'I LIGHT STATION HISTORIC RESOURCES REPORT

by William Chapman

Kalaupapa National Historical Park
Moloka'i, Hawai'i
November, 2001

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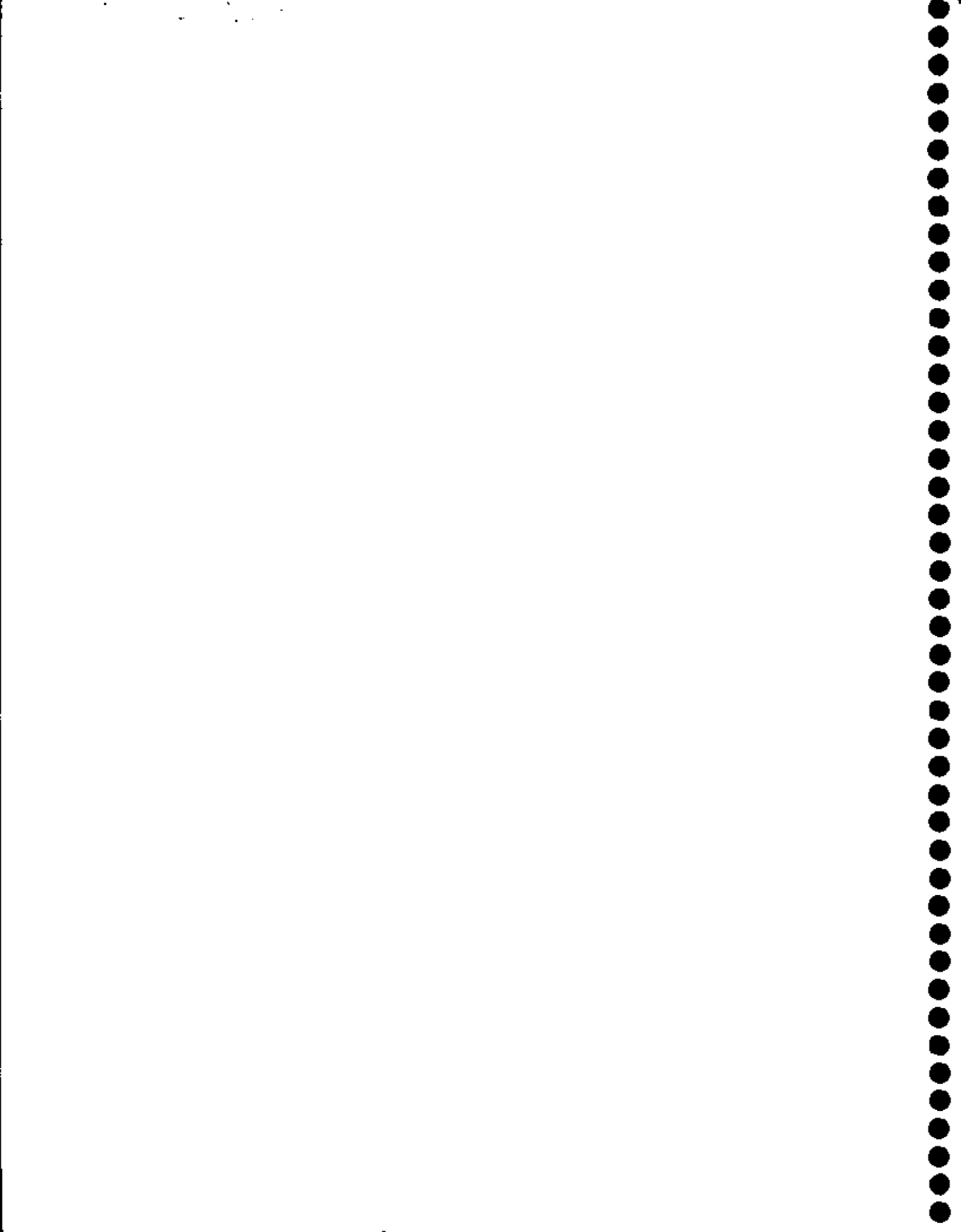


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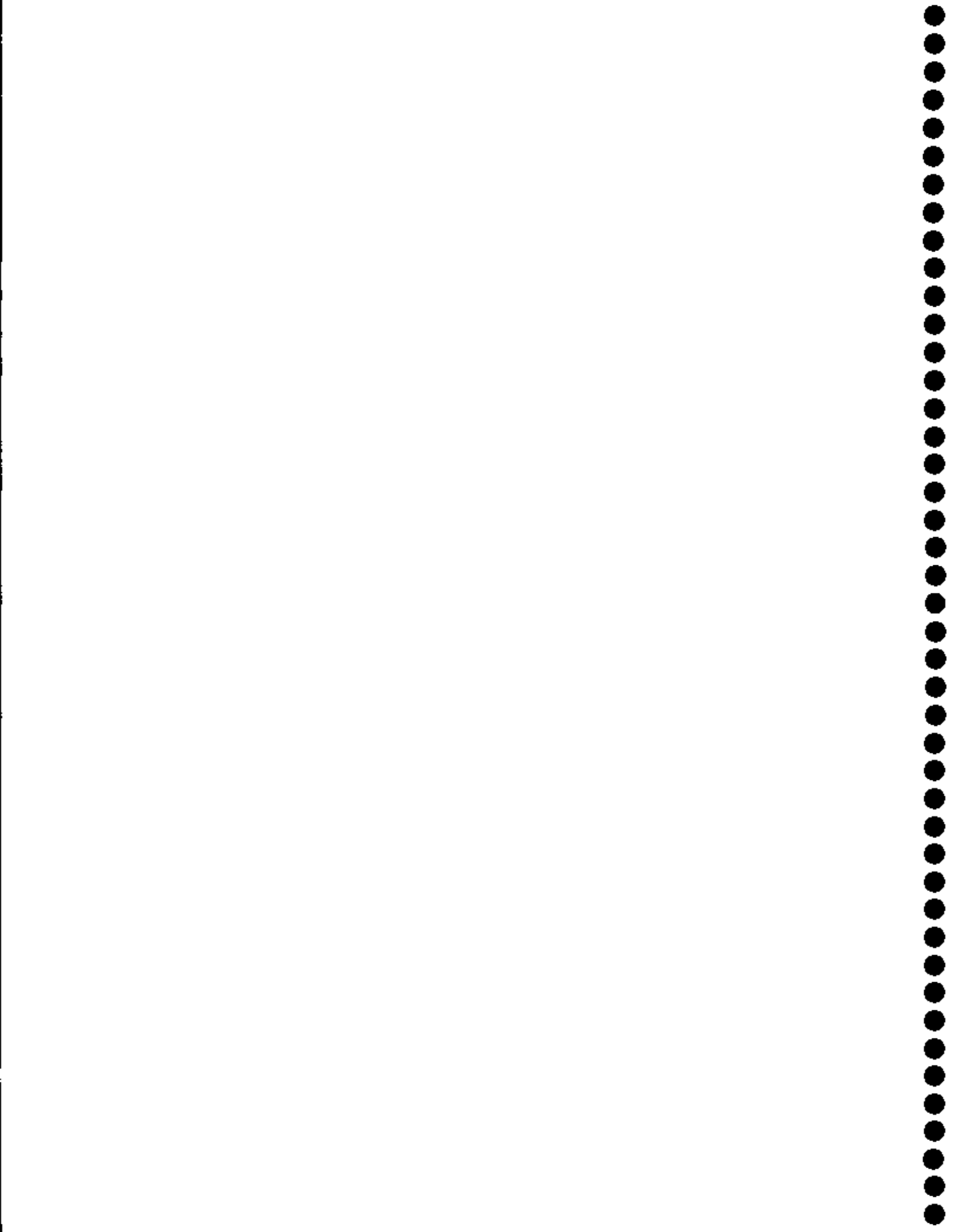
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PROJECT PURPOSE

The Moloka'i Light Station Historic Resources Report has been undertaken as part of a long-range planning effort to provide background information on the historic Moloka'i Lighthouse and related structures and landscape features. The project encompasses a detailed historic resources study, including management recommendations, and an amended National Register of Historic Places Nomination form.

The Moloka'i Light Station was built in 1908-09 at a cost of approximately \$60,000. The original station consisted of a concrete, octagonal tower, with an overall elevation of 138 ft, associated secondary structures, and three dwellings for the keepers and their families. Put into service on September 1, 1909, the Moloka'i lighthouse carried a Second-Order Fresnel lens, containing an incandescent oil-vapor lamp with a capacity of 620,000 candle-power and a range of 21 miles. The Moloka'i light, together with the Makapu'u Point light on O'ahu, guided west-bound vessels into the Kaiwi Channel, the approach to Honolulu Harbor.

The light station was manned by keepers employed by the federal lighthouse service for the first thirty years, after which time responsibility for maintaining the light was passed to the reorganized U.S. Coast Guard Service. The Coast Guard continued to man the site until 1966, when the light was fully automated.

Because of the proximity of the station to the famous Hansen's Disease settlement at Kalaupapa, the keepers lived under unusually restrictive conditions. They were not permitted to associate with the patients, and the keepers and their families had little opportunity to interact outside of the station community.

Today the site consists of the still-functioning lighthouse, several ancillary structures and one of the original keeper's dwellings. A second, later keeper's quarters, added to the site in 1950, and a garage and a storage building are also located in the residential section of the complex. In addition

the station site includes a wood-frame powerhouse, a concrete water tank, a concrete storage building (located away from the principal built-up area), sidewalks and stone walls, and the foundation remains of other structures and features. Each of these required assessment for historic significance and integrity and for their associative values.

The purpose of the project has been to evaluate the relative historic significance and integrity of all of the remaining features on the 22.9 acre site now under the ownership of the National Park Service and the U.S. Coast Guard (which retains control over a three-quarter acre plot containing the lighthouse). The tower and associated buildings, structures and other features have been evaluated for their architectural significance and also for their importance in the history of maritime transportation and commerce. They have also been evaluated for their associative value in the social and cultural history of the island of Moloka'i, the Hawaiian Islands, and the nation.

The study is intended for the use of managers, planners, interpreters, cultural resource specialists and the interested public as a reference for the history and management of the site, as set out on the Scope of Work prepared by Sharon Brown, Ph.D., historian at the Kalaupapa National Historical Park (KAL.A). The research contained in the report has also been incorporated into a revised National Register of Historic Places nomination form submitted to the State Historic Preservation Officer.

METHODOLOGY AND SOURCES

The project has involved extensive library and archival research, interviews with National Park Service personnel and others knowledgeable about the site, and field work at the Moloka'i light station. The work was conducted by William Chapman, principal investigator for the project, with the assistance of Betty Ausherman. Guidance for the project was provided by Dean Alexander, Superintendent for the Kalaupapa National Historical Park, and Christi Shaw, Cultural Resource Program Manager in the park. Don Hibbard, Administrator of the State of Hawai'i Historic Preservation Division and staff members Tonia Moy and Carol Ogata have also contributed

information and advice on the project.

The project was initiated in April, 1999. A preliminary report on the progress of the research was submitted in September, 1999. The draft of the historic resources study was completed in April, 2000 and a draft of the National Register of Historic Places form was submitted for review in June, 2000. Field work was conducted on Moloka'i in September, 1999, with a second field trip occurring in June, 2000.

The project was aided considerably by the advice of National Park Service personnel, especially Dean Alexander. All of the staff at the Hawai'i State Archives also provided much additional advice, as did DeSoto Brown of the Bishop Museum Archives. Mike Martin of the U.S. Coast Guard also provided many useful documents and, as well as his insights on the project, as did Tonia Moy of the State Historic Preservation Division. Historians at the National Archives in Washington, D.C. were also helpful. The staff of the Hamilton Library at the University of Hawai'i at Manoa, particularly librarians in the Hawaiian and Pacific Collection and Mabel Suzuki in the Government Documents section, contributed their time and expertise to the project.

The research aspect of the project included consultation of maps, photographs, correspondence, published and unpublished reports, legislation, and secondary sources. A number of interviews and transcripts of oral histories were also helpful to the research. Principal archival sources included the Hawai'i State Archives, particularly the Photographic Collection (586-0329). Additional photographs were located in the Bishop Museum's Visual Collection (Ph. 808 848-4182, M-F, 12noon-3 p.m.). The Hawai'i State Archives was also a useful source of maps, correspondence, and unpublished reports on the Moloka'i light station and on the Hansen's Disease settlement on Moloka'i. The National Archives, Record Group 26, provided many useful documents on the station's early history. The U.S. Coast Guard archives in Honolulu held many important records, including maintenance reports, correspondence, blue-prints, maps, and photographs.

Useful journal and newspaper articles included accounts in the *Honolulu Advertiser*, the

Pacific Commercial Advertiser, and the *Maui News*. The *Annual Reports* of the Lighthouse Board, the U.S. Coast Guard *Light Lists*, and the *Lighthouse Service Bulletin* have also been important sources of information.

Significant secondary sources have included reports prepared by the National Park Service, including Linda W. Greene's *Exile in Paradise: Kalaupapa National Historical Park Historic Resource Study* (1985) and the National Park Service's *Kalaupapa National Historical park: Land Protection Plan* (1986). Catherine C. Summers's *Moloka'i: A Site Survey* (1971) provided background on the early history of Moloka'i and the physical setting, as did a number of more recent archeological reports (listed in the bibliography and footnotes).

The most significant journal article is Love Dean's "The Kalaupapa Lighthouse," published in the *Hawaiian Journal of History* (1989). Gustave Kobbe's "Life in a Lighthouse," from *Century* magazine (1894), and Ted Randolph's memoir "36 Years of Memories," published in the *New Pacific Magazine* (1944) provide a vivid picture of the lives of lighthouse keepers. Richard W. Updike's "Augustin Fresnel and his Lighthouse Lenses," published by Mystic Seaport, provides an excellent description of technical innovations in lighting. Robert H. Macy's "Consolidation of the Lighthouse Service with the Coast Guard," published in the *United States Naval Institute Proceedings* (1940) is a helpful summary of the administrative structure of the lighthouse service.

Published books on Hawai'i's lighthouses include Love Dean's *The Lighthouses of Hawai'i* (1991) and James A. Gibbs's *Sentinels of the North Pacific* (1955). Bruce Roberts and Ray Jones's *American Lighthouses: A Comprehensive Guide* (1998) frustratingly leaves out discussion of Hawai'i's significant contribution to the history of navigational aids!

There is a plethora of other secondary works on lighthouses, including American lighthouses. The most useful have included Francis Ross Holland, Jr.'s *America's Lighthouses: An Illustrated History* (1972, republished 1988), Hans Christian Adamson's *Keepers of the Lights* (1955), John A. Hussey's *Early West Coast Lighthouses* (1964), and Edward Rowe Snow's *Famous Lighthouses of*

America (1955). The "official" histories, written by authors associated with the Light House Service include George Rockwell Putnam, *Lighthouses and Lightships of the United States* (1917), and the same author's *Sentinels of the Coast* (1937). The U.S. Coast Guard's *Historically Famous Lighthouses* (1957) is also a useful source.

For general background on Hawai'i's history and the historical context of the Moloka'i station, the following have been used: Edward D. Beecher, *Honolulu: Crossroads of the Pacific* (1991), Gavin Daws, *Shoal of Time: A History of the Hawaiian Islands* (1974), and Ralph S. Kuykendall, *The Hawaiian Kingdom*, 3 vols. (1938, 1957, 1967). Additional background on Moloka'i is found in George Paul Cooke, *Moololo o Molokai* (1949), Philip Spalding III, *Moloka'i* (1984) and the Hawaii Board of Health's earlier *The Molokai Settlement* (1907).

For general reference the following have been used: Jean McKean Grace and Lois Nishimoto, *Marine Atlas of Hawai'i: Bays and Harbors* (1974), Harold Stearns, *Geology of the State of Hawai'i* (1966), and Mary Kawena Pukui, Samuel E. Elbert, and Esther T. Mookini, *Place Names of Hawai'i* (1986). Eileen Tamura, Cornelia Anguay, and James Shon's *The Shaping of Modern Hawaiian History* (1983) and Thomas Milfin's *Schooner from Windward: Two Centuries of Hawaiian Shipping* (1983) also provide useful background information. (A more complete list of secondary sources consulted is included in the bibliography).

On-site research, including photographs and measurements of buildings, structures and other features of the Moloka'i light station, followed guidance set out in National Park Service guidelines, most importantly National Register Bulletins Number 15, *How to Apply the National Register Criteria for Evaluation*; Number 16A, *Guidelines for Completing National Register of Historic Places Forms*; and Number 34, *Guidelines for Evaluating and Documenting Historic Aids to Navigation*. The latter has been particularly helpful in providing contexts for evaluation, as further discussed in National Register Bulletin Number 16B, *How to Complete the National Register Multiple Property Documentation Form*.

Actual field work was guided by National Register Bulletin Number 24, *Technical Information on Comprehensive Planning, Survey of Cultural Resources, and Registration in the National Register of Historic Places*, and by Bulletin Number 23, *How to Improve the Quality of Photographs for National Register Nominations*. Further general advice and guidance was provided by John A. Burns's *Recording Historic Structures* (1989), published collectively by the Historic American Buildings Survey and Historic American Engineering Record of the National Park Service and by the American Institute of Architects.

Fieldwork for the project was carried out in September, 1999, over a two day period. A further trip for clarification of measurements and additional photography occurred in June, 2001. Each building and feature was measured and photographed in accordance with National Park Service-published guidance and accepted conventions for recording historic resources. Both black-and-white and color photographs were taken, the color photographs to aid in writing architectural descriptions. A roll of Kodachrome slides was also taken as a permanent record of the complex. Both photographic prints and negatives are currently stored at KALA, following instructions set out in the Scope of Work.

Research and writing was carried out between July, 1999 and April, 2001. Both primary and secondary sources were consulted during this period. Research consisted of visits to the Hawai'i State Archives, the Bishop Museum Archives, the collections held by the U.S. Coast Guard Service in Honolulu, and correspondence with the National Archives in Washington, D.C. Additional interviews were conducted in April, 2000 and a final trip to Moloka'i was carried out in June, 2001. Write-up of research materials occurred in March and April, 2001, with review by the National Park Service, U.S. Coast Guard, and the State of Hawai'i Historic Preservation Division occurring in June and July, 2001.

The project has been administered and funded by the Arizona Memorial Museum Association.

NARRATIVE HISTORY: THE ORIGINS AND HISTORY OF THE MOLOKA'I LIGHTHOUSE

Introduction

At thirty minutes before sunset on September 1, 1909, the light keeper assigned to the newly constructed lighthouse on Makenalua Point on the north side of the island of Moloka'i climbed the 189 winding stairs of the 112-ft masonry tower and ignited the incandescent oil vapor lamp within the lighthouse's lantern and put into service what was Hawai'i's perhaps most ambitiously conceived navigational aid. With a focal plane of 213 ft above the water, the new, flashing white light was visible to mariners from 21 miles at sea.¹ For the first time ships approaching the Hawaiian Islands from the west, and seeking entry into the Kaiwi Channel could confidently check their bearings, and navigate the approach to Honolulu Harbor from the north.

The Moloka'i light was one of several improvements to navigation introduced by the U.S. Light House Board following transfer of responsibility for the construction and maintenance of navigational aids from the Territory of Hawaii to the U.S. government in 1904. Moloka'i light was one of two significant lighthouses added to the list of Hawaiian lighthouses during this early period. The other was constructed at Makapu'u Point on the island of O'ahu, approximately twenty-five miles from Moloka'i, and serving as the principal landfall light for west-bound vessels. Initially lit exactly one month after its sister light at Moloka'i, the only 35-ft tall Makapu'u Point lighthouse was placed at an elevation of 395 ft on the slopes of the prominent headland, making its occulting signal visible at 25 miles.² Together, the two lights insured safe passage for literally thousands of ships and smaller vessels each year entering the territorial waters of Hawai'i and seeking anchorage at Honolulu.

The history of the Moloka'i lighthouse is bound-up with the history of maritime trade in the newly established Hawaiian territory and the successive improvements made to navigational aids during the early part of the twentieth century — not only in Hawai'i, but in other parts of American-

controlled territory as well. It also marked an important transition from the more haphazardly conceived and managed light stations and other aids undertaken by the Kingdom of Hawaii before 1898 and the introduction of a new system of rationally conceived and well organized navigational aids put into service during the early part of the twentieth century in an effort to insure the safe-keeping of U.S. and foreign shipping in the Pacific region.

The Moloka'i light station (referred to variously as the Moloka'i Light Station, Moloka'i Lighthouse and Kalaupapa Lighthouse) is also significant in the context of historical developments in the Hawaiian Islands and the island of Moloka'i in particular. Moloka'i has a special significance in the history of Hawai'i as the home, after 1866, of a special settlement for sufferers of Hansen's Disease, known more traditionally as leprosy. Established by the Kingdom of Hawaii to prevent the spread of the illness to the rest of the Islands' population³, the Moloka'i settlements of Kalawao and, later, Kalaupapa became the home of as many as 1000 patients, condemned to live their lives separate from the rest of the world.⁴

The site of the lighthouse, the barren and remote Makanalua Point, was significant for its very isolation. Situated on the north shore of the already sparsely populated island of Moloka'i, Makanalua Point (also known as Makanalua Peninsula) is a low-lying landform, jutting about two and a half miles into the sea and bounded on the south by steep cliffs, known as the *pali* rising as much as 2000 ft above the headland below.⁵ This was an advantage in enforcing the isolation of the population, but made both the building and manning of the lighthouse far more problematical than most other light stations in the lighthouse service. Exacerbated by a dangerous shoreline and strong ocean currents, the lighthouse's location made the delivery of building materials, supplies, and equipment especially difficult. Also, the keepers and their families were forced to live in unusually difficult circumstances, prohibited (officially) from contact with the settlement's patients and dependent upon sporadic and inconvenient transportation back and forth from their island base.

The lighthouse became important not only as part of the network of navigational aids in Hawai'i, but also as a place of particular social and symbolic significance for the Kalaupapa

community. Over the years the Hansen's Disease patients came to take a special pride in the Moloka'i lighthouse. One of the few prominent features on the peninsula, patients were fond of walking or riding over to the station, viewing the prominent tower and watching the flashing signal at night.⁶ Although prohibited by regulation to fraternize with patients, the keepers and their families nonetheless became familiar to those living on the peninsula. They shared the landing in the settlement, the keepers' children passed by the community members on their way to the winding paths to the top of the *pali*, where some children would later attend school, and on numerous occasions, despite rules to the contrary, the keepers came to know many in the community.⁷ The Moloka'i lighthouse, therefore, belongs not only to the history of the U.S. Lighthouse Service (and later the U.S. Coast Guard) but also to the history of Kalaupapa more generally.

Early Navigational Aids in the Hawaiian Islands

To understand the significance of the Moloka'i lighthouse in the maritime and commercial history of in Hawai'i — and the history of navigational aids in the Hawaiian Islands — it is important to examine the more general context of both local and national efforts to improve maritime commerce and safety prior to 1904, when the U.S. government finally accepted responsibility for the construction and maintenance of lights and other marine markers in Hawai'i.

A comprehensive system of navigational aids was slow to be established in the early Kingdom of Hawaii. For one, the technology of marine markers and lights was little developed at the time of early American and European commerce in the islands. Second, there was little administrative oversight in the earliest period of Hawai'i's development and little agreement on the means of paying for markers or assigning responsibility for their placement and maintenance.

The development of navigational aids in Hawai'i was closely linked to the rise in maritime trade during the early part of the nineteenth century. After 1819, the Hawaiian Islands experienced increasing numbers of merchant ships, and particularly whaling ships, into both Honolulu and, especially Lahaina on Maui, then an important roadstead.⁸ Hawai'i's first navigational aid was erected

in 1840 at Keawaiki, "the small passage," near the waterfront at Lahaina.⁹ A "tall looking box-like structure, 9 ft high..." this simple wood-frame lighthouse, with a single, sperm oil-fired lamp was put into service on November 4, 1840.¹⁰ In the mid-1840s, this first marker was joined by a second light mounted above the Union Hotel, near the middle of the then-bustling port.¹¹ In poor condition by the 1860s, the first lighthouse was replaced by a new small lighthouse, joined with a storehouse in 1868. At the same time, the formerly green-colored light was replaced by a red light, following by-then accepted conventions for marking harbors and ports (or anchorages, as in the case of Lahaina).¹²

By the 1840s, Lahaina was superceded by Honolulu as the most important port and source of supplies and marine services in the Islands. In the early years of the nineteenth century King Kamehameha I and his successors gradually shifted their attention to O'ahu in recognition of the increasing commercial significance of Honolulu and the growing preference by mariners for Honolulu's more protected harbor. Honolulu was also preferred by the ships of the U.S. Navy and other deep-draught vessels, which were relying increasingly on the Hawaiian Islands as a source of provisions and water, as well as refitting and repairs. By mid-century the large and well established whaling fleet also preferred Honolulu's protected harbor over more exposed Lahaina.¹³

As a result of increasing maritime activity, local businessmen in the early part of 1851 began pressing for a lighthouse to mark the passage into the harbor.¹⁴ With the support of the newly established Chamber of Commerce, an Act was passed by the House of Representatives and the House of Nobles on June 20, 1851 to build a lighthouse near the cut in the coral reef at the harbor entrance.¹⁵ Signed by King Kamehameha III, the Act also called for the construction of a lighthouse on either Diamond Head or Leahi and, if a lighthouse at the harbor was unfeasible, the provision of a lightship to serve the same purpose.

In 1869, O'ahu's first lighthouse was built near the recently widened reef cut. This first lighthouse was a wooden structure, elevated 26 ft above sea level, and erected on piles. It was connected to a keeper's dwelling, also built on piles driven into the reef. Accessible only by boat, the lighthouse was first manned by a Captain McGregor. It was fueled by whale oil lamps, magnified by

a Fourth-Order Fresnel lens. The fifth largest of seven lens sizes designated by the lens's inventor, Augustin Fresnel, this lens marked the introduction of modern optical technology into the Kingdom of Hawaii. (The gradients of lenses and their significance to navigation in Hawai'i's waters and for the Moloka'i light in particular – are discussed in greater detail on pages 47-50.)

The signal from the Honolulu light, which came to be known as the "Harbor Wink," was first lit on August 2, 1869 and was visible at 9 miles out at sea.¹⁶ A few years later, the harbor light was joined by a second, crude signal placed on the roof of the Customs House. The latter was lit by what was later disparaged as an ordinary kitchen lamp, draped with a red cloth (and later replaced by a green cloth), visible at 5 miles.¹⁷ To pay the costs of lighthouse's operation, all incoming ships were charged a "light dues" of three dollars; inter-coastal trading vessels were charged at the usually lower tariff of 10 cents a ton.¹⁸

Other lights on O'ahu were slowly added. Although called for in the Act of 1851, and increasingly pressed for by interested citizens from the 1860s, a lighthouse at Diamond Head would wait until the 1890s for its construction. Captain James King, Minister of the Interior and an experienced mariner, announced the location and design of the station in 1897: "The tower will be an open frame, arranged to obstruct the view from the [adjacent] signal tower as little as possible." King further explained that the iron tower was being built at the Honolulu Iron Works.¹⁹

Construction of the tower began by 1898. A Third-Order Fresnel lens (one "order" larger than that used at Honolulu Harbor) was ordered from the firm of Barbier and Benard in Paris. Shipped from Liverpool in September, 1897, some of the parts were damaged enroute, requiring a request for substitutes several months later.²⁰ In the meantime, the plan for the tower came under further scrutiny. Civil engineers C.H Kleugel and John Ouderkirk reported that the open-work tower might not be equal to the heavy winds experienced at Diamond Head during heavy storms. They suggested infilling the tower's struts with rubble stones. Their arguments persevered, and in 1898 Captain King reported that "As the Legislature provided that before the completion of the light a stone tower must be constructed, plans have been made and a tower of rubble masonry will be built occupying the same

place as the iron tower."²¹

Completed at a cost of \$1,170, the Diamond Head lighthouse was put into service in 1899. A Notice to Mariners was published that year: "On and after July 1st, 1899, a light will be established at Diamond Head, on the South side of O'ahu, Hawaiian Islands. Lat 21 15' 8" N. Long. 157 48' 44" W. Elevation of light above sea level 145 ft. Visibility 15 miles. Stone tower 40 ft high white washed."²² Although originally scheduled to be electrified, it is probable that the first light was powered by a kerosene lamp. The road to the lighthouse was improved, and John M. Kaukalii was appointed the first keeper, at seventy-five dollars a month. Since the station lacked a keeper's dwelling, Mr. Kaukalii lived in a private residence about a quarter mile away.²³

The last of the early O'ahu lighthouses was built well away from Honolulu, on the promontory known as Barber's Point. Long recognized by mariners as a hazardous feature, Barber's Point was identified as an ideal location for a lighthouse by surveyor William DeWitt Alexander of the Hawaiian Government Survey Bureau when undertaking a study of locations for possible marine markers. Describing Barber's Point he explained that the "reef is about two miles broad westward of Pearl Harbor where it has been elevated to some ten ft above sea level forming a level plain whose surface is characteristically pitted with holes varying from one to fifteen ft in diameter and depth."²⁴

An appropriation of \$7500 was passed by the Legislature in 1880 providing for lighthouse expenses, of which \$2500 was designated for a new lighthouse at Barber's Point. A Fresnel lens was ordered through W.H. Crossman & Brother, Commission Merchants in New York and in February, 1881, L. Santer Lemonnier, a Paris fabricator was contracted to supply the apparatus. L. Santer Lemonnier also provided a metal and glass lantern to protect the lamp and lens. The materials all finally arrived in Honolulu that summer.²⁵

Whereas the lens and other equipment made it to Honolulu, initial work on the tower was postponed due to insufficient funds. Requests for additional monies were made in 1882 and in 1884, but were turned down. Finally, in 1887 a second appropriation was made, and work could begin on

the tower. Approximately one half acre of land was deeded by James Campbell, a former seaman and owner of a vast tract of property in the western part of O'ahu, in late December. Bids were accepted to build the tower and a keeper's house, the award going to Peter High, a Honolulu builder. The cost was to be \$1,892 for the tower and \$309 for the keeper's dwelling. The plans for the structure were provided by the superintendent of public works for the government of Hawai'i.²⁶

Lorin A. Thurston, Minister of the Interior, described the completed project to the Legislature in the early part of 1888:

The tower supporting the metal lantern is of stone laid in cement mortar with suitable platforms inside and outside on iron frames. The whole structure being made as durable manner as possible. The light is 42 ft above mean tide. The location selected is at Puhilele, about 1/4 of a mile west from Kalaheo. A coral ledge, about 6 ft above mean tide, here forms the shore, and the reef extends about 5,000 ft to 6 fathoms water. It would have been preferable to navigators to have placed the light at the extremity of the shoals, but the vastly increased cost of construction and maintenance prevented, and it is considered that the purpose will be well served by the structure as it is. A small frame house has been added for the use of the light keeper and a water cistern built for his use. Cost \$2,848.00.²⁷

A Mr. A. Alona was hired as the keeper. Thurston explained the conditions of his employment: "Your appointment to commence the 9th day of April 1888 and your pay shall be Twenty Dollars a month. You are required to report to the Minister of the Interior, from time to time, the condition of the Light House under your charge, and to make requests to this office for oil and other supplies."²⁸

Fitted with its Fourth-Order Fresnel lens, the lighthouse projected a fixed, white light, visible from all points of the compass at a distance of ten miles. To identify the tower, its shaft was painted white and the lantern a distinctive red. Although an important improvement to navigation, some mariners still complained, suggesting that the light should be visible from at least fifteen miles to prevent accidents.²⁹ No changes were introduced, however, until the next century, when responsibility for the lighthouse was assumed by the U.S. government.

The lights at Barber's Point and Diamond Head were the most prominent of the Hawaiian government's contributions to maritime safety during this period. Nonetheless, there were an number of other aids introduced on O'ahu in the years just prior to their completion. These included numerous buoys and other more informal markers and possibly a number of lighted markers.³⁰ In 1885, then Governor of O'ahu John Dominis wrote out "Rules and Regulations" for the maintenance of lights built on the northwestern shore of O'ahu at Waialua.³¹ However, no other records survive before this date describing these or other lighthouses, several of which may have existed.

Developments on other Hawaiian Islands closely paralleled those on O'ahu and Maui. The earliest lighthouse on the island of Hawai'i was built at Kawaihae on the northwest coast. Whereas Lahaina and Honolulu were the principal ports for whalers during the early part of the nineteenth century, by the 1840s Kawaihae and Hilo were also becoming important stopping points, particularly for provisions and water. Cattle also were shipped from Hawai'i to Lahaina and Honolulu to supply meat for the ships anchored there. With the increase in shipping, it became apparent that lighted aids were needed.³² The Hawaiian government made no effort to address this need, so initiative was taken by local businessmen. In 1859, the firm of G.W. Macy and Company undertook to build a light tower at Kawaihae. The *Pacific Commercial Advertiser* pointed out in January, 1859 that a lighthouse at Kawaihae would contribute to improved maritime safety along Hawai'i's shore.³³

G.W. Macy and Company's plans were never carried out. In 1869, the Hawaiian government committed to improving the situation, and in the early part of the year builder Sam Chillingworth was awarded the contract to build a lighthouse. Writing to Frederick W. Hutchinson, Minister of the Interior for the Kingdom of Hawaii, Chillingworth explained on June 23, 1869, "I have framed in the stonework, and built a strong platform and protecting house and having whitewashed everything in connection with the light, it is now in a firm and complete state, and from this date the light will be attended to without intermission." Chillingworth was subsequently given the job of keeper at four dollars a month.³⁴

In 1871, Kawaihae was designated as one of six points of entry for the Kingdom of Hawaii.

The anchorage became an important place of supply for cattle from Waimea and also, increasingly, as a shipping point for the growing sugar and coffee industries. Fueled in the traditional way with whale oil, the light served through the mid 1870s as an important marine marker.³⁵ In 1877, following an accident with the oil lamp, the tower had to be rebuilt. Replaced temporarily with a kerosene lamp attached to a pole, a new lighthouse was completed in 1879, built upon the foundations of the original structure. The *Hawaiian Annual* announced in 1880, "For the anchorage at Kawaihae a white light, about fifty ft above sea level, has been erected, at a point bearing from the N.E. corner of the reef." It further pointed out that "The light can be seen as a distance of ten miles out to sea."³⁶

Efforts to improve the safety of the approach to Kawaihae were matched at the larger harbor of Hilo Bay. Almost an open roadstead instead of a protected harbor, because of its width, Hilo Bay had become an important anchorage by the middle years of the nineteenth century with the growth of agricultural enterprises in the area around Hilo town. Also, like Lahaina and Honolulu, it was an important mission station as well. By the 1860s, Hilo was doing a brisk business in coffee, arrowroot, and sugar. The town also included numerous provision stores, blacksmith and cabinet shops, bakeries, an important church, and a large centrally located building containing the courthouse, post office, and the governor's and the sheriff's offices.³⁷

The Hawaiian government, eager to encourage commercial development at Hilo, pressed for a lighthouse to guide ships entering the bay. After much consideration of various alternatives, a decision was made to build a signal at Pauka'a Point, near the entrance to the bay. Constructed of wood, the structure was completed in August, 1869 at a cost of \$325.³⁸ Lit with a conventional sperm oil lamp, the Pauka'a Point lighthouse proved unsatisfactory to most mariners, who could only see the light when approaching Hilo Bay directly from seaward. L. Severence, a Maine immigrant appointed sheriff of the island of Hawai'i, called for improvements, and in 1873, a kerosene lamp was substituted. This, in turn, improved visibility to a distance estimated at ten or twelve miles.³⁹ To further improve the situation, a second, smaller light was added on the town's wharf as well.

In 1880, the Pauka'a Point lighthouse was described as a plain, fixed light, with an elevation

of fifty ft above sea level.⁴⁰ Despite constant complaints by mariners and the pressure of Severence, nothing was done to improve the light until 1890, when a new tower was built for Hilo Harbor at Pauka'a Bluff, above the old marker. The new light featured two white lights, set at eighteen inches apart, on a horizontal line parallel to the coast. The wood-frame tower was 25 ft tall, putting the lights at 159 ft above sea level.⁴¹

The Hawaiian government's efforts at Hilo and Kawaihae were matched elsewhere on the island. In 1889, C.L. Wright, president and manager of the Hawaiian Railroad Company requested that a lighthouse be built at Mahukona, north of Kawaihae, in order to facilitate shipping from North Kohala, an important sugar-producing area, served by a newly built rail line. Wright wrote that "Foreign vessels call here about every three weeks and they often lose much time not knowing where to come in. In thick weather it is also hard for steamers to find the place. In addition it will be of material assistance for vessels bound up the channel."⁴²

The new Mahukona lighthouse was a stone structure, built upon a rock ledge. A truncated cone, twelve ft in diameter at the base and reducing to three ft at the top, the lighthouse was constructed of a combination of rubble stone and concrete. Its total elevation was fifteen ft, giving the signal a height of approximately 75 ft above sea level. It was lit by a one hundred candle-power kerosene lamp, mounted in a wood lantern. The signal was visible from about nine nautical miles, according to W.D. Alexander, surveyor general for the Kingdom, when reporting on completion of the lighthouse in 1889.⁴³

Wright, his company's interests linked strongly to improved navigation, pressed for additional lighthouses in the years just after placement of the Mahukona light. In 1891, he requested a lighted beacon on the coast of Kohala, near the new Kohala mill. He also asked for another light near Makahanaloa, southeast of the Kohala mill and seven miles north of Hilo.⁴⁴ Unfortunately money was not available, and construction would wait until 1897. In that year both beacons were completed to the same design — a wood frame, forty-ft tower topped by a white-painted lamp room. Provided with lenses manufactured by the Paris firm of Barbier and Benard, both lights were visible from ten miles

at sea.⁴⁵ Neither the Makahanaloa lighthouse nor the second light built at Kauhola Point had resident keepers but were tended by workers with residences elsewhere. By the early part of the twentieth century, both facilities were in poor condition and considered unsafe.⁴⁶

There were sporadic efforts elsewhere to provide navigational aids on the island of Hawai'i. Together with fixed markers and buoys, another lighted beacon was provided on the Hamakua coast between Pepe'ekeo and Kukuihaele in 1890. Placed on an exposed promontory of broken ledges, the Laupahoehoe beacon was intended to guide ships along the northeast shore of the island, toward landings used by several sugar companies. Consisting of a thirty-ft wood trestle tower, surmounted by a fixed, kerosene-powered light, this marker proved largely ineffective, because of its poor visibility. Like the Makahanaloa lighthouse and that at Kauloa Point, this lighthouse had no resident keeper.⁴⁷

By the early years of the twentieth century the island of Hawai'i had a total of fourteen beacons, seven built by the Hawaiian government and seven paid for privately. When surveyed in 1904, at the time the U.S. Light House Board had agreed to take over the management of lighthouses and other markers in the Hawaiian Islands, they were seen as completely inadequate to their purpose:

Most of these stations are in such a dilapidated condition that they should be rebuilt; failing that, they should be largely repaired, and in most cases the present old and poor illuminating apparatus should be replaced with full-powered lights of proper orders. The coasts need to be strongly lighted, because of the many sugar plantations on which there are strong electric lights visible many miles at sea.⁴⁸

Developments on the island of Hawai'i had been paralleled by efforts on Kaua'i. An important site of sugar production from the 1830s, Kauai, the northern-most of the Hawaiian Islands, had a checkered history of installing navigational aids. Most of the earliest beacons were built and maintained by private businesses. By 1884, there were fourteen sugar plantations on the island, with a total of eight mills. Shipping sugar to O'ahu required landings close to the plantations. By 1900, three were twelve landings, each marked by lights to guide approaching vessels.⁴⁹

All of these lights were modest lanterns, sometimes hand-held, but more typically lights mounted on wood posts. Located on both sides of Hanama'ulu bay, at Kapa'a landing, at Anahola Bay on the east side of the island, and at Hanapepe, Kaunaloa, and Waimea Bays on the south shore, these beacons were placed about fourteen to eighteen ft above sea level and consisted of kerosene behind red glass to distinguish them from the plantation lights. None had a visibility beyond three miles at sea.⁵⁰

At 'Ele'ele landing on Hanapepe Bay a more ambitious light had been established in the late nineteenth century. Fitted with a reflected red light, the lamp was placed on a simple wood trestle tower 36 ft tall.⁵¹ However, the only substantial marker on Kaua'i was built at Nawiliwili on Ninini Point, near the island's principal town of Lihue. Established in 1897, the wood-frame, forty-ft tower was paid for by the Hawaiian government. It featured a kerosene lamp, enhanced by a reflector. The light, situated seventy ft above sea level, was visible at ten miles at sea. Unlike the other markers, the light station featured a modest keeper's dwelling. It was first occupied by Manuel Souza, an immigrant of Portuguese decent from Massachusetts.⁵²

By the beginning of the twentieth century, the islands of Maui, O'ahu, Hawai'i, and Kaua'i had only eighteen lighthouses, nineteen unlighted day beacons and twenty-one buoys, along with a number of other types of markers, for a total of some seventy navigational aids. Of these there were only five significant lighthouses, which might be considered landfall markers, with the remainder of the lighted beacons being essentially harbor markers.⁵³ There were no lighthouses on the islands of Lana'i or Kaho'olawe. Little Molokini near Maui would have its first lighthouse only in 1910. The island of Ni'ihau would not have a lighted beacon until World War II.⁵⁴ It was generally agreed by local business interests and by mariners that Hawai'i's aids to navigation were inadequate and poorly conceived. As the U.S. Special Commissioner reporting on Hawai'i's lighthouses explained in 1903:

The lighthouses [in Hawai'i] are generally of a very crude character, the one on top of the custom house in Honolulu being a lantern with a red cloth tied around it.... I understand that there is not a single revolving light on the island coast. On the island of Hawaii there are but six lights and they are all "fixed," so-called, two small colored ones and four white ones, and all very cheap and of short range.... The keepers are paid from \$25 to \$30 a month.⁵⁵

Early Navigational Markers on Moloka'i

The island of Moloka'i was no different from other islands during the nineteenth century with regards to the provision of navigational aids. The first lights established at Moloka'i were those placed at Kaunakakai in 1880. A modest anchorage for inter-island trade and travel from and to Moloka'i, Kaunakakai was really the only port serving the island. Relatively unprotected and with a shallow bottom, the harbor required that ships calling at Moloka'i depend on barges and shallow draft boats to unload cargo or take on or off passengers.⁵⁶

Nonetheless, the use of the harbor increased by the 1870s; and local businessman Rudolph William Meyer was asked by the minister of the interior H.A.P. Carter to select locations for front and rear range lights to guide ships coming into the harbor. Meyer selected the sites and supervised the erection of wooden spars carrying ordinary kerosene lamps. Assigned a local keeper, at a salary of eight dollars a month, the range lights were placed in service in 1880. Despite their small size, the lights were reported visible at between five and seven miles at sea.⁵⁷

The lamps for the lights were lit each night around sunset. The keeper was responsible for cleaning the lamps each day and ensuring their reservoirs were refilled. In 1889 Samuel Kainali was the keeper. He sometimes had difficulty collecting his salary. Meyer, writing on his behalf to the minister of the Interior complained that "Samuel Kainali has called upon me for his money, three months wages to March 31, 1889, at eight dollars a month."⁵⁸ By the turn of the century, little had changed, and the keeper, then Joseph N. Uahinui, still received the same salary.⁵⁹

Although a report completed in 1903, prior to the U.S. Light House Board's assumption of responsibility for Hawai'i's lights, called for a masonry lighthouse tower outside the harbor entrance, this proposal was not acted upon.⁶⁰ The lights themselves were replaced and set on by new wood posts. The front range light was placed on a forty-ft post "on the northerly side of the Kai O Kalohi Channel." Its color was changed from red to a fixed white light. The rear light, located about 160 yards from the front light, continued to display a red signal.⁶¹ Further minor changes were introduced

in 1907.⁶²

Whereas the range lights at Kaunakakai were in the longstanding tradition of harbor lights, aiding small ships coming into the anchorage, the light at La'au Point on Moloka'i's southwestern tip was a landfall light. As such it was intended primarily to aid vessels approaching the Hawaiian Islands from abroad.

The Treaty of Reciprocity between the Kingdom of Hawaii and the United States signed in 1875 resulted in a further expansion of Hawai'i's sugar industry and increased maritime commerce between Hawai'i and the United States.⁶³ There was also increased traffic from other countries seeking landfalls in the Hawaiian Islands in order to safely navigate into Hawaiian harbors.

In 1878, the American ship *H.N. Carleton* struck the shore on the west end of Moloka'i and was wrecked there.⁶⁴ This event made it apparent that better provisions would need to be made to aid the increasing number of ships entering the twenty-five mile wide Kaiwi Channel from the north, on their reach into Honolulu. Diamond Head served in the daytime as a landfall on O'ahu, but no comparable landmark existed on the Moloka'i side of the channel. Moloka'i's western shore consisted of a sandy shoreline and low-lying bluffs, the latter rising gradually to mountains in the east. This made navigating the passage difficult, even in daylight. Navigation was particularly hazardous at night.⁶⁵

In 1880, the Hawaiian Legislature appropriated \$2,500 for the construction of a lighthouse on the western side of Moloka'i. Rudolph William Meyer was again given the assignment to select the best site.⁶⁶ Meyer chose La'au Point (also known as Kalaeokala Point), the south-westernmost tip of the island. Remote and barren, Meyer reasoned this would be the most visible point and also a location to which building materials and supplies could be easily delivered. Writing to minister of the Interior H.A. Carter, Meyer enthusiastically reported:

Nature has favored the place with a little projection about 25 ft above the level of the sea and by going 65 ft from the extreme point there is ample room for a structure 25 ft high or even

more if desired. This would elevate the light to about 50 ft above sea level and can be distinctly seen from a distance of nearly ten miles. I was there at low tide and could not discover any breakers further out than 400 ft in a westerly direction and 170 ft in a southerly one. Vessels can therefore come very near without danger, thus making a very high structure unnecessary.⁶⁷

Although the Hawaiian government's intention had been to build a stone tower, there were no readily available materials near the site. Meyer suggested, instead, that a wooden tower be built, "which in this locality being an extremely dry one, will stand for many years without repairs." Meyer also identified a good location for off-loading materials, supplies, and workmen for the project, about one and a quarter miles north of the point.⁶⁸

Meyer's plan, to which Carter apparently agreed, was to build the structure for the tower in Honolulu, and then have it assembled on Moloka'i after shipping. In the interim, Meyer argued that a temporary wood spar, carrying a kerosene lantern, be placed on the site, similar to the solution carried out for the Kaunakakai range lights. Meyer also took the initiative to negotiate a lease for the property from its owner, a woman of Royal Hawaiian lineage named Kulikolani.⁶⁹

In 1881, a contract was awarded to H. Hackfeld and Company of Honolulu to build the lighthouse structure. The final decision was to take the bigger step and build a stone tower, as originally planned. Native workers were employed to gather boulders and stones and haul them to the site.⁷⁰ By December the work was completed. A Notice to Mariners was prepared by the minister of foreign affairs:

On and after the FIRST of January, 1882, there will be exhibited on the extreme Southwest Point of the Island of Molokai... a fixed white Fresnel Light of the Fourth Order, showing all points of the compass. The Light is fifty ft above sea level and is visible from a vessel's deck in clear weather a distance of eleven miles. The Tower is painted white; the lantern red.⁷¹

Shortly before completion of the La'au Point station, John Warren Burrows was appointed keeper at a salary of sixty dollars a month — a figure high for keepers by Hawai'i standards. Burrows worked throughout December, 1881, assembling the Fresnel lens and setting the entire apparatus in

the cupola of the tower. He was housed in the modest keeper's quarters located on the point, adjacent to the lighthouse.⁷²

Anticipating the kinds of problems later facing the keepers at Kalaupapa, Burrows experienced a life of isolation and difficulty. Revealed through his lengthy correspondence with Meyer, who remained a point of contact for the Moloka'i lighthouse operations, life for the keeper at La'au Point was different from that of those assigned to Hawai'i's other light stations.⁷³ La'au Point was really the first of the light stations in the Hawaiian Islands to have been established to serve as a landfall marker for ships entering a channel. All of the others up to that point had been harbor or anchorage lights, such as those at Honolulu or Lahaina or at Pauka'a Point and Kawaihae on the island of Hawai'i. Barber's Point lighthouse, which, like La'au Point lighthouse was a landfall marker, would not be completed until 1888; and even then, would not be as isolated as La'au Point.

Throughout his tenure, Burrows faced problems in managing the light. It was sometimes difficult to get supplies, including oil for the lamps, onto the point. A reliable source of water was never found, and the station had to rely on casks of water brought to the point by lighter.⁷⁴ Within three years, both Meyer and Burrows admitted that the original lamps worked poorly with the Fresnel lens, never allowing the apparatus to function at full capacity. Two successive lamps delivered in July, 1884 and in August, 1885, performed poorly or leaked and further replacements had to be requested.⁷⁵

Although Burrows's salary was increased to seventy-five dollars monthly in 1882 -- in recognition of the problems he faced -- even this was rarely sent on time. At times Burrows faced the problem of no water, having occasionally to transport it himself.⁷⁶ The same was true of essential fuel for the lamps, which at times ran out. In July, 1891, after nearly ten years at the station, Burrows wrote the following letter to C.N. Spencer, the minister of the Interior:

I have been for nine and one half years Light Keeper at this place at a salary of \$75 a month without rations. Out of this sum I have to pay an Assistant \$25 per month including his board. I also have to bring all the oil (with the exception of 40 cases landed here) from Kaunakakai

20 miles each way, besides all my own food etc. For this purpose I am obliged to keep a large stock of pack animals. In former years I have been able to raise a few vegetables, which helped me out a little. But of late it has been so dry nothing would grow. My water still remains unfit for use. We are getting water from Haleolono, 10 miles distant. I don't think there is more out of the way, inconvenient place in the Kingdom than this. The landing is never to be depended on from one day to another. In consideration of the above disadvantages and inconveniences I humbly request Your Excellency to increase my Salary to \$100 per month from July 1, 1891.⁷⁷

Burrows's request was turned down, despite further efforts on his behalf by Meyer. However, he later received water filters and improvements were made in securing the necessary supplies of oil for the lamps.⁷⁸

Burrows would remain at the station, with his Hawaiian wife and several children, until his death in 1898. He was replaced immediately by his son, J.R. Burrows, then a young man of 26, well accustomed to life at the isolated station.⁷⁹ The senior Burrows had worked hard as the keeper and had received little help and recognition for his service or the difficulties under which he worked. This would in many ways be typical of life for keepers on Hawai'i's more remote landfall light stations and would suggest the conditions under which keepers at Kalaupapa would later work.

In 1902, the La'au Point lighthouse, then under the charge of Burrows's son, was rebuilt and repainted. Extensive repairs were made at the time as well to the keeper's cottage. In 1906 the original stone lighthouse tower was replaced by a thirty-five-ft, wood-frame structure, located just adjacent to the older tower and incorporating some of the stones as a foundation.⁸⁰ In 1912, the station, then under the control of the U.S. Light House Board, would be automated and a wood, trestle tower would be built on the bluff behind the earlier station. At an elevation of 151 ft above sea level, the new automated light was visible at eleven miles at sea.⁸¹

The U.S. Light House Board Assumes Control

In the summer of 1898, President William McKinley signed a joint resolution of the U.S. Congress annexing the Hawaiian Islands to the United States. Although the Republic of Hawaii,

proclaimed in 1893, retained control of the government, sovereignty of Hawai'i was transferred formally to the government of the United States on August 12, 1898, an occasion marked by a ceremony held in Honolulu.⁸²

In 1902 members of a Congressional committee arrived in the Hawaiian Islands to make an investigation of navigational aids and public buildings. Under the authority of Leslie M. Shaw, Secretary of the Treasury, W.H. Eustis, Special Commissioner, reported on the condition of Hawai'i's navigational markers. He relied on the advice of Lieutenant Hugh Rodman of the U.S. Navy, who had visited the Hawaiian Islands earlier in the year.⁸³

The initial report of the Hawaiian Investigation Committee presented a bleak picture of the current status of Hawai'i's lighthouses. Henry E. Cooper, Secretary of the Territory of Hawaii in his testimony before the Senate Committee on the Pacific Islands concluded:

The coasts and harbors of Hawaii are woefully deficient in lighthouses. There is only one first-class light-house in the Territory. This is on Diamond Head, overlooking the harbor and city of Honolulu. This light cost about \$15,000; the lens is of the first order. There are a few other inferior lights established at different points, but they are wholly inefficient to meet the requirements and just demands of the rapidly increasing commerce of the Hawaiian waters.⁸⁴

The report continued:

These lights have all been erected either by the monarchy or the late republic, and all are at present maintained, kept in repair, and operated at the expense of the Territorial government. The total cost to the Territory for maintaining and operating all the light-houses of the Territory for the past fiscal year ending June 30, 1902, was \$6,727. Of this amount \$1,054.88 were for repairs.⁸⁵

On January 24, 1903, a more complete report of the Congressional commission was published. Signed by W.H. Eustis, representing the U.S. Department of the Treasury, it argued strongly for the intervention of the federal government in matters pertaining to lighthouses and other marine markers:

The light houses on all the islands are still under the control of the Territorial government. There is universal desire on the part of governmental officials and citizens generally that these light houses and buoys should be transferred to the Federal Government. It seems to me most fitting and proper that this should be done at an early day.... The lights used in the light-houses throughout the island, except Diamond Head Light, are ordinary oil lights, either double wicks or circular burners. Diamond Head Light is a lense of the dioptric type of the third order, showing a fixed white light.... There is no difficulty from an engineering standpoint, in the erection of light-houses, as all the sites along the shore are sufficiently elevated so that no tall structures are required.⁸⁶

Just prior to the publication of the committee's report, or in 1902, Prince Jonah Kuhio Kalaniana'ole was elected to the U.S. House of Representatives as a non-voting member of Congress and delegate from the Territory of Hawaii. Kuhio was aware of initiatives to transfer responsibility for the lighthouses to the federal government and became a strong advocate in Washington. He soon learned that the territorial legislature had either anticipated or preempted the deliberations in the U.S. Congress and had voted to discontinue funding appropriations of lighthouses after December 31, 1903.⁸⁷

Kuhio approached the U.S. Navy Department, asking for their assistance, but was informed that authority for navigational aids rested with the Light House Board, not the Navy. The Light House Board in turn informed him that it could do nothing at the time and had to await the decision of Congress. Discussing the matter with the Speaker of the House, Kuhio was told that a special \$25,000 emergency fund might possibly be used for such a purpose. Unfortunately, the clerk of the House Appropriations Committee ruled that Hawai'i was ineligible for the monies because it was an "insular possession." Hawai'i's territorial status did not seem to argue on its behalf.⁸⁸

As the December deadline approached, Kuhio found support in the U.S. Department of the Treasury. On December 23, 1903 the comptroller of the U.S. Treasury decided that "appropriations for the Light-House Establishment ... could be extended for the maintenance of the light-houses and buoys" of Hawai'i.⁸⁹ Five days later, on December 28, President Theodore Roosevelt ordered by special proclamation that the lighthouse service of the Territory of Hawaii be taken over by the U.S. lighthouse service, under the jurisdiction of the Light House Board, and that it be placed

administratively within the Department of Commerce and Labor along with other functions of the board.⁹⁰

On December 29, 1903, the U.S. Light House Board was officially directed to take charge of the Hawaiian lighthouse service. As relayed in the annual report of the Department of Commerce and Labor, "The Board, with the approval of the Secretary of Commerce and Labor, at its session on January 4, 1904, ordered that 'the boundaries of the Twelfth United States light-house district be extended so as to include within it the Hawaiian Islands and their dependencies.'"⁹¹

With this shift in responsibility, the lighthouses and other marine markers in the Hawaiian Islands entered upon a new phase in their history. No longer subject to the wavering aims and uncertain funding of the Hawaiian government, Hawai'i's navigational aids would become part of a vast organization, with considerable funding, man-power, and technical expertise. Hawai'i's lighthouses were to become fully modern. They were also no longer fully the domain of the Hawaiian Islands but an integral component of a federal system.

The organization within which Hawai'i's lighthouses and other navigational aids were subsumed was a mature and complex entity. The government of the United States had been unique in accepting responsibility for the construction and maintenance of navigational aids; European countries had long followed a tradition of charging "light dues" or other kinds of direct duties (or in some cases local or private subscriptions) for the construction of lighthouses and other markers, much as had occurred in Hawai'i during the nineteenth century.⁹² Prior to the American Revolution each of the thirteen colonies had been responsible for their navigational aids. These had been of varying quality, but included twelve lighthouses along the eastern seaboard all built before 1771. (Several of these had been damaged during the war and had been either rebuilt or repaired in the 1770s or early 1780s.)⁹³

In 1789 the first Congress of the United States passed an ambitious and unprecedented law for the country to take on full responsibility for all navigational aids and for the funds to support such

an undertaking to come from the national treasury. This was in fact the ninth act passed by Congress and it would have far-reaching impacts on the development of trade and maritime commerce in the country. Placed under the jurisdiction of the U.S. Treasury Department, what was to become the lighthouse service assumed control of the existing lighthouses and other navigational aids and began a slow program of constructing new lighthouses and other markers.⁹⁴

Operations of the early "Lighthouse Establishment," as it was first known, were handled by the commissioner of revenue, within the Treasury Department, until 1802, when the secretary of the Treasury, Albert Gallatin, assumed direct supervision of the organizations activities.⁹⁵ However, because the country was small during these formative years, other high officials often took a direct interest in the construction of individual lighthouses and even the details of contracts.⁹⁶ But by the first decade of the nineteenth century, this was beginning to change and the organization assumed greater authority and independence.

Still, a number of important lighthouses had been constructed by 1800. These included those at Cape Henry, Virginia (completed in 1791); Portland Head, Maine (also completed in 1791); Tybee Island, Georgia (1791); Seguin, Maine (1795); Bald Head (Cape Fear), North Carolina (1796); Montauk Point, New York (1797); Cape Cod, Massachusetts (1797); Cape Hatteras, North Carolina (begun in 1798); Ocracoke, North Carolina (also begun in 1798); Gay Head, Massachusetts (1799); and Eaton's Neck, New York (1799).⁹⁷

By 1810 fully nineteen additional lighthouses had been constructed, sixteen of which were constructed between New York and Canada along the New England seaboard. These included lights at Gloucester, Massachusetts (1801); Chatham Harbor, Massachusetts (1808); Franklin Island, at Muscongus Bay, Maine (1807); and Whitehead Island, at the entrance to Penobscot Bay, also in Maine (1807). Along the South Atlantic Coast, in addition to the completion of the impressive lighthouses at Cape Hatteras and that at Ocracoke, the Lighthouse Establishment completed a light at Smith Point on the Chesapeake Bay and lights at Old Point Comfort (1802) and New Point Comfort (1805) in Virginia.⁹⁸

In 1813, responsibility for navigational aids was shifted back to the commissioner of revenue, who continued to administer the lighthouse program until 1820, when the Lighthouse Establishment came under the authority of the Fifth Auditor of the Treasury Department. The Fifth Auditor at the time was the hard-working bureaucrat Stephen Pleasonton, who became known by the unofficial title of general superintendent of lighthouses. In control of the operations of lighthouses as well as many other revenue matters until 1851, Pleasonton was instrumental in building up the organization, overseeing its transition to what would later be titled the Light House (or Lighthouse) Service.⁹⁹

By the early 1840s, Pleasonton had a staff of nine clerks, four of whom were assigned solely to lighthouse matters. Additional administrative work was assigned to local collectors of customs, who were given the title of superintendent of lighthouses for their jurisdictions. The collectors had the responsibility of selecting sites for lighthouses and other marine markers, oversaw the purchase of land, and supervised construction. They also dealt with hiring and firing keepers, authorizing repairs to light stations, and seeing that supplies were delivered and paid for.¹⁰⁰

Pleasonton carefully supervised all operations and verified all expenditures. Lacking technical expertise in maritime activities, Pleasonton relied upon Winslow Lewis, a retired sea captain and inventor, for advice on new technology, especially the types of lamps and lenses to be employed in the lights. This lack of professional background impeded some aspects of the service's activities, although the lighthouse service's finances were well controlled through Pleasonton's diligence.¹⁰¹

The operation of the Lighthouse Establishment under Pleasonton was not universally applauded. Periodic wrecks and other evidence of shortcomings led to public pressure throughout the early decades of the nineteenth century. In 1837, at the request of the Treasury Department, construction of a significant number of new lighthouses was authorized by Congress. Uncertain of the efficacy of the lighthouse service Congress also provided that inspections be made of future proposed sites to ensure that no duplication of efforts occurred.¹⁰² Finally, in 1838 a new act provided for the division of the U.S. lighthouse service into eight districts, six along the Atlantic seaboard and two for the Great Lakes. The law also called for the assignment of a U.S. naval officer to each

district, in order to upgrade the professional caliber of operations.¹⁰³

By 1842, the Lighthouse Establishment oversaw the operation of 256 lighthouses, 30 floating lights, and many more buoys and beacons, most of them located along the northeastern seaboard of the United States. But by this period there were also many lighthouses along the southern seaboard and also lighthouses marking significant landfalls and hazards on the Great Lakes.¹⁰⁴ Most of the newer lighthouses were built of brick or stone, usually covered with mortar. The majority were painted white, but some were left unpainted or, alternatively, decorated with distinctive markings. Their height varied, depending upon the elevation of their sites and the specific needs of the localities in which they were situated. Most of the towers were circular in section, others were octagonal or otherwise multi-faceted.¹⁰⁵

The earliest lighthouses were fitted with oil lamps, often of limited effectiveness. Beginning in the late eighteenth century, simple, single-wick lamps were replaced at many light stations by multi-wick lamps, known as "spider lamps." Despite the fact that they performed badly, this type of lamp remained in use at many stations until 1812, when the new Argon lamps, fitted with parabolic reflectors, were introduced throughout the lighthouse service in the U.S. It would not be until 1838, with Congressional intervention, that the U.S. began to introduce the far more efficient Fresnel lenses into the service.¹⁰⁶ (See discussion of lenses and lighting apparatus below).

Pleasanton conducted the lighthouse service with great efficiency and was proud in his report of 1842 to point out that the cost of operation of lighthouses in the United States was half that of the United Kingdom.¹⁰⁷ Nonetheless both Congress and the public continued to be dissatisfied with the Lighthouse Establishment, and in 1847 the Corps of Engineers was assigned the responsibility for the construction of six new lighthouses then proposed -- a responsibility previously assumed by Pleasanton's office.¹⁰⁸ In 1851, a special investigating board was set up to look into the matter of U.S. lighthouses and other marine markers. The board's 760-page report concluded that the U.S. lagged significantly behind other countries in terms of the efficiency of its lights, despite the continual increase in the overall number of aids.¹⁰⁹

As a result of Congress's intervention, the U.S. Lighthouse Establishment was thoroughly reorganized. In the Treasury Department's appropriation act of March, 1851 Congress "authorized and required" the secretary of the Treasury to appoint an investigating board to include two high-ranking naval officers, two army engineering officers, a civilian of "high scientific attainment," and a junior officer of the navy to act as secretary. It was this initial board that wrote the critical report of the lighthouse service under the Fifth Auditor and led to the establishment of a permanent board of nine members the following year.¹¹⁰

Beginning in 1852, operations of the U.S. lighthouse service officially fell under the authority of the Light House Board. Comprised of well-regarded members of the naval and military establishment and civilian members A.D. Bache, superintendent of the Coast Survey and Joseph Henry, first secretary of the Smithsonian Institution, the board undertook to completely reorganize the system of navigational aids employed in the country. Soon after assuming their authority, the board reorganized the service into twelve districts.¹¹¹

Incorporating new territories under U.S. control, including California and the northwest coast, each district was placed under the authority of an inspector, whose duties were to supervise the construction of new lighthouses and other marine markers. They were also to see to the installation of efficient lighting devices and to see that all markers in their districts were kept in repair and good working order. Responsibility for personnel matters were still delegated to local customs agents, who saw to the appointment of keepers and the disbursement of funds for routine operations. However, by the late nineteenth century, these responsibilities gradually eroded and more and more of the operations of the service were assumed directly by the district inspector.¹¹²

Within a few years of the establishment of the Light House Board -- as operations became more complex and the authority of customs officers in operations declined -- the administrative structure of the Board expanded to include both an inspector and a district engineer in each of the twelve districts. The inspector, who remained a naval officer, was responsible for the general superintendence of lighthouses, lightships and other marine markers in his district; the engineer,

usually recruited from the Army Corps of Engineers, oversaw the placement and construction of lighthouses and other markers. The board also set up a central depot for dispersing supplies and equipment to lighthouses and light vessels. This was located in the Third District at a site in Staten Island, New York.¹¹³

Under the Light House Board's authority the quality of aids to navigation in the United States improved immeasurably. For the first time, the placement of new lighthouses was based strictly on maritime considerations, not the influence of local inspectors or politicians. The efficiency of operations also improved dramatically. Lighthouses and lightships had to maintain good quality lights; their keepers and skippers had to perform their duties efficiently and competently or they were quickly removed from their posts. Reinforced by the required three-monthly inspections undertaken by the district inspector, each of the districts witnessed an improvement in navigational aids, quickly making the United States one of the leading services in the world.¹¹⁴

One of many of the innovations introduced by the Light House Board was the annual publication of the *Light Lists*. Showing the location of each light, lightship or buoy, the *Light Lists* became a critical aspect of navigation in U.S. territorial waters, citing statistics on locations, changes to lights, range and visibility, the characteristics of lighthouses and their signals and much more. The *Light Lists*, in turn, were supplemented by periodic Notices to Mariners, which announced significant changes in lighthouses, their locations or characteristics.¹¹⁵

Many new lighthouses were built under the board's direction. Others were rebuilt or, in many cases, were given higher elevations in order to improve their visibility to mariners. Economy conscious as it was under the Fifth Auditor's office, the Light House Board, with its considerable technical knowledge, experimented with new lighting devices and alternative fuels. They ensured that all lights operated efficiently and quickly replaced damaged lamps and lenses. They improved the training of keepers and assistants and rationalized salaries and other compensation for the lighthouse and lightship personnel.¹¹⁶

On July 1, 1903, the Board was transferred from the Department of the Treasury to the Department of Commerce and Labor (after 1917, renamed the Department of Commerce).¹¹⁷ This was the same year that Hawai'i's lighthouses came under scrutiny by the Light House Board and the year before Hawai'i's lighthouses came under the control of the U.S. Lighthouse Board as part of the Twelfth District.

In 1910, Congress abolished the Light House Board and created a new Bureau of Lighthouses.¹¹⁸ Still situated in the Department of Commerce and Labor, the Bureau of Lighthouses followed many of the existing procedures of the earlier Board, although with some significant changes. Principal among these was a shift from the military and naval character of the older service, toward a more civilian-dominated administrative structure.¹¹⁹ The 1910 act establishing the bureau restricted the number of naval and military officers in the service, substituting civilian inspectors in most of the districts. Engineers from the Army Corps of Engineers were still assigned to the districts, to serve as technical advisors. But these officers had no role in the administrative aspects of the district's operations and served only as technical consultants.¹²⁰

The new Bureau also reorganized the overall structure of the lighthouse service. Soon after passage of the act, the service included nineteen districts, with a civilian inspector assigned to all but three of them. Most of the inspectors by this period were career lighthouse service employees and, while fundamentally civilian in character, the service was relatively free from political interference and favoritism.¹²¹ Under the overall authority of the new Bureau chief, George R. Putnam, the Bureau of Lighthouses set new standards for efficiency and organization.

By 1910, the U.S. lighthouse service had control over 11,713 navigational aids, distributed along all the coasts of the United States, the Great Lakes, and after 1904, the Territory of Hawaii. An inventory completed in 1913, listed 12,824 aids overall, including 1,462 lights above the status of river post markers, 51 lightships, and over 7,000 buoys of all types. The service also maintained 46 tenders [small boats], used to bring equipment and supplies to the often remote stations, and to aid the inspector in performing his duties.¹²²

Administered from the central office in Washington, the Bureau was placed under the authority of the Commissioner of Lighthouses, served in turn by a Deputy Commissioner. Also in the Washington office were a construction division, under the chief construction engineer; a naval construction division, under the superintendent of naval construction; a hydraulic division, headed by an assistant engineer; and the general office staff, supervised by the chief clerk. Each of the nineteen districts had an office located one of the principal cities in the district, and each district had its own construction and maintenance staff. Larger projects, such as the construction of new lighthouses, were supervised by the district offices in consultation with the Washington office.¹²³

Hawai'i would be placed under the Nineteenth District in 1910. The office of the district inspector was in Honolulu. Also included within the jurisdiction of Nineteenth District were markers on other Pacific islands, including, eventually, Midway, Guam, and American Samoa -- all added to the U.S. lighthouse service's responsibility in the early years of the twentieth century, soon after Hawai'i.¹²⁴ America's other Pacific possessions, most significantly the Philippines and Panama, were never subsumed within the U.S. lighthouse service, but maintained their own establishments.

By 1917, when the Commissioner of Lighthouses, George R. Putnam, wrote an overview of the U.S. lighthouse service, the United States had jurisdiction over an estimated 48,881 statute miles of seacoast, rivers and lakes. Some 47,192 were directly under the authority of the Bureau of Lighthouses, including 4,020 miles on the Great lakes and 5,842 miles of coastal rivers. Overall there were 14,947 aids to navigation, including lighthouses, lightships, range lights, and buoys maintained with an operating budget of approximately five million dollars annually. Nearly 6,000 people were employed by the service, including 1,783 keepers and assistant keepers; 1,524 responsible for range lights and light posts; 1,529 assigned to vessels; 610 in construction and repair; and 270 clerks and engineers. Subject to civil service rules and a merit system, the U.S. clearly had the most extensive and well managed system of navigational aids in the world.¹²⁵

Building of the First Kalaupapa Lighthouse and the Makapu'u Point Lighthouse

The lighthouse on the Makenalua Peninsula of Moloka'i would serve as a single link in this

vast network of American navigational aids. It was not, however, an insignificant addition to the roster of lighthouses in the Hawaiian Islands; and, indeed, would be one of the most ambitious undertakings of the Light House Board in the years immediately after they assumed responsibility for Hawai'i's marine markers in 1904.

Attention was first drawn to the importance of a lighthouse on the north side of Moloka'i island as early as the Hawaiian Investigation Report of 1902. As Henry Cooper, superintendent of Public Works for the Territory of Hawaii reported:

The great bulk of the Pacific commerce passes through the channel between the islands of O'ahu and Molokai. Many hundred vessels now pass annually through this channel, and the number is rapidly increasing, and there are, with the single exception of the light-house at Diamond Head, no light-houses whatever on the exposed points of either of these islands. There is a small light on the further point of the island of Molokai, but it is not visible for more than about five miles at sea.¹²⁶

In January, 1903, Lieutenant Hugh Rodman, U.S. Navy, submitted his more detailed report. Based on interviews with local merchants and mariners, as well as a personal investigation of existing lights and other markers, Rodman's report made a number of recommendations for improvements to existing beacons and the provision of additional aids. For Makenalua Peninsula the report suggested that a wooden, trestle type structure, fitted with a flashing red light, visible at sea a distance of ten miles, be placed at the "Leper Settlement on Molokai at a cost of \$1,000."¹²⁷

During the year 1903, the Light House Board, after receiving the testimony and reports on navigational aids for the territory, requested an appropriation of \$60,000 for a lighthouse at Makapu'u Point on O'ahu and another \$40,000 for a new lighthouse on Makenalua Peninsula. Congress turned down the request and did not appropriate funds for either project. The following year, the Board stressed again that a new lighthouse with a Fourth-Order Fresnel lens (the same as that used many years before at Honolulu Harbor) was still required on Moloka'i and that a light with a Second-Order lens (a much more powerful lens) was needed at Makapu'u Point. The 1905 annual report of the Light House Board further emphasized that "A fourth-order light is needed at this point

[Leper Settlement, Hawaii]. It is estimated that it will cost \$40,000." Finally, on June 10, 1906, funds were approved and appropriated for Makapu'u Point -- a total of \$60,000 as originally requested -- but nothing was allocated for Moloka'i.¹²⁸

The Light House Board continued to press for funds for the Makanalua Peninsula during the years 1906 and 1907. In their report to Congress they emphasized that the site was an ideal location for a lighthouse. On a dangerous coast with little relief, the Board emphasized, the Makanalua Peninsula jutted significantly out to sea, making it a natural landfall site along on an otherwise steep and curving coast. Still, many legislators were opposed to the idea. One of the principal arguments against the site, in addition to the cost, was the proximity of the proposed site to the Hansen's Disease settlement, a source of concern and prejudice for many.¹²⁹

While Congress deliberated, the Light House Board decided to proceed with some sort of light on the site. In 1906, the annual *Lights and Fog Signals of the United States (Light Lists)* contained the following entry: "Number 273: Molokai: Makanalua Light to be established."¹³⁰

Work on the light station at Moloka'i began late in the year 1905. Poor weather in January, 1906 delayed commencement of the project.¹³¹ Construction was under the charge of First Lieutenant J.R. Slattery, of the U.S. Army. Slattery's title was Assistant to the Engineer of the Twelfth Lighthouse District. Because of the health requirements imposed upon Moloka'i due to the presence of the now famous colony for sufferers of Hansen's Disease, Slattery had to secure special permits from the Territorial Board of Health, which administered the facility at Kalauppapa for himself and any workers brought to the site. As of mid-January he was still awaiting access permits. They were finally issued by Lucius E. Pinkham, President of the Board of Health, on January 22.¹³²

Workmen approved by the Board of Health aided some in the work as well. As Pinkham wrote to Slattery: "Superintendent J.D. McVeigh of the Leper Settlement ... will do all the hauling you desire and furnish clean labor. He advises you to delay sending material and men until the weather moderates and becomes settled. The storm has been quite severe and has done some damage."¹³³

Replying to McVeigh, Slattery wrote that he had

consulted the Weather Bureau and sea captains along the waterfront. They all seem to think that the weather is now settled and that the opportunity is favorable for sending men and supplies for the Light House at the Settlement by the *Likelike* [a small supply boat employed by the service] tomorrow.¹³⁴

Permits to go to Kalaupapa were issued to Frank Palmer, John F. Hunt, and Robert Gillispie, employees of the lighthouse service, to do the work.¹³⁵

Within a week, the first light station was completed. As the Light House Board reported in its annual report to the U.S. Department of Commerce and Labor:

On March 1, 1906, a fixed red lens lantern light was established on Makaanalua, island of Molokai, 64 ft above the water and 34 ft above the ground, on the top of a lead-colored mast, having at its base a small white house with lead-colored trimmings and a red roof.¹³⁶

The following year the Board reported that the dwelling for the keeper had been fully completed, a water tank had been installed, and minor repairs made to the station.¹³⁷ Although of limited utility, the new light demonstrated that least the first steps had been made to provide a safer passage along Moloka'i's north shore and that the Lighthouse Board had committed to providing navigational aids for the approach to the Kaiwi Channel to the west.

Efforts for a lighthouse at Makapu'u Point, twenty-five miles away from Kalaupapa, on the eastern tip of the island of O'ahu, roughly paralleled steps being taken at Moloka'i. First proposed as early as 1888 following an maritime accident involving the bark *S.N. Castle*, the Makapu'u light was intended to mark the other side of the Kaiwi Channel and serve as the principal landfall light for ships approaching Hawai'i from the west coast of the U.S. as well as those coming from South and Central America.¹³⁸

With pressure from ship owners, masters, and others, the minister of the Interior for the

Kingdom of Hawaii, Lorin A. Thurston, recommended a light be placed on the high jut of land forming the point. A formal request to the Hawaiian legislature was made in 1890, and by 1901, plans were being drawn up for a small masonry tower.¹³⁹ The Department of Public Works concurred with many of the earlier suggestions, with the exception of suggesting that a fixed lens be installed, rather than the flashing proposed by the lens manufacturer, Chance Brothers and Company of Smethwick, England.¹⁴⁰ The Department's report concluded "The point is high, and good stone for building is abundant in the vicinity. The estimated cost is \$10,000."¹⁴¹

Despite concurrence on the need for a lighthouse at Makapu'u Point, nothing would be done for several years. The primary reason nothing was done was that by 1902 it was evident that the U.S. government was going to intervene in Hawai'i's maritime commerce, and it was probable that costs of new lighthouses would be funded by the United States. Money for maintenance of existing lighthouses and other markers from the territorial government, in fact, had nearly dried up by the time responsibility for them was transferred to the U.S. Light House Board in 1904.¹⁴²

However, it was obvious to the Congressional Investigating Committee in 1902 that a signal at Makapu'u Point was much needed. As the Light House Board reported in its annual report of 1904 (covering activities of the previous year), "there is not a single light on the whole northern coast of the Hawaiian Islands to guide ships or warn them of their approach to land after a voyage of several thousand miles." The board recommended passage of an act for the construction of a lighthouse at Makapu'u Point, requesting an appropriation of \$60,000.¹⁴³

It would take another year for the U.S. Congress to consider the Makapu'u lighthouse again. But this time, discussions focused not only on the Makapu'u light, but on the need to provide funds for long delayed maintenance of all the navigational aids in Hawai'i. Makapu'u light became somewhat overlooked in the process of debate and discussion. However, the following year, 1906, the need for a light at Makapu'u Point became a priority again. The following report was heard by the Fifty-ninth Congress in its first session, January 9, 1906:

Makapuu Point is the extreme southeastern point of the island of Oahu. To the east of it is the Kaiwi Channel, which passes between the islands of Oahu and Molokai, which are about 25 miles apart. The harbor of Honolulu, the principal harbor of the central Pacific Ocean, is on the southern coast of Oahu, a short distance west of Makapuu Point... There is no light on the entire northern coast of the Hawaiian islands to guide ships or warn them as they approach those islands. The lack of such a light not only renders navigation at times very dangerous, but in bad weather or at night often compels them to slow down and await clear weather or daylight. With the increasing importance of the commerce between the United States and the Hawaiian Islands, and the commerce passing the Hawaiian Islands and stopping at Honolulu, it will be greatly to the advantage, speed and safety of vessels that this much-needed aid to navigation be provided.¹⁴⁴

As a result of the Light House Board's strong advocacy the bill was passed on June 10, 1906 and an appropriation of \$60,000 was made on June 30, 1906.¹⁴⁵

Goaded further by the much-publicized wreck of the ship *Manchuria* off the end of Makapu'u Point in August, 1906, efforts moved quickly to begin construction of the lighthouse.¹⁴⁶ In January, 1907, Oscar L. Strauss, secretary of the U.S. Department of Commerce and Labor cabled Territorial Governor George R. Carter that the President proposed issuing an executive order to reserve approximately ten acres of land for the lighthouse.¹⁴⁷ Carter, in his reply, clarified that only a portion of the land was actually owned by the Territory, and that that portion was under lease.¹⁴⁸

On January 12, 1907, President Theodore Roosevelt signed an executive order declaring that 9.82 acres be set aside for the lighthouse station. In addition to the public lands, an additional 7.906 acres were purchased from the Bernice Pauahi Bishop estate on August 29, 1907, and yet another 11.1 acres acquired the following April. This brought the total holdings to 28.826 acres.¹⁴⁹ The 1907 annual report of the Department of Commerce and Labor recorded that

A survey of the site was made and a deed was prepared. A road was completed to within about 600 ft of the proposed site for dwellings. Plans and specifications for the structures have been made, and work on the site will be begun soon.¹⁵⁰

The summit of Makapu'u Point is fully 647 ft above the sea. Within this rough, volcanic

terrain, a site was selected about 395 ft above sea level for the lighthouse tower. Dynamite was used to blast the ledge in preparation for the access road and the foundations for the lighthouse. A second road was constructed to provide access to the keepers' dwellings, which were to be located up-hill from the tower, in a more protected site. The houses were built of volcanic stone extracted from the hill and had thick walls, neatly painted white trim and red-tinted shingle roofs. Water for the keepers' use was pumped from nearly four miles away and was stored in a iron-banded redwood tank, with a capacity of 10,000 gallons. A paddock and barn were added as well, to house horses needed to bring supplies to the site. There was also a concrete oil house to hold kerosene cans for the lamp.¹⁵¹

The actual lighthouse tower was completed in October, 1908. Only thirty-five ft tall, because of the overall elevation of the site, the circular, concrete tower would wait for several months to receive its lantern and lens. Originally scheduled to receive a Third-Order Fresnel lens — and then later a Second or even a First-Order lens -- the Makapu'u light would eventually be fitted with a somewhat experimental "hyperradiant" lens. Displayed at the Columbia Exposition in Chicago in 1893, as part of the Light House Board's exhibit, the hyperradiant lens was a variation on a more conventional Fresnel lens (and actually the "top" of the seven orders originally set out by Fresnel), with a far greater diameter — in this case fully six ft of interior area surrounding the lamp. Designed for earlier type lighting devices, which rapidly were being superceded by the new incandescent oil vapor lamps introduced at this time, the hyperradiant lens was something of a dinosaur at the time of its installation.¹⁵² Still, once the decision had been made to have a lens of the First-Order, the Light House Board decided to make good use of the equipment they owned; Makapu'u Point's light would ultimately be the only one fitted with a hyperradiant lens within the U.S. lighthouse service.¹⁵³

On October 1, 1909, Makapu'u Point lighthouse was lit for the first time. Fitted with a modern incandescent oil-vapor lamp, despite having been designed for a less effective lighting device, the lamp and the lens created a combined output estimated at 29,000 candlepower, making it one of the most powerful lights ever installed. The occulting (flashing) light was visible at twenty-five miles at sea and served as the principal landfall light for the Hawaiian Islands for all ships approaching from the east.¹⁵⁴ For the first time Hawai'i had a first-class lighthouse guiding ships into the port of

Honolulu. (Robert Carse in his 1969 survey of lighthouses later estimated the true candlepower at as much as 150,000, giving the range as fully twenty-eight miles.)¹⁵⁵

The Makapu'u Point lighthouse was the most ambitious intervention by the U.S. Light House Board in Hawai'i at the time of its completion in 1909. The pole-mounted light at Moloka'i had been a temporary measure at best. But at other sites, more permanent signals would be established over the early years of the U.S. lighthouse service's involvement in the Territory of Hawaii. Indeed many hundreds of thousands of dollars were spent on the construction of new navigational aids — and the up-grading and maintenance of existing lighthouses and other markers — in Hawai'i between around 1905 and around 1912.¹⁵⁶

Among the lighthouses completed were those at Paukaa Point on the island of Hawai'i (established in 1907); on Pepeekeo Point, also on the island of Hawai'i (and also completed in 1907); Mahukona, Hawai'i (first displayed in 1907); Kailua, Hawai'i (lit in 1909); and Kauhola Point (established in 1912). On the island of Maui, lighthouses were built or substantially rebuilt at Lahaina (1905); Kauiki Head (1908); Nakalele Point (1908); Pauwela Point (1910); Hawea Point (1911); and Molokini Island (1911). Kaua'i received new lights at Nawiliwili Harbor, in 1906; at Kahala Point, in 1908; at Makahuena Point, also in 1908; at Kokole (1908); at Hanapepe (1912); and Kalauea Point (1913).¹⁵⁷

All of these new and improved lighthouses contributed greatly to the promotion of maritime commerce and also the safety of shipping in the Hawaiian Islands. Each marked a different significant passage or hazard and functioned together as part of a single, rationalized network of navigational aids. The new lighthouse at Moloka'i island would serve as another piece in the puzzle of maritime transport and commerce in the Pacific.

The Building of the Second Light Station at Kalaupapa

Almost as soon as the temporary light station and keeper's quarters had been completed —

in March, 1906 — on the Makanalua Peninsula on Moloka'i, plans were set in place for a more ambitious lighthouse and signal. On February 26, 1907, or approximately one year after funds were appropriated for the new lighthouse at Makapu'u Point on Hawai'i, an act was passed by Congress to build a new light on Moloka'i. On March 4 the same year, an appropriation of \$60,000 was approved by Congress at the request of the Light House Board.¹⁵⁸

By the middle of the summer, 1907, plans had been prepared by the Twelfth District's engineering office.¹⁵⁹ A recommendation for the site also had been completed. This, and preliminary drawings for the lighthouse, was forwarded to the Washington office of the Light House Board for their approval. Specified in a letter dated August 17, 1907, the Assistant Engineer for the Twelfth District recommended siting the tower "on the elevation known as Kalawa, in the peninsula of Makanalua, making out from the north shore of Molokai Island."¹⁶⁰

On September 5, 1907, A. Ross, Captain, U.S. Navy, and chairman of the Committee on Location of the Light House Board reported that the site recommended for the "proposed light and fog-signal on the north shore of Molokai Island, T.H." had been favorably agreed upon.¹⁶¹ Also on September 5, Henry S Pitchert, chairman of the Committee on Lighting wrote to concur with the location committee's report. He also expressed the recommendation that the proposed lighthouse be fitted with a Second-Order lens, elevated to a focal plane 226 ft above sea level, enabling a visible range of "21 ½ nautical miles." He recommended additionally that

in view of the proposition to put the hyper-radiant lens at Makapuu Point that the second order lens recently ordered for Makapuu be placed at Molokai Light Station, and that the characteristic flashing white every 20 seconds be retained.¹⁶²

On September 6, 1907, Colonel D. W. Lockwood, chairman of the Committee on Engineering wrote that preliminary plans for the lighthouse, prepared by "the Assistant to the Engineer of the Twelfth Light-House District" also had the concurrence of the committee. He recommended approval of the design with the following provisions:

The tower to be as shown on sheet 5-1, and so designed that it will take the 2nd order bi-valve lens and 1st order helical bar lantern recently ordered for Makapuu Light Station. The railing at the base of the lantern as shown on the sheet is objectionable and must be designed in the simple form shown on the standard lantern drawings. The floor of the lantern must be provided with an opening at least 7 ft in diameter in accordance with the lantern drawings.¹⁶³

Captain C.W. Otwell, the Assistant engineer for the Twelfth District continued to work out the details of the project and made further revisions to the plans. On April 28, 1908, Otwell conveyed a packet containing a location map to the then acting Governor of the Territory of Hawaii, Ernest Mott Smith:

There is also [Otwell explained in his cover letter] indicated a tract which it is proposed later to ask to be reserved for light-house purposes. There has as yet been no survey by which the definite description by metes and bounds can be furnished. The tract set forth includes, however, only enough land to accomodate [sic] the buildings of the light station and to provide a small tract of land upon which the keepers could raise a few vegetables.¹⁶⁴

The acting Governor, in turn, referred the matter to the superintendent of Public Works for the territory, replying to Otwell on May 4 and again on May 22, 1908. Governor Mott Smith's only concern was that the "Trig. Station called Kalawao" might be obstructed in some way, although he was assured, he informed Otwell, that this problem would be taken into account.¹⁶⁵

Work was delayed pending final approvals during May and early June. Otwell and his staff also had to complete the final drawings for the lighthouse tower and other structures and lay further groundwork for the acquisition of the property needed. In his report of July 1, 1908, Captain Otwell described the progress of the Moloka'i project during the previous fiscal year:

Outline plans for a second order flashing light were prepared and forwarded to the Board and approved. The location determined upon is near the Government Triangulation Station, Kalawao, Makenalua. The question of the setting aside of the necessary land for this station was taken up with the Executive Office of the Territory of Hawaii and acquiescence obtained for the setting aside of a tract of about twenty-five acres. A small party was dispatched to the location a few days before the close of the fiscal year for the purpose of carrying on the preliminary work of installing a water system and the plant. It is hoped that the light will be

placed in commission by the latter part of the present calendar year.¹⁶⁶

While on-site preparations were being made for construction during the last week of June, 1908, the actual survey of the plot to be acquired by the U.S. government was not completed until September. Carried out by F.H. Kales, Office of the Assistant to the Engineer, Twelfth Lighthouse District, a survey was completed by September 16 and signed by Otwell.¹⁶⁷ The plot, a trapezoidal shape, measuring about 1,230 ft along its longest side, 1,206 ft along the second longest side, and 998 ft and 658 ft, respectively, along the shorter sides, encompassed an estimated 27 and a half acres overall.¹⁶⁸ It descended from an elevation of about 105 ft to a low point of approximately 20 ft. The land, all of it public land, then owed by the Territory of Hawaii, was comprised of a broad sweeping slope of rough, sparsely vegetated volcanic out-crops and loose stone, following fairly regular contours and fanning out from the high point of the Kiikolu hill, an ancient volcanic rock form.

On October 27, 1908, following approval and submission of the survey to the Light House Board and to the Executive Office of the Territory of Hawaii, "certain lands within the Kalaupapa Leprosarium" as specified on the drawing, were acquired for lighthouse purposes by the U.S. government under Executive Order 962, signed by President Theodore Roosevelt.¹⁶⁹

As with the earlier light post, arrangements had to be made with the Hawaii Board of Health for permits for the workers. Concerned with preventing contamination by the disease through contact with the patients, the Board of Health was extremely cautious about issuing permits and strict in prohibiting interaction with the residents. This was obviously a point of frustration for the builders. Captain Otwell complained to Mark Robinson, president of Board of Health in July, 1908, "I have just learned that permits to leave as well as to visit the station are required."¹⁷⁰ Apparently, no simple procedure was ever put in place, and there was always some confusion over what was required. Occasionally emergency passes had to be issued for the work parties, as they sat in lighters [small boats] off the landing area, waiting to come ashore.¹⁷¹

The project would require a number of workers, although it is surprising, given the size of the

**Figure 1. Office of Assistant to the Engineer of the 12th
Light-House District, Honolulu T.H.; Molokai Light Station;
Survey of Site; Prepared under direction of Captain C.W.
Otwell, Corps of Engrs. Designed by F.H.K[ales], Drawing
No. L2-196, September 16, 1908. Board of Health,
Lighthouse Establishment, Hawai'i State Archives.**

DESCRIPTION OF LAND TO BE ACQUIRED
FOR LIGHT-HOUSE PURPOSES
#3 IN MAKANALUA
MOLOKAI DISTRICT, ISLAND
OF MOLOKAI, T. H.

FROM KALAWAO TRIG.
STA. MEASURE BY TRUE

ATTACHED AND DISTANCED
TO A CONCRETE PIER FOR
A PLACE OF BEGINNING.

284-12, 1200 TO A CONCRETE PIER.

TO A CONCRETE RIG
THENK TO A CONCRETE RIG

161° 0' ACROSS TO INITIAL POINT
CONTAINING 215 ACRES MORE

OR L-33
Survey by F.H. Kania

Office of Asst. to the Engineer
127 N. Light House Dist.
Memphis T. N.

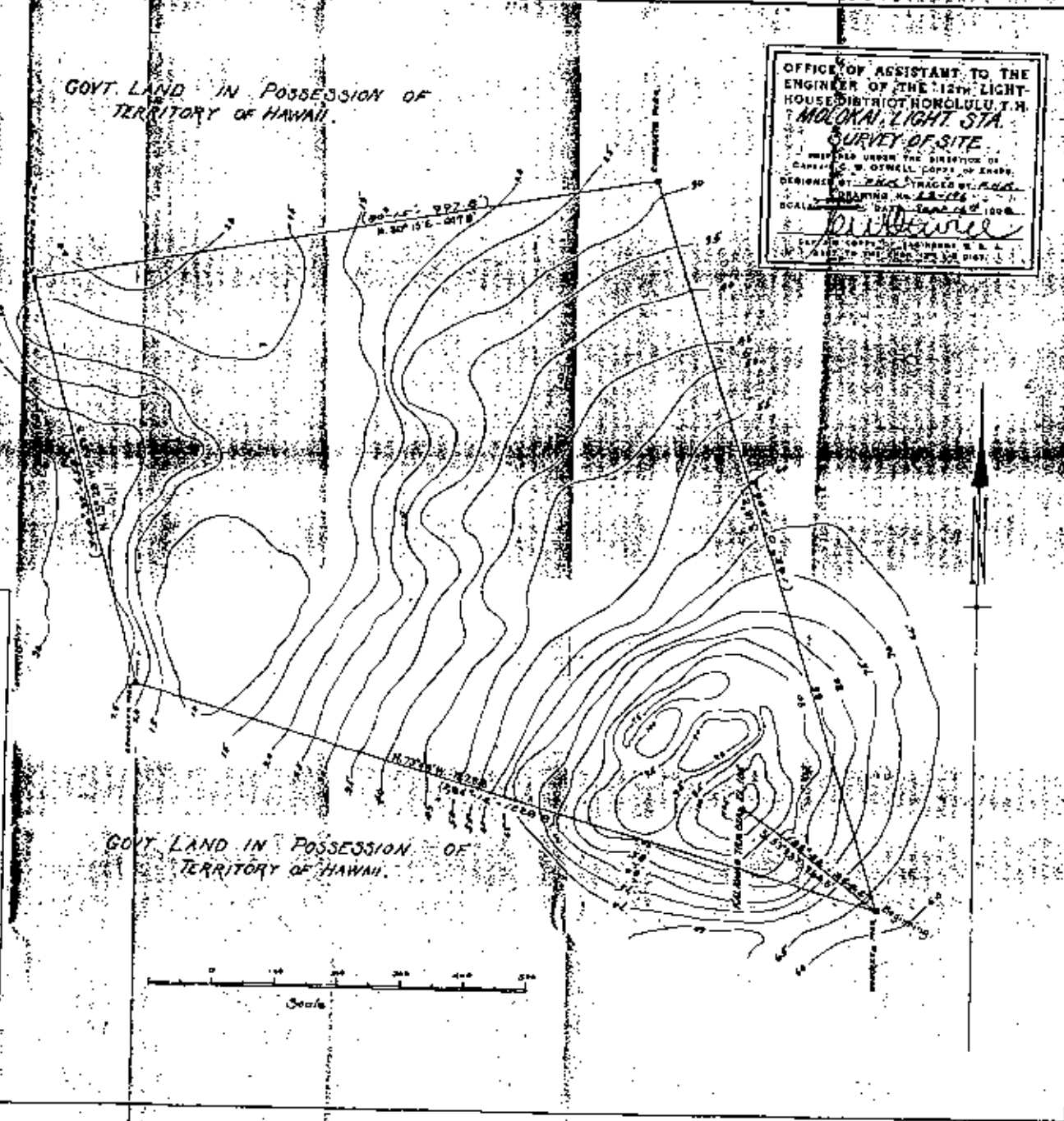
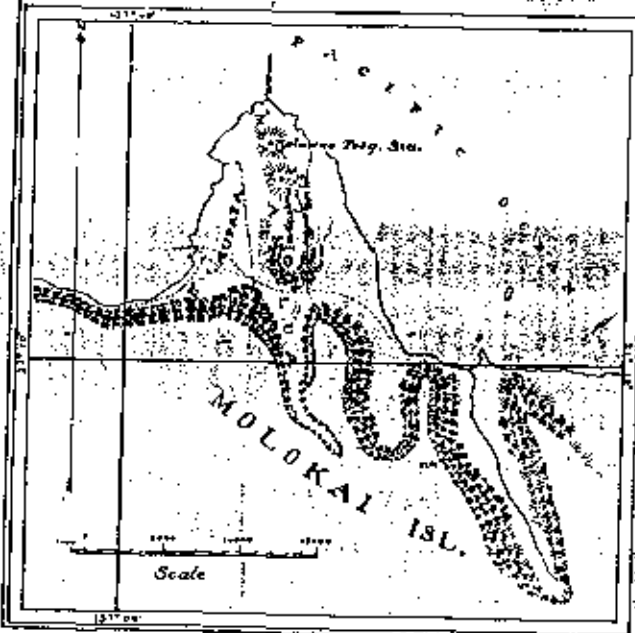
GOVT. LAND IN POSSESSION OF
TERRITORY OF HAWAII.

OFFICE OF ASSISTANT TO THE
ENGINEER OF THE 12TH LIGHT-
HOUSE DISTRICT HONOLULU, T.H.
MOLOKAI LIGHT STA.
SURVEY OF SITE

REPORTS UNDER THE DIRECTION OF
CAPTAIN C. W. OTWELL, Corps of Engineers,
DESIGNED BY PAUL TRAGED BY PAUL

SCALE: 1" = 100' DATE: June 10, 1998

FOR AN COPY OF THE HANDBOOK E. A. A.
DIST. TO THE CHAIRMAN OF THE DIST.



BEST COPY AVAILABLE

tower and the difficulties of construction in such a remote place, that the overall numbers were not greater than they were. Letters between Captain Otwell and Mark P. Robinson of the Board of Health actually name only fourteen workmen, although some other names may simply be missing from the records. These included Leslie E. Bailey; painters Thomas Kalawai, William Kau, William Haleole, and David Henry; carpenters A.F. Cook and Gene Gomard; pipe-fitters Robert Weber and Charles Marse; mason J.C. Picanco; plumber's helper K. Iwanaza; tinsmith T. Omori; and laborers George Kahapula and Joe Morse. We know too that Eugene Wagner, later foreman of the project, was also present from an early date.¹⁷³

Before actual work could begin arrangements had to be made for water on the site. It was immediately determined that the existing catchment and water-storage tank built for the existing, small station would not be sufficient either for the work party or for the station personnel once the new lighthouse was built. Captain Otwell, anticipating the problem as early as April, 1908, wrote to C.F. Cofer, an administrator with the Board of Health, "For construction purposes and for a permanent supply... the most feasible way to get water seems to be through the mains already laid for the settlement." Water for the settlement at Kalawao came from the Waikolu Valley, above the Makanalua Peninsula to the southeast. Otwell estimated that 300 gallons a day would be required during the work period, and suggested that the water "could be drawn off during the day or night as most convenient."¹⁷³ On June 9, 1908, Cofer wrote to Otwell that permission for the line had been granted by the Board of Health.¹⁷⁴ That month a party of workers began laying the pipe from the main. A second group was employed building a road from the Kalaupapa landing to the proposed station site, about two miles away. Otwell himself supervised borings of the soil and rock surface to determine the suitability of various spots within the site for building and to estimate the carrying requirements of the foundation.¹⁷⁵

That summer and fall, work got underway on the construction project. In July a concrete shed and a second wood-frame building were erected near the Kalaupapa wharf to store building materials and supplies.¹⁷⁶ Because the shoreline at Kalaupapa was shallow, cargo and men had to be transported from larger ships or boats by means of lighters and barges to the wharf. The lighthouse service did

not have any of its own ships at this period and had to depend on local, inter-island freighters to carry workers and building materials, as well as food and other supplies, to Moloka'i. Smaller ships used included the *Likeli*, the *James Makee*, and the *Iwalani*.¹⁷⁷

Once unloaded on shore, materials were carried to the site by means of donkeys, horses and carts along the new road, running along the northwest and north edge of the peninsula. These included many tons of cement, sand, lumber for forms and for the construction of outbuildings and later keepers' cottages, nails, iron, glass, machinery, and tools. Food for workers on site had also to be brought to the site in this way, since little was available locally and this was reserved for the resident patients.¹⁷⁸

Work on the lighthouse was underway by September, 1908. It required six months to complete the concrete work on the tower.¹⁷⁹ Rising to about 112 ft above grade, the tower required wood forms for its octagonal, reinforced-concrete shell. The concrete was installed by layer, moving upward by distinct courses, using the then conventional technique known as cold-pouring. Twenty ft in diameter at the base, and resting on a thirty-ft wide concrete platform and foundation, the tower tapered to approximately fourteen ft at its summit. The walls of the structure were over four ft thick at the bottom, reducing to fifteen inches at the top, and it included two internal floors or landings, in addition to concrete supports for a later winding staircase.¹⁸⁰

Overall, the tower required thousands of tons of concrete, all mixed on site and carried by wheel barrow to the scaffolding and forms. It was then lifted into position by means of a mechanical hoist attached to the scaffolding. The whole project was extremely arduous and without doubt the most ambitious lighthouse ever to have been built in the Hawaiian Islands. Although there are no remaining records of the day-to-day work on the tower, we know it was very dangerous. One worker, preparing the upper part of the tower for its iron superstructure, fell from the scaffolding and was killed.¹⁸¹

The tower had been specifically designed to carry a large lighting apparatus. This was to be

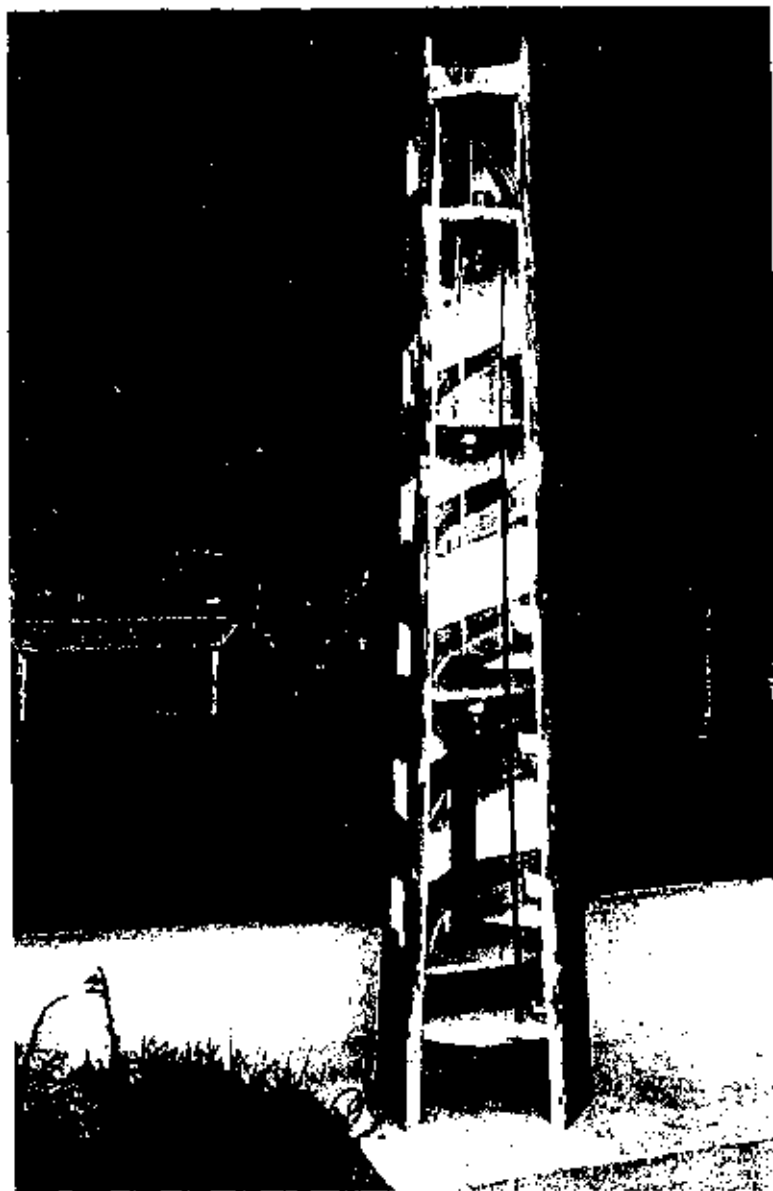


Figure 2. Photograph, model of Lighthouse Tower, date unknown [ca. 1910]. Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.

a Second-Order Fresnel lens, one of the largest lens used by the U.S. lighthouse service. Documented in final drawings prepared and signed by Captain C.W. Otwell (dated August 4, 1908)¹⁸², the tower had to be of a height that would optimize the characteristics of the lighting apparatus, an equation determined by long-standing practice and engineering knowledge.¹⁸³ There were also a number of

specific requirements, including a shaft to contain the falling weight needed to drive the mechanism that controlled the rotation of the lens, and also an iron platform and specially designed carriage and pedestal for the lens.¹⁸⁴ The whole was to be topped by an approximately sixteen-ft high lantern, surmounted by a finial and lightning rod, bringing the superstructure to a full twenty-three ft in elevation. Overall, with its three-ft-high base and its 112 ft tower, the structure measured 138 ft in height, measured from the ground. The final focal plane of the light would be 213 ft above sea level, giving the light a visibility at a distance of twenty-one miles at sea.¹⁸⁵

By the end of the year work had progressed significantly on the new light house and most of the concrete was completed. The final work of preparation for the lens was done in January and February. Eugene B. Wagner, one of the first workmen employed on the site, and foreman by December, 1908 provides a glimpse into the progress of the work. In March, 1909, he wrote a friend that having "fixed up the light at O'ahu [presumably Makapu'u Point]" he was "now working on Molokai." As he went on to explain:

This tower is 112 ft. Have the cement all in and will begin putting up the iron work next week. Have raised one piece of the iron already. The light pedestal weighs 2,200 pounds. Had to take it up on top. There are four other pieces each weighing 2,000 a piece. I snapped some pictures of the tower as men were lifting the large prism... I wish I was through here, there is no place to go we are right in the leper settlement and of course are not allowed to go anywhere else, just like prison... This life on the ocean wave isn't what it is cracked up to be.¹⁸⁶

Wagner and the other laborers were working against time to complete the structure before the arrival of the lantern and lens. Ordered by the Light House Board in Washington in September, 1907, from the Chance Brothers and Company, Limited, in England, the lens arrived in New York

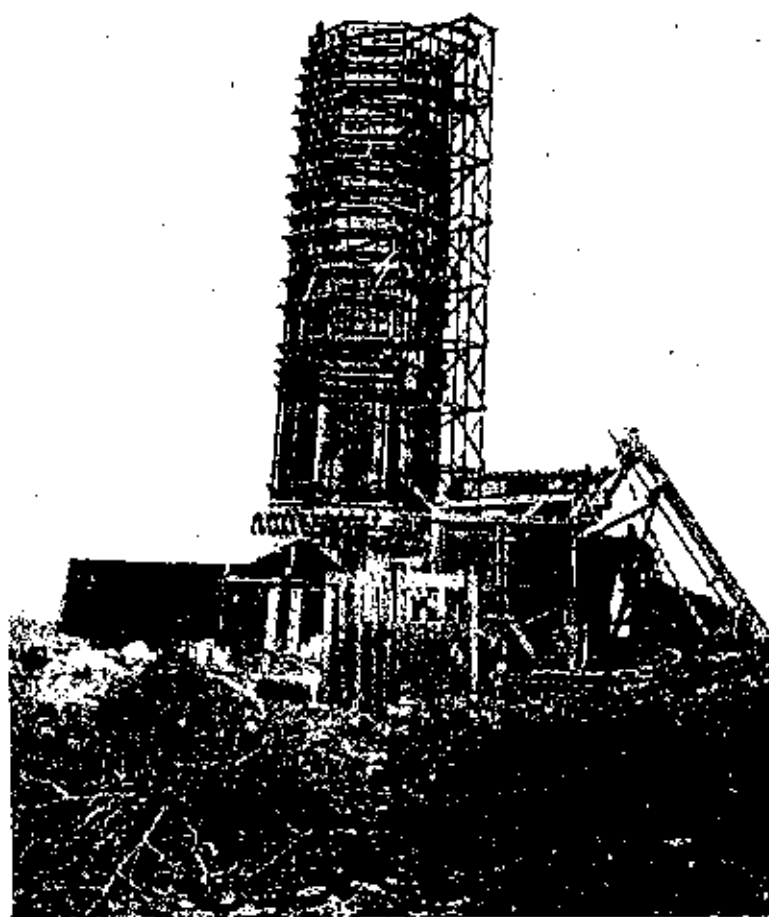


Figure 3. Lighthouse tower under construction. Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.

in July and was delivered to the Twelfth District's depot in Honolulu in November, 1908.¹⁸⁷

Based on a technology developed in the 1820s by French scientist Augustin Fresnel, the Fresnel lenses, as they became universally known irrespective of the specific manufacturer, combined two different methods for increasing the refractive power of lamps so necessary for providing powerful signals.

Traditional lights, those used prior to the mid-nineteenth century, depended on cone shaped, or parabolic reflectors, to magnify the light from oil-fueled lamps. One method for increasing the power of lights was to have multiple lights, all focused through a single lens. These were known as catoptric mechanisms. The alternative approach was to have a single light with multiple refracting lenses to increase the intensity. This was a dioptric apparatus. The Fresnel lens united the catoptric and dioptric approaches (known as catadioptric), resulting in a central, reflecting "bull's eye" of great intensity surrounded by refracting prisms and glass rings.¹⁸⁸ As Hans Christian Adamson explains in his history of lighthouses:

The effect is similar to the flow of water through a well-nozzled hose. The bullseye is the hose. The refracting rings and prisms that bend and direct the beams correspond to the nozzle that directs a solid column in any one direction -- outward.¹⁸⁹

The adoption of improved knowledge of optics was matched in the Fresnel apparatus by improvements in lamps, fuel and the method of delivering fuel to the lamp. Through the years, the earlier oil-fueled Argon lamps, favored particularly by the U.S. lighthouse service, were replaced by coal gas lamps, then, in 1896, by acetylene gas (kerosene). By the late nineteenth century most of the lamps in the U.S. had been replaced by newly developed incandescent oil-vapor lamps, fueled in fact by kerosene. These provided a remarkably powerful and consistent light, vastly increasing the range of many American light stations and the estimated candlepower of many lights.¹⁹⁰

Delivery of the fuel was another technical concern. In the mid-nineteenth century American lighthouses depended on so-called mechanical lamps. Oil for the lamps was stored in a reservoir

below the level of the tower. It was pumped upwards, as needed, overflowing the lamps wicks by means of a clockwork mechanism. The lamps burned according to what was known as the constant-level principle, in that the surface of the oil was kept just beneath the point at which combustion occurred. French and later British manufacturers improved the system through the introduction of pistons moved by weights (or in some cases springs), which drew the oil from the reservoir at a more uniform rate. Lamps fueled in this way came to be known as "moderators" because of a device built into the oil line that could control the rate of flow and reduce the pressure as the level of oil in the reservoir.¹⁹¹

By the late nineteenth century Fresnel lenses had been installed in nearly all the lighthouses within the U.S. system. Refined and improved over the years, by the early twentieth century design and manufacture had reached a high art. In each of the lenses a lamp surrounded by a polyzonal lens is placed at the central focus. The lens itself is made up of glass prisms set in panels. The central part of the lens consists of dioptric (refracting) prisms, the upper and lower sections consist of a series of prismatic rings, which are both refracting and reflecting. The advantage of this system, coupled with the improved lighting mechanism, is the great brilliancy of the light. The entire apparatus was also extremely fuel efficient, another great advantage.¹⁹²

The basic classification of Fresnel lenses is based on the interior radius of the lens, known as the focal distance. Simply, this is the distance from the center of the light to the inner surface of the surrounding lens. Fresnel lenses came to be classified according to order — from the smaller, least powerful Fourth-Order lenses through the large, First-Order lenses (and even more powerful "hyperadial" lenses) placed in larger, more important lighthouses.¹⁹³ The lens for the Kalapaupa light was classified as a Second-Order lens, although because of its size, it bordered on being a First-Order lens and has in some records been classified erroneously as such.¹⁹⁴

To distinguish one light from another, and also according to the specific functions of different lights, the signals of each marker differ. Some lights are "fixed," meaning they consist of a single, constant signal. More often the signal is moderated by an assigned period of brightness and darkness,

creating what is thought of as a flashing light. Each light has different assigned characteristics in order that mariners might easily recognize the light and identify their location. The flashing effect is created by mounting the lens upon a ring or "chariot" moved either by an electric motor (a more recent innovation) or by a weight-operated clock mechanism.¹⁹⁵

Typically, the weight was suspended within a channel or "shaft" in the lighthouse tower. The weight had to be reset periodically for it to work and drive the revolution of the lens during the night. The weights were usually steel or iron drums linked to cords or chains. Their movement was translated to a series of gears and connected to a pinon, which rested on the ring of the lens chariot. A vane-type governor controlled the speed of revolution. A hand crank was employed to raise the weight. The clock mechanism, usually enclosed in a glass case, was attached to the pedestal of the lens. The drum was fitted with a ratchet, gears, and a clutch, to allow the mechanism to be rewound without moving the lens.¹⁹⁶

The tower at Moloka'i light station was designed to accommodate this type of sophisticated lighting apparatus. Construction drawings show a thirty-two-ft long weight shaft below the pedestal of the lens.¹⁹⁷ Instead of relying on ball bearings to facilitate the movement (revolution) of the lens in its chariot, the lighthouse at Moloka'i was designed to employ a trough containing liquid mercury. The mercury supported the weight of the lens and ensured easy movement. The device was further designed to allow for the lowering of the mercury vat in order to make repairs or examine the lighting apparatus. The vat could also be drained for cleaning, a procedure required every six months in order to ensure smooth operation. The mercury vat approach was chosen at Moloka'i because of the enormous size of the lens and lamp — the apparatus weighed over three tons — and to increase reliability.¹⁹⁸ The signal at Moloka'i required the lens to revolve regularly around the light, creating a flash every twenty seconds.¹⁹⁹

The final significant component of the lighthouse was the lantern, or the superstructure containing the light and lens apparatus. As with lenses, great improvements were made in the design and standardization of lanterns during the nineteenth century.²⁰⁰ By the time of the construction of

the Moloka'i light, lanterns were fabricated off-site and were made of standardized components designed to maximize the efficiency of the lighting apparatus. That installed at Moloka'i was made up of a series of lozenge-shaped glass panels, mounted within an iron and bronze framework.²⁰¹ The helical bars holding the glass corresponded to the curvature of the lantern. Set diagonally, these bars minimally obstructed the beam of light emitted by the lamp allowing for greater visibility. The lantern was also fitted with vents and flues to allow for emissions of wastes produced by the lamp.²⁰² The original lamp at Moloka'i was a "Meade Design," 55 millimeter incandescent oil-vapor lamp, with an estimated output of 390,000 candlepower (corrected in 1915 to 620,000 candlepower).²⁰³

Installation of the iron work for the lighthouse began in the early part of April, 1908.²⁰⁴ Initial work included installation of the iron rails for the concrete staircase, and the cast-iron platform for the lens pedestal, located about seven ft below the top of the concrete tower, and supporting what was referred to as the watchroom. An iron rail was also placed around the cantilevered concrete gallery, or "catwalk," of the tower, 116 ft above grade (including the 4-ft high base). Hoisting of the lantern and installation of the lamp and lens followed during late April and May.²⁰⁵ By the middle of June the lantern and lens had been installed and other details, such as wood windows lighting the interior shaft of the tower and the entrance door had also been completed.²⁰⁶

Work continued during the summer months on other buildings and structures on the site. These included an oil house, also built of concrete and located well away from the light tower (approximately 550 ft) to the northwest, and three houses designed to house the lighthouse keeper and his assistants and their families. The 1909 report of the Light House Board to the Department of Commerce and Labor explained:

The three dwellings are alike, one and a half stories high, made of concrete, with two bedrooms, living room, dining room, bathroom, storeroom, and kitchen on the main floor and an attic above. A wide verandah runs around the front, one side, and part of the rear of each house, and is covered by a roof supported on nine concrete columns. The roofs of the houses are of frame, covered with corrugated-iron sheathing.²⁰⁷

There are a number of significant discrepancies in this description. It appears from later

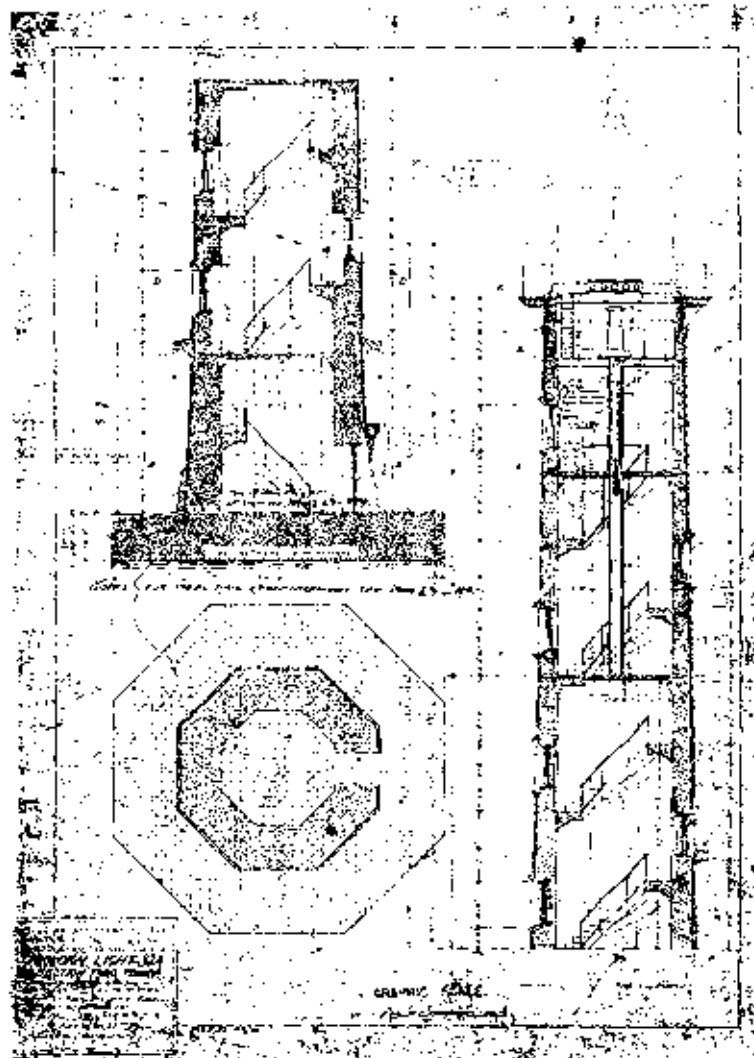


Figure 4. Office of Assistant to the Engineer of the 12th Light-House District, Honolulu, T.H., Molokai Light Sta., Ver. Section thro' Tower, Prepared under the direction of Captain C.W. Otwell, Corps of Engrs. Designed by F.H.K[ales], Drawing No. L3-181, August 4, 1908, U.S. Coast Guard Archives, Honolulu, Hawai'i. [Later notes to repairs made in 1950s]

reports and historic photographs that none of the houses was in fact of concrete. One later report suggests that the first keeper's dwelling, or dwellings, were wood.²⁰⁸ The present stone dwelling appears to date from 1909, although a later National Park Service report gives the date of 1913²⁰⁹ (although no other reports record or confirm this date). This dwelling, reserved for the chief keeper and his family, was of rubble-masonry construction. It is a hipped-roof cottage, with massive exterior walls. Residences for the two assistant keepers appear to have been of single-wall or wood-frame construction, sheathed with some kind of weatherboarding. All appear to have been placed on concrete foundation posts, which may account in part for the confusion. None of the houses seem to have had verandahs as described in the report, but had much smaller recessed porches. The stone dwelling, the early dwelling remaining on the site, had (and has) a recessed porch on its northwest corner and a partially enclosed breeze-way or work area on the south.

Later site plans of the lighthouse plot indicate that the two wood dwellings had a similar overall shape — basically a rectangular footprint with rear shed additions.²¹⁰ The two identical wood dwellings, located to the west of the stone house, had simple, gable roofs, whereas the stone dwelling had a more elaborate hipped roof. The dwellings were modest overall, but each featured two bedrooms, a living area and dining area, an interior bathroom and a kitchen. None of the houses were what would now be considered “one and a half stories high,” but were one-story buildings, elevated somewhat above the ground, with accessible attics. None of the attics had a sufficient elevation to allow for use other than storage and none appear to have included windows or dormers.

The dwellings, however, made a distinct “architectural statement” — more than might have been expected for buildings of such utilitarian purpose, although the Light House Board specifically recommended that buildings be designed in such a way as to blend with prevailing local architectural styles and conditions.²¹¹ The stone dwelling was (and is) in what would now be called the Craftsman style.²¹² Employing a relatively informal, open plan and irregular, almost picturesque exterior elevations, this structure showed great attention to detail and displayed a high level of craftsmanship. The other two dwellings appear to have been more utilitarian in character. All of the dwellings followed conventions then being employed in a number of government-built buildings of the early part

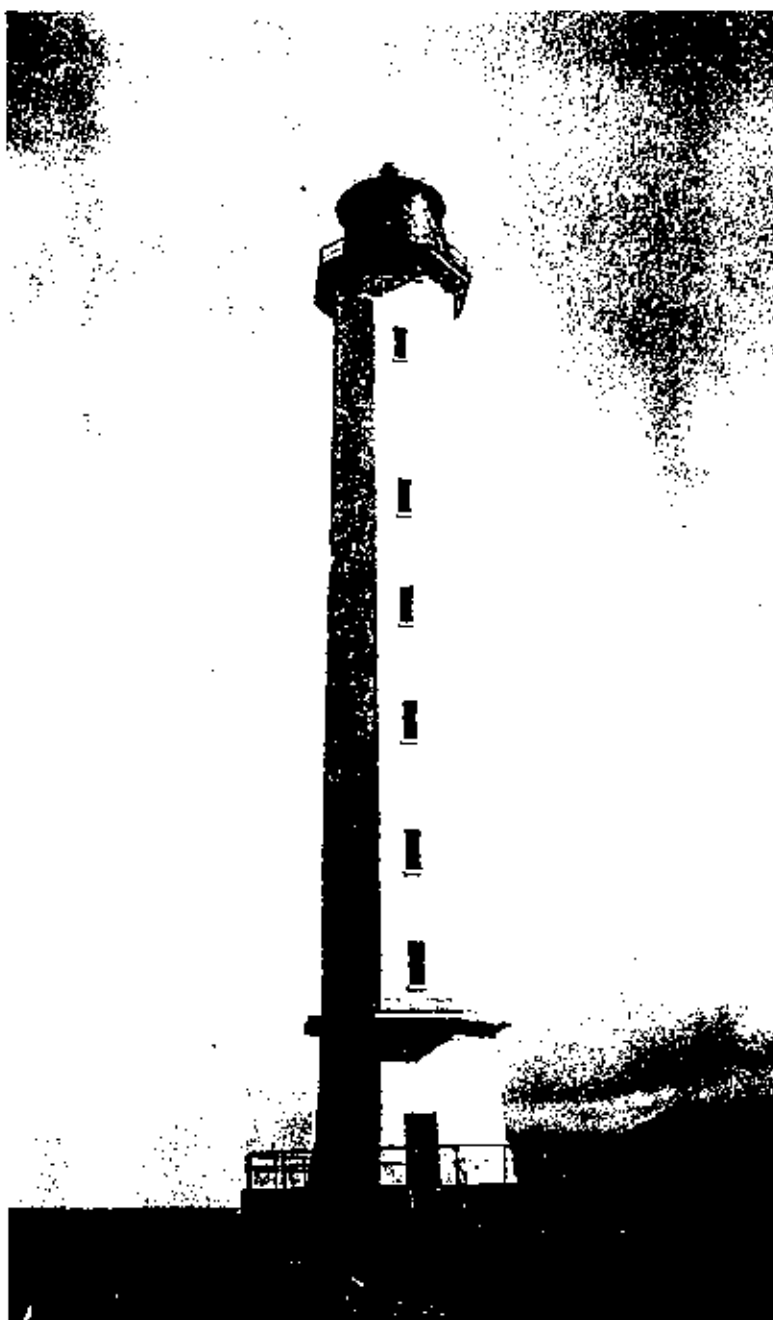


Figure 5. Completed tower, Postcard, Kalaupapa Lighthouse, Moloka'i, ca. 1910. Bishop Museum Archives, negative number CP 73604.

of the twentieth century, including those of the military and the Light House Board's "sister agency," the U.S. Lifesaving Service.²¹³ The stone structure, reserved for the chief keeper and his family, featured elaborate stonework, utilizing materials taken from the site. The others appear to have followed more typical building conventions in the Hawaiian Islands of the period. All three were placed in a neat row, within a stone-walled compound, downslope from the lighthouse.

In addition to the houses the property included an octagonal, concrete water tank, apparently added when construction work was during the previous summer (1908). Located about 80 ft south of the tower, it had a capacity of 12,000 gallons and stored drinking water and water needed for other purposes for the station. A wood-frame building, possibly used both for temporary housing and a site office, was located just southwest of the tower base. Identifiable in photographs of the site taken during the construction of the tower, this simple plank structure appears to have been used to cover an oil tank used to hold kerosene intended for immediate use. It had been removed by 1931, when possibly a different type of tank was installed (or simply, the frame structure was seen as no longer necessary). An inspection conducted in 1927 reported on the tank, but made no mention of a wood structure; so possibly the wood building was removed between 1924, when it appears in a photograph, and 1927.²¹⁴

In addition, there appear to have been at least two, and possibly three, other wood secondary buildings, all located near the residential compound. One of these was located immediately behind the head keeper's dwelling; the other two behind one of the wood-frame houses. That near the principal keeper's dwelling appears to have been used for as a tool house and for storage; it was built at an early period, but may have dated to ca. 1920, when a garage also appears to have been added to the site as well. The other two structures were located nearer the wood-frame cottages and were used as wash-houses by the keepers and their families. At least one appears to have contained a shower as well. (Only one of these structures still remains, with substantial changes and an addition made in 1951.)

It appears that the majority of ancillary structures were completed during the months of June

through August, 1909. One of the keeper's dwellings was still incomplete as of September, as were some of the outbuildings, but these appear to have been finished later in the year. Additional changes and additions to one of the keeper's quarters were reported in subsequent reports, and further work occurred on the grounds of the keepers quarters throughout 1909 and 1910; the 1913 report of the Governor of Hawaii mentioned that "additions to a dwelling at the Molokai Light Station were nearly completed."²¹⁵ Whether the stone dwelling was in fact finished by this period, or was that referred to in the governor's report, remains uncertain. The 1916 report of the Bureau of Lighthouses gives an amount of \$1,362 for "general repairs to the station,"²¹⁶ but this or no previous report makes any mention of the construction of a new keeper's quarters on Moloka'i. (Keepers' quarters were completed at Barber's Point, at Kilauea, and at Makapu'u during the same period, most paid for out of a special Congressional appropriation passed on May 27, 1908, for improvements to dwellings and for new dwellings throughout the service;²¹⁷ costs for the quarters at Moloka'i clearly were covered under the original appropriation for the light station, suggesting that all three dwellings were completed in 1909 or shortly afterward.)

Despite discrepancies in the record and the fact the minor changes and additions to the complex continued to occur, the basic outline of the lighthouse station was complete by the end of 1909. The cost of the entire station had come to \$59,977.04, a little over two dollars short of Congress's stipulation that the cost "not exceed \$60,000."²¹⁸

The Moloka'i Light Station's Early Years; Life of the Keepers and the Kalaupapa Community

On September 1, 1909, the new Moloka'i light was lit for the first time. Ignited by the station's first keeper, James M. Keanu, the new signal, emanating from an incandescent oil-vapor lamp and amplified by the lighthouse's powerful Fresnel lens, shown twenty-one miles out to sea, exhibiting bright white flashes every twenty seconds.²¹⁹ From this point on the Moloka'i light joined a growing fraternity of lighthouses in the Hawaiian Islands and indeed had become one of its most prominent members.

For the next two decades the Moloka'i light station would proceed with the business at hand. A keeper was assigned to the station and was joined by his family. The first keeper was James M. Keanu, previously assigned to the earlier Makanalua Light and destined to stay in Moloka'i until 1926 -- returning in 1929 to 1932 and again from 1937 to 1939.²²⁰ He was joined by First assistant William F. Williams and Second Assistant Charles L. Martin. Williams would remain until 1913, when he was replaced by John H. Kanakeo. Miller stayed only a year, being replaced in 1911 by Edward L. Miller. In 1914, John Makahi became the First Assistant Keeper, staying for five years. The same year Ed Robins, Jr. joined the station as Second assistant Keeper. His tenure lasted five years. In general, the position of keeper enjoyed a longer tenure, the junior posts turning over more frequently.²²¹

Generally, the keepers were joined by their families at the remote station. As with the construction workers, the Board of Health had to issue passes to all of those coming and going, so there is some record of family life.²²² Despite their isolation, the station residents formed a small community. They shared in the work, maintained small gardens, kept animals, particularly pigs and chickens. The men hunted and fished together, as a way of improving their diets and those of their families, but also for recreation. Wild pigs, goats, and deer were plentiful on the peninsula and the station was close to the shore, making fishing easy.²²³

For basic supplies the station community depended on the regular visits of the service's cutter, the *Kukui*. Placed into service in March, 1909, the *Kukui*, was the first vessel owned by the Hawai'i sub-district and dedicated exclusively to lighthouse activities.²²⁴ The *Kukui* was the lighthouse community's link to the outside world. A steel hulled, schooner-rigged vessel (with auxiliary steam power), the 190-ft ship was one of the fastest vessels in Hawaiian waters. Its mast served as a derrick, which could hoist a load of twenty tons. Much of the food, other supplies, and materials for maintenance were carried on the *Kukui*. It would anchor at the landing in Kalaupapa, where supplies and materials were off-loaded. Everything was then hauled over the two-mile long road to the station.²²⁵

Life for U.S. lighthouse service personnel and their families differed from that on other

stations due to the unique presence of the Hansen's Disease community of the island. The Board of Health, which oversaw the operations of the facility at Kalaupapa, and the light house service agreed it would be in the best interests of the keepers and their families to avoid all contact with patients. Therefore, it was official policy that no fraternization take place. Henrietta McKaughan writing in the *Honolulu Advertiser* in 1925 stressed that "The keepers are all non-lepers and are not permitted to associate in any way with leper patients or even paroled patients."²²⁶

In recognition of their isolation and their unusual circumstances, the keepers at the Moloka'i lighthouse station were given additional rights and increased compensation over keepers at other stations in Hawai'i. Their pay scale was higher than that of other keepers.²²⁷ Also, the keepers and their families were given a full month's annual leave. The families of the keepers were allowed to travel back and forth to Honolulu at their own request; they were also allowed to receive visitors at the station, including any of the non-patients living on the peninsula as well as visitors from Honolulu and elsewhere. Because of the station's isolation, a special arrangement was made to allow the keepers and their families have medical attention provided by the resident physician in Kalaupapa.²²⁸

Historian Love Dean makes the observation that most of the keepers and their families were probably used to lives of isolation.²²⁹ Many, indeed, came from remote areas of the Hawaiian Islands and were acquainted with hardship. Dean points out that Assistant Keeper John Kanekoa had worked on a ranch before coming to Kalapaupa in 1913. First Assistant Keeper John Makahi was a farmer, then was assigned to the Keahole Light Station on the island of Hawai'i before being transferred to the Moloka'i lighthouse one year after Kanekoa. Manuel Ferreira, Chief Keeper from 1927 to 1929, had been previously employed in Honolulu, at the Harbor Light, but he too came from a rural background in Maui before joining the lighthouse service in 1907.²³⁰

Still, conditions at the station were much more restrictive than at other lighthouse stations. There were no school facilities for children at the station; and during the station's early years school-age children had to rely on home-schooling or be sent to live with relatives in Honolulu or on one of the other islands, coming home weekends and holidays for family visits.²³¹ Most of the provisions and

supplies were shipped from Honolulu, where they were unloaded at the wharf at Kalaupapa, then were re-sorted to take to the station. All of the perishable goods were "double-packed," which meant that the outer carton or covering had to be removed and destroyed as part of a procedure to avoid contamination. This was the same procedure followed by non-lepers on Moloka'i, including physicians, attendants, administrators, and others involved with the Hansen's Disease colony.²³²

Occasionally, keepers and their families made the long trip up the twisting *pali* trail. Some of the children later attended school in Kaunakakai, known as "topside," and during the 1920s one of the keepers kept a homestead there in addition to his free residence at the lighthouse station.²³³ Fresh foods, especially vegetables and fruits, were obtainable "topside," and occasionally were brought by mule down to the peninsula. In addition, the keepers continued to grow vegetables on site, as well as keeping banana plants near their houses.²³⁴ But at times there were shortages. Manuel Ferreira, one of the keepers in the 1920s, reflected:

Hunting was one of our favorite off-duty recreations. We used to go out frequently after wild pigs, goats and deer. This meat came in mighty handy at times when food shipments were delayed because of bad weather at sea.²³⁵

Although not allowed to receive patients at their homes and restricted in their contact with the patients living in Kalaupapa, there was obviously some interaction. Ferreira recollected in an article published in 1944: "We were forbidden to associate with the lepers [sic], although we had to go onto the lepor reservation [Kalaupapa] numerous times to take care of work."²³⁶ Fred Robins, Jr., reflecting upon life at the station in the 1930s, pointed out also that despite the restrictions, keepers and their families nonetheless got to know many of the patients. They would sometimes pass notes to one-another and speak casually or wave whenever the keepers or their dependents passed though the settlement.²³⁷ At an even later date, keepers would play baseball with patients and could meet occasionally on a social basis.²³⁸ But at during the station's first years the keepers and their administrators felt they had to exercise more caution.

As of 1913, there were three keepers and families in residence.²³⁹ The report of the

Superintendent of the Leper Settlement gave a population figure of six males and five females at the station, for a total of eleven persons. Other resident non-patients included the superintendent; the physician and his family; five Franciscan sisters; two priests and five brothers; six Japanese servants; thirteen employees at the U.S. Leprosarium in Kalawao; one Board of Health employee; and assorted others for a total non-patient population of fifty-two.²⁴⁰ This, then, was the community with which the residents of the lighthouse station could interact more openly and which served, to some degree, as their social network.

But it must be remembered that the station was not really isolated, as far as the local community was concerned. In fact the lighthouse station can be interpreted not only as an outpost of the U.S. lighthouse service but also as integral addition to a community of some 1000 patients and others who made the Makanalua Peninsula their home during this period. The lighthouse, when it was built in 1908 and 1909, was one of the most prominent architectural features of the island. Visible for many miles and distinguished each night by its flashing signal, the Moloka'i lighthouse became a familiar presence on the island and also a considerable point of pride for all of the residents.

The history of the Hansen's Disease settlement on Moloka'i dated back to 1866, when the first patients were transferred from Honolulu as part of an ambitious plan to isolate and eradicate the illness in the Hawaiian Islands.²⁴¹ Faced with what was feared to be an epidemic of leprosy during the 1850s and early 1860s, the legislature of the Kingdom of Hawaii passed an act on January 3, 1865, to acquire a suitable piece of land for "to secure the isolation and seclusion" of those afflicted with the disease.²⁴² Godfrey Rhodes, then president of the Board of Health inspected a number of sites on Moloka'i, and on September 20, 1865, reported that he had arranged for the purchase of a 6,000-acre tract of land on the Makanalua Peninsula for the proposed settlement.²⁴³ Long settled by native Hawaiians and possessing at that period a small community of farmers, fishermen, and missionaries, the latter of whom had come as early as 1839, when a mission sub-station was established on the peninsula, Makanalua would become, beginning in January, 1866, the site of one of the world's most famous leper colonies.²⁴⁴

By the early 1870s nearly 600 persons had been sent to the new settlement on Moloka'i.²⁴⁵ Often accompanied by unaffected wives or other family members, the first residents lived in difficult conditions in what turned out to be an extremely harsh environment. Improved gradually through the interventions of the Board of Health and the often sacrificial efforts of such notable figures as Joseph de Veuster, better known as Father Damien, Mother Marianne Cope, and Brother Joseph Dutton, the settlement included over 1000 patients by the end of the century.²⁴⁶

Until 1905, many of the patients lived at Kalawao on the east side of the peninsula. Originally forced to live in grass shacks and stone shelters, the patients began to receive better housing in 1874, due largely to the persistent efforts of Father Damien. Additional hospital facilities and homes for children were added in the last two decades of the nineteenth century. Father Damien also built and later expanded the Kalawao church of St. Philomena and erected a second Catholic chapel in the smaller community of Kalaupapa. During the same period a new Protestant church was also added to the small community on the west side of the peninsula as well.²⁴⁷

By the mid-1880s there were about 300 to 400 dwellings on the peninsula, an estimate made by Robert Creighton, editor of the *Pacific Commercial Advertiser*.²⁴⁸ By this period Kalaupapa was becoming the more important settlement area, both in terms of the number of buildings and community vitality. As Creighton observed:

There is a "live public opinion" at Kalaupapa, which does not exist in such marked degree at Kalawao, where the people are more subdued in manner and tone. Frequent intercourse from without may account for this in part at the former place, but it is also largely owing to the presence there of a numerous class of people who are not lepers.²⁴⁹

Kalaupapa was also important as the best landing place for supplies and people coming onto the peninsula and for passengers departing as well. Although periodic efforts were made to provide for a better landing on the eastern side of Makenalua, the coast there was unprotected and hazardous. The landing at Kalaupapa, while never good, was more sheltered, and boats could off-load onto lighters and barges there without great difficulty — except in times of very bad weather. Still, in the

first decade of the twentieth century, the landing at Kalaupapa was not very impressive and consisted of a platform for loading and unloading into surf boats, that served steamers and other vessels anchored further out to sea.²⁵⁰

In the latter part of 1906, the landing was improved through the construction 300 ft of masonry sea wall, flanking the concrete landing. New warehouse space was also added around this time, and tracks were laid for horse and hand-moved trucks servicing the warehouses.²⁵¹ In 1907, a wood-frame pavilion was added to the landing. Open to the air, the structure was fitted with wood shutters to allow for its use as an assembly hall when needed. Some of the older remaining wood buildings were torn down that same year, and the wharf was improved through the addition of concrete steps. Construction on the two warehouses, which had begun the previous year, was also completed.²⁵² In 1908, the Light House Board would also add its own warehouse to the area to facilitate first the building of and then the servicing of the new lighthouse station.²⁵³

By this period the Hansen's Disease settlement on Moloka'i was a substantial presence. In addition to the patients, clergy, physicians, nurses, helpers, and administrators, the community had two hospitals, a clinic, a jail, slaughterhouse, lumber mill, and several churches.²⁵⁴ There was a home for young girls and, in 1890, a new, large complex for boys, known as the Baldwin Home, was opened in Kalawao.²⁵⁵

In 1907, facilities were expanded further through the construction of the U.S. Leprosy Investigation Station on the east side of the peninsula.²⁵⁶ Authorized by Congress in 1905, this was to be one of the most ambitious undertakings on Moloka'i, consisting of a hospital, quarters for the director, a house for the pharmacist, an administrative building, a laboratory, morgue, power house, stable, quarters for attendants, and a storage building. Located near the old Kalawao community, the building site encompassed twenty-six acres overall. Completed in 1909, around the same time as the lighthouse station, the Leprosy Investigation Station represented a new chapter in the treatment of the disease and another indication of increasing federal involvement in the Hawaiian Islands.²⁵⁷

Because of the massiveness of the project, consideration was given to the construction of a new landing at Kalaekilo'a Point, near the new hospital. However, the high cost of construction both of a landing and an access road — estimated at between \$15,000 and \$25,000 — the decision was made to rely on the old landing at Kalaupapa and to transport the building materials and supplies over the existing road, much as the Light House Board had decided the previous year.²⁵⁸ The Board of Health gave permission for the use of the recently improved wharf and landing and also allowed the Marine Hospital Service, which was supervising the project, to employ the hand-powered derrick, operated by the residents of the settlement. F.W. Peace, who supervised the construction, recommended that a mechanical hoisting machine be installed, an improvement that was later made at the landing site.²⁵⁹

By 1909, the Mākanalua Peninsula had become almost wholly institutional in character. Remaining private homesteads had finally been condemned in 1894, and the last of the independent landowners were forced to leave the peninsula. From that date, the only residents remaining in Kalawao or Kalaupapa were the patients or those somehow involved in their care.²⁶⁰ The Mākanalua Peninsula had become a fully governmental establishment, managed overall by the Board of Health, with the help of churches and charitable organizations. The federal government's presence was evident at the Leprosy Investigation Station and at the Moloka'i Lighthouse Station.

The new Leprosy Investigation Station, however, would be short-lived. The hospital facility attracted few patients, most of the patients preferred to be treated in the dispensary in Kalaupapa rather than making the long trip to what was by then an unpopulated edge of the peninsula. Moreover, it was found that the experimental work could be conducted on O'ahu, at facilities in Kalihi, at a lower cost. By 1913, the exposed character of the site, on the harsher, east side of the peninsula, had begun to take its toll of the facilities, and maintenance began to become a problem. By 1913, operations were shut down and the buildings were left in the hands of a single caretaker. In 1929, the facility was torn down and the materials salvaged for use in Kalaupapa.²⁶¹

The Moloka'i Lighthouse would not suffer the same fate, but would remain an important

presence on the island for many years. Residents of the Hansen's Disease settlement, many of whom watched as the station and its impressive 138-ft tower were built, continued to take an interest in the station. They watched new buildings being added, witnessed the lives of the keepers and their families. They saw the young children leaving for school and noted when they returned for holidays. Walking or riding over to the station was one of the few outings available on the remote peninsula. Patients were fond of seeing the light marking their home and identified closely with it.²⁶² Many years later (in 1986) when the lighting apparatus was dismantled and taken to Maui for display, the remaining patients felt that something of themselves had been taken away. In 1993, when it was returned, resident patient Clarence Naia announced: "Why they took it away from us, I can't figure it out. The light belongs here. Don't belong no place else."²⁶³

Developments at the Moloka'i Light Station in the 1910s, 1920s, and 1930s

Following its activation in September, 1909, there were few substantial changes to the Moloka'i Light Station during its first forty years. In 1911, the signal of the light was altered slightly to display a flash every ten seconds rather than every twenty.²⁶⁴ Four years later the power of the original incandescent oil-vapor lamp was modified to produce an intensity of 620,000 candlepower. Also, there was the mention of "additions to a dwelling at the Moloka'i Light Station" in the 1913 report of the Governor of Hawaii, and the expenditure of \$1362 on "General repairs to the station" cited in the Bureau of Lighthouse's report for 1916.²⁶⁵ But otherwise, alterations and additions to the station were of a modest character, suggesting more an evolution of the facilities than any new campaign of improvements.

By the 1920s the light station had evolved into what might be considered its "mature period." All of the original structures had been completed. The grounds were being groomed and tended. The stone walls surrounding the keepers' dwelling compound were in place. By that period, trees had been planted at the periphery of the compound, along the east wall, to serve as a wind break. Each of the keepers had a small garden, located within the compound or set into one of the historic stone enclosures scattered near the site and probably the remnants of earlier sweet potato plots.²⁶⁶

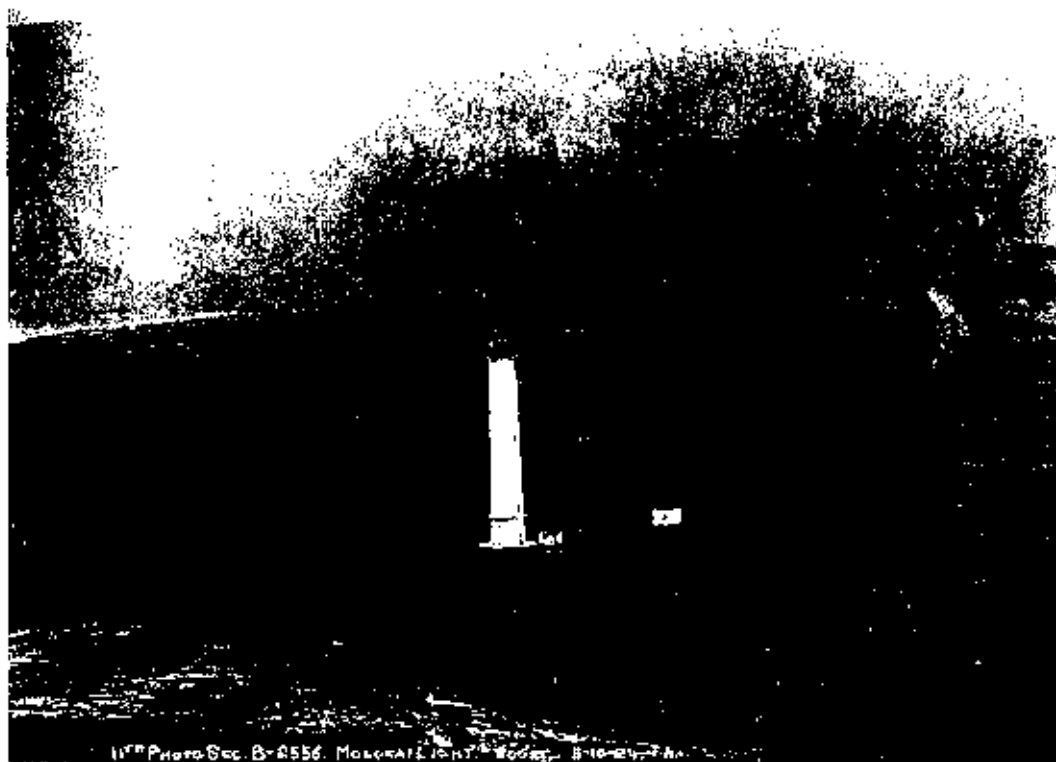


Figure 6. Aerial view, Lighthouse at Kalaupapa peninsula, Moloka'i, Hawai'i, November, 1924. Bishop Museum Archives, negative number CP 121, 583.

Sometime in the late 1910s or early 1920s a garage was added to house the station's new half-ton Ford truck.²⁶⁷ This simple wood-frame structure was (and is) located just northwest of the keepers' compound, outside the walls. It was accessed via an unpaved road, leading from the principal road to Kalaupapa. (A report completed by the U.S. Coast Guard in 1971 gives a date of 1909 and an original construction cost of \$1,000, although no other documentation has been found to support this.)²⁶⁸

At some time between 1927 and 1930 a concrete walkway was constructed between the station and the lighthouse tower in order to make the daily walk by the keepers easier. Thirty-two inches wide and built in ten-ft sections, this walkway still remains on the site, although there is evidence as well of other changes and repairs. The name WM KLEE and the date 1929, inscribed in the seventh section from the walkway's beginning, at the edge of the keepers' compound, suggests that this is the original construction date.

The most significant "event" to occur at the station was an earthquake on Christmas day, 1923. As the *Lighthouse Service Bulletin* recorded:

A heavy earthquake shock occurred at Molokai Light Station, Hawai'i, on December 25, 1923, throwing and scattering mercury from the mercury vat. No damage was done to the illuminating apparatus, tower, or houses.²⁶⁹

Elizabeth Peet, writing about Hawai'i's lighthouse service fifteen years later provides a more picturesque account:

Life occasionally does a few handsprings for these men, Superintendent [Frederick A.] Edgecomb points out. Familiar is the story of the keeper of the Molokai beacon at Kalaupapa, who was busy cleaning his lenses when an earthquake hit the island. As the tremors increased, the spindly tower tipped so violently that the mercury spilt out of the vats carrying the revolving light. Unable to turn in a dry socket, the huge lense was temporarily replaced by an emergency light.²⁷⁰

Later recognized as a hazardous material, mercury, or "quick-silver" as it was also known,

was critical to the operation of the light and had to be replaced quickly in order to avoid stopping the rotation of the lens. A similar accident would occur in January, 1938.²⁷¹

In November, 1927, R.R. Tinkham, Superintendent of Lighthouses made an inspection of the lighthouse complex, providing one of the most detailed records of the facility now available.²⁷² He was accompanied by Manuel Ferreira, then head keeper of the station. Tinkham's report describes the site, buildings, apparatus, and other elements. He identifies the plot as incorporating 21.6 acres (plus or minus). The dwelling area he describes as enclosed by a stone wall, the entire reservation marked by a wire fence, or five parallel wires attached to redwood posts. The tower, he notes, was repaired in June, 1913 (possibly part of the general repairs mentioned in the 1916 report of the Bureau of Lighthouses) and had been repainted in 1927, or just before the inspection tour. He also mentions a flagpole "50 ft west of the tower."²⁷³

The lantern he describes as a "First order standard helical bar cylindrical lantern," with a diameter of twelve ft, six and one eighth inches. He identifies the construction materials as consisting of cast iron sills and cornice, and cast bronze roof-sash bars (the diagonal glazing bars, holding the curved glass panels). The roof he identifies as cast iron and conical in shape. The railing of the gallery is stated to be cast iron. (Now long replaced by steel pipe-rail.) He points out too that the tower had an electric signal system, connected by conduit to each of the keepers' dwellings.²⁷⁴

The illuminating device is identified as a catadioptric, bivalve second order apparatus, with a power of 620,000 candlepower (English candles). Its revolving time is given as twenty seconds, the duration of the flash, 0.3 seconds, the duration of the eclipse, 9.7 seconds (corresponding to the ten-second signal specified in the *Light-Lists*).²⁷⁵

The lamp itself is described as a "'B' type 55 mm IOV [incandescent oil vapor]" with a single tank. Its un-enhanced intensity was estimated at 1,500 English candles. The kerosene oil was stored in a 1,254-gallon cylindrical tank, protected by a wood-frame structure, located southwest of the tower. The oil, he points out, was piped to the lamp using a hand-pump, located on the first floor of

the tower. Linked to the top of a tower through a twenty-five gallon receiving tank, the oil was then transferred to the incandescent oil vapor tank, mounted in the watch-room (lower lantern) of the tower. The oil itself was "hailed by truck in drums from Kalaupapa landing" to the storage tank.²⁷⁶ (It appears that the earlier, concrete storage building, located northeast of the tower, was no longer being used for its original purpose, but was used by this period for storing domestic oil, held in drums, alcohol, stored in cans, and paint or other combustible materials.)²⁷⁷

Tinkham provides a fairly detailed description of the keepers' quarters and the residential area. Two of the buildings, he pointed out, were painted light gray, with lead-colored trim and red roofs (suggesting that they were still metal sheathed). The third was "natural stone (dark blue) with [a] gray (asbestos shingled) roof."²⁷⁸ The first two buildings were of frame-construction, he emphasized, the third had stone bearing walls. He also identified that a frame addition had been made to the stone building in 1927. Each of the dwellings, he noted, had five rooms, a bath and a pantry. Each dwelling was fitted with "sanitary plumbing and fixtures," the waste line leading to cesspools. Each dwelling had a shower, but no bath tub. An additional shower-head had been installed "in laundry building." Each house also had a oil-operated stove, with three burners manufactured by Perfection Blue Flame. Each house also had a sink "'Standard' vitreous enameled iron."²⁷⁹

Tinkham confirms that a garage had been built "150 yards in front [of the keepers' dwellings];" also that it was painted light gray and had a red-painted red roof. He also mentioned a laundry at the "rear of [the] middle dwelling" and a hen house at the southwest corner of the keepers' compound. The circulation pattern consisted of unpaved paths only, at this time. The gardens, he pointed out, were enclosed by stone walls. It appears that the third storehouse or laundry behind the other wood structure had been removed by this period. Tinkham does mention the storehouse or workshop/storage building behind the stone building ("One store and shop building, 16 x 22 ft, two rooms, about 100 ft east of Keeper's dwelling, wood frame construction."),²⁸⁰ which also seems still to have been in place in 1930 when the site was photographed.

A report in the *Lighthouse Service Bulletin* in 1930 provides a somewhat different



Figure 7. Aerial view, Kalaupapa Lighthouse, Moloka'i, Hawai'i, ca. 1931. Bishop Museum Archives, negative number CN 110, 140.

description:

Molokai Light Station, on the north side of Moloka'i Island of the Hawaiian group, is difficult of access for purposes of inspection. Exposed to the sea, landing conditions on this side of the island are dangerous and passenger steamer service is infrequent. The light station is adjacent to the quarantine area of the leper settlement, which is isolated from the rest of the island by a natural barrier, a "pali" or vertical wall of the mountains nearly 2,000 ft high. Molokai Light is the landfall for vessels from the north bound for the city of Honolulu, situated about 50 miles west of the island of O'ahu [actually about twenty-five miles west].

A general inspection was made of the Molokai Light Station by the district superintendent in company with the superintendent on general duty, involving a number of interesting means of travel...

The light station was given a careful inspection. It is maintained efficiently by a lighthouse keeper and two assistants, all natives of Hawai'i. The grounds are attractive with extensive well-kept lawns. Water is scarce at many Hawaiian light stations, and for this station it is piped 5 miles from a mountain reservoir. The tower here is of reinforced concrete. The light is 213 ft above sea level; it is 620,000 candlepower, and is visible on clear nights 21 miles....²⁸¹

Around 1930, a new means of access arrived at the station: an approximately 1500 yard-long airstrip, located just west of the light station, along the sandy stretch of flat land adjacent to the rough shore. At first this was just a makeshift landing area, and, according to residents, this served the first few small planes to come to the peninsula.²⁸²

By 1933, a more complete airstrip had been finished, with additional improvements taking place the following year.²⁸³ Shown on a survey map of 1938, it approximated its present form by that period. Consisting, however, of rough-packed earth for many years, by the post-World War II period it would have a small paved section at the south end; the runway itself would not be paved until 1953, when the Hawaii Aeronautics Commission undertook the work.²⁸⁴ A small frame house was located just east of the south end of the landing strip. Around 1933, this was linked via a dirt road to the station complex, crossing the rock-strewn land from the southwest. This small structure appears to have served as the temporary terminal for Interisland Airways, which provided service to the islands on a more regular basis after 1934. By 1950, it would be replaced by a larger wood-frame terminal building, and another secondary structure, located to the west of the original site.²⁸⁵

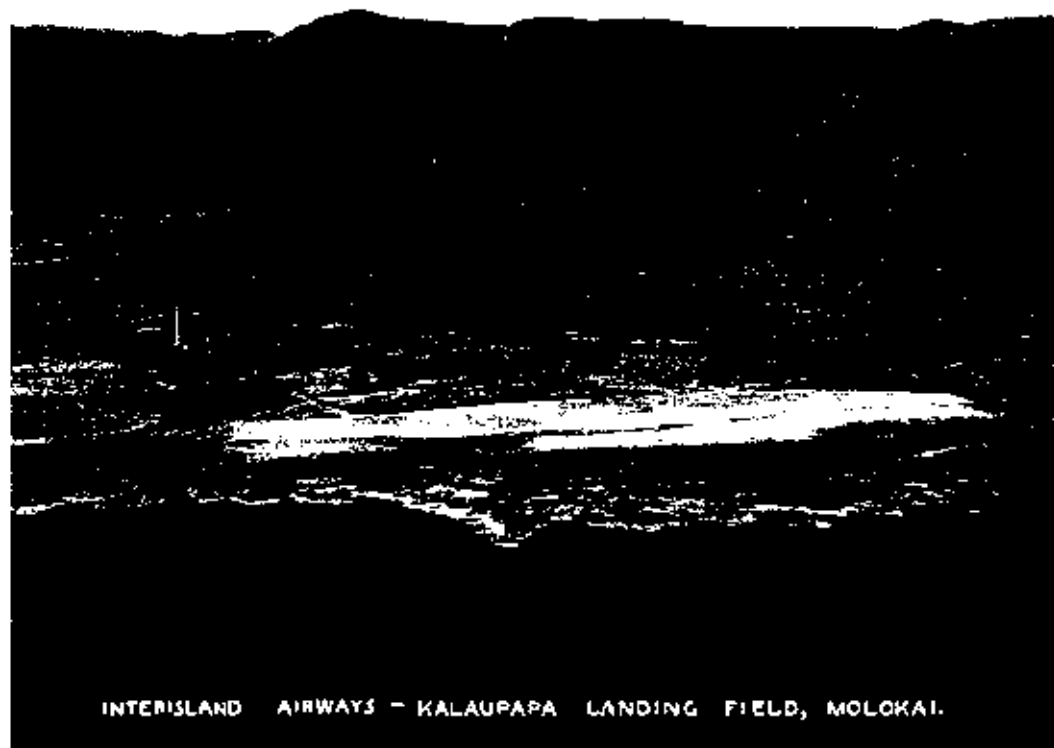


Figure 8. Aerial view of Kalaupapa, Molokai, Hawaii, ca. 1931.
Bishop Museum Archives, negative number CN 110, 144.

In 1934, or around the time of the construction of the airfield, another innovation was introduced to the light station — electric power for the light. As the annual report of the Bureau of Lighthouses recorded: "At Molokai three fully automatic 2-kilowatt engine generators and equipment were purchased for electrifying the lights."²⁸⁶ The lamp itself was a 1,000-watt, 110-volt, PS52 lamp. The following year "the structures at Molokai Light Station were wired for electricity, and approximately three-fourths mile of road near the reservation was graded."²⁸⁷ The reliance on kerosene oil had ended, and one of the last stations using incandescent oil-vapor lamps was converted to a much more powerful electric light.

This change had a dramatic impact on the overall power of the signal. Local journalist Harry Albright citing Frederick Edgecomb as his source, placed the light's output at 2,500,000 candlepower. This made it the most powerful of all of Hawai'i's lighthouses and other aids to navigation — then estimated at 311 overall.²⁸⁸ To incorporate the two generators, a new, frame "power-house" was added to the station, just north of the light tower. The oil storage tanks apparently were removed at the same time, the wood building having been taken down as early as 1930. As indicated on an aerial photograph of that date.

Around this period, travel writer Henry Franck visited Kalaupapa. His impressions provide a vivid picture of the peninsula in the middle part of the 1930s. Arriving at the top of the *pali* trail, Franck recorded the scene:

A step or two forward disclosed a view of the famous — or is it infamous? — colony far, far below, a view hardly surpassed throughout the length and breadth of the United States. The trail down the all but inaccessible face of that virtually perpendicular rock wall is cut in sharp zigzags that make walking a feat. Unfortunately the trail itself is not solid rock, which would be bad enough on a morning after heavy rain, but was greasy with mud of disintegrated lava, so that half our steps downward promised to end in a toboggan-slide more or less on the backs of our necks...

Early as we had come, the Hawaiian sun soon beat down like a gigantic Klieg light upon all the peninsula, except in the narrowing shadow of the precipice on which we hung, picking out the details of the tranquil settlement below: little villages or clusters of miniature houses among trees, a lighthouse out on the tip of the tongue of land, a ship rusting on the rocks near

the surf-beaten entrance to what Kalaupapa calls its harbor — left there four years ago, we found later, by a Hawaiian captain bringing supplies to the colony, who had celebrated New Year's too well. A power line pitched almost headlong down the peninsula with Molokai proper — and for that matter with the world at large...

We were met at the bottom not only by the superintendent of the colony, but by the territorial official in charge of all matters pertaining to lepers on the islands, with an automobile. ... We drove first of all along such "roads" as the colony boasts, to Kalawao, some three miles away on the farther side of the peninsula.... Instead of being floor-flat, as it looks from the top of that great natural barrier, the peninsula proved to be almost hilly, now that we had got down to it. To-day the population has receded from Kalawao, formerly a village of some size, which lies "far off in the distance, desolate and unattended," according to those who had just won permission to deprive it of its chief distinction. On the contrary we found the iron-fenced, cement-topped grave of Father Damien, with its marble shaft, in a perfect state of preservation, well tended, in fact....

The little cemetery lies half hidden by a ring of iron-wood trees almost in the shadow of the modest church of Saint Philomena.... Mass is still said there now and then, for one thing. Still, there is no disputing the fact that Kalawao, once well populated, growing dry taro, tobacco and most of its other needs on the leeward side of wind-breaking walls, is almost un-peopled today, isolated — yet far more accessible than in Father Damien's time.

We drove back to Kalaupapa, the leper settlement of to-day, over more caricatures of a road. The colony, like so much of the United States, has been promised better ones, now that our national initiative and energy are centered in Washington. The triangular promontory, attached to the cliff that overhangs it like a bracket to a wall, is covered with stones big and little, black sinister volcanic rocks, as if they had rained down upon it, as no doubt they did. The lighthouse in its fenced square quite separate from the leper settlement was until recently the last surviving kerosene lighthouse in the United States; it is now, if I caught our driver's words clearly above the gasps of the bouncing car, the largest single electric lighthouse, or the largest one with its own plant, on our coasts. The beach beyond is fringed with little houses belonging to and in some cases built by the lepers.²⁸⁹

On January 22, 1938, the station's usually tranquil existence was interrupted by another earthquake. Harry Albright of the *Honolulu Advertiser*, writing a few months after the event recorded:

a sharp tremblor [sic] threw 43 pounds of mercury out of the vat, causing the lens to stop suddenly and rest on its vertical rollers. The keeper and assistant keepers promptly poured spare mercury into the vat until the lens was in motion having been stopped for a period of only 15 minutes. No other damage was done excepting the loss of approximately five ft of

stone wall which was shaken down as a result of the quake.²⁹⁰

Ed Marques, Second Assistant Keeper was on duty at the time of the mishap. Many years later he reflected upon the event:

The mercury sloshed out all over and soon there was not enough mercury in the vat to support the weight of the lens and it stopped revolving. A supply of mercury was stored in cylinders on the floor below, and we carried two, hundred pound containers up the stairs and emptied them into the vat until the lens could revolve again. The next day, when we could see, we gathered the spilled mercury up by sweeping it, a little at a time, into dust pans, then we poured it through cheese cloth into containers. When it settled out clean and it still looked like polished silver and we could see the reflections of our faces in it.²⁹¹

The lives of the keepers and their families in the late 1930s did not differ significantly from those of their predecessors a generation before. The station was still relatively isolated, despite the new air-link — used only in emergencies by the station — and the gradual upgrades of the keepers' dwellings. With Hansen's Disease increasingly under control by this period, there was less fear of contact with patients, although official prescriptions of non-fraternization were still applied by the lighthouse service. Children still had to be educated off-island, or in some cases, in Kaunakakai.²⁹² Also, the keepers still had to follow strict procedures in transporting supplies, most of which still arrived by ship from the wharf at Kalaupapa, although they could now be brought more efficiently by truck to the station itself.

The great lens and lamp itself still needed constant care, despite the up-grading to electric power in 1934. The revolving mechanism for the lens still operated in the same way; and the keeper on duty had to carefully watch the clock and weight mechanism to anticipate re-cranking every three hours during the night. As in many other lighthouse stations, the keepers had to take care during inclement weather, had to be concerned during lighting storms, and also had to contend with occasional flocks of flying birds, which could damage the lantern and lens.²⁹³ It was hard work, and it remained a lonely assignment much of the time.

The Moloka'i light station would keep a full retinue of three keepers until 1942, when it was determined that two resident keepers were sufficient to operate the light. The two principal Keepers of the 1930s were James Keanu, who had served at the Moloka'i station from 1909 to 1939, with a brief interruption in 1927-29, when Manuel Ferreira took over the duties, and in 1933-36; Fred E. Nihoa, who was the head Keeper from 1933 to 1936. First Assistant Keepers during the same period included Fred E. Nihoa (1928-31), John Enos, Jr. (1932-35), James Gibson (1936), and Claude E. Platt (1837-41). The Second Assistant Keepers were William K. Nihoa (1930-34), Frank Pate (1935), and Ed Marques (1936-46).²⁹⁴

James Keanu gained an almost legendary reputation at the station. Although he had lost his right hand in a dynamite accident, Keanu still performed his work in an exemplary way. Ed Marques, who was his Second Assistant Keeper during the late 1930s, concluded:

Keanu could do everything.... All the jobs that needed to be done at the light station Keanu could do — he could use a shovel, a pick, an ax; he could even wring out sheets! He was a good man and a good worker.²⁹⁵

Marques himself worked at the Moloka'i station for eleven years. He had come to Moloka'i as a freshman in the service and the Moloka'i lighthouse was his first assignment. Employed previously as a seaman and as a contractor, he had been first attracted to the job by a notice posted at the Federal Building in Honolulu. As he later reflected:

There were a lot of men who wanted the job, and I was surprised when the clerk called me. I guess my earlier job as seaman helped me. My salary as second assistant keeper was \$125 a month and \$20 was deducted for housing. Once a year we were given a 26 day leave.²⁹⁶

Marques regretted that the job gave him little time to explore the island. By coincidence shipwrecked on the island four years before he took up his post, he remembered the *pali* trail as "one of the most beautiful trails [he had] ever taken."²⁹⁷

One of the most vivid remembrances of life at the Moloka'i Light Station during the late

1930s is offered by Fred Robins, Jr., son of the keeper from 1939. Fred Robins, Jr. remembered first coming to the station in 1937 [although other records suggest it must have been 1939]. "At the time I was six years old," he recollected in 1985, "and I was raised here, brought up on this Coast Guard Station."²⁹⁸ (The Moloka'i Lighthouse Station became officially a part of the U.S. Coast Guard in 1939, when the federal lighthouse service was subsumed by that organization as part of a general reorganization of government departments and agencies.)²⁹⁹ Referring to the stone keeper's dwelling he continued, "It's about ten acres and this is the exact home we came to, right here."³⁰⁰

Robins recalled his mother hanging plants at the rear of the house: "lauwa'i plants" he called them. He also remembered roses and hibiscus plants. "When we were living here this place was beautiful, real beautiful." He continued, "Not a weed or dry leaves around. Was kept by my dad and his people here."³⁰¹

Robins also identified the wash house, still on the site. He remembered the path and steps to the lighthouse being flanked by hedge similar to cotton flower, only about four ft in elevation. Chickens, he pointed out, were raised to the rear of the house compound [consisting of a flock of about 200 in the late 1930s]; sweet potatoes were grown in the area between the compound and the lighthouse, presumably in the stonewall-protected terraces still on the site. Robins recalls his father also planted bananas and papaya in two rows behind the row of houses. Referring to the trees lining the road to the compound and protecting the houses on the north and east, he explained: "My dad used to cut it where we could see right out to the airport. All the trees were cut. It was all uniform type."³⁰²

Both within the compound and in the flat stretch leading to the airport, the grounds were kept neatly mowed, "not this lantana," as Robins stressed.³⁰³ There was also a hibiscus hedge along the stone wall facing the compound. The grounds included a grove of coconut palms as well, a fact confirmed by contemporary photographs.

In 1936, or shortly before the time Fred Robins, Jr. first moved to Moloka'i, the parcel

containing both the lighthouse tower and the residential compound was re-surveyed. This was necessitated by the new airstrip, which encroached upon the northern edge of the original plot, established by Presidential Executive Order in 1908. The local superintendent also wanted an additional strip of land added to the southwest edge of the existing plot, both to create a larger buffer and also to compensate for land lost through the construction of the airstrip. L.M. Whitehouse, contacting Superintendent F.A. Edgecomb of the Nineteenth Lighthouse District, wrote in June, 1936:

Assistant Evans has returned from his surveys at Kalaupapa and in the course of his work relocated the original concrete monuments at the north, south and southwest corners of the premises, but was unable to find the monument marking the northwest corner. He found, however, that the monument must have been removed or plowed out when the landing field lying directly to the northwest of the light station site was extended and improved....

I am enclosing white prints showing in blue figures the azimuths and distances as compared with the new survey and shaded in blue, a portion of the present station included in the landing field and the roadway bordering the field. Shaded in green is the additional strip you desire. It should also be noted that the area in the presidential order given as 26.39 acres when accurately computed, shows a result of 21.57 acres.³⁰⁴

On November 1, 1938, the correction to and amendment of the original Moloka'i lighthouse station plot was signed by President Franklin D. Roosevelt as Executive Order Number 8000. It was published in the *Federal Register* on November 4, 1938.³⁰⁵ In its final wording, the site included 22.88 acres, "more or less —" the area still included within the station boundaries.

The War Years and Modernization

The following year, or 1939, the Moloka'i Light Station along with the rest of the U.S. lighthouse service's facilities, equipment and personnel were transferred to the U.S. Coast Guard, for many years a sister agency to the Bureau of Lighthouses. On July 7, 1939, the Bureau of Lighthouses officially went out of existence, and authority as well as administrative personnel and records were moved to the U.S. Coast Guard Headquarters in Washington from their former home in the Commerce Department. The lighthouse service was now, along with the Coast Guard, a part of the

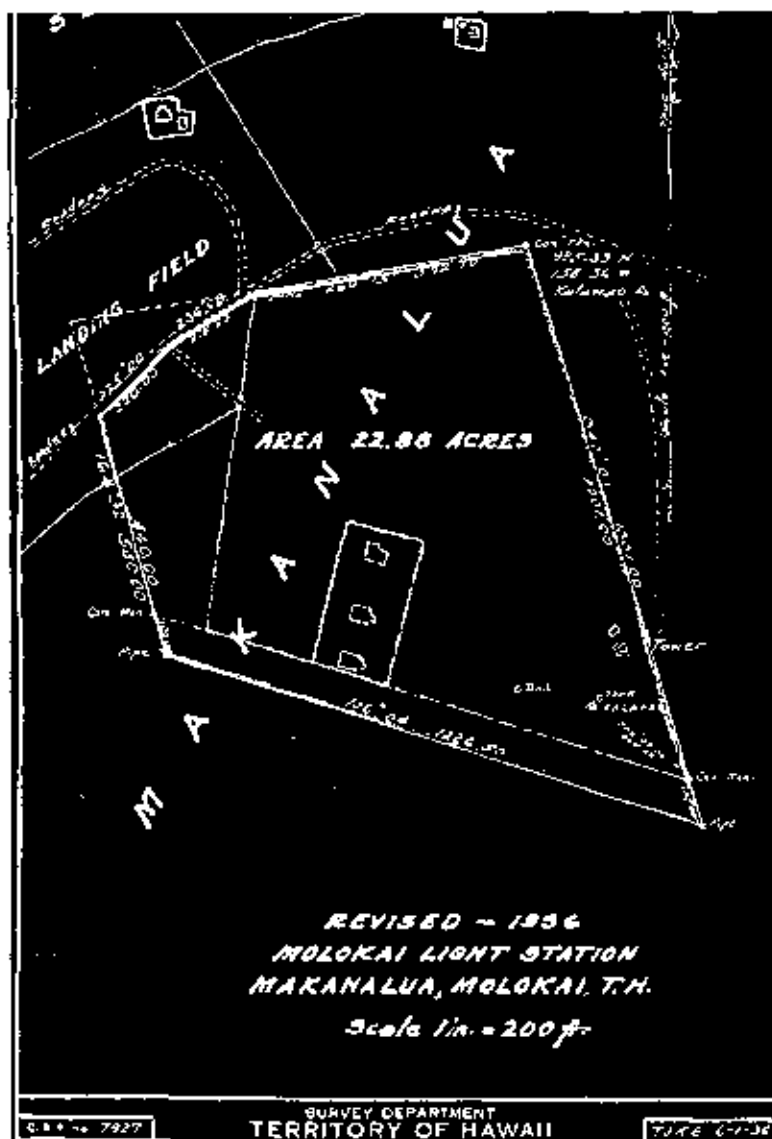


Figure 9. Survey Department, Territory of Hawaii, Revised -
 1936, Molokai Light Station, Makanalua, Molokai, T.H. U.S.
 National Archives, Record Group 26.

Treasury Department, as it had been during its early years.³⁰⁶

Keepers and other personnel of the service were given the option of remaining as civilians or entering the U.S. Coast Guard as military personnel. About half the keepers and other employees retained their civilian status, the other half following the military route.³⁰⁷ During World War II even more converted to or joined the military service, ultimately leaving only a few non-military personnel in the service.

The station at Moloka'i would roughly reflect the national pattern. Fred Robins was in many ways typical. First joining the U.S. lighthouse service in 1922 when he was only sixteen years old, he remained a civilian when given the choice in 1939. However, in 1941, with the outbreak of the war, he joined the U.S. Coast Guard. He was given a navy rank during the four years of the war, while still serving officially as keeper of the lighthouse station.³⁰⁸

Ed Marques, an assistant keeper during the war years, recalls that the station had a much more military atmosphere during this time. Marques carried a forty-five caliber pistol and a rifle. "We felt well protected — as long as we saw the enemy first!" he later explained.³⁰⁹ After December 7, 1941 the lights were turned off and the lighthouse was used as a spotting station for enemy ships, submarines, and aircraft. The keepers would stand shifts in the day and night.

Fred Robins's daughter, Anna Mae, recalled the tedium of the war years at the station. She described her mother's nightly routine:

She would finish up the dinner dishes, and then prepare a snack, perhaps some special treat. After she put us to bed, she would walk to the light tower, carrying the food and something to drink, and stay with our father on his shift at the light. Sometimes she would take us with her, and I would watch them as they sat together, and we would look out at that great ocean and the night sky.³¹⁰

The war would prove uneventful for the Moloka'i station. Less than one year after the war's end, however, the massive tidal wave of April 1, 1946, crashed onto Moloka'i's coast. Since both the

lighthouse and the living quarters were built on high ground "they were untouched by the 35-ft wave."³¹¹ The tidal wave did considerable damage to buildings near the coast. Henry Nalaiehua, a resident of the settlement, recalled several cottages washed away:

...another was lifted off its foundation and floated into the ocean. The main office was spun off its foundation... and faced in a different direction. Headstones from the graveyard ... were strewn about... The most severe damage for Kalaupapa was to our pipeline... the only source of water.³¹²

Robins himself recalled the view from the light station. He too saw the houses: "One minute the houses were there, and the next they were washing away in the wave."³¹³ Robins moved quickly to help people in Kalaupapa and assisted in repair work.

Fred Robins and Ed Marques remained at the Moloka'i Lighthouse throughout the mid-1940s, with Robins holding the post of Keeper at the Moloka'i Light Station until 1953, when he was transferred to another station. Around 1946, Robins was joined by Harry Kupukaa, who remained on the post until the early 1950s.³¹⁴

Robins became in many ways the face of the Coast Guard on Moloka'i and became intrinsically identified with the Moloka'i light over his many years there. He became the friend to many within the community, despite regulations which still prohibited fraternization with patients by the light station personnel. He willingly relayed letters and messages, joined patients in baseball games and was an active member of the local Lions Club when it was started in 1948 and also a member of the Darien Post Number 33 of the American Legion, also begun in the post-war era.³¹⁵

His daughter recalls that he enjoyed fishing especially: pole fishing, spear fishing and throw-net fishing together. In addition to the flock of chickens he also raised ducks, goats, and pigs. He took a particular interest in homing pigeons. "We had quite a farm at Kalaupapa," recalled Anna Mae.³¹⁶ Robins and his family returned about every three or four months to Honolulu to visit family.³¹⁷ His daughters were sent as boarding students to Kamehameha Schools and his son, Fred, Jr. attended

McKinley High School staying with an aunt. Fred, Jr. recalled:

We still returned to Kalaupapa every chance we got. I was a lighthouse kid, just like my father, and I loved it. Our lives were not lonely or monotonous. We created our own fun, our own games. We built kites and scooters. We went swimming and fishing. We were naughty and got spanked.³¹⁸

The early 1950s would mark a period of significant development in the station's history. From an administrative and personnel point of view the lighthouse service was changing, and the Moloka'i station would reflect this shift. Older keepers such as Marques or Robins or Assistant Keeper Harry Kupukaa were slowly leaving the service, to be replaced by younger Coast Guard men with no links to the old Bureau of Lighthouses.

Stations, also, were becoming smaller and were being modernized. The Moloka'i light had been electrified since 1934; and although keepers still had to insure that the revolving mechanism was properly employed — requiring resetting the weights and drum every three hours — there was less work to be done than before. By around 1950 there were only two keepers at the station: Fred Robins and Harry Kupukaa. By 1960 there would only be a single keeper assigned to the station.³¹⁹

The U.S. Coast Guard considered ways of dealing with these changes and with the loss of corporate knowledge, in a sense, of the operation of older stations such as Moloka'i. Concerned that it would become increasingly difficult to recruit younger Coast Guard men to remote stations such as Moloka'i, Captain O.C Rohnke of the Fourteenth Coast Guard District explored the possibility of hiring someone from the Kalaupapa settlement to run the light.³²⁰ There remained the question of health hazards. L.F. Badger, then Medical Director of the Hawai'i Public Health Service, replied positively to Rohnke's inquiry:

I would not hesitate to employ an arrested case of Hansen's Disease at the light. However, if such personnel were employed, I would request that they be examined periodically for any evidence of activity of the disease. An arrested case of leprosy may become active and be as much a possible source of infection as any other active case. I do not consider it advisable to employ active, bacteriologically positive cases.³²¹



Figure 10. Aerial view, Keeper's compound and light station, 1956. U.S. Coast Guard Archives, Honolulu, Hawai'i.

Apparently nothing came of this potential avenue for recruitment, and the U.S. Coast Guard continued to man the station in a conventional way throughout the 1950s.

There would be significant changes to the station, however, during the same period, in large part as a result of declining personnel needs and also perceived needs to modernize accommodations for the residents. Around June, 1950 the middle of the three dwellings was demolished and a new, flat-roofed, concrete-block structure was put up in its place. It was completed by the end of the year and was ready for occupation in 1951. The same year (1951) new water supply lines were added to the station, and the stone keeper's dwelling was renovated to some degree. A small addition was also made in 1951 to the old wash house behind the middle keeper's quarters, to provide for additional storage.³²²

Aerial photographs from ca. 1931 and ca. 1951 reveal the differences in the site. A storage building or workshop located behind the stone keeper's cottage, shown in the ca. 1931 photograph, had been removed by 1951. In the 1951 view, the power house added in 1934 to accommodate the generators was in place. In both views, the oil-storage building located southwest of the tower seemed no longer on the site, suggesting that the wood-frame structure (still visible in a 1926 photograph) had been considered no longer necessary even before electrification.

The principal difference was the addition of the modern keeper's quarters. This building represented a dramatic change over the more traditional designs previously employed at light house stations such as that at Moloka'i and reflected the modernist spirit of immediately post-war America.³²³

Measuring about 30 by 46 ft, the new house included two bedrooms and a central bath. The living and dining areas were combined to create an open area of nearly 25 by 25 ft. The exterior bearing walls of the structure were of concrete block. Windows were still double-hung wood sash as on the earlier houses, but many of these were grouped, together in rows, suggestive of the International style.³²⁴ A wood-frame entry way marked the north end of the house, giving an

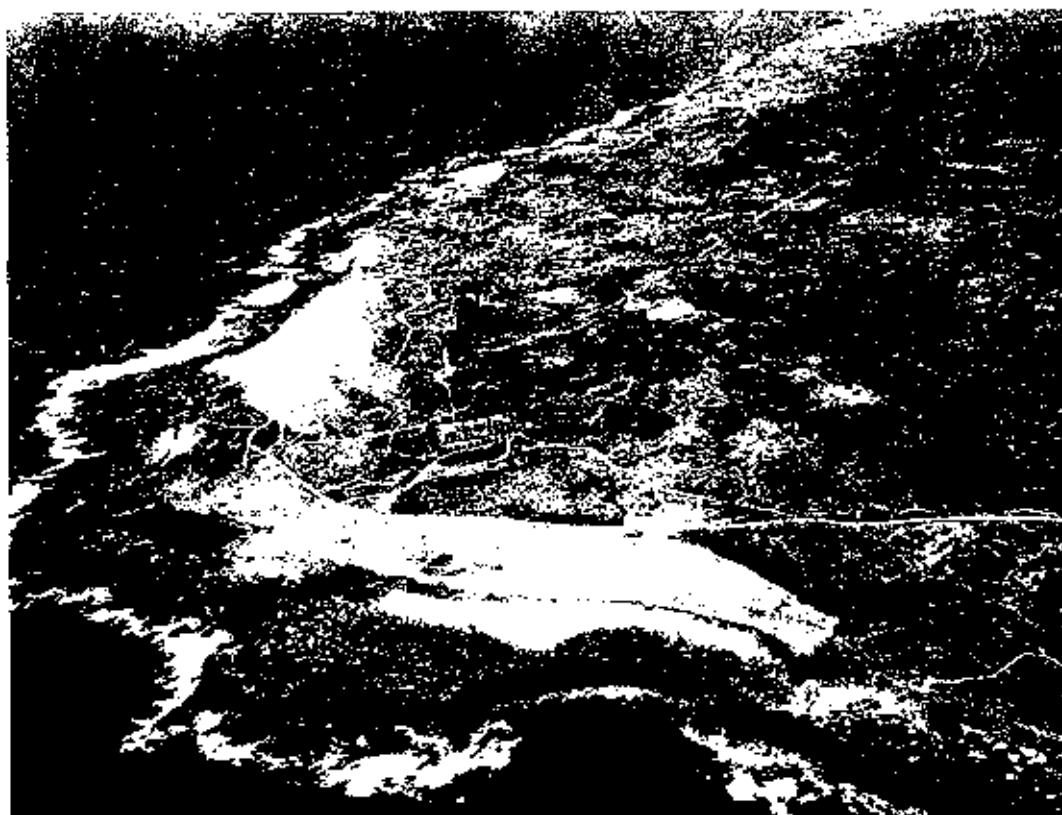


Figure 11. Aerial view of Leprosarium Settlement [Moloka'i Light Station]. Bishop Museum Archives, U.S. Army Photograph, negative number CO 86630.

otherwise institutional-feeling building a domestic character.

The most significant contrast, of course, was the flat roof. Of wood frame with rolled roofing, the flat roof contrasted dramatically with the pitched roofs of the two adjacent structures. Similar to other Coast Guard and Navy buildings of the same period — as well as a growing number of commercial and institutional buildings built elsewhere in Hawai'i in the post-war era ³²⁵ — the new keeper's quarters harkened a new period in the management of the station and marked a shift from the old technology of the former Bureau of Lighthouses to the efficiency of what would soon become a fully modernized (and eventually automated) station.

Other changes at the station over the same twenty-year period represented maturation rather than the introduction of new features. The trees surrounding the residential compound and lining the access road from the northwest had filled out and matured. The lawn surrounding the house and spilling out toward the airstrip was still well tended. The hibiscus hedge lining the stone wall of the compound remained neatly in place. Foundation plants accented the residences. The grove of coconut palms, about thirty trees in all, was fully mature, and punctuated the grounds of the residential area in a uniform pattern. By the mid-1950s these reached as high as forty ft.

Other work at the site during the 1950s consisted primarily of maintenance. The tower itself, which was reported to show signs of cracking — a not surprising development, considering the harsh marine environment and the relatively primitive system of construction — was scheduled for a re-coating. This was completed in 1953 using a process known as "Gunite," similar to the method used for pouring swimming pools. ³²⁶ Unfortunately the Gunite layer, with its rougher texture, softened the sharp lines of the original tower, although small cracks were filled in this way.

Elsewhere on the site there was continuing minor change. By 1952, the third keeper's dwelling — still indicated on maps of the previous year — had been removed. The keeper himself, then Fred Robins, moved with his family to the new building, apparently letting First Assistant Keeper Harry Kupukaa live in the older, stone house, itself just recently renovated. By this point the station

no longer required three keepers, and a report of May 14, 1952, completed by the chief of the Engineering Division for the Fourteenth District of the U.S. Coast Guard explained that there "are two dwellings, one each for two keepers there. One is new; one needs replacing or [further] renovation — if we are to continue to keep two (2) keepers there." It was estimated that it would require \$25,000 to replace the older stone building, something then considered desirable.³²⁷

The report of 1952 asked a more significant question than whether the keepers' quarters should be retained or not, but asked also whether there was continuing need for the station at all! This report reflected a significant shift in the operation of the lighthouse service and increasing rationalization and application of cost-accounting measures to what had become the navigational aid division of the U.S. Coast Guard. In the end it was decided to "retain a 2,500,000 cp light at this location...; to retain a light in watched status — if it can be done by one man, using automatic alarms, etc."³²⁸

The decision to retain the station was apparently made in Washington. As the chief of the Operations Division in Honolulu announced to the chief of the Engineering Division: "Captain Ross verbally advised Chief, Operations Division that Headquarters would not 'go along' with its discontinuance." Further thought was given to operation of the station by a single person and whether commercial power might become available for the station or not — and if not, whether the existing generator system might be improved. Most important, consideration was given for the first time to "Conversion of present windless drive of lens to electric drive with standby hand-operated windless drive (as at present)."³²⁹

The 1952 operations report concluded that while other matters were being considered, the older stone dwelling would be minimally maintained, awaiting possible demolition ("disposition," as phrased in the report). Installation of automatic alarms and a time clock were also recommended as immediate measures.³³⁰

By 1956, the Moloka'i Light Station had evolved to a new point of "maturity." In overall

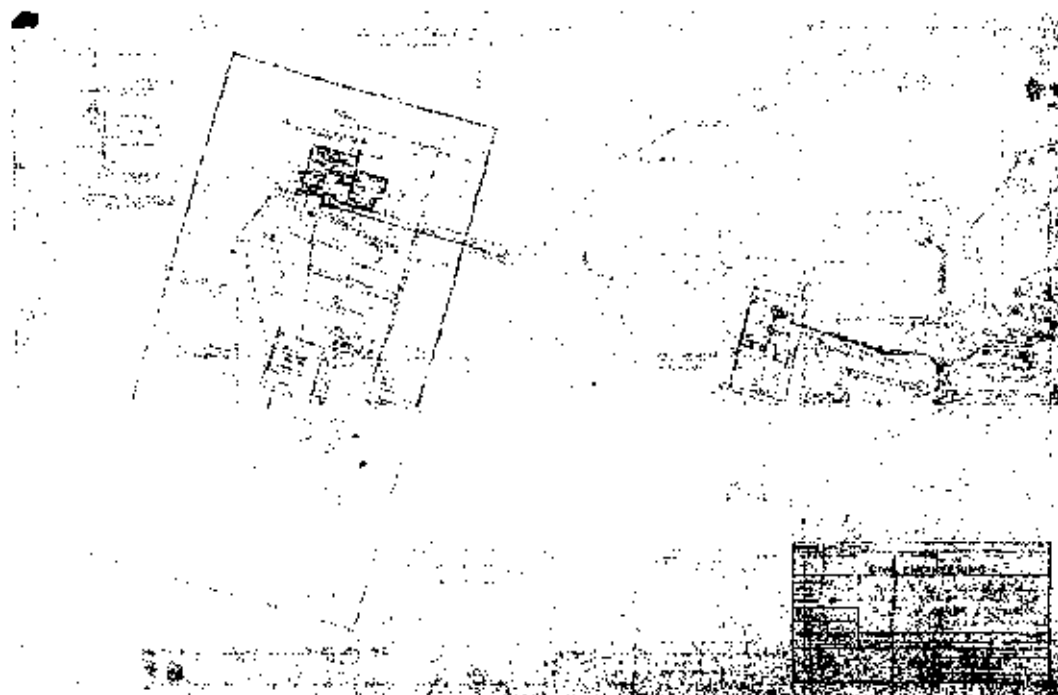


Figure 12. Construction documents, Civil Engineering Division, U.S. Coast Guard, 14th Coast Guard District, April 24, 1950 with revisions, 14th Coast Guard District records, Honolulu, Hawaii.

appearance and in terms of its components it approached closely to what still remains on the site. Significant changes included the demolition of the last of the two wood keepers' residences (demolished in 1950 and 1952, respectively), a small addition to the small, wood-frame wash house (built in 1909; added to in 1951), and completion of the rectangular, flat-roofed, masonry house within the residential compound (1950). Significant features of the 1920s and 1930s were in place: the powerhouse (1934), the concrete walkway (1929), and the frame garage (ca. 1920). The trees and plants introduced in the 1910s and 1920s had reached maturity. The site was well maintained, with immaculate lawns and neatly trimmed hedges and foundation shrubs. It still conveyed aspects of its historic, 1909 origins and announced the new period of modernization under the U.S. Coast Guard Service.

Most significantly, the entire complex was now powered by commercial electricity, with poles stretching from the Kalaupapa settlement two and a half miles to the west.³³¹ This eliminated the need for the generators other than in emergencies. Still not connected to the outside world by telephone, Moloka'i Light Station had nonetheless become connected to the wider world.

On February 14, 1956, the characteristics of the Moloka'i light were officially published by the U.S. Coast Guard and signed by Rear Admiral F.T. Kenner, Commander of the Fourteenth District. The light's display, an occulting (flashing) light at ten second intervals remained the same. The clockwork apparatus still required rewinding every three hours; the attendant was required to check the proper operation of the light every four hours. Because of improvements to the electrified lamp (the original 110-volt lamp was replaced around this time by a 1,000-watt, 120-volt, CC-8 tungsten halogen lamp), the power was estimated at 12,000,000 candlepower — making Moloka'i lighthouse still one of the most powerful in the service. Manned by a single keeper, housed in a "modern, up to date 5 room dwelling,"³³² the Moloka'i lighthouse still contributed significantly to maritime safety in the Hawaiian Islands.

By the end of the decade this latest era at the Moloka'i Light Station was coming to an end. Admiral Kenner's successor in the Fourteenth Coast Guard District, Rear Admiral S.H. Evans opened

the door to new developments in a January 20, 1959, letter to Dr. Ira D. Hirschy, Director of the Kalaupapa settlement:

For many years, the civilian Lighthouse personnel who were transferred to the Coast Guard... have been available to maintain and operate Molokai Light Station.... We soon will be faced with no more "old timer" lighthouse personnel and are experiencing difficulty interesting the younger military generation in isolated duty assignments such as the Molokai Light Station.³³³

Evans's letter marked the beginning of a plan to automate the light at Moloka'i and dispense with the need for resident keepers, then still needed to operate the clockwork mechanism that actually still turned the light. He suggested to Dr. Hirschy that equipment "now available" made it unnecessary to man the station and that the new equipment would allow operation "with very little supervision of a relatively unskilled nature." Admiral Evans hoped that a "locally available non-patient or released patient" might be able to perform the necessary tasks: "lens and general cleaning; replace burned out lamps." They would also need to make routine tests of emergency equipment and carry out other duties with the help of U.S. Coast Guard personnel.³³⁴

Evans's subordinate, Captain A.C. Unger followed up with a letter to Dr. Clarence B. Mayes, Medical Director of the Public Health Service in Honolulu on March 18, the same year:

We are considering changing Molokai Light Station to automatic operation with no resident Coast Guard personnel in attendance at the unit.... To operate the light automatically will require that we obtain the part time services of a resident of the Hansen's Disease settlement to visit the light at least once each week and as required in case of an emergency. This person would clean the lens, test operate equipment, change lamps, etc. Additionally, it will be necessary that Coast Guard personnel from Honolulu visit the light from time to time for inspection and performance of major maintenance duties

We have conferred and corresponded with Dr. Hirschy, Director, Division of Hansen's Disease, Territory of Hawaii, who advises that the services of non-patient or released patient personnel are available at the settlement to perform the work we have in mind. We understand that some non-patients are at the settlement of their own choosing and not by reason of their having been afflicted or previously exposed to Hansen's Disease.

While we understand that much progress has been made with regard to Hansen's Disease, we

consider it most important that we be sure that implementation of our plan will not jeopardize the health of those Coast Guard personnel who from time to time are required to visit and work at the light.³³⁵

Dr. Mayes replied a month later, declaring emphatically "that in the opinion of this office and the consensus of competent medical opinion, your Coast Guard personnel would not, in any way, be in danger."³³⁶ Dr. Hirschy, in turn, got back to Admiral Evans and emphasized that he "would be glad to suggest one or more dependable employees of the Settlement with whom a contract for services might be arranged."³³⁷

In the end negotiations came to a stand-still over issues of liability, not the suitability of personnel. The difficulty from the U.S. Coast Guard's point of view was adequate supervision on site and the nature of the contractual relationship with the Hansen's Disease Settlement. The Coast Guard's Legal officer cautioned that there was some question as to the Territory's "liability to anyone if the light should fail to operate [or contrastingly] to their employee who may be injured on the job at the light."³³⁸ As a result, further consideration was given to contracting on an individual basis with a local resident. But despite continuing assurances, the matter was put on hold.

In the meantime, the Coast Guard decided to explore the possibility of even more reliable automation. Plans were made initially for an emergency or "stand-by" lamp to be mounted in the lantern gallery.³³⁹ Powered by battery, this would have less intensity than the existing generator-powered light, but would not require constant monitoring and servicing as did the generator. With commercial power available on the island, this meant that the battery-powered light would switch on automatically in the event of power failure. It was further recommended that a failure alarm system be wired to the keepers' dwelling. (As of 1965, however, the battery-powered lamp had yet to be installed).

In 1960, the decision was finally made to no longer consider the station fit for family occupation.

Captain C.N Daniel, Commander in the Fourteenth Coast Guard District, writing on September 12 that year, explained that

CG Light Station, Molokai, heretofore a family station has not had personnel with families at the station for the past one and one-half years because it is not considered to be a proper place for a normal service family to live. The last family was removed because of the effects on family morale due to extreme isolation of the station and practical non-existence of the normal living associated with a family station.³⁴⁰

He recommended that Moloka'i be "designated an overseas isolated duty station where dependents are not allowed." From that date, he explained further, "the normal tour of duty at this station will be 12 months with compensatory absence of 2 ½ days a month."³⁴¹

One of the last keepers under the old system was M.F. Beeson, assigned to the station just prior to its reclassification as an "isolated duty station." A single man, Beeson was forced to stay a full month at the lighthouse before the arrival of his assistant. Because Moloka'i had yet to be reclassified, there were no special provisions for books or magazines.³⁴² Andrews Flying Service, which had taken over the Moloka'i run from Interisland Airways, charged the Coast Guard personnel six cents a pound for delivery of food and personal items. Captain Daniel recommended that the government cover some of these expenses "which it imposes on the station personnel by assigning them to this duty station" and also that the Coast Guard provide "a reasonable number of magazines monthly and paper books occasionally," provisions eventually supplied through the reclassification.³⁴³

With the future of the station's operation uncertain, maintenance began to fall behind. A report produced in 1963 noted that the older stone keeper's residence had "not been used for several years except for infrequent usage by contract workers." The building was full of "rapidly deteriorating furniture, appliances and fixtures." It was suggested that the building "be stripped to the proportions of an unused barracks, which would leave it available for use by workers as there is no other place to billet men at the settlement." The alternative of repairing the structure was considered too costly and time consuming; it was estimated that fourteen hours a week would be needed for mere house-keeping.³⁴⁴

Fortunately, nothing was done to the older dwelling, and it, along with other structures, faced simply slow deterioration. By 1965, there were reports of leaking roofs on all the buildings. In the older house it was noted that "A hit of the fist on the bulging bathroom wall will shake down termite dust into the tub." It was noted further that the masonite counter-tops were "worn and unsightly." The plumbing in both houses was thought to be inadequate and antiquated. And despite formal recommendations for the installation of telephone service as early as 1960, none had yet been installed.³⁴⁵ The 1965 maintenance report also noted "all paved roads at this unit are potholed and badly deteriorated."³⁴⁶

Automation of the Light; the End of Life at the Station

By 1964, plans were well advanced toward automating the station. That year Acting Commander Captain Charles Tighe of the U.S. Coast Guard Fourteenth District circulated an announcement that automation would take place soon. It was recommended that the change take place during fiscal year 1966.³⁴⁷ On March 29, 1965, a project request form was submitted to the U.S. Coast Guard headquarters proposing to "Disestablish Moloka'i Light Station and convert Moloka'i Light to automatic-unattended operation." The estimated cost savings was \$9,500 in annual operating expenses. It was further suggested that "Structures other than those necessary for operating the light can be disposed of as excess and the light can be serviced monthly by personnel from Honolulu Base." Emergency servicing and the use of a stand-by generator were to be contracted out on a private basis. Costs for the conversion project were estimated at \$8,600.³⁴⁸

The changes suggested for Moloka'i represented both new advances in technology and changes in operations for the U.S. Coast Guard. For one, new, powerful electric lights had been developed, which, combined with older lenses, could produce a powerful signal. In addition, new, more efficient lenses were becoming available, which would soon make the older Fresnel lenses unnecessary. Another point was that navigational aids themselves were becoming less necessary. As a report issued in August, 1965, by the Commander of the Fourteenth Coast Guard District pointed out, most of the ships entering the channel off Moloka'i were equipped with modern navigational

devices.³⁴⁹ These included gyro-compasses, radio direction finders, radar and fathometers. Most larger ships no longer relied on the signal from lighthouses to take their bearings. However, lighthouses were still of importance for some vessels, including recreational vessels; lighthouses such as Moloka'i also served as an important landfall signal, even if the ship's location could be calibrated using modern equipment as well.

In 1965, it was estimated that approximately 1,800 sea-going vessels a year passed in the vicinity of the Moloka'i light.³⁵⁰ This number included all ships coming from and going to the west coast of the U.S., those proceeding to the Panama Canal, and any ships bound for or from South or Central America. Of these it was estimated that approximately 500 vessels depended on the Moloka'i light as their principal landfall light, the remainder depending more on Makapu'u light.³⁵¹ Nonetheless, nearly three quarters of the ships appreciated the Moloka'i light as well and used it to help steer their course. Ships relying to some degree on the Moloka'i light ranged from small, 300-ton ocean-going tugs to 29,000 and above gross-ton tankers and passenger vessels. Occasional fishing craft and pleasure boats also used the light, although most inter-island boats sailed across the gentler south coast of Moloka'i. Although the Coast Guard appears to have given some consideration to terminating the station altogether, it was evident that Moloka'i light still performed an important function. The only issue was how best to automate the station in order to save on both personnel and maintenance costs.

On December 6, 1965, correspondence with the Department of Health was resumed. Captain T.F. Epley, Acting Commander of the Fourteenth Coast Guard District wrote to Dr. Leo Bernstein in Honolulu:

The Commandant of the Coast Guard has approved conversion of Moloka'i Light Station at Kalaupapa from manned operation to automatic unmanned operation. We have set 1 April 1966 as a target date for this conversion. After automation, we plan to dispose of all excess property at the light including our quarters there.³⁵²

Epley went on to explain that the Coast Guard would still require the services of a resident of

the settlement, but that the contract will be a direct one, not one arranged through the Department of Health. The other matter was a telephone link to the police department in Kalaupapa in order to monitor the light and in case there should be a power failure. As Eply explained, "Even though the constable might be away from the police station making his rounds, he will always be in view of the light and will perform the same function as the alarm."³⁵³ In anticipation of this a telephone line had been installed between the station and the Kalaupapa settlement in 1964.³⁵⁴

The final move toward automation would wait until well into July, 1966. The light would first be switched to automatic power on August 1.³⁵⁵ Until that time the station continued to be manned. That spring and summer Boatswain's Mate First Class Daniel J. Bryson and Engineman Third Class James R. Creighton were on duty at the Moloka'i station. Bryson was a career Coast Guardsman from Jackson, Michigan and had been in the service for twelve years, serving the last year at the remote Kalaupapa station. Creighton, a native of San Antonio, Texas, had only arrived in Moloka'i four months before the date set for automation. Both left shortly after the need for manual rewinding of the clockwork mechanism was no longer required and the fully automated light with the motorized mechanism was clearly working.

Orders sent out in June, 1966, called for the crating and removal of all unnecessary materials and equipment from the site.³⁵⁶ Still much remained on the old Moloka'i Light Station site that had to be taken care of or otherwise disposed of. In June, 1968, a final accounting of property and equipment remaining at the station was made under the direction of Captain Victor Pfeiffer, Commander of the Fourteenth District.

Summarizing the inventory in a letter to Dr. Ira Hirschy of the Department of Health Pfeiffer listed: an "Assistant' Keeper's dwelling" of combined wood-frame and stone construction: "Condition: stone construction, good; woodwork and flooring, heavily termite infested;" a keeper's dwelling: "concrete block construction....Condition: concrete block construction, good; interior, good." Other structures listed were "Store house... Condition: poor;" "Garage.....Condition: poor;" "Fuel shed — sturdy concrete construction, located north of light tower. Condition: door broken off

hinges;" "Fresh water tanks (2) — concrete construction with dimensions of 12 ft diameter x 10 ft height. Located approximately 100 ft south of light tower. Condition: roofing missing."³⁵⁷

This was one of the only references to a second water tank and leaves some questions. The survey map of 1936 indicates two tanks, one on the present location of the concrete storage tank, located south of the tower, and a second tank located to the west. Only one tank is listed in the 1927 inventory of the property.³⁵⁸ What remains on the site are the concrete foundation remains — tapered concrete posts — for a now missing structure. These possibly held a second water storage tank installed between 1930 and 1936, but this remains uncertain. This second tank was almost certainly not of concrete (possibly wood or metal); and there must have been some error in the 1968 survey, or simply, another tank was located near the tower that no longer remains on the site.

The 1968 inventory went on to cite the remaining contents of the buildings, listed as "Title B property:"

- 1 ea chest type freezer
- 1 ea Maytag washer
- 1 ea 40 gal Westinghouse electric water heater
- 1 ea GE refrigerator
- 10 ea chairs
- 8 ea wooden tables
- 1 ea bookcase, wooden
- 1 ea settee — wooden with cushions
- 1 ea 4 drawer file cabinet
- 1 ea deck metal
- 2 ea beds with headboard
- 2 ea chest of drawers — wooden
- 3 ea mattresses
- 2 ea box spring mattress
- 1 ea desk, wooden
- Various plumbing fixtures and electrical fixtures ³⁵⁹

Pfeiffer stresses that "All the above items which are of wood construction appear to be termite ridden. Other items are deemed to be in such condition as to make further use by the Coast Guard uneconomical." As he stresses in his letter to Dr. Hirschy:

In the event you have no need for the facilities and no other public body is interested in them, the surplus buildings will probably be demolished. In order to forego the expense of sending a Coast Guard demolition crew to accomplish this task, we are interested in the possibility of having qualified members of the settlement perform the demolition and scrap removal for us in exchange for the salvage value of materials and title B property. The demolition would have to conform to Coast Guard requirements so that no safety hazards would remain.³⁶⁰

In 1971, the plot was re-surveyed for purposes of redistribution of the property.³⁶¹ The Coast Guard had retained 0.7461, or approximately 3/4's acre for its own use, conveying the remainder of the about 22.9 (22.88) acre plot to the General Services Administration. In 1971, the State of Hawai'i expressed an interest in acquiring the rest of the property to have it joined to land already held as part of the Department of Health's operations. The U.S. Coast Guard, which oversaw the survey, recommended strongly for the transfer:

1. That, except for the light structure and 32,400 square ft adjacent to the light, the land and buildings are excess to the needs of the Coast Guard.
2. That the buildings and structures are in run down condition and present a poor appearance.
3. That the two buildings are restorable and could be used by the anyone who had reason to live at Kalaupapa.
4. That the proper maintenance of the buildings and structures by the Coast Guard would be expensive and that there would be no benefit to the Coast Guard in maintaining them.
5. That as long as the State Hansen's Disease Facility is in operation, it is not permissible (sic), practical, or desirable for any other party to use the land and the buildings.
6. That there is no known Federal Agency need for land or structures.³⁶²

By this period, however, new plans were afoot for the whole of the Makenalua Peninsula. Throughout the years after the construction and first use of the Moloka'i Light Station, the Hansen's Disease settlement had continued to evolve. The 1920s and 1930s had witnessed considerable restructuring of the settlement community, as the population shifted more completely to Kalaupapa. The 1930s, in fact, would mark one of the most important decades in the physical history of the settlement, with new dormitories, schools, and homes being built on the western edge of the

peninsula.³⁶³ By 1940, Kalaupapa was a well developed community, with stores, a post office, community center, schools, homes, administrative buildings, workshops, and warehouses. Along with the lighthouse station, Kalaupapa had reached its "mature" period.

But much would change in the years after World War II. Drugs developed during the war years, particularly the sulfone drugs, such as promin, diasone, and promizole, were found to be immensely effective in the treatment of Hansen's Disease. Beginning in May, 1946, patients at Kalaupapa were given the option to be treated as part of their routine therapy; and by 1948 remarkable improvement in the condition of patients was evident.³⁶⁴ In August, 1948, about 240 patients were under drug treatment, representing approximately 85 percent of the residents.³⁶⁵ It was discovered that their ulcers were healing, various lesions were diminishing, and in some cases even failing vision was arrested. At the same time, greater precautions were being taken to prevent children from contracting the disease, so fewer children were being forced to move to Kalaupapa from elsewhere in the Hawaiian Islands.³⁶⁶

Although it was not immediately clear to everyone involved, these developments certainly pointed to a time when the leprosarium would no longer be necessary. In 1948, there remained only 280 patients, 38 parolees, or former patients showing no remaining symptoms, and six *kokuas*, or helpers (usually wives or other family members of patients).³⁶⁷ The sixty-bed hospital was manned by a doctor and two assistants. There were also eleven nurses, five Sisters of St. Francis and six lay nurses, and two laboratory technicians. The settlements also included an administrator and occasional clerks or assistants. The schools and boys' and mens' homes were run by a handful of Roman Catholic brothers. By the late 1950s, the number of patients had diminished by nearly half again.³⁶⁸

After 1949, no new patients were required to be admitted to the settlement, although occasional patients continued to voluntarily take up residence in the settlement over the next two decades. Treatment of the disease primarily was conducted in Honolulu, where patients could be housed more economically. Repairs and improvements would continue to be made at the Kalaupapa settlement, and even new houses would be built in the post-war period. But overall, the entire project

was winding down. By the 1960s, most of the fears surrounding the disease had dissipated and, beginning in 1968, letters coming from Kalaupapa no longer needed to be fumigated.³⁶⁹ In 1969, the Department of Health officially decided that those infected with Hansen's Disease no longer needed to be isolated; and most patients could live at home with no more than occasional visits to doctors.³⁷⁰

In 1974, there were only 119 patients still remaining in residence at Kalaupapa.³⁷¹ The State of Hawai'i assured residents that they would have a continued right to remain on Moloka'i, particularly because some residents had never known another home. But as of 1969, when no more patients were allowed to move to Kalaupapa, it had become clear to everyone that at some point there would no longer be a Hansen's Disease settlement on Moloka'i.³⁷²

The National Park Service Assumes Control

A Citizens Committee for the Preservation of Kalaupapa emerged during this period and pressed for some kind of intervention. As a result, Representative Patsy T. Mink introduced a bill in Congress to create a national historic site on Moloka'i, and on October 17, 1976, an act was passed determining that the Kalaupapa leprosy settlement "constituted a unique and nationally significant cultural, historical, educational, and scenic resource,"³⁷³ and directing the Secretary of the Interior to study the settlement and make recommendations as to its preservation and interpretation (Public Law 94-518).³⁷⁴

A report was completed in July, 1978, and the Kalaupapa settlement was recommended for inclusion within the National Park System in October, 1979.³⁷⁵ With continuing advice from the Kalaupapa National Historical Park Advisory Commission, as well as other state and federal agencies, patients, architects, historians, and others, the bill to create a national park at Kalaupapa was finally signed into law on December 22, 1980.³⁷⁶

After 1980, the Kalaupapa Hansen's Disease settlement became the Kalaupapa National Historical Park. Patients still remained (and remain to the present time) on the peninsula and many

of the administrative functions were (and are) still handled by the Hawai'i State Department of Health. Much of the money for operating the settlement comes from the federal government through the Department of Health; and responsibility for maintenance has been assumed by the National Park Service, which has an administrative presence on the peninsula.³⁷⁷ With a small, but active tourism business, Kalaupapa, it can be assumed, will eventually become an interpretive center and site dedicated to the understanding of the importance of leprosy in the cultural life of Hawai'i as well as the particular roles of significant figures such as Father Damien, Brother Joseph Dutton, and Mother Marianne Cope in ministering to sufferers of Hansen's Disease. The Moloka'i Light Station, identified in numerous National Park Service-sponsored studies as historic properties, had become by 1980 in many ways simply a part of this story.³⁷⁸

The historic value of the Moloka'i lighthouse, and to a lesser degree the secondary structures associated with it, had become apparent both to historians and the Coast Guard itself by this period. A trip report written in September, 1974, by Lieutenant D.(Dick)A. Wilson, Chief of the Civil Engineering Branch for the U.S. Coast Guard's Fourteenth District, pointed out that "Moloka'i Light has been proposed for inclusion in the National Register of Historic Places."³⁷⁹ In 1976, the Moloka'i Light Station would be listed in the National Register as part of the Kalaupapa Leprosy Settlement National Landmark District nomination.³⁸⁰ A separate, although very incomplete, nomination for the station was submitted in 1982.³⁸¹

Listing in the National Register of Historic Places, and the steps leading up to listing, introduced a new period in the history of the light station. The U.S. Coast Guard, which still had (and has) jurisdiction over the tower was forced to think differently about any proposed changes at the site. Consultation with the park's superintendent and with the State Historic Preservation Officer and his staff also became a requirement whenever changes were contemplated. In short, the Moloka'i Light Station had become a historic monument, not merely a navigational aid!

Inspections by the Coast Guard engineers therefore began to take on a different type of significance; they now concerned the condition of historic fabric, not just structural or cosmetic issues

per se. And reports from the 1970s and 1980s indicate that both the lighthouse tower and subsidiary buildings and structures were facing significant problems.³⁸²

Dick A. Wilson, Chief of the Engineering Branch of the Fourteenth District summarized many of the problems in his report dated as early as September 3, 1974. The tower, he pointed out, showed "marked deterioration of paint." The lower twenty ft of the tower indicated "concrete cracks and spawling." A interior crack, located near the clock level, did not penetrate the wall. But the presence of rust stains throughout, Wilson cautioned, indicated the possibility of a leaking roof. Three windows on the east side of the tower were deteriorated beyond repair; Wilson suggested they "be replaced or sealed." Those on the west, he found, to be in better condition; he suggested they be sealed. Estimated costs were \$30,000.³⁸³

In addition, Wilson found that the front door to the tower was missing its louvered panel. Important to the ventilation of the tower, he suggested replacement. He found too that the shaft was filled with debris; also that the carriage wheels were "frozen in place by built-up grease."³⁸⁴ He recommended more thorough cleaning during the next inspection.

Wilson's report was particularly discouraging about the ancillary buildings. "The buildings on the station are dangerously deteriorated."³⁸⁵ It was clear that the station had reached a point of no return, as far as the condition of buildings and structures was concerned. National Park Service intervention was coming none too soon.

One of the final issues, and one that would have an important impact of the future of the lighthouse, was the condition of the operating mechanism. As Lieutenant Wilson reported:

Very small amounts of mercury were found on the clock level, usually imbedded in accumulated grease. A mercury vapor level check of the light tower is scheduled for funding this quarter. The U.S. Naval Shipyard conducts the tests. The unit should be cautioned to remove excess and spilled grease and oil since these substances trap and obscure free mercury and make its visual detection nearly impossible.³⁸⁶



Figure 13. Kalaupapa Lighthouse, Kalaupapa, Moloka'i, Hawai'i, March 1974.
Bishop Museum Archives, John C. Wright, negative number H 107, 223 - frame 48.

Although plans continued to be put forward for the retention of the original apparatus, it was apparent within the next ten years that a more thorough rethinking of the problem was going to have to be conducted. The issue of mercury contamination in the light of increased understanding of environmental hazards became more a concern during this period. Periodically personnel from the Navy Environmental and Preventive Medicine unit were called in to monitor mercury contamination and deal with minor spills.³⁸⁷ An inspection made on January 15, 1985, revealed that mercury was regularly leaking from the vat.³⁸⁸

But even before this condition was revealed the Coast guard had decided to replace the older Fresnel lens with a new rotating beacon. On this occasion the State Historic Preservation Office was consulted. Writing to Susumu Ono, Chairman of the State Historic Preservation Review Board on November 15, 1982, Captain B.D. Lovern, Chief of the Navigational Aids Branch of the Fourteenth Coast Guard District, explained that

We propose to replace the classical lens with a modern rotating beacon which will provide adequate service to the mariner, reduce the maintenance effort and, most importantly, eliminate the mercury health hazard.

The new equipment will be mounted inside the existing protective glass enclosed housing. Although the brilliance of the light will be reduced somewhat, and the light at night will look "different" to the mariner than it does now because it will have a shorter flash length, the appearance of the structure will not change.

The lens, which because of its age, probably has some historical value in itself, will be disposed of in accordance with the guidelines for the disposal of such properties.³⁸⁹

The same day a Project Request Form was sent to headquarters in Washington by Commander D.F. Murphy, Chief of the Signal Management Branch.³⁹⁰ On January 21, 1983, the Advisory Council on Historic Preservation concurred with the State Historic Preservation Officer that the removal of the lens would have "no adverse effect" upon the historic property at Moloka'i.³⁹¹

Before removal of the lens took place, the Coast Guard began to consider other changes on the site. Proposals were made in 1984 to demolish both the remaining concrete water tank and the

wood-frame powerhouse. But both the National Park Service on site in Kalaupapa and the State Historic Preservation Officer informed the Coast Guard that both structures were considered historic and were considered "integral" to the lighthouse complex.³⁹² Efforts were made at the same time to consider the best way to preserve the lens itself, which was already scheduled for removal. Proposals from the Hawaiian Maritime Center in Honolulu and the Lahaina Restoration Foundation in Maui were considered, with the Lahaina Restoration Foundation's proposal being accepted.³⁹³

Finally, in 1986 the Coast Guard began the necessary steps to remove the older apparatus and provide a new illuminating device. An Industrial Work Order was issued in March that year calling for the replacement of the "classical lens with DCB-224 beacon." The work called for the removal of the electric motor, gears, and shaft from the lens rotation mechanism; removal of the 1,000-watt lamp and pedestal; draining the mercury from the vat and decontamination of all areas likely to have been in contact with mercury; modifications in the cast iron platform; construction of a new mounting stand for the lighting apparatus; and removal of the "classical lens" from the site.³⁹⁴ The Coast Guard made arrangements at the same time for the lens to be loaned to the Lahaina Restoration Foundation in Maui, which was interested in displaying the lens as an educational exhibit.

To carry out and monitor the work, six men from the ANT (Aids to Navigation Team) were sent to Moloka'i from their home base at Sand Island, Honolulu. The team included petty officers Aaron J. Landrum and Ralph Craig. Their assignment included supervising the work of a civilian contractor, who had been given a deadline of fourteen days to complete the clean-up of mercury in the tower and a general decontamination. The task for the Coast Guardsmen was to disassemble the lens and pack it for shipping to Maui.³⁹⁵

The project was complex, but was guided by the well thought-out assembly scheme and a numbering system engraved on the components of the six-ft wide lens. Aaron Landrum remembering the job, commented:

The numbering system is so simple and clear that anyone, even someone who had never seen a Fresnel lens before, can understand how the lens is assembled. There are Roman numbers



Figure 14. Kalaupapa Lighthouse, Moloka'i, Hawai'i, June 1978, Bishop Museum Archives, negative number I 114, 812 - frame 16.

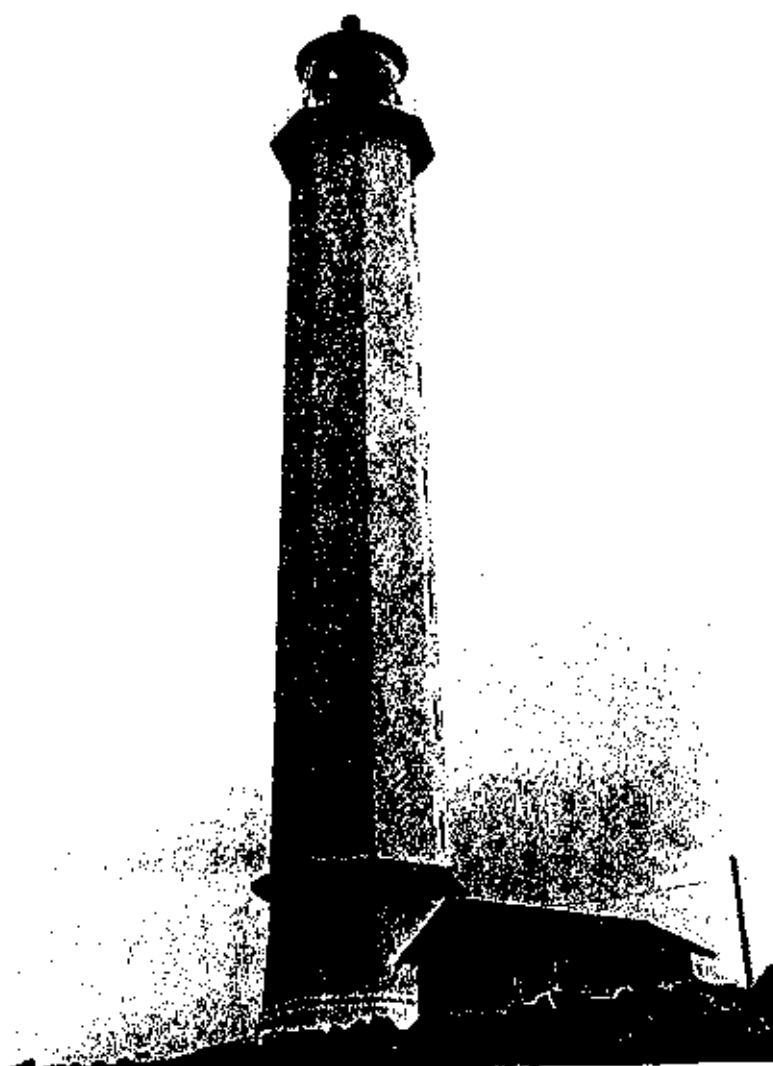
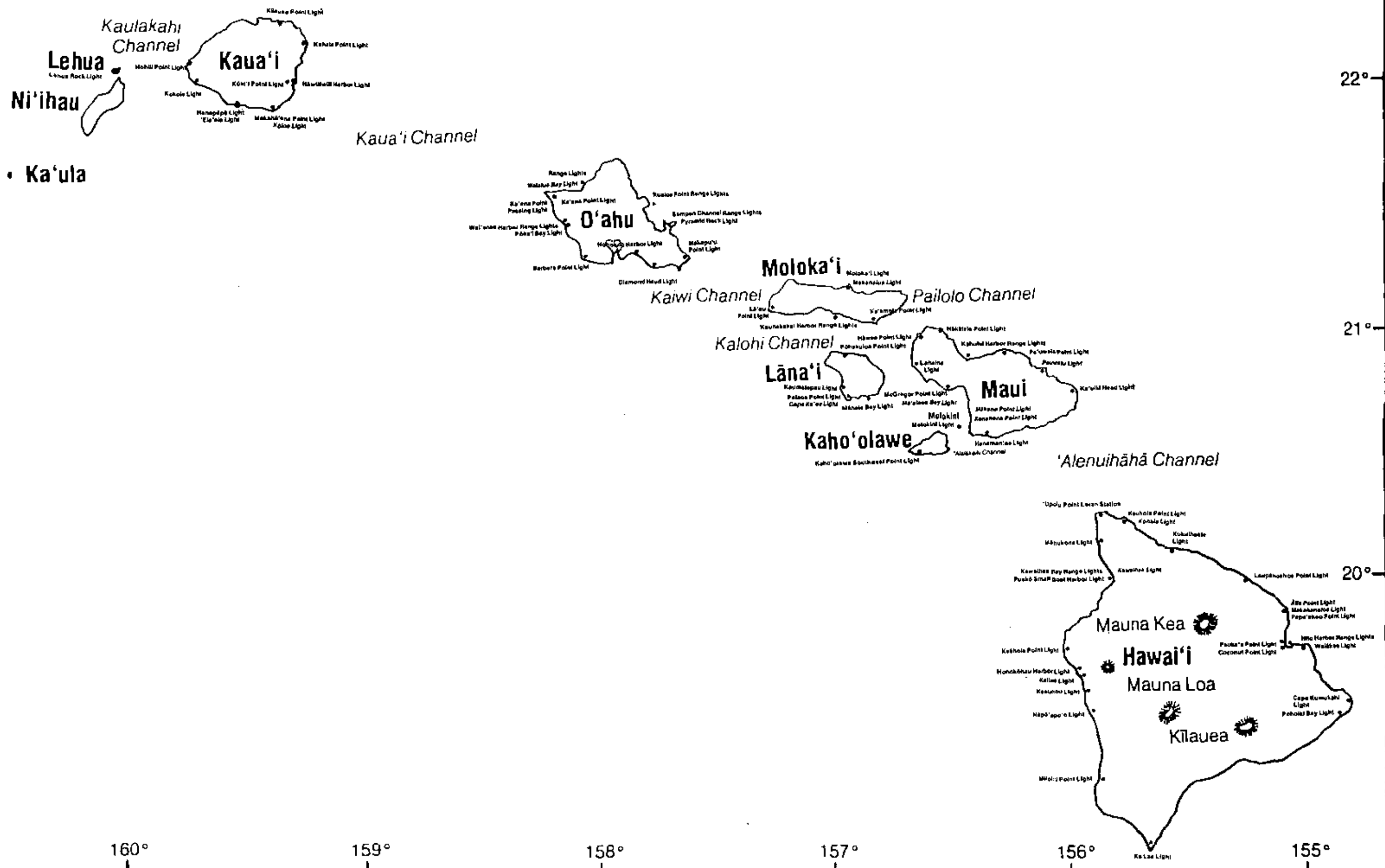


Figure 15. View of Moloka'i Lighthouse, from the northeast,
1985, U.S. Coast Guard Archives, Honolulu, Hawai'i.

Figure 16. Location Map, Lighthouses in the Hawaiian Islands. Map by Sayance Virochrut.



as well as Arabic numbers, and on the bottom is stamped "A go to A, I go to I," etc. The lens is so beautifully designed, once it is assembled the weight of the sections automatically makes the whole lens fit together tightly.³⁹⁶

The system proved so simple that videotaping the sequence of disassembly proved unnecessary. Ralph Craig explained the procedure further: "There were 26 sections all together [sic] and each weighed about 264 pounds." The sections were then lowered down the side of the tower.

We used this old truck — no brakes, only a hand brake, no doors, rusted out — and we tied a line to it. After we removed a section of the lens we'd wrap it up in two old mattresses and then attached it to the other end of the line. As the truck backed up towards the tower the lens was slowly lowered to the ground. You can imagine how tough it was getting every piece down. The road was rough and rocky, and the wind was blowing about 35 to 40 miles an hour. We had to use a cheater pole — a solid aluminum pole with a chiv at the top. We used the cheater pole to keep each section we lowered from smashing into the tower.³⁹⁷

The whole process lasted two and a half days, before the lens was removed. The sections were taken to the landing in Kalaupapa, where they were stored until the Coast Guard Cutter *Mallow* arrived. Each section was then put in a small boat and taken to the cutter offshore. The lens was then transported to Lahaina, Maui for reassembly as part of the Lahaina Restoration Foundation exhibit.

Landrum and Craig were dispatched to Maui to assist in putting the exhibit together. This took five days altogether. The Foundation, under the direction of Jim Luckey, arranged for the lens to be displayed in a small building located at the Wharf Shopping Complex. Here it was put on display daily for visitors.³⁹⁸

There were regrets about the move almost immediately. Both Aaron Landrum and Ralph Craig, the Coast Guardsmen assigned to the project, pointed out that the residents of Kalaupapa seemed to feel that something was being taken away from them. "One of the things the people enjoyed," Landrum explained, "was going up to the airport at night and watching the light... There is so little the people have. There is so little they can do."³⁹⁹



Figure 17. Detail of tower and lantern, from northwest,
1985, U.S. Coast Guard Archives, Honolulu, Hawai'i.

Richard Marks, a patient at the settlement and also the Kalaupapa sheriff, complained strongly to the press:

They talk about the Statue of Liberty, well, this light was the first thing that hundreds of thousands of immigrants to Hawai'i saw when they first came here. Everyone of our people ... can remember this light looking over us ... Nobody gives a damn about the people here ...

Maui is going to set up a building and put money into it. How willing are they going to be to give it back? We're not blaming the Coast Guard. They're doing their job.... but the lens should be shown here. What does Lahaina have to do with the light?⁴⁰⁰

In 1993, Marks's plea was answered when the lens was returned to Kalaupapa. In September, 1993, the Lahaina Restoration Foundation's exhibit was closed, and the Coast Guard planned to return the lens to O'ahu, pending further decisions.⁴⁰¹ Neal Borgmeyer, then head of maintenance for the National Park Service in Kalaupapa, heard that the future of the lens was uncertain and, together with the Superintendent, Peter Thompson, requested that the lens be returned to Moloka'i.⁴⁰² Jim Lucky of the Lahaina Restoration Foundation gave the proposal his support.⁴⁰³ In October, 1993, Jim Deibler of the Fourteenth Coast Guard District flew to Maui to supervise the disassembly and move of the lens to Kalaupapa. Reporting on October 17, the Maui news explained:

It took less than four hours for the Coast Guard cutter *Sassafras* to reach the Kalaupapa harbor. The crates were then lowered into a smaller craft which needed to make three trips to shore to deliver the fragile goods. Borgmeyer and his co-workers — Lionel Kaawaloa, Albert Pu, Jeffrey English and Kevin Seitz — were lined up on the wharf, waiting to guide the light home, piece by piece.⁴⁰⁴

The lens is presently stored in the old garage on the lighthouse station property. The other structures and buildings at the site are in various states of repair, used now primarily by the National Park Service to house temporary staff or visitors. Minimal maintenance, under typically stringent budget constraints, has taken place at the site, including the re-roofing of the concrete water tank and periodic repairs to other buildings. The site now awaits adoption of a more thorough management plan to determine steps to take for the preservation of remaining features. (A National Park conservation team examined the condition of the lens in the summer of 2001, as part of a general plan

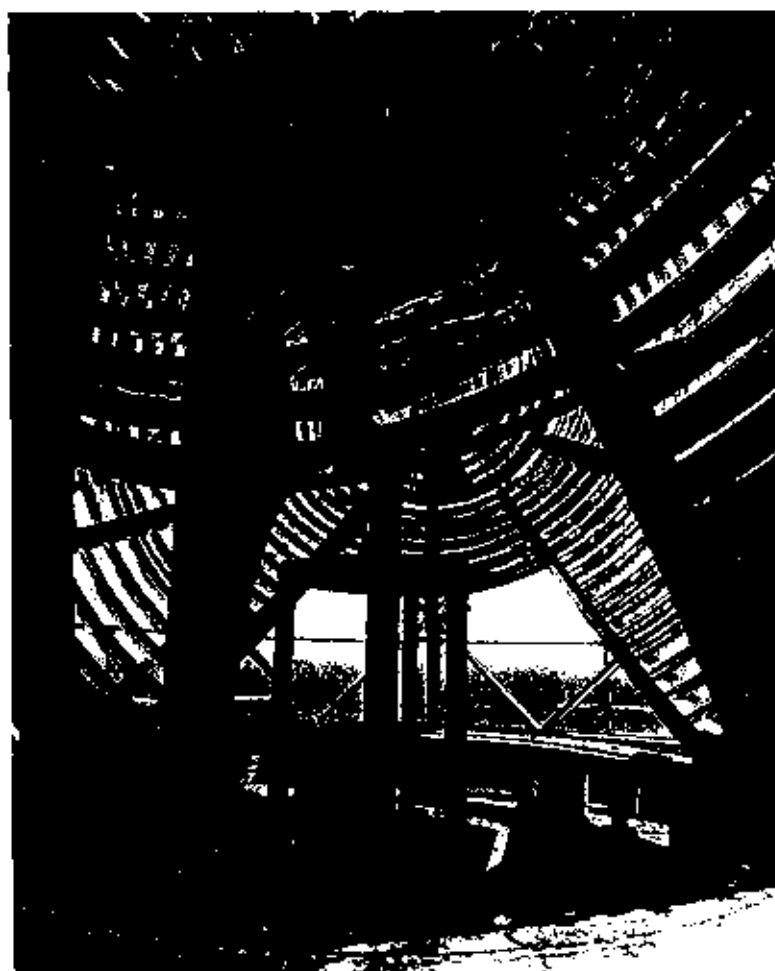


Figure 18. View of lens, interior of lantern, 1985, U.S. Coast Guard Archives, Honolulu, Hawai'i.

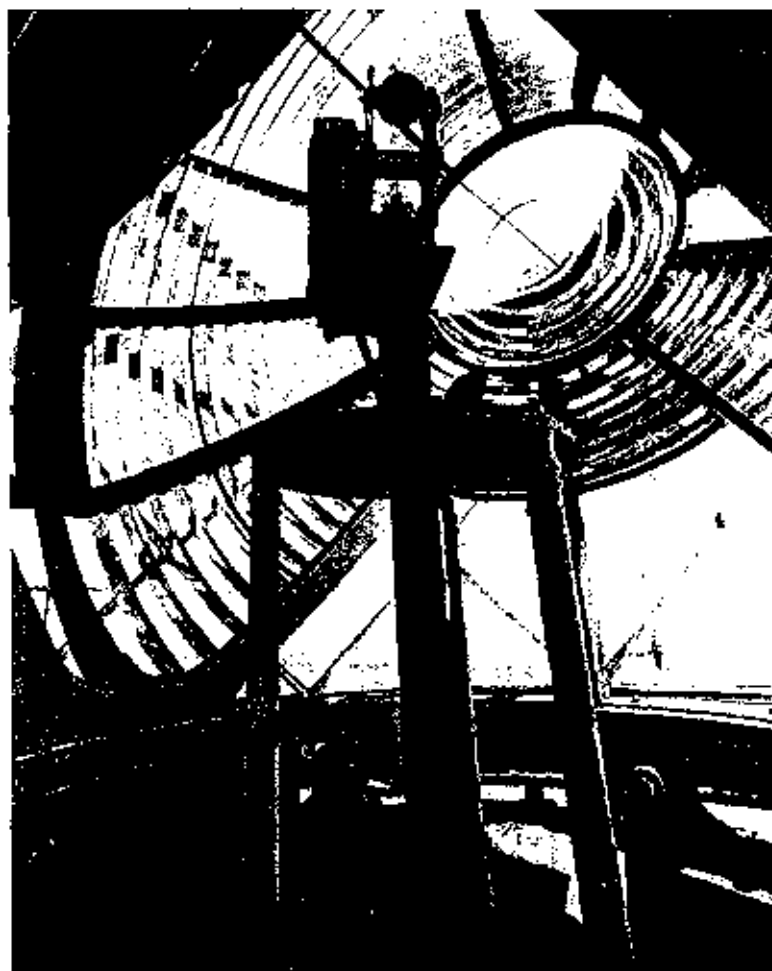


Figure 19. View of lens, 1985, U.S. Coast Guard Archives,
Honolulu, Hawai'i.

to display and interpret it to the public.)

The approximately 22.9 acre site of the Moloka'i Light Station is presently owned jointly by the National Park Service, which was conveyed the land by the General Services Administration in 1980, and the U.S. Coast Guard, which has retained ownership of approximately three quarters of an acre containing and immediately surrounding the lighthouse tower.⁴⁰⁵ There is presently discussion about the possibility of conveying all of the property to the National Park Service. With the signal at Moloka'i now playing a smaller part in the navigational safety of Hawaiian waters, the actual function of the lighthouse plays an increasingly smaller role. The property is now un-manned and requires only periodic inspections for maintenance.

As the Kalaupapa National Historical Park becomes a more established entity with the gradual, but inevitable decrease in the number of resident patients and the waning of the role of the Department of Health in the management of the area, it is likely that the lighthouse and associated buildings and other features will become a significant part of the interpretive program of the park, as set out in the legislation establishing the park (Public Law 96-565, enacted December 22, 1980). The Moloka'i Light Station is an important piece of the nation's history, and also important in the history of the Hawaiian Islands and Moloka'i Island, especially the Kalaupapa peninsula. Its remaining buildings and structures convey a strong sense of the history of the lighthouse service in Hawai'i and the lives of the keepers who once were stationed there over several significant eras. Collectively, they constitute an important resource for the nation, the state, and the locality and a valuable interpretive and educational tool for future generations.



Figure 20. Air Survey Hawaii, Aerial view, Molokai Light Station, May 28, 1990, Kalaupapa National Historical Park, Kalaupapa, Hawai'i.

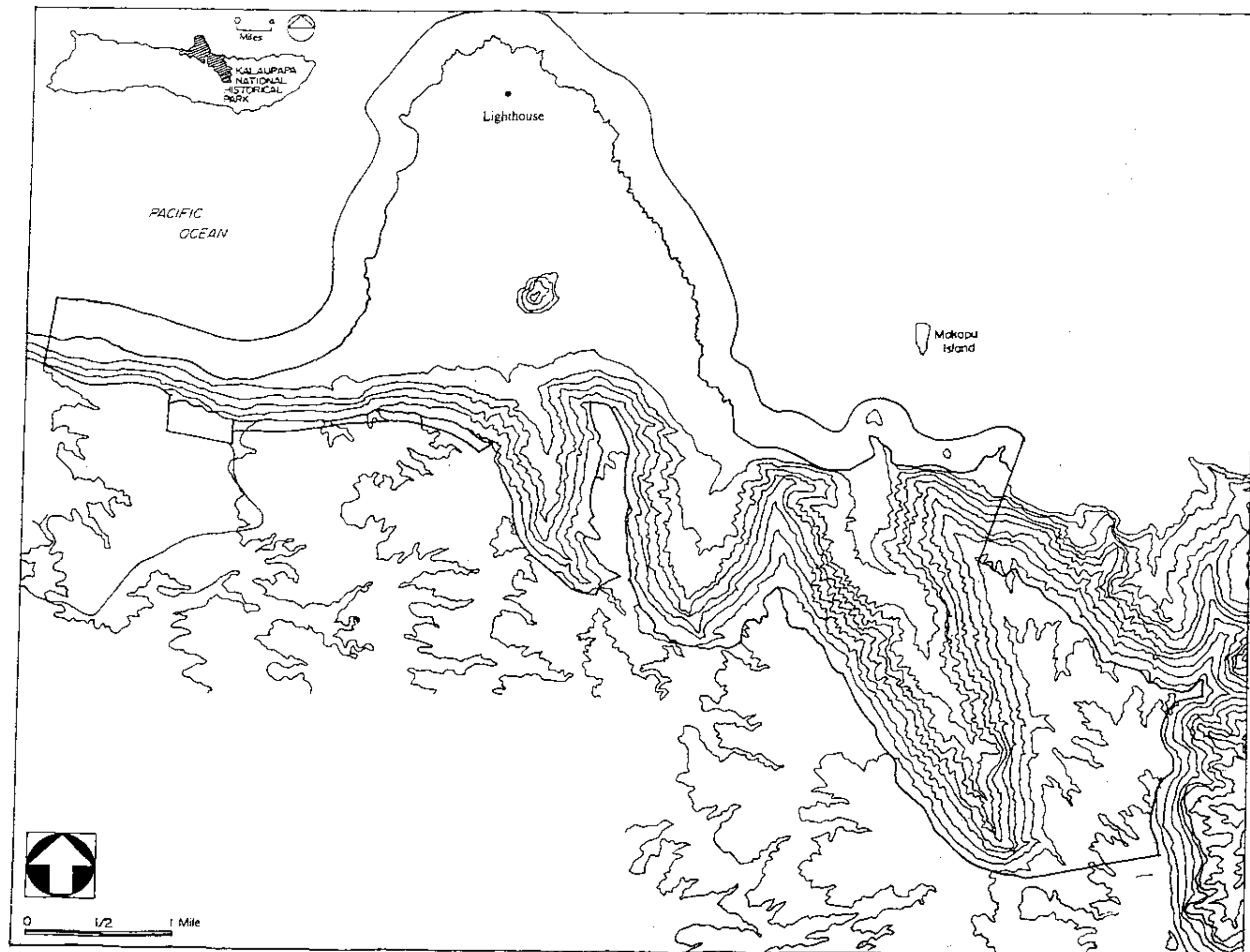
PHYSICAL DESCRIPTION: LIGHTHOUSE TOWER AND ASSOCIATED BUILDINGS, STRUCTURES, AND OTHER FEATURES

Location and Setting

The Moloka'i Light Station is located at the northern edge of the Makanalua Point, also known as the Makanalua Peninsula or, alternatively, the Kalaupapa Peninsula, on the north coast of the Hawaiian island of Moloka'i, the County of Maui. Situated about a half mile from the tip of the peninsula, known as Kahu Point, and a quarter mile from the Kalaupapa Airfield, the white-painted lighthouse, with its elevation of 138 ft above the ground and approximately 225 above sea level, forms a prominent feature of the landscape, visible from sea and air from many miles. The Moloka'i Light Station is about 50 miles east-northeast of the city of Honolulu and 25 miles east of Makapu'u Point Light Station, the second important landfall light for ships arriving in Hawai'i from North, Central, and South America.

The lighthouse station is situated along a slight rise in what is known to geologists as the Kalaupapa shield. A volcanic formation, the relatively low-lying promontory is ancient evidence of the outflow of lava northward from the Moloka'i sea cliffs, formed long before. At the south end of the shield, close to the cliffs or *pali*, is the Kauhaku Crater, with its lake one of the most distinctive geological formations on the peninsula. The Kauhaku Trench, possibly a collapsed lava tube, stretches northward from the crater in the general direction of the lighthouse tower.

The site of the light station could be seen to straddle the divide between the drier, Kalawao side of the peninsula, to the east, and the larger, and somewhat more protected Kalaupapa side, to the west. The lighthouse itself sits near the top of a knoll, with an elevation of 105 ft above sea level. The Kalawao Trig Station (bench mark) was established at this point prior to the construction of the tower; the tower foundation was placed at the approximately 90-ft contour, to the northeast of the Trig Station. Known traditionally as Kiikolu hill or rise, the knoll measures about 600 ft wide, descending steeply on the south and east sides, and declining more gradually along the north and



**Figure 21. Location map, Moloka'i Lighthouse, Kalaupapa
National Historical Park. Map by Sayanee Virochut.**

northwest.

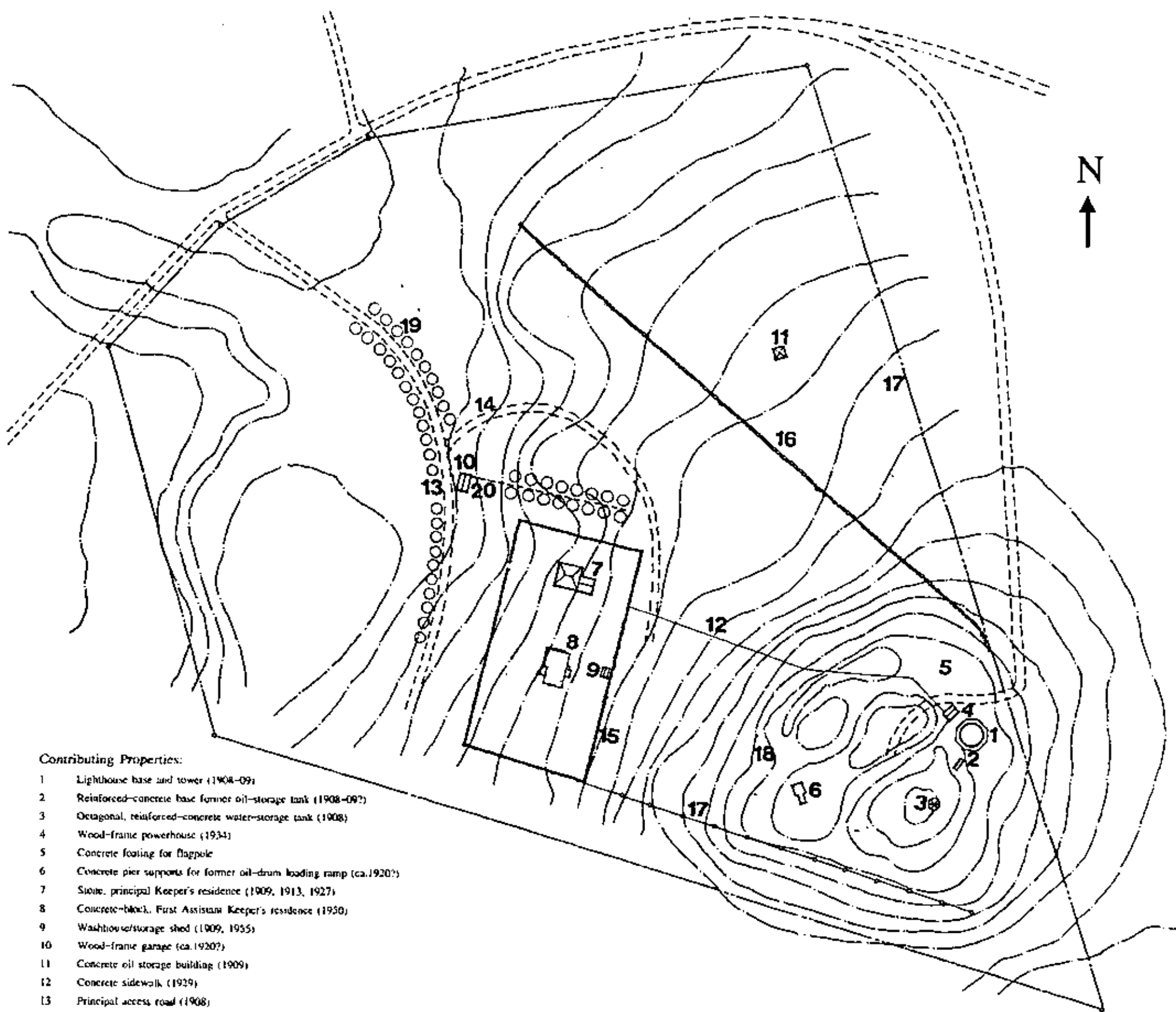
Landscape Features

The soils along the east and northeastern sides of the plot are dry and harsh, consisting of sandy soils and broken volcanic crust and boulders. The west and northern slopes are better watered, and consist of grassy areas broken up by numerous volcanic stones and boulders. The latter are strewn largely over all of the site, although most are clustered together in either low-lying piles or have been brought together historically (and prehistorically) to form terraces, walls, and enclosures. These enclosures and walled areas were used historically (and, again, prehistorically) for agricultural purposes, protecting fragile plants from harsh, southwesterly winds, and also serving to hold domestic animals, especially pigs. In the more recent historic period, or after the establishment of the light station, these protected terraces were also used for small-scale agriculture by the keepers and their families. Interviews and records indicate that the keepers grew a variety of foodstuffs, including sweet potatoes, a longstanding crop in this part of Moloka'i, as well as various other vegetables and fruits.⁴⁰⁶

A more elaborate stone wall, rising from approximately two to four ft above grade, extends nearly 1,000 ft along the eastern edge of the property, in a northwesterly direction (from the lighthouse tower), following the downward slope of the hill.

Volcanic (basaltic) stones were also used to delimit the residential compound of the keepers. The resulting perimeter wall measures about 150 by 300 ft and is located 450 ft west of the lighthouse tower. Made up of boulders ranging from two ft to six inches in diameter, this wall rises from four to five ft above grade on four sides. It is broken on the northwest side, to provide access to the dwellings, and on the northeast to allow for the concrete pathway leading to the tower.

In addition, the site includes a number of rubble masonry retaining walls, differing from the various terraces and walled compounds in that they are usually mortared (but not always). These



Contributing Properties:

- 1 Lighthouse base and tower (1908-09)
- 2 Reinforced-concrete base former oil-storage tank (1908-09?)
- 3 Octagonal, reinforced-concrete water-storage tank (1908)
- 4 Wood-frame powerhouse (1934)
- 5 Concrete footing for flagpole
- 6 Concrete pier supports for former oil-drum loading ramp (ca.1920?)
- 7 Stone, principal Keeper's residence (1909, 1913, 1927)
- 8 Concrete-block, First Assistant Keeper's residence (1930)
- 9 Washhouse/storage shed (1909, 1955)
- 10 Wood-frame garage (ca.1920?)
- 11 Concrete oil storage building (1909)
- 12 Concrete sidewalk (1929)
- 13 Principal access road (1908)
- 14 Historic pathway/road (1908 or earlier)
- 15 Stone perimeter wall, Keepers' compound (ca.1909)
- 16 Stone wall along north edge of site (pre-existing)
- 17 Wire perimeter fence (ca.1910?)
- 18 Stone terraces, walls, compounds (pre-existing)
- 19 Ironwood allee and wind break (ca.1920)
- 20 Fresnel lens (1909)

Moloka'i Light Station Historic District

Kalaupapa, Moloka'i, Hawai'i

National Register Nomination,

June 1, 2000.

Savanne Virochnut Delineator

walls are generally associated with specific structures, often defining their upper boundaries or holding back soil of adjacent higher ground. They are described in association with individual buildings and structures and are not identified and numbered as separate contributing structures.

A historic pathway or roadway leads from the north to the tower, for a distance of about 900 ft. Well recorded in historic plans, this roadway is now only partially visible. Only a short section falls within the boundaries of the Moloka'i light station, where it accesses the site at the southeast.

The more substantial historic road arcs across the north and west edges of the site, just outside the boundaries of the light station plot. Serving as a means of communication with the settlement at Kalaupapa, 2 ½ miles to the west, this road historically was unpaved; and it is now paved only to the edge of the Air Field, which it also serves. Within the area of the station an unpaved drive stretches about 600 ft from the access road, in an easterly, then southerly direction. Historically, this drive separated at the northwest corner of the keepers' compound, providing for access to the work and service areas above the compound, just downslope from the tower.

Other, smaller pathways and drives interrupted (and still interrupt) the surface of the slope west of the tower, providing access historically to storage facilities and other various features. Some of these roads and paths may also be remnants of agricultural pathways, leading to various terraces and protected enclosures. Difficult to distinguish given the present condition of the site, these many paths have not been individually identified as contributing features.

The drive to the lower area was bordered historically by Ironwood trees (*casuarina equisetifolia*). These appear to have been added in the 1920s to provide a wind break and formal landscape feature for the site. Photographs of ca. 1930 show neatly planted rows of trees along the principal approach from the northwest and also lining the west edge of the keepers' compound, about thirty ft from the wall. These remain on the site today, although those marking the west edge of the keepers' compound are no longer trimmed as they were historically. Clusters of trees, again apparently ironwood, were located on the lower slope of the hill behind (east) of the keepers'

compound. Remnants of these trees still remain on the site as well.

The site is covered with a variety of tropical grasses and shrubs, including Lantana (*Lantana camara*), Ilima (*Sida fallax*), Heliotropium amplexicaule (*Heliotropium amplexicaule*), Bermuda grass (*Cynodon dactylon*), and Hairy Horseweed (*Conyza bonariensis*).⁴⁰⁷ Historically (until ca. 1960) the keepers' compound had a turf lawn that was well manicured by station personnel. There were also ornamental plantings and shrubs along the foundations of the keepers' residences and bordering other features, such as the concrete walkway to the tower. Presently most of the site is overgrown with successional grasses and shrubs.

Banana and papaya trees were tended historically within the keepers' compound. Vegetable gardens were also maintained within the compound and in the sheltered area east of the compound wall.

Photographs of the 1930s through the 1950s also indicate a stand of palm trees, neatly distributed within the keepers' compound. These appear to have been planted in the 1920s and were removed from the site sometime after 1960.

Remnants of a post and wire fence still border part of the historic light station property. The original fence appears to have been added around the time of construction or shortly afterward, around 1910. The fence is listed in a 1927 inventory of the property and is described as a five wire fence on redwood posts. In 1936, the boundaries were altered somewhat. On the south side, the boundary line was expanded; on the northwest it was reduced to take into account the new air strip. As a result the earlier fence no longer corresponds to the property boundaries in some sections.

A concrete walkway extends from the keepers' compound to the lighthouse, a distance of about 450 ft. This was constructed after 1927 and before 1930. A date of 1929 inscribed on the walk (in the seventh section), and the initials W.M. KLEE verifies this as the original construction date. Thirty-two inches wide, and poured in ten-ft sections, the walk is interrupted by a series of steps and

**Figure 22. Site Plan and Boundaries, Proposed Moloka'i
Light Station Historic District, Kalaupapa, Moloka'i,
Sayance Virochrut, delineator.**

landings as it stretches toward the tower base, from the lower elevation of the keepers' compound to the west. The upper-most steps, closest to the base of the tower are inscribed 6/1/29 and 6/3/29. The concrete surface of the walkway is finished on the edges by a three-inch wide tooled border. This border marks the edges of the expansion joints as well.

An approximately eight-ft wide concrete drive intersects the walkway (at a diagonal) about 20 ft from the base of the tower. Only about two ft wide on either side of the walk, this feature appears to have been added around 1934, when the adjacent powerhouse was constructed.

Summary of and Distribution of Features

The Moloka'i Light Station consists of two distinct "precincts," or built-up areas, and a single isolated structure, the original oil-storage building, located about 550 ft northwest of the lighthouse tower. Both of the historic precincts contain historic (and contributing) buildings, structures or other features. The following is a list of features, arranged according to geographical proximity. Known historic features no longer present on the site are also noted.

The Lighthouse Precinct: Located at the along the top of the Kiikolu knoll, the lighthouse area includes the following historic (contributing) features:

- 1) the lighthouse base and tower (built 1908-1909); structure;
- 2) the reinforced concrete base for the former oil-storage tank (possibly built in 1908-1909, but also possibly a ca. 1925 replacement for an earlier storage tank), located 25 ft south of the tower; site;
- 3) the octagonal, reinforced concrete, water storage tank, located about 100 ft southwest of the lighthouse (built 1908); structure;
- 4) the wood-frame powerhouse (1934), located about 15 ft northwest of the tower; building;
- 5) the concrete footing for a flag pole (ca.1909?; prior to 1924), located about 75 ft northwest of the tower; site;
- 6) the concrete pier supports for the former oil-drum loading ramp (date uncertain, possibly ca. 1920), located 200 ft west of the tower; site;

Historic features no longer visible on the lighthouse site included:

- a) a wood-frame structure on the site of the oil-storage tank base, still present in 1924 but removed before 1930 and possibly before 1927;
- b) a second water storage tank, probably of wood construction, located approximately 150 ft west of the tower, indicated on a site map in 1936 and listed in an inventory of 1968. If such a tank existed it was built after 1927 and was demolished sometime after 1936. (There is some discrepancy in the record of this feature, and it may never have existed.)

The Keepers' Compound: Located along the west slope of the rise, the keepers' compound (and immediately adjacent area), includes the following historic (contributing) features:

- 7) the original, stone principal Keeper's residence (built 1909; additional work 1913; rear frame addition 1927) building;
- 8) the concrete-block First Assistant Keeper's (and later principal Keeper's) residence (built 1950); building;
- 9) the washhouse/storage shed, located behind (east) of the Second Keeper's residence (built 1909; expanded 1955); building;
- 10) the wood-frame garage, located 150 ft northwest of the stone Keeper's residence (built ca. 1920, although possibly earlier); building.

Historic features no longer present included:

- c and d) two wood-frame quarters for the First and Second Assistant Keepers, built in 1909, demolished in 1950 and 1953, respectively; located south of the remaining 1909 stone quarters;
- e) tool house and storage building located approximately 100 ft east of the principal Keeper's dwelling, built around 1920; demolished after 1950, prior to 1956;
- f) second washhouse, located to the rear of the Second Assistant Keeper's dwelling, built ca. 1909, demolished prior to 1927;
- g) henhouse, located in "SW corner of reservation" in 1927; built ca. 1920?; demolished ca. 1930?;
- h) henhouse/chicken yard, located 250 ft northwest of the principal Keeper's quarters, 100 ft north of the garage, built ca. 1920, demolished after 1950.

Oil Storage Building:

- 11) a rectangular, reinforced concrete building (1909), built originally for storing oil (kerosene), but later for storing other combustible materials; located 550 ft northwest of the tower and approximately 350 ft northeast of the keepers' compound; building.

Landscape Features:

Additional historic (contributing) features throughout the site include landscape features

previously described. It should be stressed, however, that the site includes numerous stone terraces and walled compounds, walls, and partial walls that make a precise count of all features difficult. Principal features are assigned separate numbers; smaller or partial walls, terraces, and compounds are listed collectively.

- 12) concrete sidewalk (built 1929), extending from keepers' compound to the lighthouse tower; structure;
- 13) principal access road (built 1908); structure;
- 14) historic pathway/road from the north to the lighthouse tower (1908, possibly earlier); structure;
- 15) stone perimeter wall for keepers' compound (built ca. 1909); structure;
- 16) stone wall along northeast and east edge of site, just west of the oil storage building (date unknown, possibly pre-exists date of lighthouse); structure;
- 17) wire perimeter fence (added ca. 1910?, at least by 1927; many alterations); structure;
- 18) stone terraces, walls, compounds, scattered over the west slope of the station plot (dates unknown, possibly pre-exist date of construction of light station); site;
- 19) Ironwood (*Casuarina equisetifolia*) trees, allee defining access road and forming screen for keepers' compound (planted ca. 1920, prior to 1930); site;

The area also possessed historically numerous smaller paths and trails, providing access to agricultural compounds and terraces as well as providing access to features of the light station. These are presently difficult to identify, given changes in the use of the site, and impossible to number separately.

The site also includes at least four wood, electrical transmission poles post-dating ca. 1955, when the station was serviced with commercial power for the first time. The dates of the existing poles are not known, although they appear to be replacements of earlier examples. The poles have not been assigned numbers and are not considered "contributing features" at the present time. However, their date of installation suggests that they should be considered for any future interpretive plan by the park.

Historic Fresnel Lens

The site possesses a historic, Second-Order Fresnel lens, delivered to the lighthouse in 1909



Figure 23. Aerial view from northeast, September, 1999.
Photograph: William Chapman.

and first operated in September that year. The lens was removed from the site in 1986 and returned to the Moloka'i station in 1993. It is presently packed and stored in the historic garage near the keepers' compound:

20) Fresnel lens (manufactured, 1907; installed, 1909; removed, 1986; returned, 1993); object.

The Station's Sequence of Development

The "Original" Station, 1908-1915

Construction of the Moloka'i Light Station began in June, 1908, when the first work crew arrived on Moloka'i. Initial work included provisions for water and connection to the water line serving the settlement at Kalaupapa. It is likely that the 12,000 gallon reinforced concrete water tank was among the first structures erected on the site. Work on the tower began in September, 1908. Relying on wood form-work and a wood derrick and mechanical lift, workers completed the concrete work by March, 1909. In April, 1909, the iron work was first installed. The lantern and lighting apparatus were added over the summer months. The light was put into service in September, 1909.

Construction on the site also included an oil storage tank, protected by a wood structure, located about twenty-five ft south of the tower. A building of a similar form is visible in construction photographs; and it likely was used to protect the drums or a larger tank to store the kerosene for the light. However, a second, reinforced concrete building was also constructed about 550 ft north of the tower. This building may have intended for more long-term storage. Eventually it would be used to store other hazardous materials.

Other structures and buildings were added to the site apparently during the spring and summer of 1909. These included three keepers' quarters, located in compound west of the tower. The most elaborate of these was a stone-walled, Craftsman-style bungalow, located at the north end of the group. The other two dwellings were wood-frame (or possibly vertical board or "single-wall")

construction. These were identical and consisted of simple, rectangular-plan buildings with gable roofs (in contrast with the principal Keeper's house, which had a complex hipped roof). Each of the houses featured recessed porches on their west sides. It is likely that all three houses were completed or nearly completed at the time the light station was first activated. A single reference gives a date of 1913 for the stone keeper's cottage, although no other evidence supports this later date. Additions were made that year to one of the cottages, a point noted in the Light House Board's annual report. But most of the work appears to have occurred around 1909.

In addition to the houses, the residential complex included two wash houses, located behind the two wood dwellings. These were used for laundry, and at least one (and possibly both) included a shower for the use of the keepers. It is likely that the stone perimeter wall surrounding the keepers' dwellings was also completed at this period, since stone would have had to be removed from the construction site prior to building the houses.

The property, therefore, as of ca. 1915 consisted of:

- i) the lighthouse (1908-09)
- ii) the concrete water tank (1908)
- iii) the wood oil-storage house and tank? (1908-09; possibly replaced ca. 1925)
- iv) the concrete oil storage building (1909)
- v) the stone-walled keepers' compound (1908-09)
- vi) the stone Keeper's quarters (1909, additions 1913)
- vii) a wood First Assistant Keeper's residence (1909)
- viii) a wood Second Assistant Keeper's residence (1909)
- ix) a wood wash house (1909)
- x) a second wood wash house (1909)
- xi) an unpaved access and construction road to the site (1908, and possibly earlier)
- xii) a second unpaved road providing access to the keepers' compound (1908)
- xiii) a stone wall along the east edge of the site, possibly pre-dating the lighthouse (date unknown)
- xiv) a network of unpaved pathways between the light and the keepers' compound and within the compound (1908-09)
- xv) stone walled terraces and compounds distributed along the slope of the hill leading to the lighthouse (dates unknown)
- xvi) wood-post and wire fence, marking periphery of property (ca. 1910?, although possibly later)

The "Classic" Station, 1925-1931

By ca. 1925 the site had evolved to some degree. This period (around 1920-1930) might be considered the "classic" period of the station — the time during which it achieved its fullest period of development and during which it still retained the majority of its original features. This period also benefits from a fairly detailed inventory, completed in 1927 by R.R. Tinkham, Superintendent for the Fourteenth Lighthouse District. Photographs of ca. 1930-31 reinforce the 1927 inventory.

During this period the station included nearly all of the features built during the initial phase of development and several new or modified features. These were the additions:

- i) a garage to contain the station's Ford truck (ca. 1920, although possibly earlier)
- ii) a tool and storage building added behind the first keeper's dwelling (ca. 1920)
- iii) a flagpole added about 50 ft northwest of the tower (ca. 1920, possibly dating to the original period, or prior to 1915)
- iv) construction of a concrete walkway to the tower (1929)
- v) introduction of a new kerosene oil storage tank (ca. 1925, possibly simply a modification of the original storage tank, possibly no alteration)
- vi) construction of loading ramp west of tower (ca. 1920?)
- vii) addition of a chicken coop at the "southwest" edge of the complex; possibly the addition of another hen house at the north (ca. 1920?)
- viii) addition of a large frame attachment to the principal keeper's quarters (1927)
- ix) planting of ornamental allee of trees and windbreaks (ca. 1920)
- x) development of keepers' gardens, east of the keepers' compound

In addition, the wood-frame structure sheltering the oil-storage tank or tanks, located just next to the lighthouse tanks was demolished, sometime between 1926 and 1930 (and probably in 1926, since it is not mentioned in the 1927 inventory). After 1926, the single, 1,954-gallon oil storage tank rested in an exposed reinforced concrete carriage, located about 25 ft from the base of the tower. This possibly is the original oil storage method, although a modification was clearly made if this was the case, in that the wood superstructure was removed during this period.

One of the wash houses was also removed, probably around 1925, or prior to 1927.

Significant Intermediary Modifications

In the years immediately after the period of maximum development on the site, several new features were introduced:

- i) a wood-frame powerhouse was built to house the generators used to power the station (1934)
- ii) the airstrip was built to the west of the station (begun ca.1931; graded 1934; completed ca.1939; paved 1953)
- iii) maturing of palm trees planted within the keepers' compound (ca. 1925-1956)
- iv) possible construction of and subsequent removal of a later (post 1927, but pre-1936) water tank, located west of the original tank

During this period some older features became outmoded and were either removed from the site or fell into disrepair. These included the oil storage tank near the lighthouse tower and the loading ramp — neither of them necessary once the station had been supplied with electrical generators.

The "Modern" Station, 1950-56

In the early part of the 1950s the station was modified significantly — to the point where it had a different configuration altogether. This could be considered the station's "modern" period; and the changes reflected significant reorganization within the lighthouse service (after 1939, a branch of the U.S. Coast Guard Service) and a different approach to management of the station. The changes were evidenced in a reduction in the number of buildings and structures at the station, the neglect of some outmoded features, and, especially, the introduction of a new, flat-roofed concrete residence.

In ca.1955, the station was linked to commercial power and the generators and powerhouse became back-ups only.

The formal landscape of the site reached a high point of development and maturity during this period. Photographs of the mid-1950s show well tended lawns, neatly trimmed trees, and generally

well maintained grounds.

The following summarizes the changes:

- i) demolition of the two wood-frame keepers' quarters (demolished, 1950 and 1953)
- ii) demolition of the tool house (demolished, ca. 1951)
- iii) construction of new keeper's quarters (1950)
- iv) addition to remaining wash house (1955)

Subsequent Changes

After ca. 1956 the station began to deteriorate. Only two keepers were assigned to the station, after 1960 single men in the Coast Guard. The older keeper's residence was neglected as were other buildings on the site. In 1966, the station was fully automated and the buildings became further neglected. By the 1970s, the water tank was no longer roofed; the oil storage building was in poor repair, and other buildings, such as the powerhouse, loading ramp, etc. were allowed to fall into disrepair. Since 1980, the property, excepting the tower and powerhouse, have been the responsibility of the National Park Service, which is able to provide only minimal maintenance. The two houses have been used as special purpose housing for National Park Service personnel and others.

Detailed Physical Description of Contributing Features

1) Lighthouse Base, Tower, and Lantern

Construction dates: 1908-1909

Dates of Alterations: repairs, 1913; repainting, 1927; concrete repairs and Gunite application, 1953; electric power added, 1934; additional repairs, possible removal and replacement of windows and doors, ca. 1974; removal of historic Fresnel lens, modifications to lantern floor, 1986

Classification: Structure

Significance: National, State, and Local

Applicable Criteria: A and C

Integrity: Location, Setting, Materials, Feeling, and Association (through several periods of significance);

Losses of or Threats to Integrity: Design, Workmanship, due to modifications after ca. 1950

The lighthouse tower is situated at the 90-ft contour level of the Kiikolu knoll or hill, about half a mile from Kahui Point, on the Kalaupapa Peninsula (Makanalua Peninsula or Point) on the north coast of the island of Moloka'i. Placed on an 28-ft diameter, octagonal concrete foundation, or plinth, rising about 3 ft above grade, the reinforced concrete tower extends a full 112 ft above the foundation level. Constructed using a technique known as cold-pouring, the tower was reinforced with both vertical and horizontal iron bars, set about 6 in on-center. The octagonal tower tapers slightly, having an exterior diameter of 21 ft at the base and 14 ft 6 in at the top. The structural walls decrease in width as well, being 4 ft 8 in thick at the base and a little over 1 ft 3 in at the top.

The interior of the shaft is divided into five sections, defined by four concrete landings, located at approximately the 16-ft level; the 44-ft level; the 72-ft level; and the 92-ft level. The landings are linking by a circular (winding) concrete staircase, anchored to the interior wall. An iron pipe rail, with an elevation of 36 in, follows the outer edge of the staircase.

The upper-most floors of the tower consist of a cast iron platform, resting on 6-in steel I-beams, historically designed to carry the weight of the lens and lens pedestal; and a second, lighter metal floor at the lens level. (This floor was elevated a few inches in 1986, when the older mercury vat system was eliminated and the Fresnel lens was removed to be replaced by a modern, electrical signal.) The area between the upper-most floor and the cast iron platform was known historically as the watchroom. Access to the watchroom was via a circular, iron staircase. Access to the upper most lantern room required (and still requires) a fixed iron ladder.

A 32-ft long, 18-in wide weight shaft descends from the watchroom level to the level of the third concrete landing. This shaft contained the counterweights — actually steel drums, measuring about 2 ½ ft in length and 1 ft in diameter — used historically to move the lens in its chariot or channel while activated. Operated manually, the weights linked via a system of cables and pulleys to the gear mechanism operating the revolving light. The movement of the drums was translated to



Figure 24. Lighthouse tower (Feature 1) and concrete sidewalk (Feature 2), from northeast, September, 1999. Photograph: William Chapman.

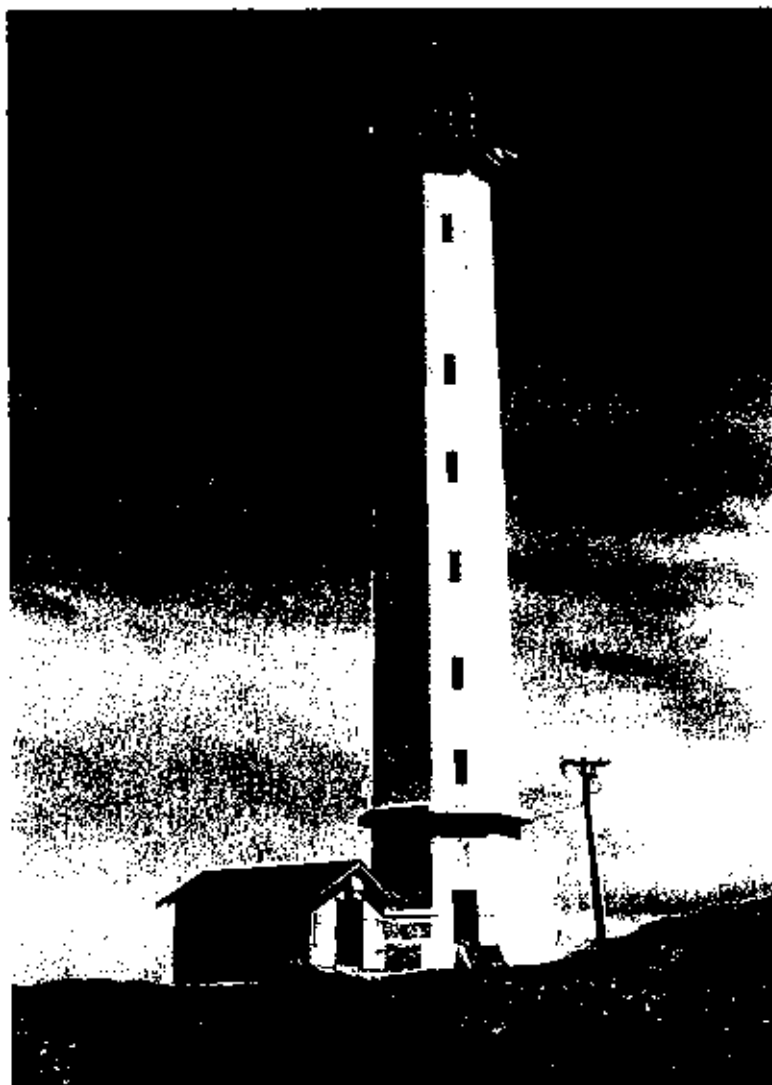


Figure 25. Lighthouse base and tower (Feature 1), with wood-frame powerhouse (Feature 12), from northeast, September, 1999. Photograph: William Chapman.

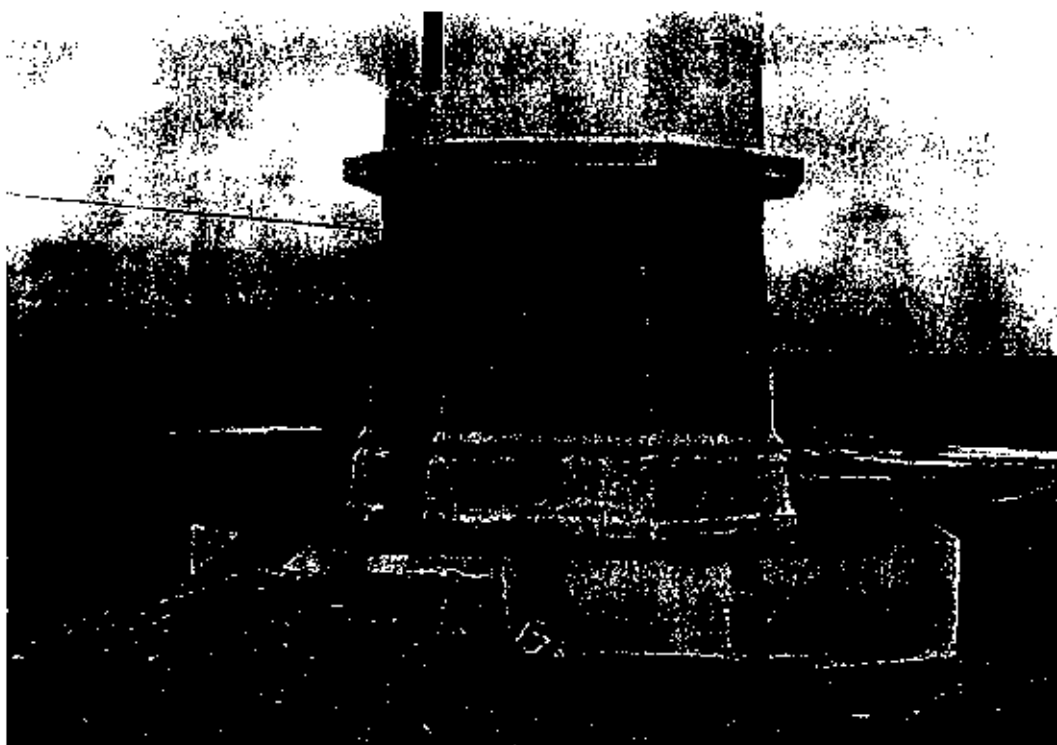


Figure 26. Lighthouse base (Feature 1), view from southwest, September, 1999.
Photograph: William Chapman.



**Figure 27. Lighthouse tower (Feature 1), view from west,
September, 1999. Photograph: William Chapman.**



Figure 28. Interior, Lighthouse tower (Feature 1), September, 1999.
Photograph: William Chapman.

a series of gears and connected to a pinon, which rested on the ring of the lens chariot. A hand crank was used to raise the weight, a procedure that had to be repeated by the keepers every three hours during their watch. An open-frame clock mechanism, removed in 1986, was attached to the pedestal of the lens to gauge the time. The drum mechanism was fitted with a ratchet, gears, and a clutch, to allow the mechanism to be re-wound without moving or stopping the lens.

The exterior of the tower is relatively simple, consisting of the facets created by the octagonal shape, and some ornamental details. A buttressed, concrete staircase, with five treads, ascends to the top of the base on the west side. The stairs were originally fitted with pipe-iron handrails, which also extended around the perimeter of the base. Extending about 3 ft above the platform, and consisting of a top rail and lower second rail, the railing appears to have been removed sometime in the 1950s and certainly by the mid-1970s.

The body of the tower is decorated by a decorative, molded band, which extends about 4 ft 3 in above the surface of the octagonal base, projecting about 8 in at the bottom and 6 in at the top. The molding along the top of this feature consists of prominent *torus*, surmounting a *scolia* and *ovolo*. A simple *plinth*, rising 6 in above the surface of the base and projecting 1 in from the wall surface, serves as the base. The molded base is interrupted by the door opening on the western most facet.

At approximately the 18-ft level, belt course or coping, projects about 18 in from the surface of the wall. Sloping at the top and corbeled underneath, this belt course acts as a drip mold for the tower.

The top of the concrete tower features a projecting, molded concrete cornice, supported by simple, diagonal concrete brackets at approximately 2-ft intervals. Projecting about 2 ½ ft from the plane of the wall, the octagonal cornice features a typical *cyma recta* molding along the outer edge.

The fenestration of the tower consists of nine window openings, six on the west facing facet

of the tower and three on the east. The west side also was fitted with the entrance door to the tower. The window openings measure 1 ft 4 ½ inches by 4 ft ½ in. The entrance door measures 3 ft 1 ¼ in by 7 ft 8 1/8 in. Originally fitted with double-hung wood window sash and a wood paneled and louvered door, the windows have been replaced by fixed glass and, on the east, have been in-filled with concrete. The single door is now a sheet-metal replacement. Records indicate that substantial repairs took place in the 1950s and 1970s; the in-filling of the east windows appears to have occurred in 1974 . Also, additional work, possibly including repairs to a further modifications to openings, occurred in 1986 at the time the Fresnel lens was removed and a new lighting apparatus was installed.

Original drawings for the tower called for projecting and molded entablatures over the window openings and a molded and bracketed entablature over the door. Final construction included projecting, plane window sills, but eliminated the entablatures. At some period, most probably in 1953, when the exterior of the tower was treated with a concrete coating of Gunite, the sills were removed. The exterior surface of the tower is now extremely plane and uniform and original surfaces have been softened by the application of the Gunite coatings.

The most dramatic feature of the tower was the iron and bronze lantern surmounting the tower. In keeping with current technology and design, the lantern, prefabricated and manufactured off-site, was what was described as a "First order standard helical bar cylindrical lantern." Rising over 3 ft above the peak of the concrete tower, the lantern was manufactured of cast and wrought iron, with the curving sash bars constructed of cast bronze. Designed to minimize obstruction of the signal, the helical pattern of the glazing bars held curved, lozenge-shaped glass panels, measuring about 2 ½ ft diagonally. The sill, cornice, and roof were all of cast iron. The decorative railing extending about 1 ft above the entablature of the roof was wrought iron. The lantern gallery (the exterior "catwalk") had a concrete floor and was fitted with a 3-ft high, pipe rail banister and posts.

Other than the lens itself, and the successive lamps or other apparatus used to provide the light source — both of which are discussed below — , the only other distinctive features of the original light tower and lantern were the cast-iron ventilator ball, capping the lantern, and the bronze

and platinum-pointed lightning rod placed at the top and connected by means of a cooper strip to the lantern sill. Access to the gallery is provided by a two-panel glass door, set flush with the lantern glazing. Circular, cast-iron ventilators are set in the concrete tower wall, at the watchroom level. Additional adjustable ventilators are located along the lantern sill. Two steel airlock doors secured the watchroom and lantern.

The lantern protected a Second-Order Fresnel lens manufactured by Chance Brothers and Co., Ltd, England, made in 1907 and delivered to the site in 1909. Known as a catadioptric bi-valve lens, the lens's two panels, made up of glass prisms set in panels and concentric, prismatic glass rings above and below the panels, had an internal diameter of 1,400 mm (about six ft) making it one of the largest lenses installed in the Pacific region. Initially possessing a power estimated at 390,000 candlepower, it was improved through the introduction of a new lamp in 1915 to an estimated 620,000 candlepower. In 1934, with the addition of an electric lighting device, its power was estimated at fully 2,500,000 candlepower. By 1956, with further improvements to the lighting apparatus, the total output was estimated at 12,000,000 candlepower!

Based until 1934 on the older oil (actually kerosene) technology, the original lamp was a "Mcade Design," 55 mm incandescent oil-vapor lamp. In 1915 this was replaced by a "B" type oil-vapor lamp of a similar size.

To allow the lens to revolve easily, in order to create the appropriate signal, the lens and lighting apparatus was set in a mercury-filled trough or channel (also referred to as a "vat"). The trough itself was 10 in deep and a little over 4 in wide. It carried about 250 pounds of mercury, which had to be filtered every six months to insure smooth operation of the apparatus.

The trough, along with the lens and lamp, were supported by an enormous, cast-iron pedestal, about 8 ft high and 6 ft in diameter. The pedestal was by the cast iron floor and steel I-beam forming the lower floor of the watchroom.

The lamp was fed by a 25-gallon reservoir located in the service area beneath the watchroom. It was then pumped to the lamp reservoir in the lantern. The oil originated in a 1954-gallon capacity storage tank at the ground level and was pumped by hand using a pump located on the first floor of the tower. The oil ran through ½ in pipe located in the stairwell.

The early light station was also fitted in the 1920s with bell wires, linking to the keepers' dwellings. A time clock, table, and tool board were also located in the watchroom.

The original signal was a white flash (created by the revolving lens) every 20 seconds. In 1911, this was changed to a ten-second flash (flash 0.3 seconds; eclipse 9.7 seconds). In 1986, a new signal was substituted for the historic signal.

Other specifications for the tower and lantern are:

Ground line to top of concrete platform: 114 ft 8 3/4 in

Height of lantern: 23 ft 3 1/4 in

Top of lantern (including ventilator and finial) above ground: 138 ft

Focal plane to top of lantern: 18 ft 2 1/4 in

Focal plane to ground line: 119 ft 9 3/4 in

Focal plane above sea level: 213 ft

Number of steps within the tower: 189

[Additional description of the lens, now stored on the site, is given under item number 20 below.]

2) Reinforced Concrete Base for Former Oil Storage Tank

Construction dates: 1908-09 (likely); alternatively ca. 1925

Dates of Alterations: Removal of wood super-structure ca. 1925-1930

Classification: Site

Significance: National, State, and Local as a contributing, although secondary element

Applicable Criteria: A

Integrity: Location, Setting, Design (partial), Materials (partial), Workmanship (partial)
Losses of or Threats to Integrity: Feeling and Association

Historically the carriage for a 1,954-gallon cylindrical fuel tank, the structure now includes four concave concrete supports (cribs) for the tank and a perimeter wall rising 32 in above grade at the highest point. Construction photographs of ca. 1909 show a wood structure on this site. A 1924 aerial photograph also shows a wood building, presumably a structure sheltering the oil supply for the light. In 1927, the oil tank is listed on the inventory for the station, without mention of a wood cover or structure. Photographs taken in ca.1930 show no building on the site. Alternative explanations: 1) the oil storage carriage or cradle is original (ca. 1909) but was earlier covered by a wood structure for added protection; 2) the concrete carriage replaces an earlier system of oil storage (using a storage building) and was added at a later period, possibly ca. 1925 or earlier.

Physical evidence, including the presence of steel or iron anchors in the surface of the wall, favors explanation number 1: a 1908-09 construction date and later (ca.1925-30) removal of the wood shelter.

The present structure is a partial ruin, in that it lacks significant features, especially the metal oil tank and wood superstructure. However, since this tank was removed sometime after 1934, when the signal was electrified, the present ruin possesses associative value to the period following the introduction of an electric lighting apparatus. So integrity of design, materials, and workmanship is high for the 1940s and 1950s, but lower for the period prior to 1934 when the structure was being used. The structure has high integrity for location and setting.

Located about 15 ft south-southwest of the lighthouse tower base, this modest, reinforced concrete structure consists of a rectangular walled enclosure, containing four concrete cribs (or carriages or caissons), which historically carried a cylindrical, metal storage tank of a capacity of 1,954 gallons. Used to store fuel oil (kerosene) for the oil-fired lighting apparatus at the top of the lighthouse tower (and pumped by a hand-pump located on the ground floor of the tower to a second 25-gallon reservoir, or "receiving tank" in the tower's service room), the storage structure was a

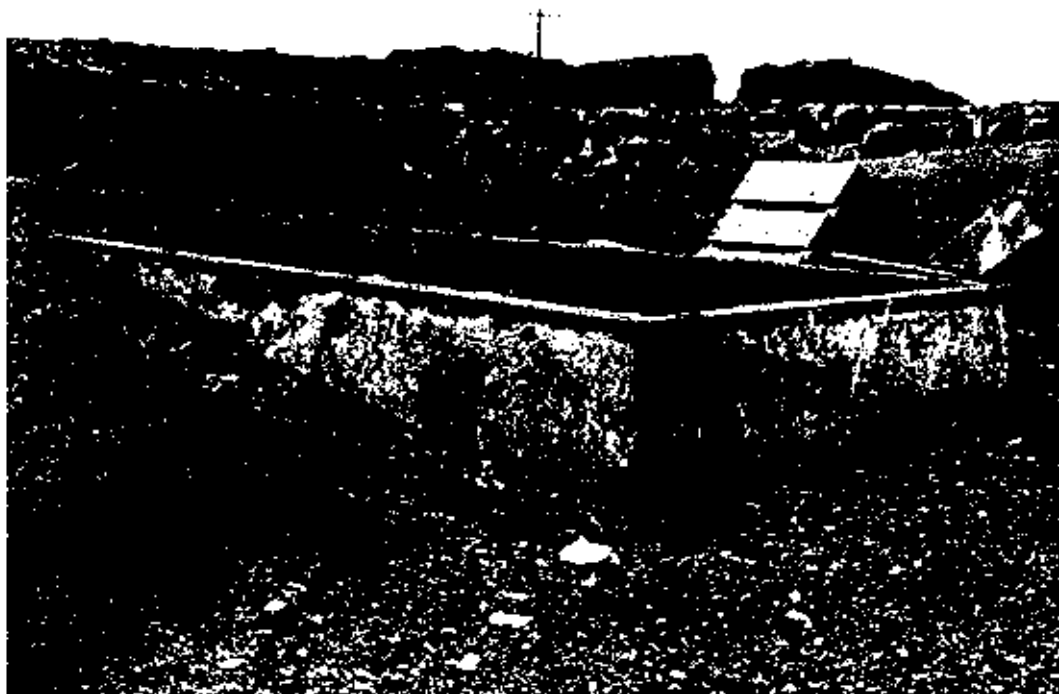


Figure 29. Reinforced-concrete base of former oil-storage tank (Feature 2), from east, September, 1999. Photograph: William Chapman.



Figure 2. Small house located at site of Feature 2, September, 1999. Photograph: William Chapman.



Figure 31. Retaining wall, vicinity of reinforced-concrete base of former oil-storage tank (Feature 2), from southeast, September, 1999. Photograph: William Chapman.

significant component of the early station. A second oil storage building was located about 550 ft northwest of the tower (Feature Number 11), but appears not to have been used only for this purpose, especially once this more convenient tank was in place.

Measurements for the structure are 7 ft 8 in by 17 ft 8 in, with the narrower dimensions at the northeast and southwest sides (the structure is oriented roughly northeast by southwest), pointing to the south facet of the octagonal tower base. The 6-in wide, reinforced concrete walls rise 32 in above grade on the northeast corner, the high point of the perimeter wall, to grade level on the sloping southwest corner. The northwest corner extends 28 in above grade; the southeast corner also reduces to nearly grade level. Internal depth is about 35 in to the base of the concrete cribs.

Each of the four concrete cribs measures 6-in thick, and extends above grade (the concrete floor of the structure) 24 in. Placed perpendicular to the side walls of the structure, the cribs are each 5 ft 2 in long (or wide); the semicircular "carriage" that held the oil tank is 14 in deep and 42 in wide.

At least twelve rusting anchors are still visible in the surface of the wall. These presumably held down the wood cover (a gable-roofed, white-painted structure) shown in historic photographs.

A rubble-stone retaining wall flanks the concrete structure on the west and south sides. Rising about 3 ft above the level of the concrete structure and located about 2 ft away from it, this feature separated the higher elevation of the water tank (and access path or road to the tank), from the base of the lighthouse tower.

3) Octagonal, Reinforced Concrete, Water Storage Tank

Construction date: 1908

Dates of Alterations: Loss of original roof structure, ca. 1970; new concrete roof, September, 1997

Classification: Structure

Significance: National, State, and Local as a contributing structure

Applicable Criteria: A and C

Integrity: Location, Design (partial loss), Setting, Materials (partial loss), Workmanship, Feeling, and

Association (partial loss)

Loss of or Threats to Integrity: Minor loss of integrity of Materials, Design, and Association due to the new (1997) concrete roof; the principal structure, however, the property has a strong association with the light station throughout its nearly 100 years of existence and especially during the significant epochs of its historic developmental periods

Probably one of the first structures on the site, the water tank is a reinforced concrete container with an estimated storage capacity of 12,000 gallons (a later U.S. Coast Guard estimate places the capacity at 8,000). Rising about 10 ft above grade to the top of its outer walls (and about 12 ft to the peak of its octagonal, concrete roof), the structure is located about 80 ft south-southwest of the tower base at an elevation of 105 ft above sea level (about 15 ft higher than the base of the tower).

A simple, white-painted structure, the water tank sits on a base rising about 9 in above grade and projecting about 14 in from the walls of the tank. Each of the walls is approximately 5 ft 9 in wide. A 2-ft high plinth, projecting about 2 in from the wall surface, is carried around the structure on all eight sides. The tower is capped with a red-painted, octagonal concrete roof. The roof projects out over the wall about 9 in. The undercroft features a 3 in-wide drip mold, channeled into the soffit.

A metal outflow pipe is located on the lower wall on the southwest side. An inflow pipe is located on the opposite northeast side. An overflow pipe is located on the upper wall on the south side. A single access hole is located on the southeast side of the roof, near the outer edge. Pipes and other debris are spread around the site.

The water tank is accessed via an unpaved drive, leading from the base of the lighthouse tower.

4) Wood-frame Powerhouse

Construction date: 1934

Dates of Alterations: removal of generators, ca. 1986; removal of metal vents, ca. 1986; removal of

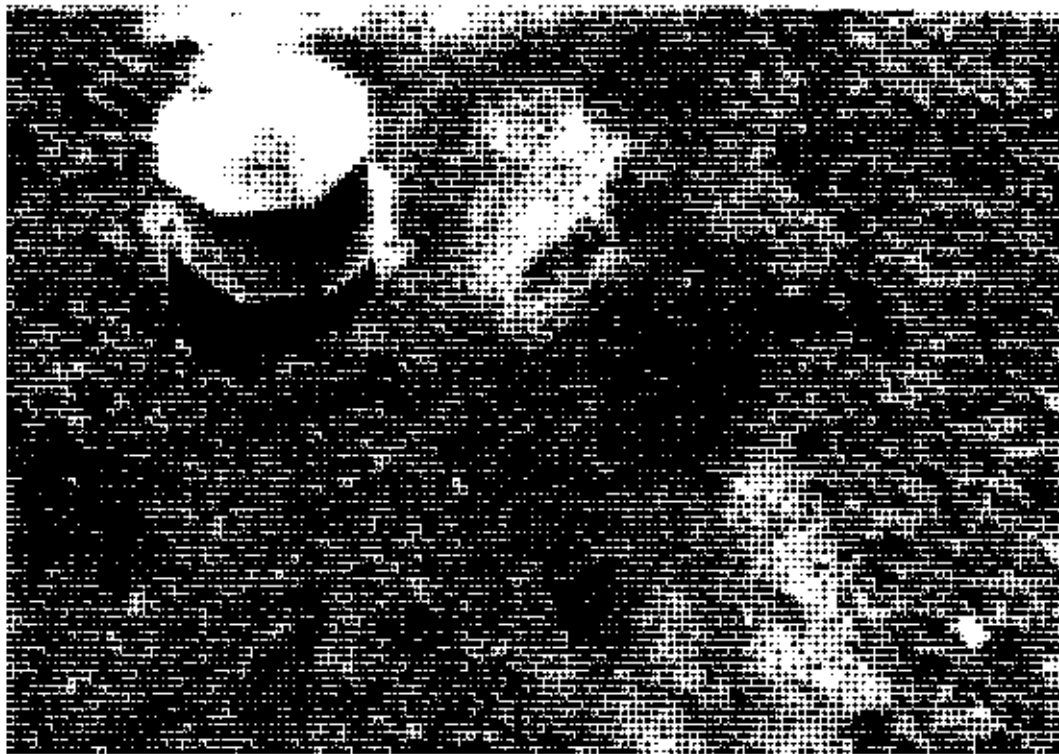


Fig. 1. The photograph shows the surface of the material after the test. The bright spot is the reflection of the light source. The dark area is the material surface. The scale bar is 1 cm.

doors and windows, ca. 1990s

Classification: Building

Significance: National, State, and Local as a contributing structure

Applicable Criteria: A and C

Integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association

Loss of or Threats to Integrity: Some small loss of Material and Design Integrity due to partial loss of some features, such as some window sash and doors.

The property has strong associative value to the 1930s era of the light house station, and despite loss of the generators and other original features still conveys a sense of its historic purpose.

The powerhouse is a rectangular, one-story building located about 12 ft northwest of the lighthouse tower base. Measuring 14 ft 2 in by 18 ft 8 in, it is oriented along a northeast-southwest axis, with the entrance on the southwest, facing the concrete walkway. The frame and vertical board building sits on a concrete foundation, approximately 20 in above grade on the southwest, descending to 32 in on the northeast corner and 28 in on the northwest corner, where the slope of the hill falls off to the north.

A concrete ramp extends across the front of the building. This measures 14 ft 2 in (the width of the front of the building) by 6 ft 2 in. The ramp conforms to the contours of the slope, dropping approximately 1 ft on the left (southwest) and ascending about 3 in on the right (southeast), where it adjoins the earlier (1929) sidewalk. A concrete drive straddles the walkway, just to the west of the powerhouse, allowing access to the water tank and other secondary structures near the lighthouse tower. This measures about 8 ft by 4 ft (with an additional 2 ½ ft for the pre-existing sidewalk) and crosses the walk at a diagonal about 3 ft west of the concrete ramp.

The small building is of frame construction, the frame consisting of true 2 x 4 in members, with the upright posts (studs) set about 3 ft on center. There is a horizontal member at about three ft above grade; also a 4 x 4 in sill and top plate. The structure is braced in the corners by 2 x 4 in diagonal members, which interlock with the supporting studs. The structure is attached by metal bolts to the reinforced concrete floor and foundation.



Figure 33. Octagonal, reinforced-concrete water-storage tank (Feature 3), view from north, September, 1999. Photograph: William Chapman.



Figure 34. Wood-frame powerhouse (Feature 4), view from west, September, 1999.
Photograph: William Chapman.

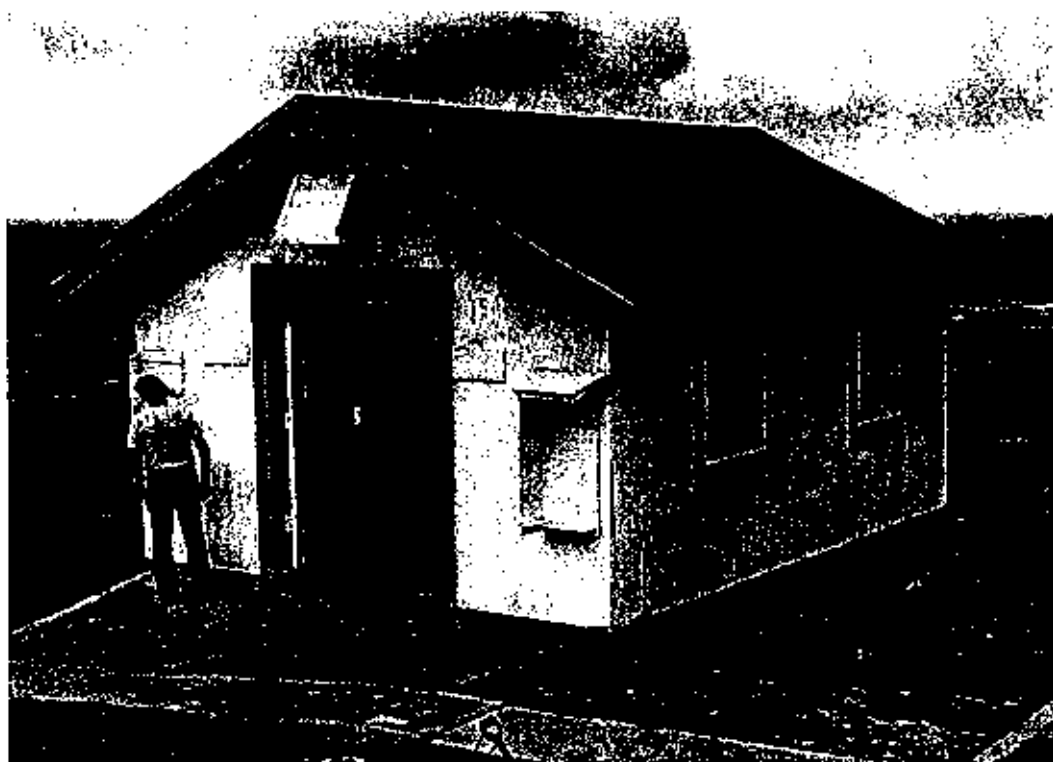


Figure 35. Wood-frame powerhouse (Feature 4), view from southwest.
Photograph: William Chapman.

The exterior of the building is clad with 6 in (actually 5 ½ in) vertical siding. The cladding is exposed on the interior. The boards are tongue-and-groove Douglas fir, of the type common in Hawai'i during this period.

Exterior details are simple and utilitarian in character. The building is symmetrical, with a wide entrance door, originally fitted with double doors, and two windows on either side. The window openings measure 29 by 44 in; the entrance is 5 ft wide and 6 ft 8 in high. Both the window openings and the door are fitted with 5-in wood trim. The windows have projecting, sloping sills, with aprons. Originally glazed, the double-hung sashes are now empty. Those on the east have been covered with plywood; the west windows still retain their historic wood screens, although these are in disrepair. The building has no corner boards or other decorative elements.

The exterior is fitted with the remnants of two attached cupboards, mounted on the entrance (southwest) facade, flanking the entry door. Originally capped with a sloping wood cover, decorated with a wood molding, only one of the covers is still in place. Both cupboards are missing their doors and one side. They originally held equipment for the station. Their overall dimensions are about 18 by 40 in. They project 10 in from the exterior wall.

A ventilator hood is located above the entrance door. This feature measures 16 by 24 in and projects 16 in from the plane of the wall. It appears to be of more recent design and was probably added some time after 1960 or even later. The rear of the building also had a vent in the gable end. Flanking the front door are two small boards placed about eye level and originally used to post notices.

A 13-in square hole and a 6 ½-in diameter round hole are located between the windows on the west (northwest) side. There is also an irregular cut-out on this side, measuring about 8 by 5 in. These originally provided for metal vents penetrating the wall.

The roof is a simple gable form, mounted on 2 x 6 in rafters and sheathed with tongue-and-

groove boards. The rafter tails are cut at an angle and are visible on the longitudinal sides of the building. The roof is covered with composition roofing (asphalt), of relatively recent origin.

The interior of the building is a single, open space, punctuated by three concrete benches for the generator equipment. The first of these measures 47 by 33 in, and extends 11 ½ in above the floor. The second is identical. The third measures 23 by 33 in, with the same height. The generators to operate the lamp after 1934 were mounted on this spot. They became outmoded in ca. 1955 when commercial power became available, but the equipment remained on the site, used in an emergency capacity until the 1980s.

The interior also features a closet in the northeast corner. Measuring 32 by 52 in and extending to the plate level, the closet included two shelves, each 8-in wide, and a wood, pigeon-hole frame. The closet was historically kept locked and has a 24 by 77 in door with a window opening. A 16 by 40 in corner shelf is located in the opposite corner, just to the left of the entrance. This is located 1 ft above the floor and was used for storage. A 23 by 36 in desk is located on the east wall, between the two window openings.

5) Concrete Footing for Flag Pole

Construction date: 1909?, possibly ca. 1920 (Prior to 1924)

Dates of Alterations: Removed prior to 1978

Classification: Site

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A

Integrity: Location, Design (partial), Setting, Materials (partial), Workmanship (partial)

Loss of or Threats to Integrity: The base or footing is only a portion of the original feature and no longer holds the flag pole it was designed for. The date of removal is uncertain, although a photograph of 1978 shows the flag pole was no longer in place. The base has an association with all of the periods of significance for the station, although it lacks integrity for all periods since the flag pole is missing. Photographs of the 1950s are unclear as to whether the flag pole is in place or not. If it had been removed by that date the base alone would have integrity to this period; if not, the association is only with the post-historic period, or after ca. 1960. Because of this an assessment of the feature's Feeling or Association is difficult. In its present form the base or footing is only a partial feature, much like the oil-storage structure.

The flag pole footing or base is a circular, concrete structure, 24 in in diameter and rising 5 in above grade. It is located about 28 ft northwest of the powerhouse, 5 ft north of the concrete sidewalk, and about 50 ft northwest of the tower. The hole for the original wood flag pole is a 6-in square of about 1 ft in depth.

The flag pole is visible in a photograph taken in 1924 and is cited in a 1927 inventory of the lighthouse station.

6) Concrete Pier Supports for Oil-Drum Loading Dock

Construction Date: ca. 1920?, possibly earlier

Dates of Alterations: deterioration of wood structure after ca. 1950 (possibly as late as 1955, when the facility no longer required fuel for the generators, or even after 1966, when the light was automated)

Classification: Site

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A

Integrity: Location, Design (partial), Setting, Materials (partial), Workmanship (partial)

Loss of or Threats to Integrity: The structure is a ruin, once the foundation supports for a wood loading dock. The wood elements deteriorated after ca. 1950, when they appear still to have been on the site. As piers alone, they may have existed in this state during the late historic period (1950s), suggesting an association (as a ruin) with this period. However, the present resource does not correspond to the feature during other historic periods. So overall, there is a loss of Feeling and Association with the earlier period of the light station.

Located 210 ft west-southwest of the lighthouse tower, the loading dock was originally a wood platform, supported by tapered concrete piers. This feature was present on the property from the 1920s and possibly from an earlier period. The purpose of the structure was to facilitate the off-loading of oil drums (kerosene), gasoline, and other materials at the station. It likely post-dates the acquisition of a motorized truck at the facility, apparently around 1920 (and probably no earlier than 1918 when trucks first became widely available from the Ford Company). Access to the loading ramp was via an unpaved road leading from the north of the lighthouse and winding up the hill from the east edge of the lighthouse tower.



Figure 36. Stone terraces, walls, compounds (Feature 18), and concrete pier supports for former oil-drum loading ramp (Feature 6), from lighthouse tower. The concrete footing (Feature 5) for the flag pole is located adjacent to the walkway at the right. View looking west/northwest, September, 1999. Photograph: William Chapman.



Figure 37. Concrete pier supports for former oil-drum loading ramp (Feature 6), from northeast, September, 1999. Photograph: William Chapman.

A plan of ca. 1950 indicates a broad "I"-shaped structure, with the stem pointing to the southeast. This plan and the present configuration of the piers and other remaining elements suggest that the ramp was inclined on the south side, and that the ramp led to a wood platform on the north.

Presently the site of the loading ramp consists of 13 regularly spaced, tapered piers, two square piers of lower elevation at the south end, and a narrow concrete slab lying along the south end of the grouping, probably the base for the wood ramp.

Each of the piers measures about 30-in square at the base and tapers to a 12-in square top. Each is embedded in the ground to a different degree; so some expose as little as 8 in of material above grade, others as much as 2 ft (changing the lower dimension in each case). Nine of the piers form a neat, square pattern; four others stretch out in a regular line toward the northwest. These appear to have been rearranged from their original locations. (Four other piers are located about 30 yards from the principal access road; they have no overall pattern and may have been moved from this site at a later period.)

A 6-ft long, 10-in wide "L" shaped slab runs across the "top" (south) of the group of piers. This appears to have anchored the wood ramp and served as a sill. In addition, two square piers, rising only 8 in above grade, and 14-in square, lie between the tapered piers and the concrete sill. This contain iron anchors, placed in the middle of their top surfaces.

Overall dimensions of the grouping are about 24 by 12 ft. The group of nine tapered piers creates a square of 12 by 10 ft.

There is considerable wood and metal debris scattered throughout and at the periphery of the site.

7) Stone Principal Keeper's Residence

Construction date: 1909

Dates of Alterations: additions to rear and/or completion of residence, 1913?; further additions to rear, 1927; further alterations and additions to rear and interior changes, kitchen area and bathroom, ca. 1950s and possibly later; roofing, ca. 1970s

Classification: Building

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A and C

Integrity: Location, Design, Setting, Materials (minor changes only), Workmanship, Feeling, and Association

Loss of or Threats to Integrity: None existing; gradual further losses through continued neglect likely

This building is associated with all the significant periods in the Moloka'i Light Station's history. It possesses integrity to the period after 1927, when a substantial addition was made to the rear of the structure. It remained essentially unchanged through the late historic period (ca. 1950-56).

Located at the northern end of the keepers' compound, about 500 ft west of the lighthouse tower, the principal Keeper's Quarters is a relatively high-style Craftsman cottage built as part of the original residential complex for the station. The other two residences, for the First and Second Keepers, were simple, rectangular wood cottages, of a more utilitarian design. Although one later record gives a date of 1913 for the principal Keeper's residence, all other evidence seems to suggest that the building was completed during the first phase of construction at the Moloka'i Light Station. It is possible that some changes were made to the cottage in 1913, when other money was expended at the station; also the rear wood section of the building was added in 1927, according to an inventory completed that year.

The building is surprisingly intact overall. Nearly all historic features remain in place, and there have been few modifications even to the building's interior. The roof has been recovered in more recent times, and is now covered with composition (asphalt) roofing shingles, replacing the original roof, which appears to have been asbestos shingles, colored a light gray. There have also been some modifications to plumbing fixtures and kitchen appliances over the years, although even now these preserve an association with the late historic period of the station (ca. 1950-56).

"L"-shaped in plan, the residence consists of a rectangular, masonry-walled main body, with

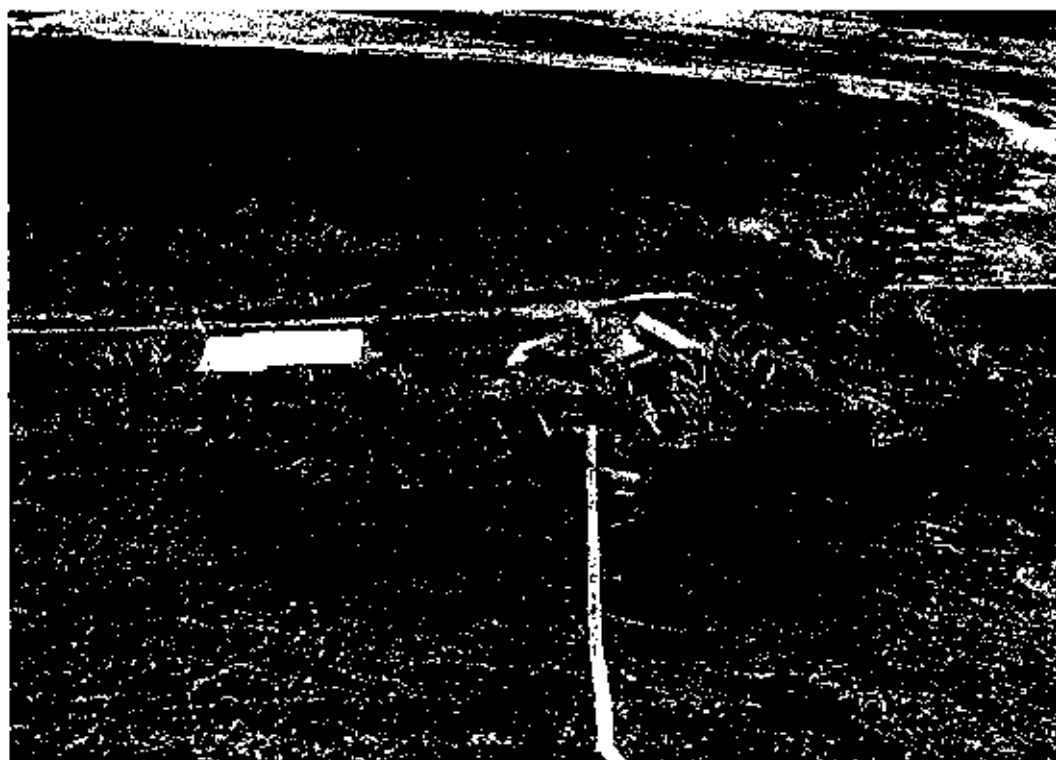


Figure 38. View of Keeper's compound (Features 7, 8, 9, 12, 13, 15), view looking west/northwest, September, 1999. Photograph: William Chapman.



Figure 39. Stone, Principal Keeper's Residence (Feature 7), from west, September, 1999. Photograph: William Chapman.



Figure 40. Stone, Principal Keeper's Residence (Feature 7), from east/northeast, September, 1999, Photograph: William Chapman.

a recessed porch, on the west, and a smaller, wood-frame ell across the rear of the building, on the east. Overall dimensions for the hipped roof, one-story house are 30 ft by 30 ft for the stone section and 20 ft 5 in by 22 ft for the wood-frame ell. A small shed addition, measuring about 8 by 3 ft, projects from the southeast corner of the ell.

The building sits on sloping ground, rising to the rear (east). The floor level is about 3 ft above grade on the west, reducing to grade level on the east end.

The exterior stone walls are unusual for a building built for utilitarian purposes and reveal a surprisingly strong design sensibility. Based on prototypes publicized during the period after 1905, when the Craftsman style first became popular, the house has many of the qualities of this popular American building style. These include the basically informal plan and open arrangement of rooms, the asymmetrical arrangement of the exterior elevations, and the emphasis on natural materials for construction.

The Keeper's residence is built of local basaltic stone gathered on the site for the exterior walls. While interior partitions are wood, the 18-in thick exterior stone walls are load-bearing. These are slightly battered at the base, giving them a thicker appearance than actual. The walls are laid up in a rubble pattern, set in relatively white mortar.

One particularly unusual feature is the existence of three semi-circular crawlspace vents located on the east, north, and south sides. Those on the sides of the building, the south and north, are 16 in high and 36 in wide. That on the west, or front elevation, is 38 in wide and 17 in high. The vents recall the Richardsonian architectural style of the previous decade. Almost cyclopean in character, the arches have rough-cut stone voussoirs forming the arch. The vent on the west also has a massive stone sill at the ground level.

The stone construction also features prominently in the buttressed staircase at the west end, leading to the recessed entry porch. Comprised of two steps on either side, measuring 25 and 40 in

above grade, respectively, the buttresses are of rubble construction and are capped with massive stone slabs, each measuring about 33 by 18 in. The buttresses flank a concrete staircase, comprised of five steps, each with 12 in treads and 6 in risers. A concrete slab, measuring about 4 by 10 ft, is at the base.

The porch is defined by rubble-stone balusters, continuous with the exterior walls below. These rise 32 in above the level of the porch floor. The entry to the porch is 72 in wide, approximately the width of the concrete stairs below. The baluster is capped with a concrete rail, which in turn is fitted with a wood sill (originally installed to hold the screening, which is no longer in place). The stone baluster extends along the west end of the south wall a distance of 10 ft 2 in, creating an opening 8 ft 8 in wide by about 68 in high. The opening on the west, at the entry way, is 14 ft wide and also 68 in high, above the balusters, and 8 ft 4 in high at the entrance.

The building also features a rubble-stone post on the southwest corner, measuring about 18 in square and extending 68 in above the level of the rubble-stone baluster. A white-painted concrete lintel spans the west entrance and the south opening. This measures over 15 ft long on the west and 10 ft on the south; it is approximately 1 ft high. The edges of the porch, including the walls, lintel, and corner post, are fitted with 2 x 4 in nailing strips, once holding screening.

The entry porch floor is concrete and measures 14 by 8 ft 8 in area. The interior walls are rubble stone, matching the exterior. A single entry door is located in the middle of the rear porch wall. The opening measures 39 by 90 in and is fitted with a 35 by 84 in wood, three-panel door, the top panel of which is glazed. A concrete lintel, measuring 48 by 6 in spans the head of the entry door. The ceiling is beaded matchboard, with 1 ½ in wide strips. A later (ca. 1960) light fixture is placed in the middle of the ceiling, presumably a replacement of an earlier fixture.

Seven widow openings pierce the main body of the building; three on the north, two on the south, and one on the west, to the left of the entry porch. The openings of six of the windows measure 42 by 73 in; the wood window sash and frames measure 36 by 68 in. One window, at the

center of the north wall, is smaller and measures 32 by 54 in. This window lights the bathroom located in the center of the north side of the house. All of the windows are fitted with double-hung wood sash, with a 4-over-4 glazing pattern. Concrete sills, measuring 42 by 4 in, projecting 2 in from the plane of the wall and recessed 11 in into the opening, are located at the base of six of the openings. The smaller opening on the north wall has a similar sill, 34 in wide.

The rear wood ell is of combined frame and single-wall construction. Added in 1927, with possible further modifications in later years, the ell is made up of 7-in wide vertical, tongue-and-groove boards with a v-groove pattern. A horizontal girt, comprised of two parallel boards, each approximately 2 in wide, spans two sides of the ell; a single girt, placed at the level of the lower girt of the sides, spans the rear. A projecting water table, with drip mold, is placed at the base of the wood walls. The girts are placed 62 in above the level of the water table.

The ell is fitted with paired windows on the north and south. These measure 65 in wide by 66 in high. The wood surrounds or trim boards project only slightly, about 3 in, and are 2 in wide. The windows are double-hung wood sash, with a 4-over-4 glazing pattern as on the main body of the building. A smaller, single window is located on the north wall, at the east corner. This measures 34 by 36 in on the exterior (including the trim) and 28 by 40 in on the interior. Access to the ell is via a recessed entry at the southeast corner.

The ell is supported by a reinforced concrete foundation wall, approximately 6-in thick and between 10 and 4 in high. A vent is located on the south wall beneath the paired window. Measuring about 15 by 8 in, the vent reveals a crawlspace of 1 ft in elevation for the ell. The main body of the building is elevated about 2 ft above grade.

The roof form is hipped for the main body of the building, with a cross-gable covering the rear ell. The rear of ell roof is also broken into two sections, creating a slightly different elevation on the south side from the north, where the eave is continuous with the north wall. The small shed addition, constructed of plywood, is also located at this end; this is either a modification of an earlier

attachment or an addition made sometime after ca. 1950. It encloses a sink and utility area.

The roofing material is modern, composition (asphalt) roofing. Earlier records and photographs suggest that the building was originally covered with light-colored asbestos shingles, since removed. The roof covering was replaced again in 2000 by a wood roof, substituting for the asphalt roof installed in the 1970s.

The 2 x 4-in rafter ends (tails) of the roof are exposed following the standard for Craftsman-style architecture. The ell features end boards on the gable ends and knee brackets supporting the gable on the southeast side. Vents are located between some of the rafters, these measure 14 by 3 in and are screened. Otherwise the exterior is unembellished.

Pipes and vent stacks are visible on the rear (the east end). Another vent stack pierces the roof on the north side of the main body of the building. Electrical service is supplied on the south side, the box attached to the rear ell to the right of the paired window.

The interior consists of seven rooms: a living area (possibly once used for dining as well); two bedrooms in the main body of the building, flanking a central bath; a large kitchen; a third bedroom on the north side of the ell; and a pantry. There are also service areas and closets at the rear, not included in the room count.

Interior surfaces are mostly plaster over wood lathe and also plaster applied too the interior stone walls. Wood trim consists of 5-in wide, plain surrounds and 8-in high base boards. There is also a picture rail, located about 10 in from the ceiling in all the front rooms. Doors are horizontal paneled.

Light fixtures are relatively modern, appearing to date from the 1960s or 1970s.

The rear ell features tongue-and-groove, vertical board walls. The ceilings are beaded matchboard, similar to that used on the porch ceiling. The floors throughout are Douglas fir, about 4-in wide.

Some of the surfaces in the service area are covered with vinyl. The wood floors are painted. The rear service wing also has a concrete floor in some sections.

Historically (from around the 1930s through the 1950s) the house was embellished with foundation plants and shrubs, none of which are now in place.

A rubble masonry retaining wall is located at the rear of the house, about 20 ft from the rear wing. About 5 ½ ft high, this wall marks the transition to a higher grade at the rear of the property.

A modern, metal clothesline is located south of the building.

8) First Assistant Keeper's Residence, later Keeper's Residence

Construction date: 1950

Dates of Alterations: Unknown, possibly 1960s, 1970s

Classification: Building

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A and C

Integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association, to the 1950s period

Loss of or Threats to Integrity: Neglect and poor maintenance

This simple, modern building was built in 1950 to replace an earlier, wood-frame residence built in 1909. Of strikingly contrasting design to the older elements on the site, the new residence represented a move toward modernization of the facility during the 1950s. It became outmoded after the light was automated in 1966. It has been used by the National Park Service and the U.S. Coast Guard for temporary housing since 1966. It maintains integrity of design to the 1950 period and has experienced few changes or modifications.

The First Assistant Keeper's Residence is a one-story, concrete-block, flat-roofed building located in the near middle of the historic keepers' compound. Measuring about 30 by 46 ft overall, the house sits on slightly sloping land, which rises toward the rear of the building. Extremely



Figure 41. First Assistant Keeper's Residence, later Keeper's Residence (Feature 8), view from northwest, September, 1999. Photograph: William Chapman.



Figure 42. First Assistant Keeper's Residence, later Keeper's Residence (Feature 8), view from northeast, September, 1999. Photograph: William Chapman.

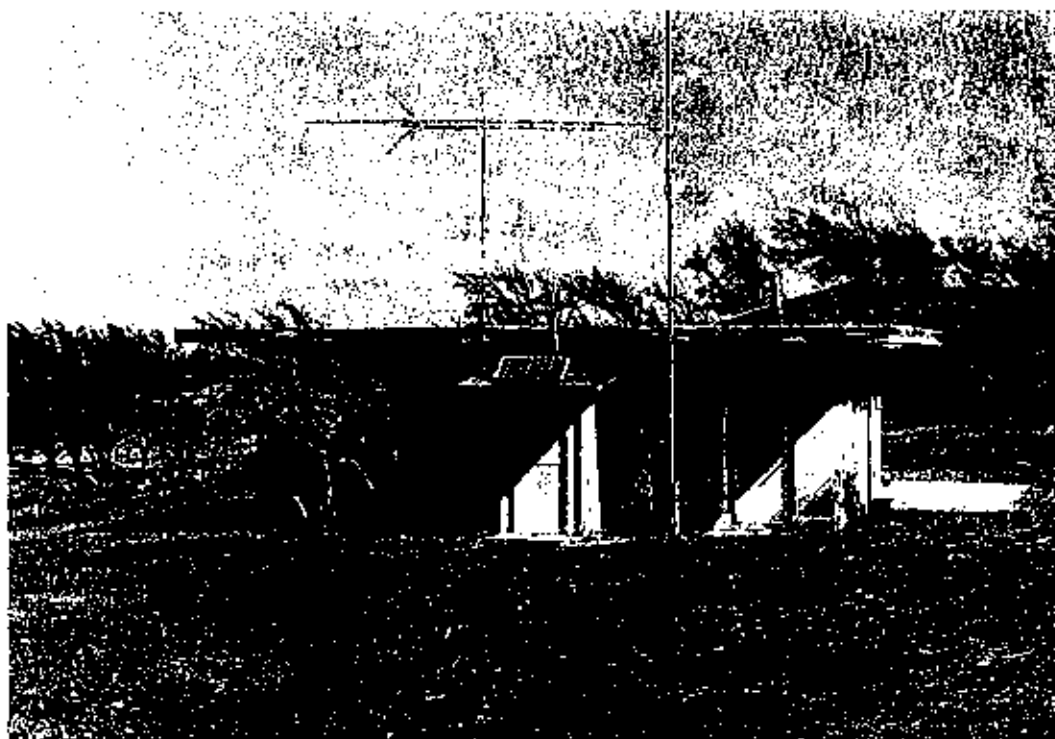


Figure 43. First Assistant Keeper's Residence, later Keeper's Residence (Feature 8), view from south, September, 1999, Photograph: William Chapman.



Figure 24. Looking east, east of the summit of Mount St. Helens, from the north, September, 1999. Photograph: William Chapman.

utilitarian in style, the walls consist of white-painted, and unembellished concrete blocks sitting on a poured concrete foundation. The roof, which is constructed with wood rafters, is cantilevered about 3 ft from the surface of the wall. The eaves are boxed, with a fascia of about 6 in in width running around the building on all sides. The ends of the 2 x 6-in rafters are visible in the soffits. The edges of the roof have 3-in metal flashing; the roof covering is rolled roofing (asphalt), colored a bright white.

The building is irregular in plan, with a rear pantry and work area appended to the east facade at the south end matched by a recessed porch on the southeast side. The site slopes toward the east, creating a slight change in elevation from the front (west) to the rear (east) of the building. Resting on a slightly projecting concrete plinth, the floor level changes from 29 in above grade on the west to 10 in on the east along the north side; on the south the change of grade is from 9 to 7 in, running west to east. The plinth, which visually serves as a water table, is beveled on the top and projects 2 ½ in from the face of the house on all four sides.

The principal entrance to the house is on the west side, at the edge of the main block of the building; the recessed sun porch and living area is to the south and is set back from the plane of the building by five ft just to the south (right) of the entrance. The entry area is comprised of an enclosed, weatherboard-sheathed porch approached via a simple, two-step concrete staircase with concrete buttresses. The stairs project from the building about 3 ft and extend about 2 ft above grade. The width of the concrete steps and buttresses overall is 10 ft 9 in; the steps are 5 ft wide.

The entry porch itself is of frame construction. Measuring 5 ft by 10 ft 2 in, the entry encloses a concrete pad, leading to a second entry door. The recessed and enclosed porch is lit by two fixed pane windows flanking the entry door and a third light in the top panel of the entry door. These measure 24 by 42 in. The porch door has three panels beneath the larger glazed section and measures 42 by 82 in. It is enframed by simple, 3-in wide plain trim. Matching corner boards mark the corners of the entry porch and also surround the windows. A single, modern light fixture is placed over the entrance.

The interior door, set in a concrete block wall, is flush paneled, measuring 35 by 84 in. A diamond-shaped window, typical of 1950s design, is placed in the middle of the door, at about eye level. The opening itself is 40 by 87 in and is unembellished other than the jambs and lintel (header), set back from the surface of the wall.

The remainder of the building is strikingly stark and simple. The only break in the concrete block walls are irregularly placed window openings. These include paired windows, grouped windows, and some single windows. The majority are wood, double-hung sash windows, with a 1-over-1 glazing pattern. The openings also are fitted with wood screens set into the window enframingent.

The windows are arranged with two, paired windows on the north side; a combination of a paired window and two single windows on the east (rear), and a single window and paired window on the principal elevation (the west), to the left (north) of the entrance. The south side of the building is fitted with sliding windows, grouped on the south and west.

Measurements for the windows are fairly uniform. The double (paired) windows are 42 by 73 in overall; the rear single window openings measure 38 by 43, with the sash at 32 by 36 in. The front single window has the same dimensions. The sliding window sash measure 34 by 39 in on the west and 34 by 49 in on the south. There are four leaves on each facade.

The rear of the building features a service area measuring 4 by 16 ft 4 in. Accessible through two doors, one on the east and a second on the south, this area, which is integral to the main building, is fitted with screened windows along the east side. Both doors are flush paneled, that on the east fitted with a small rectangular window at eye level. The door on the south accesses a separate service close; the east door provides access to the kitchen area, laundry, and pantry.

A small radio room is attached to the middle of the south elevation. Probably added at a later date, possibly in the 1960s or 1970s, this room includes a solar panel and antenna on its simple shed

roof. Measuring 4 by 4 ft, the closet-like room is constructed of plywood and is fitted with two-panel wood door. The electrical service box for the dwelling is located just to the right of the radio closet; a second, taller antenna also rises at this point, reaching about 30 ft above grade.

Pipes and conduits are placed on the rear of the building. Electrical conduits follow the ledge of the plinth. Two vent stacks break the surface of the roof.

The interior of the building consists of a single, large and open living and dining area, encompassing the sun porch on the south; a kitchen and service area in the southeast corner; two bedrooms on the north side and a single bathroom. The floors are vinyl over concrete; the walls and ceilings are "celotex," wood or cane-fiber wall board, with 3/4 in wood moldings. The light fixtures and appliances are relatively modern, possibly dating to the construction period, but also possibly replacements of the 1960s or 1970s.

The exterior of the building includes concrete pads or landings on the east, near the entry, at the south outside the service door, and along the rear. That on the front measures about 10 by 1 ft; that on the south 4 by 4 ft; that on the rear, outside the rear door, also 4 by 4 ft. The rear of the building also includes a larger concrete pad, measuring about 16 by 8 ft and incorporating the older landing outside the rear service area. A few foundation plants still remain on the west side of the building, to the left of the entrance.

This area, which appears to have been added at a later date, possibly the 1960s, served as a patio and included a barbeque pit carved out of the rubble masonry wall marking the east edge of the patio area. Four steps, measuring 49 by 69 in overall, are located at the east side, providing access to the shed and workshop behind the building. A roughly former rubble retaining wall spills along the earthen embankment immediately behind the house and at the edge of the patio.

9) Wash House/Storage Shed

Construction date: 1909

Dates of Alterations: Addition, 1955

Classification: Building

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A and C

Integrity: Location, Design (partial loss), Setting, Materials (partial loss)

Loss of or Threats to Integrity: Workmanship (loss of some details and character), Feeling (some loss of a sense of historic character), Association (association with post-1955 period only)

The wash house/storage shed has had numerous alterations since its construction in 1909 as a laundry building and possible shower facility. The most significant of these is an addition to the south end of the building in 1955, which added about fifty percent more floor area to the structure. The roof and siding have also had numerous alterations over the years. Overall, the building has little integrity to any period prior to 1950, and only minimal integrity to the period after 1955 due to apparent small changes made to the building in the 1960s, 1970s, and possibly 1980s and 1990s. Still, it is considered a contributing building to the site, and has the strongest associative value with the late historic period, ca. 1950-1956.

This simple, wood-frame structure is one of the last remaining smaller ancillary building on the site of the Moloka'i Light Station. Built in 1909, it was one of three smaller sheds on the site; the other two included a workshop located just outside the keepers' compound to the north of the concrete walkway leading to the lighthouse, and a second wash house, located to the south of this structure, behind what was once the Second Assistant Keeper's quarters (demolished in 1953). Only the present wash house, originally located behind the First Assistant Keeper's residence, still exists. The second wash house, shown in early photographs, was demolished prior to 1927. The tool shed outside the compound walls was taken down sometime in the 1950s.

The present building is a one-story frame structure, measuring 20 by 9 ½ ft. Constructed of 5-in wide tongue-and-groove vertical boards, with some interior framing members, on the north and of a mixture of 7-in wide vertical and 6-in wide horizontal siding on the later south addition, the structure sits on a poured, reinforced concrete slab, which projects about 2 in from the face of the building. Built on a slight slope, the concrete base extends about 12 in above grade on the west side,



Figure 45. Wash house/Storage shed (Feature 9), view from northwest, September, 1999. Photograph: William Chapman.

and 6 in above grade on the east.

The roof is a simple gable form, built with 2 x 4 in rafters and sheathed in corrugated cementitious material on the north and corrugated sheet metal on the south addition. Completed with a fascia and end boards, the roof has exposed rafter ends, which project 22 in from the face of the building.

Two door openings and four windows pierce the outer walls. The historic entrance is on the west side and consists of a 30 by 78-in opening fitted with a five panel door. The newer section has a plywood door. A single concrete step, measuring 34 by 20 in and extending 6 in above grade, leads to the principal entrance. A concrete ramp, measuring 41 by 43 in provides access to the addition. A plywood sheet is attached to the left of the principal entrance; a sign identifying the building as a paint shed is located just to the right of the same door at eye level.

Three of the original windows are on the rear (east) side of the building; the fourth historic window is located on the north gable-end. The window openings measure 33 by 35 in and have 3 ½-in surrounds or trim. None are presently glazed, but appear once to have been fitted with double-hung wood sash windows.

The interior of the building is obscured by more recent shelving and a variety of stored paint cans and other materials.

The exterior is surrounded by wood and metal debris. The building backs up to the rubble-masonry wall surrounding the keepers' compound.

10) Wood-frame Garage

Construction date: ca. 1920?

Dates of Alterations: Windows blocked up, building re-roofed, 1970s and 1980s?

Classification: Building



Figure 46. Wood-frame garage (Feature 10), from northwest, September, 1999.
Photograph: William Chapman.

Significance: National, State, and Local as a contributing building

Applicable Criteria: A and C

Integrity: Location, Design, Setting, Materials (minor loss), Workmanship, Feeling, Association

Loss of or Threats to Integrity: Some loss due to enclosure of windows

The wood-frame garage is a historic and contributing feature of the Moloka'i Light Station, added around 1920 to house the station's half-ton Ford truck. No specific records of the construction of the building have been found, although it was clearly on the site as of 1927 when a detailed inventory of the station was completed. Similarly, no record could be found of when the first motorized vehicle was brought to the station. While the first motorized trucks came into being in 1896, Ford's popular model became available only after World War I. It is likely that the station acquired a truck around this time, after 1918.

The simple, rectangular structure measures 17 ft 3 in by 25 ft 2 in. It is oriented roughly north and south, following the longitudinal ridge of the gabled-roof. Placed on a concrete foundation and slab, which extends 14 in above grade on the west and 6 in above grade on the east, the building has a simple 2 x 4-in frame construction and is sheathed in 5-in wide tongue-and-groove vertical boards.

A concrete slab or step, set at grade level, spans the front of the building. This measures 15 in by about 24 ft and rises only 1 in above grade and 5 in below the line of the siding on the west side of the building. A small concrete "drum" or bollard is located at the edge of the entrance, just at the middle of the step. Half-circular in plan, this feature extends 6 in above the level of the step.

Access to the building is through a double door on the west, toward the north end. This opening measures 9 ft 8 in wide and is fitted with single-paneled doors, each 4 ft 10 in in width and 8 ft high. The garage doors are flanked by two decorative wood panels, framed in 1 by 2 in boards.

The building has three windows, one on the north gable-end, and two on the rear or east side. Measuring 27 by 45 in on the interior and surrounded with 4-in plain wood trim and a projecting sill, the windows are now closed with plywood panels. Originally they appear to have been double-hung

wood sash.

A single vent is placed above the window opening on the north side. Measuring 24 by 18 in, the louvered vent is not matched on the south side, suggesting a possible later change at this end.

The roof is supported by 2 by 4-in wood rafters, which project about 14 in from the wall surface. The roof is sheathed in composition (asphalt) roofing material, of relatively recent origin.

The interior of the structure is simple with exposed plank walls and a bare concrete floor. The garage is presently used to house the historic Fresnel lens removed from the lighthouse in 1986.

The site is relatively free of overgrowth or debris. A small rubble retaining wall is visible along the rear of the building, about 4 ft from the foundation. This holds back the hill rising to the rear and was probably added at the time of the building's construction.

11) Oil Storage Building

Construction date: 1909

Dates of Alterations: Gradual deterioration, no specific date

Classification: Building

Significance: National, State, and Local as a contributing building

Applicable Criteria: A and C

Integrity: Location, Design (some loss), Setting, Materials (some loss), Workmanship, Feeling, and Association

Losses of or Threats to Integrity: The building is abandoned and un-used. Some elements are missing, including the entrance door. There is some deterioration of materials, due to water penetration and rusting of metal elements. The building, however, still preserves a strong sense of historical association with all of the historic periods of the Moloka'i Light Station, despite some minor losses of design and material integrity

The oil storage building was constructed as part of the original lighthouse station as a place to store the oil (kerosene) used to fuel the lamp of the light signal. Because the material was combustible, the decision was made to store the oil away from the keepers' quarters and the light



Figure 47. Oil-storage building (Feature 11), view from tower looking north, September, 1999. Photograph: William Chapman.



Figure 48. Oil-storage building (Feature 11), view from south, September, 1999.
Photograph: William Chapman.



Figure 11. Aerial photograph of the study area, showing the location of the study area (indicated by a white box) in the study area (indicated by a white box). (1), September, 1999. Photograph: William Chapman.

itself. However, almost as soon as the light was completed, or even before it was completed, a second oil storage facility was constructed next to the light house, where it could be pumped directly to the lamp by the keepers. Historical records suggest this oil house became a secondary storage building and at a later date became a storage building for other hazardous materials as well.

Located 550 ft northwest of the lighthouse tower and 350 ft northeast of the keepers' compound, this simple, block-like building is sited in an open area well away from the other structures and buildings associated with the Moloka'i Light Station. Measuring about 12 ft 5 in square and 8 ft 6 in high, the oil storage building is capped by a pyramidal, concrete roof, with a circular metal vent placed at its peak.

Built of reinforced concrete, laid up in distinguishable courses, the structure has a single wall opening — the door on the east side. This measures 38 by 81 in and is surmounted by a 36 by 11 in open transom. The jambs of the door are square and reveal a wall thickness of about 1 ft. The concrete opening is fitted with 2 x 4-in wood jambs and a wood header, all of which are bolted to the wall. The transom also has remaining wood elements.

The perimeter of the building features a projecting footing. This extends about 4 in above grade and projects 6 in on all sides. A 24 by 48 in concrete pad marks the entrance. A metal benchmark, mounted on a concrete knob, is located just 6 in from the southeast corner of the building. Other concrete debris is scattered near the storage structure.

The roof of the building is about 6 in thick and made up of red-painted, reinforced concrete. The outer edge of the roof projects about 8 in from the wall and includes a decorative, square molding and drip mold. The roof has several cracks, showing evidence of rusted reinforcing bars.

The interior of the building is stark and empty. The floor is concrete, now covered with debris, including spalled concrete from the interior walls and roof. The walls are fitted with a pattern of 2 x 3 in wood blocks set in the wall surface in a grid pattern, nine per side. These appear to be nailing

blocks, possibly intended to aid in the installation of shelving or an interior wall of some kind. The walls and ceiling show much evidence of cracking, due largely to the rusting of iron reinforcing bars. A noticeable horizontal crack cuts across both the interior and exterior about 1 ft below the level of the wall plate.

12) Concrete Sidewalk

Construction date: 1929

Dates of Alterations: Possible repairs, 1930s through 1970s

Classification: Structure

Significance: National, State, and Local as a contributing structure

Applicable Criteria: A

Integrity: Location, Design Setting, Materials, Workmanship, Feeling, Association

Loss of or Threats to Integrity: None, some small amount of erosion

The sidewalk was not listed in the 1927 inventory of the property. It is evident in ca.1930 photographs. A name and date inscribed on the walkway is WM KLEE 1929. This is written on the surface in the seventh section of the walk, counting from the keepers' compound. Other dates of 6/1/29 and 6/3/29 are scratched on the walk near the 1934 powerhouse.

The concrete walkway served as a means of communication between the keepers' compound and the lighthouse tower. Before its construction keepers relied on unpaved paths to carry out their duties. The walk is 450 ft long, beginning at the edge of the keepers' compound and ending at the steps to the lighthouse tower. It travels in a east-southeasterly direction for a distance of 250 ft, then turns eastward for 150 ft, then southeastward for the remaining 50 ft. Divided into 10 ft sections and 32 in wide, the walk is broken by six sets of steps. The first of these is a single step, the next 2 steps, the next 5 steps, the next 4 steps, the next 2 steps, and the last, near the top, 1 step again. Each of the steps is about 6-7 in high and 1 ft deep.

A concrete drive crosses the walkway just before (west of) the powerhouse. Providing for a historic road or pathway, the concrete "pad" crossing on the diagonal, preserving the original



**Figure 50. Concrete sidewalk (Feature 12) from southeast, September, 1999.
Photograph: William Chapman.**

concrete walkway in its middle. Total dimensions are about 8 by 4 ft, not including the 32-in wide walkway.

The concrete has a 3-in smooth edge on four sides of each section. Overall the walkway is in good condition, with some minor settlement and tilting along its course.

13) Principal Access Road

Construction date: 1908

Dates of Alterations: Unknown

Classification: Structure

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A

Integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association

Loss of or Threats to Integrity: None known

The road from Kalaupapa to the site of the station may well predate the construction of the station. However, it is certain that the road was improved during the construction period and that the turn toward what was to become the station was first introduced at this time. Until 1936, a greater portion of the road fell within the boundaries of the station property. However, a re-survey of that year, placed the road and airstrip outside the boundaries (actually forming the west edge of the station property).

The road as nominated to the National Register extends from the northwest edge of the plot in a southeasterly direction, then curves toward the south in a wide arc ending at a point in front of and parallel to the west wall of the keepers' compound for a distance of about 700 ft. Just to the north and west of the keepers' compound the road splits, with one branch going eastward toward the lighthouse tower, then southward to the rear of the keepers' compound.

The road is gravel surfaced and graded. It appears to follow its historic route.



Figure 51. Principal access road and Ironwood trees (Features 13 and 19), view looking west/northwest, September, 1999. Photograph: William Chapman.



Figure 52. Historic pathway/road, extending from north side of site (Feature 14), from west/southwest, September, 1999. Photograph: William Chapman.

14) Historic Pathway/Road from North

Construction date: 1908 or earlier

Dates of Alterations: Unknown

Classification: Structure

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A

Integrity: Location, Design, Setting Materials, Workmanship, Feeling, and Association

Loss of or Threats to Integrity: None known; gradual erosion of feature

This historic road or pathway extends around the north edge of the point, leading toward Kalawao, then branches southward toward the light station, almost due north of the tower at a distance of 900 ft. It enters the actual boundaries of the light station at a point just east of the tower, turning abruptly westward 50 ft northeast of the tower base, where it transects the light station's eastern boundary line. The road then proceeds west 100 ft, then turns southwest as it crosses the concrete walkway just to the west of the powerhouse building. It then extends to the site of the oil drum ramp, 200 ft to the southwest.

The historic pathway/road is barely discernible in places and consists of a hard-packed gravel surface. The point of intersection with the concrete walkway is marked by concrete "pads" which cross the walkway on the diagonal. This diagonal crossing measures about 8 by 4 ft, plus the width of the walkway (2 ½ ft).

This road appears to have played a significant role in the construction of the light station, particularly the tower. It was later used to provide access to the light tower section of the facility.

15) Stone Perimeter Wall for Keepers' Compound

Construction date: 1909

Dates of Alterations: None known

Classification: Structure

Significance: National, State, and Local as a contributing structure

Applicable Criteria: A



Figure 53. Stone perimeter wall for Keeper's Compound (Feature 15), from northwest, September, 1999. Photograph: William Chapman.

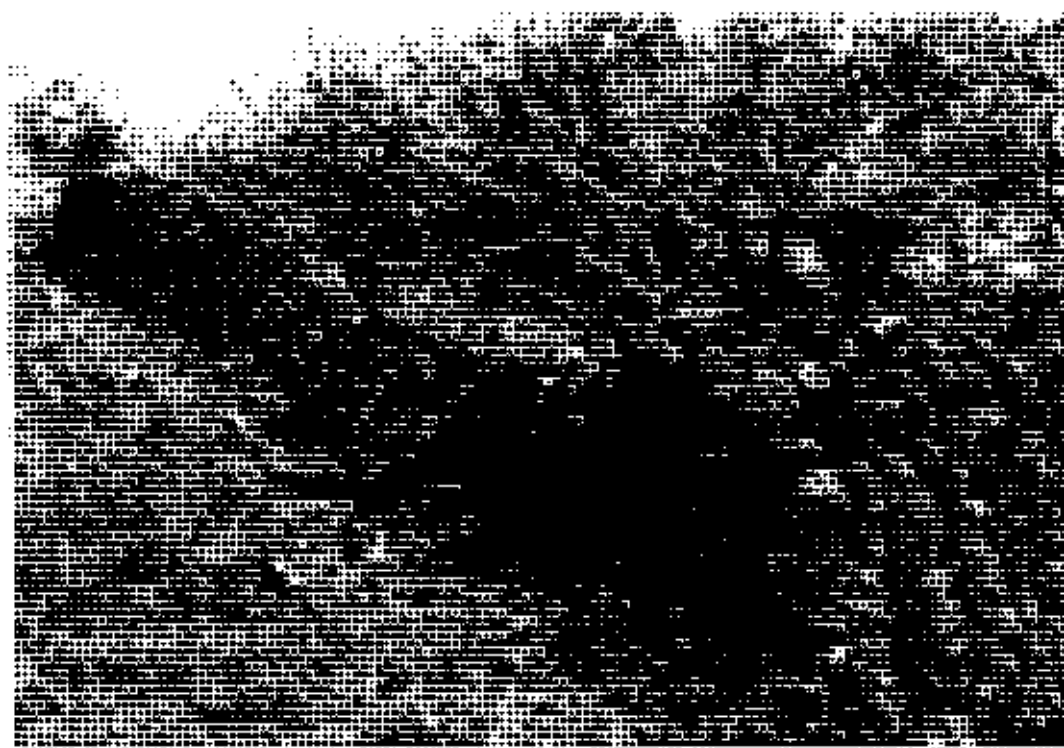


Figure 54. Portion of stone perimeter wall, Keeper's Compound (Feature 15), at rear of compound, view from east, September, 1999. Photograph: William Chapman.

Integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association
Loss of or Threats to Integrity: None apparent

The stone perimeter wall has associative value to each of the historic periods of the light station's past. Built in 1909 to provide for a boundary for the keepers quarters, the perimeter wall also was the result of clearing the space of loose stones as the first phase of the construction project.

The perimeter wall is a near rectangle, measuring about 300 ft on its east and west sides and 160 ft on the north and south. Built along sloping land, the elevation rising to the east, or rear, of the compound, the wall is comprised of rubble masonry, basaltic (volcanic) stone found on the site. The stones vary in diameter from 2 ft to 6 in, and include some larger boulders as well. The height and thickness of the wall varies, although it tends to be larger on its upper side. Along the east it rises about 5 ½ ft above grade and is from 8 to 10 ft thick. On the west, the wall is slightly lower, about 3 ½ to 4 ft above grade and 6 ft thick. The north and south walls are of about the same proportions.

The wall is broken at the north end of the west side and north end of the east side to provide access to the compound. The lower (west) opening is about 20 ft wide and allows for automobile access. The upper break, which is about 5 ft wide and was historically marked by a wood gate (the posts of which still remain), opens to the historic concrete walkway and also provided access to the other service areas, as well as the keepers' garden areas historically.

16) Stone Wall on North and East Sides of Site

Construction date: Unknown

Dates of Alterations: None known

Classification: Structure

Significance: Historically present on site. National, State, and Local as a contributing element

Applicable Criteria: A

Integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association

Loss of or Threats to Integrity: None known

The wall appears to predate the light station and relate to earlier field divisions on the point.

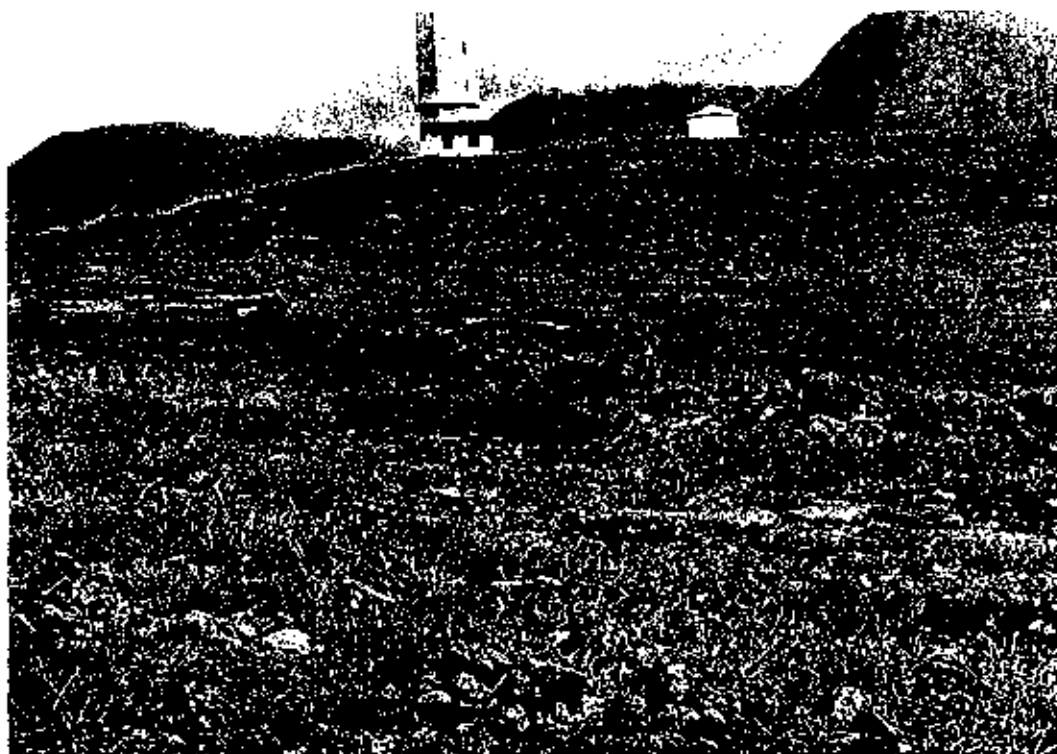


Figure 55. Stone wall on north and east sides of site (Feature 16), view from north, September, 1999. Photograph: William Chapman.

It relates to the site only in that it was present during all the significant periods in the station's history.

The rubble masonry wall runs from the northwest part of the property southeast toward the lower slope of the lighthouse tower, for a distance of about 900 ft. It then follows the rear ridge of the knoll, ascending to the east of the tower.

The wall is comprised of basaltic rubble stones, laid up in a random pattern. It is broken in several areas. No more than 4 ft thick, it rises to about 2 to 3 ft above grade..

17) Wire Perimeter Fence

Construction date: ca. 1910?

Dates of Alterations: Outmoded after 1936 when the size of the light station plot was altered

Classification: Structure

Significance: National, State, and Local as a contributing element

Applicable Criteria: A

Integrity: Location, Design (partially lost through missing elements and deterioration), Setting, Materials (with significant loss), Workmanship (for remaining posts), Association in its present condition with the last period of historic significance for the site only (after ca. 1950). Loss of materials and design due to deterioration. Feeling only applies to the later period as well.

Described in the 1927 inventory as a 5-wire metal fence mounted on redwood posts, this feature historically delineated the outer boundaries of Moloka'i Light Station, an area estimated (incorrectly) as about 22 acres. In 1936, the boundaries of the plot were changed, and the original fence became irrelevant. It was allowed to stay in place and much of it has since deteriorated.

The remaining posts are in poor condition, and in many sections are no longer distinguishable. The original posts were square-cut redwood, mounted with five strands of wire. They were set approximately 1 ft into the ground and extended about 4 ft above grade.



Figure 56. Stone terraces, walls, and compounds (Feature 18), from east, September, 1999. Photograph: William Chapman.

18) Stone Terraces, Walls, and Compounds

Construction date: Unknown, most built prior to light station

Dates of Alterations: Various, some compounds re-utilized by lighthouse keepers after 1909

Classification: Site

Significance: Historically present on site; re-utilized during historic period

Applicable Criteria: A, D

Integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association

Loss of or Threats to Integrity: Deterioration of walls, leading to loss of Design and Material integrity; and also integrity of Workmanship, Feeling, and Association over time

The majority of these features appear to be agricultural terraces and compounds used during the period prior to the development of the light station. Some were used again to house animals and serve as protective barriers for various vegetable and root crops, especially sweet potatoes (which were grown earlier as well). The walls are still visible and intact, although they no longer perform the same function. The site is overgrown and some walls have deteriorated. So losses of integrity to the "active" period of use has been lost to some degree. However, since most of the features were no longer in use after the light station was established, the feature still possesses integrity to the more recent historic period, as scattered walls, terraces, and compounds.

Difficult to map or number, due to their indefinite character, the walls, terraces, and compounds of the site are found distributed primarily along the west slope of the hillside, below (west) of the lighthouse tower. The majority of the terraces and walls were constructed to provide for planting areas and for protection against harsh southwesterly winds. The walls generally rise no more than 2 to 3 ft above grade; terraces are evident from the absence of loose boulders and stones.

In addition to walls and terraces, there are numerous piles of stone. These may represent just piles of gathered stones, or they may be natural formations. The site also includes numerous walled areas (compounds) and partially walled areas. These appear to have been used historically (and possibly prehistorically) as planting areas and also to hold animals, particularly pigs, which were commonly kept in the area. One of the largest of these compounds is located just east of the keepers' compound and appears to have been used during the more recent historic period both as a garden

area and for animal husbandry.

As with the walls and terraces, the compound walls typically extend no more than 4 ft above grade and are about 4 to 4 ft thick. They are made up of basaltic stone found distributed throughout the site. Typical compounds are about 15 by 20 ft in dimension, with some both larger and smaller examples.

19) Ironwood (*casuarina equisetifolia*) Trees, Allee and Windbreaks

Construction date: Planted ca. 1920

Dates of Alterations: Trimmed through the 1950s; no further maintenance after that period

Classification: Site

Significance: National, State, and Local as a contributing feature

Integrity: Location, Design, Setting, Materials, Workmanship, Feeling, and Association

Loss of or Threats to Integrity: Continued growth and lack of maintenance. The trees are now more mature than during the historic periods of their presence on the site

Sometime early in the light station's history, possibly as early as 1909-10, but more likely around 1920, the station was provided with ornamental plantings, including an allee of trees lining the principal approach road from the west, a double row of trees to serve as a windbreak on the north of the keepers' compound, and a second row to the west, parallel to the west wall of the keepers' compound. The trees used are known as ironwood, due to their resilience. Imported originally from Australia these trees were popularly used to line roads and mark property boundaries throughout the Hawaiian Islands.

Photographs and oral accounts emphasize that the trees were kept trimmed through the 1950s period. Fred Robins, Jr. recalls that the row of trees to the west of the compound were kept trimmed to allow for a view of the airstrip. Photographs of the 1930s through 1950s confirm that the allee and the other formal plantings were kept regularly trimmed.

In all there are about 50 trees belonging to this common designed landscape.

Additional trees are located elsewhere on site, mostly to the east of the keepers' compound. The majority of these appear to be opportunistic plants and are not part of a designed landscape.

20) Fresnel Lens

Construction date: 1907, installed 1909

Dates of Alterations: Lamp altered periodically; signal altered 1911; lens removed 1986; returned to site, 1993. Now stored in garage near keepers' compound

Classification: Object

Significance: National, State, and Local as a contributing feature

Applicable Criteria: A and C

Integrity: Design, Materials, Workmanship

Loss of or Threats to Integrity: Loss of integrity of Location, Setting, Feeling, and Association

The property has been removed from its historic setting within the lighthouse tower. It is presently stored in the site garage and is packed in crates. Nonetheless, the lens possesses tremendous significance as a Second-Order Fresnel lens and for its long association with the Moloka'i Light Station. It is presently an object out of its original context, but possessing significance for its past association and as a historic property in its own right.

The lens, used historically to magnify the light signal at Moloka'i lighthouse, is what is known as a catadioptric, bi-valve lens. Based on a technology developed beginning in the 1820s by the French scientist Augustin Fresnel, the catadioptric lens represented a significant advancement in optics over earlier lenses.

The traditional technology had depended on one of two techniques; multiple lamps or light sources concentrated on a single lens, which focused the intensity of the light; or a single light source amplified through multiple refracting lenses. The first technique was known as the catoptric approach, the second as the dioptric. The Fresnel lens combined both these techniques, creating what was in effect a "bull's eye" of great intensity surrounded by refracting prisms and rings which transmitted the light's signal.

Fresnel lenses were classified according to the interior radius of the lens, or the distance from the center of the lamp or light to the inner surface of the surrounding lens. Fresnel lenses ranged from smaller Fourth-Order lenses through to the largest, and most powerful First-Order lenses.

To operate the signal, the lens was set on a chariot, which was in turn mounted on a pedestal fitted with a channel or vat containing liquid mercury. This allowed the lens to move around the light at a predetermined speed.

The Moloka'i light was originally set to "flash" every 20 seconds; in 1911, this was changed to every 10 seconds. Operated by a clock and weight mechanism, the lens then revolved every 20 seconds, with a flash lasting 0.3 seconds followed an eclipse of 9.7 seconds.

The lens at Moloka'i was manufactured by the firm of Chance Brothers and Company, Limited in England. It was ordered in September, 1907, by the Light House Board and delivered to Honolulu in November, 1908. The light was marked U.S.L.H.B 2.11. The lens, with an inside diameter of 1,400 mm (approximately 6 ft) was classified as a Second-Order lens.

The lens contained 26 panels overall, 13 to each valve or side. There were 18 prisms in each full panel around the central panel and 7 prisms in each partial panel. Each of the 26 sections weighed over 260 pounds, giving the lens a total weight of about 6,800 pounds — over well over 3 ½ tons! The lens parts were carefully numbered to allow for easy assembly and disassembly.

The lens was displayed in Lahaina in Maui from 1986 until its return to Moloka'i in 1993. On October 17, 1993, the crates containing the lens were unloaded at the Kalaupapa landing and trucked to the old station for storage.

MANAGEMENT RECOMMENDATIONS

Deficiencies in Research Materials and Data

Records in a number of important areas are incomplete. The most noteworthy of these is the lack of records covering more recent maintenance work on the property. More recent (post 1950) U.S. Coast Guard records are concise about changes to the light, maintenance of the lamps, cables, batteries, etc., but do not describe work on buildings. As a result many of the changes carried out in the 1960s and 1970s on structures, such as the lighthouse, but also including the lighthouse keepers' quarters, are incomplete. The changes overall have been minor, including concrete repairs, re-roofing structures, the addition of new light fixtures, kitchen appliances and so on. The actual materials and features themselves can serve to identify them and provide approximate dates. Nonetheless, additional maintenance records or other documents would be extremely useful in developing long-term maintenance and rehabilitation plans.

This deficiency is not critical for the evaluation of properties for historic significance and integrity or for purposes of the revised National Register nomination form. However, prior to any long-term rehabilitation or restoration work at the Moloka'i Light Station, a more in-depth investigation of existing buildings and of maintenance and repair records needs to occur. Specifically, Historic Structure Reports (HSR's) are recommended for each of the contributing buildings and structures within the station prior to any further work on them. This would apply to the lighthouse, the stone keepers' quarters, and the modern (1950) keeper's quarters in particular.

The other area of deficient knowledge pertains to the cultural landscape of the station. We know from existing evidence and from other research that the landscape of the site reflects agricultural practices of the pre-station era. The landscape includes numerous walls, terraces, and stone compounds that were used for agricultural purposes. We know that sweet potato and other root crops were grown in this way on Moloka'i, both in pre-contact times and in the more recent historic period. Animals, especially pigs, were also kept in stone compounds such as those found on the site.

A more thorough survey and mapping of the landscape is recommended. The emphasis should be on identification of cultural materials and features and an understanding of agricultural practices.

In addition, the site has never been surveyed archeologically, especially for evidence of use and occupation during the pre-contact period and also during the more recent historic period, particularly the early nineteenth century when Moloka'i still had a large Native Hawaiian population. The use of the area by early leprosy victims, especially in the late nineteenth century when the settlement focused on nearby Kalawao, should also be investigated.

A number of properties associated with the light station still remain enigmatic. The history of the oil storage structure, now consisting of the reinforced concrete supports for the oil tank, is incomplete. It appears that this is an original, 1909-period structure. It was altered through the removal of the wood protective super-structure, sometime, it appears, in the 1920s. Additional information on this feature would be useful.

The possible existence of a second water tank and other secondary features also deserves some further investigation. There are presently discrepancies in the written record. One account and one historic map suggest that there were once two tanks, one on the site of the existing tank and another to the west. The area should be examined more thoroughly for the presence of remains associated with an earlier tank.

There is some physical evidence to suggest the presence of other features on the site, including, masonry retaining walls and terraces, wood and concrete debris, and unrelated concrete foundation posts located in various areas within the site. All of these deserve further investigation and might be included as part of an archeological survey of the site.

In terms of more directly historical research, there remain some frustrating discrepancies regarding the tours of duties of the various keepers assigned to the site. A more thorough investigation of U.S. Coast Guard personnel records would be useful as would a further search

among the records of the Bureau of Lighthouses, which had responsibility for the site before after 1910 and before 1939. The list compiled by Love Dean, the foremost historian of lighthouses in Hawai'i, seems inaccurate in part.

A more thorough search for correspondence relating to the light house station, particularly letters written by keepers and their wives and children would help to flesh out the story of life at the station. Early twentieth-century people tended to be letter writers. Contacts should be made with descendants of keepers and keepers' families to see if any materials exist outside existing or known archives.

Recommended Future Studies and Reports

Cultural Landscape Study, focusing on stone walls, terraces, and compounds related to prior use of the site;

Archeological Survey, examining pre-contact and historic-period use of the property; to include possible identification of structures and sites relating to the light station period as well;

Historic Structure Reports (HRS's), on the lighthouse tower and the two keepers' quarters, prior to any rehabilitation or restoration work; further investigation of a less thorough kind required prior to work on the powerhouse, the garage, and the wash house;

Historical Report, on the lives of the keepers and their families; requires the identification of additional personnel records (if available) and additional correspondence (also, if available).

Interpretative Plan for the site, specifying the period or periods to be interpreted, treatments recommended for individual properties or features and so on.

Recommendations for Resource Management and Interpretation

Revision of National Register Nomination

This report is a first step in the revision of the earlier National Register of Historic Places nomination form, completed and submitted in 1982. The revised form completed concurrently with

this report, identifies all contributing properties related to the operation of the historic lighthouse and places them in historical context. The revised nomination form serves as an essential blueprint for future management of the site.

Maintenance and Rehabilitation and/or Restoration of Existing Properties

Properties identified in this report and described in the revised National Register of Historic Places nomination form are subject to careful treatment and review. All existing historic and, therefore, contributing properties need to be considered as significant features of the site and must be treated in accordance with *The Secretary of the Interior's "Standards for Historic Preservation Projects"* and other published guidance on the treatment of historic properties.

Remaining buildings should continue to be maintained to high standards. No significant alterations or demolitions should take place without consultation with cultural resource specialists of the National Park Service and discussion with the State Historic Preservation Officer and the State Historic Preservation Office staff.

Development of a long-term rehabilitation and/or restoration plan for the light station property is needed. As the Kalaupapa settlement becomes less a health facility and more a unit of the National Park Service, the Moloka'i Light Station will likely become an important visitor center. It is important that an overall plan be developed for the site and also that individual rehabilitation and/or restoration plans be developed for each contributing building.

It is recommended that the station be maintained in much its present condition for the immediate future. The station presently represents the facility as it had evolved by the 1990s. For the time being it is recommended that no further changes be allowed at the property and that all buildings be maintained and stabilized only. Opportunities for intervention, such as needs for re-roofing or other standard maintenance, should take the least invasive approach possible -- largely, replacement in kind and simple repairs and repainting.

Overall, a conservative, “tentative” approach to managing historic properties has tended to prevail among historic preservation professionals in recent years. At Kalaupapa, the approach has been to allow the “period of significance” to continue to be extended with the evolution of the site. However, at some point, especially after the last patient has left the settlement, some kind of “stabilization” will occur. At that point properties will, in a sense, become frozen in time. Even as it is presently managed, Kalaupapa increasingly is favoring earlier treatments — as in the case of re-roofing buildings in “historic” materials such as wood shingles (rather than the composition roofing that had become more-or-less standard by the 1970s and 1980s).

Nonetheless, as the Kalaupapa community becomes more of an interpretive and recreational center and no longer functions as a medical center, a re-evaluation of treatments of remaining buildings, structures, and other features no doubt will occur. It is likely that the Kalaupapa settlement will “privilege,” in a sense, somewhat earlier times. Already, NPS projects have tended to return individual properties to something of their original or at least “historic” character. The final project will result, therefore, in some “restored” buildings, some “rehabilitated” ones, and some simply “stabilized” or “preserved” buildings.

The result will include a number of significant anachronisms, where only portions of the settlement will remain and individual properties will lack their historic built contexts. The restoration of the Kalaupapa settlement to a specific period would be a highly problematic undertaking — and one far too expensive to be carried out realistically. What can be expected will be a conscientious retention and restoration of fragments of the settlement, perhaps to the 1930s or 1940s period, when many of the present buildings were constructed, and the acceptance of loss of other significant elements dating to the same period. At the same time, it is apparent that buildings and other features added more recently, such as buildings added in the 1970s and even 1980s, will simply be retained as representative of the evolution of the site.

With the Moloka'i Light Station the opportunity exists for a more consistent and philosophically defensible approach to rehabilitation and presentation. As it stands the station

possesses primary integrity to the 1950s period. There have been remarkably few changes after that time or after ca. 1955-56, when a number of photographs were taken of the site. In the early 1950s the site had reached a kind of climax of development. The lighthouse was still operating and there were still resident keepers on the site. In 1953, the last of the historic wood-frame keeper's quarters was demolished. A tool house was demolished around the same time; and in 1955, the last addition — a modest attachment to the historic wash house — was made. The powerhouse was also already present on the site; the former oil storage tank had become outmoded and the wood super-structure protecting it had been demolished.

Perhaps most significant of this period is the fact that the station was not yet "in decline." The concrete-block keeper's dwelling, added in 1950, suggested that the station was still projected to have a useful life. The older residence became the Assistant Keeper's residence shortly afterward and the station was embarking on a new, modern period. By this time those features considered unimportant had been removed or were simply remaining as ruins. In the case of the wood keeper's house and the tool shed, they were removed. The old oil loading platform and ramp were allowed to deteriorate; the old oil storage structure became simply a ruin. At the same time, the grounds were maintained at probably their highest standard in history; the grass in the keepers' compound was neatly mowed; the buildings had carefully maintained foundation shrubs, the allee and windbreak trees were carefully trimmed; and the palm grove, neatly interspersing the keepers' residences, was fully mature.

As a result of this high-point in the station's history and the fact that the existing buildings and structures most closely match this period there is a strong argument for giving priority to the 1950s in any rehabilitation and, even later, interpretive plan. In ca. 1955, the station presented a new, modern look toward the future, but also still possessed much of the past. It is strongly recommended that any incremental alterations to the buildings or the site keep this avenue in mind and that no effort be made to remove existing buildings or structures or to undertake restorations to any earlier period.

Recommendations for Interpretation

It is strongly recommended that the existing buildings, structures, sites, and other features be retained. It is further recommended that an effort be made over time to restore the site to something of its early 1950s character. Again, this period represented a significant era in the light station's evolution, and the existing properties correspond most closely to that era --- any restoration to another era, for example, would require the demolition of existing buildings and the reconstruction of many missing elements, making the project impractical overall.

Ideally, the historic light station will become an interpretive center focusing on the history of navigation and navigational aids in Hawai'i and the lives of the keepers and their families on the remote station on Moloka'i. The center can also interpret the technology of lighthouses and later Coast Guard facilities.

In broad outline the following are suggestions:

- 1) All existing buildings and structures to be retained;
- 2) Restoration and/or rehabilitation plans need to be developed for each property;
- 3) The grounds should be restored to their ca. 1955 appearance, including replanting the palm trees and better maintenance of the historic ironwood trees;
- 4) Ruins, such as the oil storage structure and the loading ramp, should be stabilized;
- 5) Threatened structures, especially the oil storage building, require immediate attention and should be repaired and possibly restored;
- 6) The stone Principal Keeper's dwelling should be restored to its condition as of ca. 1955; this would allow for the visitor to gain an appreciation of the lives of keepers of other eras as well, since so few changes have been made to the building; it is recommended that this become, basically, a house museum, preserving artifacts from that and slightly earlier eras;
- 7) The modern, 1950 keeper's quarters should be adapted for use as an interpretive center; this building, with its large open spaces, would be well suited for use as a

museum, to include photographs, uniforms, models, and other interpretive materials;

- 8) The garage should be maintained as a storage building;
- 9) The wash house should be rehabilitated and retained for storage;
- 10) The powerhouse (possibly) could be used for the display of the historic Fresnel lens;
- 11) The lighthouse should remain in service and be inaccessible to visitors.

ENDNOTES

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72. See Dean, *Lighthouses*, p.93.
73. Ibid., pp.93, 191, n.29, n.30, n.31, n.32.
74. Letter, R.W. Meyer to minister of the Interior, March 2, May 6, June 15, 1885; August 10, December 18, 1885, Interior Miscellaneous, Lighthouses, Hawai'i State Archives.
75. Ibid.
76. Letter, R.W. Meyer to W.M. Gibson, minister of the Interior, May 15, 1886, Interior Miscellaneous, Lighthouses, Hawai'i State Archives; see also George Paul Cooke, *Moololo o Moloka'i* (Honolulu: Honolulu Star-Bulletin, 1949), p.132.
77. Letter, J.W. Burrows to C.N. Spencer, minister of the Interior, July, 1891, Interior Miscellaneous, Lighthouses, Hawai'i State Archives.
78. See Dean, *Lighthouses*, p.95.
79. Cooke, *Moololo*, p.132; Letter, J.R. Burrows to James A. King, minister of the Interior, March 4, 1898, Interior Miscellaneous, Lighthouses, Hawai'i State Archives.

80. John A. McCandless, *Second Annual Report of the Superintendent of Public Works, Year Ending June 30, 1902* (Honolulu: Bulletin Publishing Company, 1902), p.91.
81. U.S. Department of Commerce and Labor, *Light List* 1906, pp.58-59; *Light List* 1923, p.8.
82. Ralph S. Kuykendall, *Hawaiian Kingdom, 1874-1893: The Kalakaua Dynasty*, Vol. III (Honolulu: Univ. of Hawai'i Press, 1967), pp. 568-70, 582-90; Daws, *Shoal*, pp. 289-91.
83. U.S. Treasury Department, Post Office Sites in Honolulu and Hilo, Territory of Hawaii, Fifty-seventh Congress, Second Session, House Document 319, January 24, 1903, p. 8.
84. U.S. Senate, Hawaiian Investigation, Part 2, Fifty-seventh Congress, First Session, June 28, 1902, p. 49.
85. Ibid. See also Dean, "Kalaupapa Lighthouse," p. 138.
86. U.S. Treasury Department, Post Office Sites in Honolulu and Hilo, Territory of Hawaii, Fifty-seventh Congress, Second Session, House Document 319, January 24, 1903, pp. 7-8.
87. Dean, *Lighthouses*, p. 10; see also Lori Kamae, *The Empty Throne: A Biography of Hawai'i's Prince Cupid* (Honolulu: Topgallant Publishing, 1980), p. 114.
88. Dean, *Lighthouses*, pp. 11, 180, n.23, n.24; Kamae, *Empty Throne*, pp. 114-15.
89. U.S. Department of Commerce and Labor, *Annual Reports* 1904, pp. 285, 288.
90. December 28, 1903. U.S. Department of Commerce and Labor, *Annual Reports* 1904, pp. 285, 288.
91. Ibid., p. 253.
92. See D. P. Heap, *Ancient and Modern Lighthouses* (Boston: Tinkor and Co., 1889); D. Alan Stevenson, *The World's Lighthouses Before 1820* (London: Oxford Univ. Press, 1959); and Kenneth Langmaid, *The Sea, Thine Enemy: A Survey of Coastal Lights and Life-boat Services* (London: Jarrold Publishing, 1966) for general histories of early lighthouses.
93. For a concise, recent history of American lighthouses see Bruce Roberts and Ray Jones, *American Lighthouses: A Comprehensive Guide* (Old Saybrook, Conn.: The Globe Pequot Press, 1998), (which surprisingly does not mention Hawai'i's lighthouses!). The now standard references are: Hans Christian Adamson, *Keepers of the Lights* op.cit.; Robert Carse, *Keepers of the Lights: A History of American Lighthouses* (New York: Charles Scribner's Sons, 1969); and Ross Holland, Jr., *America's Lighthouses: An Illustrated History* (New York: Dover Publications, 1988).

94. George R. Putnam, *Lighthouses and Lightships of the United States* (Boston: Houghton Mifflin Co., 1917), pp. 30-34; Holland, *America's Lighthouses*, pp. 26-27. An early (and not fully accurate) overview is found in Robert Mills, *The American Pharos or Lighthouse Guide* (Washington, D.C.: Thompson and Homans, 1832). See also, George Weiss, *The Lighthouse Service: Its History, Activities and Organization* (New York: AMS Press, 1926), pp. 1-7, on the beginnings of the lighthouse service.
95. Putnam, *Lighthouses and Lightships*, p. 23; Holland, *America's Lighthouses*, pp. 26-27; Weiss, *Lighthouse Service*, p. 4.
96. Holland, *America's Lighthouses*, p. 26.
97. Roberts and Jones, *American Lighthouses*, p. 9. See also, Putnam, *Lighthouses and Lightships*, pp. 1-30; Carse, *Keepers of the Lights*, pp. 13-16.
98. Holland *America's Lighthouses*, pp. 117-18; Roberts and Jones, *American Lighthouses*, individual entries.
99. Holland, *America's Lighthouses*, p. 27; Putnam, *Lighthouses and Lightships*, p. 38; and Weiss, *Lighthouse Service*, pp. 4, 8, 12.
100. Weiss, *Lighthouse Service*, pp. 8-10.
101. Holland, *America's Lighthouses*, pp. 14, 27.
102. 5 Stat. L., 181, 185; Holland, *America's Lighthouses*, p. 28; Weiss, *Lighthouse Service*, p. 7.
103. Holland, *America's Lighthouses*, p. 28; Weiss, *Lighthouse Service*, pp. 7-9; 5 Stat. L., 289, 292, Twenty-fifth Congress, Second Session, Senate Document 428.
104. Putnam, *Lighthouses and Lightships*, pp. 42-43; Holland, *America's Lighthouses*, p. 27; Weiss, *Lighthouse Service*, pp. 7-8.
105. Adamson, *Keepers of the Lights*, pp. 34-35, provides an overview of lighthouse types. See also, Frederick A. Talbot, *Lightships and Lighthouses* (Philadelphia: J.B. Lippincott, 1913), pp. 11-27.
106. Adamson, *Keepers of the Lights*, pp. 36-40; Carse, *Keepers of the Lights*, pp. 6-69; Holland, *America's Lighthouses*, pp. 14-16. On the controversy surrounding the introduction of the Fresnel lens, see Richard L. Updike, "Winslow Lewis and the Lighthouses," *The American Neptune* 28, 1 (January, 1968), pp. 31-48.

107. Twenty-seventh Congress, Second Session, House Document 811; described in Holland, *America's Lighthouses*, p. 27.
108. Putnam, *Lighthouses and Lightships*, p. 43; Holland, *America's Lighthouses*, p. 33.
109. Thirty-second Congress, First Session, Executive Document 28; Holland, *America's Lighthouses*, pp. 27, 33-34; Weiss, *Lighthouse Service*, p. 11.
110. 10 Sta. L., 112, 119; Weiss, *Lighthouse Service*, pp. 12-14; Putnam, *Lighthouses and Lightships*, pp. 43-45.
111. Weiss, *Lighthouse Service*, pp. 14-15; Putnam, *Lighthouses and Lightships*, p. 40.
112. Holland, *America's Lighthouses*, p. 36. Cf. Weiss, *Lighthouse Service*, p. 15; and Roberts and Jones, *American Lighthouses*, p. 9.
113. Holland, *America's Lighthouses*, p. 36; Weiss, *Lighthouse Service*, p. 15; Putnam, *Lighthouses and Lightships*, p. 46.
114. Holland, *America's Lighthouses*, p. 36.
115. Ibid., p. 214-17. The *Light Lists* were initiated during the administration of Stephen Pleasanton, as fifth auditor, beginning in 1838. The Lighthouse Board began regularly issuing the lists in 1852.
116. Weiss, *Lighthouse Service*, pp. 14-17; Holland, *America's Lighthouses*, pp. 36-37.
117. Putnam, *Lighthouses and Lightships*, p. 46. The act of February 14, 1903 (31 Stat. L., 826, 827), creating the Department of Commerce and Labor, transferred the Lighthouse Service from the Treasury to the new department, setting up conditions for the new administration of the service beginning in July of that year. See Weiss, *Lighthouse Service*, p. 18.
118. Passed by Congress on June 17, 1910; 36 Sta. L., 534. See Putnam, *Lighthouses and Lightships*, pp. 46-47; Weiss, *Lighthouse Service*, pp. 20-21.
119. Holland, *America's Lighthouses*, p. 37.
120. Ibid.; Weiss, *Lighthouse Service*, pp. 21-22; Putnam, *Lighthouses and Lightships*, pp. 46-47.
121. Holland, *America's Lighthouses*, p. 37.
122. Putnam, *Lighthouses and Lightships*, pp. 52-54; Holland, *America's Lighthouses*, p. 37; Weiss, *Lighthouse Service*, pp. 24-25.

123. Holland, *America's Lighthouses*, p. 37.
124. U.S. Department of Commerce and Labor, Report of the Commissioner of Lighthouses, *Annual Reports* 1911, pp. 540, 562-63, 565. The Twelfth District originally extended from northern California to the Mexican border. The island of Midway was added to the district in 1904; Guam and American Samoa in 1905. The Nineteenth District included the Pacific islands only; U.S. Department of Commerce and Labor, Report of the Lighthouse Board, *Annual Reports* 1909, p. 615.
125. Putnam, *Lighthouses and Lightships*, pp. 49-52; Holland, *America's Lighthouses*, pp. 36-37.
126. U.S. Senate, Hawaiian Investigation, Part 2, Fifty-seventh Congress, First Session, 1902, p. 49; cited also in Dean, *Lighthouses*, p. 97.
127. U.S. Treasury Department, Post Office Sites in Honolulu and Hilo, Fifty-seventh Congress, Second Session, House Document 319, January 24, 1903, pp. 8-9. See also, Dean, *Lighthouses*, p. 97; idem, "Kalaupapa Lighthouse," pp. 138-39.
128. U.S. Department of Commerce and Labor, *Annual Reports* 1905, p. 255; 1907, p. 609. See also Dean, "Kalaupapa Lighthouse," pp. 139-40.
129. U.S. Coast Guard, Moloka'i Light Station file 28575, 14th Coast Guard District, records. See also, James A. Gibbs, *Lighthouses of the Pacific* (West Chester, Penn.: P.A. Schiffer, 1986), p. 218; and Adamson, *Keepers of the Lights*, p. 285.
130. U.S. Department of Commerce and Labor, *Lights and Fog Signals of the United States* (Washington, D.C.: GPO, 1906), pp. 56-57.
131. U.S. Department of Commerce and Labor, *Annual Reports* 1905, p. 253.
132. Letter, L. E. Pinkham to J. R. Slattery, January 22, 1906; Letter, J. R. Slattery to L. E. Pinkham, January 22, 1906; Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives. Cited and discussed in Dean, "Kalaupapa Lighthouse," pp. 40, 163 n. 13.
133. Letter, L. E. Pinkham to J. R. Slattery, op.cit.
134. Letter, J. R. Slattery to L. E. Pinkham, op. cit.
135. Dean, "Kalaupapa Lighthouse," p. 163 n. 13.
136. U.S. Department of Commerce and Labor, *Annual Reports* 1906, p. 224.
137. U.S. Department of Commerce and Labor, *Annual Reports* 1907, p. 608.

138. *Hawaiian Annual* 1889, p. 84. See also, Dean, *Lighthouses*, pp. 38-39.
139. Petition to Lorin A. Thurston, minister of the Interior, October 9, 1888, Interior Miscellaneous; Minister of the Interior, Kingdom of Hawaii, Reports, 1890, p. 273, Interior Documents, Hawai'i State Archives.
140. Letter, Chance Brothers & Company, Smethwick, England, to W. E. Roland, superintendent of Public Works, Jumbo file 1, Hawai'i State Archives. Cited in Dean, *Lighthouses*, pp. 39, 184 n. 6.
141. Report on Makapuu Light House, 1901 [no month or day], Public Works, Lighthouses, Hawai'i State Archives.
142. Dean, *Lighthouses*, p.40.
143. U.S. Department of Commerce and Labor, *Annual Reports* 1904, pp. 285,288; 1905, p. 255.
144. U.S. House of Representatives, Fifty-ninth Congress, First Session, Report No. 159, p. 1.
145. See Dean, *Lighthouses*, p. 40, for further discussion.
146. Discussed in Dean, *Lighthouses*, pp. 40-41; See also *Paradise of the Pacific* (September, 1906), pp. 23-24; *Hawaiian Annual*, 1907, pp. 113-14.
147. George R. Carter, cablegrams, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.
148. Ibid.
149. President Theodore Roosevelt, Executive Order 962, January 12, 1907; discussed further in Dean, *Lighthouses*, pp. 41-42.
150. U.S. Department of Commerce and Labor, *Annual Reports* 1907, p. 609.
151. U.S. Department of Commerce and Labor, "Description of Makapuu Point Light Station," September 14, 1910, *Annual Reports* 1910, pp. 3, 16-17.
152. Kay Grant, *Robert Stevenson* (New York: Meredith Press, 1969), pp. 169-70.
153. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 635.
154. *Pacific Commercial Advertiser*, October 2, 1909.
155. Carse, *Keepers of the Lights*, p. 169.

156. U.S. Department of Commerce and Labor, *Annual Reports* 1904-1913. Outlined in Dean, *Lighthouses*.
157. Carse, *Keepers of the Lights*, pp. 410-11; Holland, *America's Lighthouses*, p. 224.
158. U.S. Department of Commerce and Labor, *Annual Reports* 1907, p. 608; 1910, p. 508. State of Hawai'i Survey Division, Lighthouse file, Report, dated October 27, 1908, Department of Accounting and General Services; cited also in Dean, "Kalaupapa Lighthouse," p. 163 n. 15.
159. Letter, Captain A. Ross, chairman of the Committee on Location, to the Lighthouse Board, September 5, 1907, Moloka'i Island file, Lighthouses and Light Stations, CD 3026 1991, Box 19, Record Group 26, National Archives.
160. Letter, C.W. Otwell, Assistant to the Engineer for the Twelfth District, to A. Ross, August 17, 1907, Moloka'i Island file, Lighthouses and Light Stations, CD 3026 1991, Box 19, Record Group 26, National Archives.
161. Letter, A. Ross to the Lighthouse Board, September 5, 1907, Moloka'i Island file, Lighthouses and Light Stations, CD 3026 1991, Box 19, Record Group 26, National Archives.
162. Letter, Henry G. Pritchett to the Lighthouse Board, September 5, 1907, Moloka'i Island file, Lighthouses and Light Stations, CD 3026 1991, Box 19, Record Group 26, National Archives.
163. Letter, D.W. Lockwood to the Lighthouse Board, September 6, 1907, Moloka'i Island file, Lighthouses and Light Stations, CD 3026 1991, Box 19, Record Group 26, National Archives.
164. Letter, C. W. Otwell to His Excellency, Ernest Mott-Smith, Acting Governor of the Territory of Hawaii, April 28, 1908, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.
165. Letters, Ernest Mott-Smith to Captain C. W. Otwell, May 4, May 22, 1908, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.
166. Report, submitted by C. W. Otwell, July 1, 1908, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives. Otwell reported that "A small party was dispatched a few days before the close of the fiscal year for the purpose of carrying on preliminary work of installing a water system and the plant."
167. Survey, by F. H. Kales, signed by C. W. Otwell, Assistant to the Engineer, Twelfth District, titled, Moloka'i Light Sta. Survey of Site, Office of Assistant to the Engineer of the 12th Light House District, Honolulu, Drawing No. L2-196, September 16, 1908.

168. The estimated acreage was 26.39 acres. A later survey in 1936 revealed that the actual area was only 21.57 acres. Letter, L. M. Whitehouse to F. A. Edgewood, June 2, 1936, Survey Department, Honolulu, Territory of Hawaii, Hawai'i State Archives. The site of the light station was revised and set out on the following document: Revised — 1936, Molokai: Molokai Light Station, Makanalua, Molokai: T. H., Survey Department, Territory of Hawaii, ESF No. 7927, TIKE, 6-1-36.
169. U.S. Department of Commerce and Labor, *Annual Reports* 1907, p. 608; State of Hawai'i Survey Division, Lighthouse file, October 27, 1908, Department of Accounting and General Services; *Report of the Governor of Hawaii to the Secretary of the Interior for the Year Ended June 30, 1908* (Washington, D.C.: G.P.O., 1908), p. 26.
170. Letters, Captain C. W. Otwell to Mark P. Robinson, July 6, 1908; July 15, 1908, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.
171. Dean, "Kalaupapa Lighthouse," p. 141.
172. *Ibid.*, pp. 141, 164 n. 38.
173. Letter, Captain C. W. Otwell to L. E. Cofer, April 28, 1908, Board of Health and U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives. See Dean, *Lighthouses*, pp. 99, 192 n. 65; and *idem*, "Kalaupapa Lighthouse," pp. 142, 163 n. 21.
174. Letter, L. E. Cofer to C. W. Otwell, June 9, 1908, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.
175. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636.
176. Letter, Mark P. Robinson to C. W. Otwell, July 6, 1908, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives. See also Dean, "Kalaupapa Lighthouse," pp. 143, 163 n. 23.
177. Letter, C. W. Otwell to Mark P. Robinson, July 6, 1908, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives.
178. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636; 1910, p. 508.
179. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636. Photographic collection, Moloka'i, Hawai'i State Archives. Discussed also in Dean, *Lighthouses*, pp. 100, 192 n. 72.
180. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636.
181. Dean, *Lighthouses*, pp. 70, 192 n. 70.

182. Molokai Light Sta, Drawing L3-181, August 4, 1908, Designed by F. H. K[ales], signed C.W. Otwell, Moloka'i Light Station, file 285575, records, U.S. Coast Guard, 14th Coast Guard District.
183. The requirements for light towers are discussed at length in Talbot, *Lightships and Lighthouses*, pp. 11-27; and Putnam, *Lighthouses and Lightships*, pp. 176-84.
184. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636.
185. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636; 1910, p. 517.
186. Letter, Eugene Van Wagner, Kalaupapa, to Darr Perry, Caro, Michigan, March 2, 1909, Eugene Van Wagner Collection, Hawai'i State Archives; cited in Dean, "Kalaupapa Lighthouse," pp. 141, 163 n. 19.
187. U.S. Department of Commerce and Labor, *Annual Reports* 1910, p. 508.
188. Discussed at length in Putnam, *Lighthouses and Lightships*, pp. 192-99. See also Holland, *America's Lighthouses*, p. 18 and Roberts and Jones, *American Lighthouses*, pp. 22-24 on the application in U.S. lighthouses.
189. Adamson, *Keepers of the Lights*, p. 39.
190. Talbot, *Lightships and Lighthouses*, pp. 46-48.
191. *Ibid.*, pp. 48-49.
192. Holland, *America's Lighthouses*, pp 21-24; Putnam, *Lighthouses and Lightships*, pp. 186-88.
193. Talbot, *Lightships and Lighthouses*, p. 37; Putnam *Lighthouses and Lightships*, pp. 193-94; Holland, *America's Lighthouses*, p. 18.
194. See U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636. The classification was first introduced by Augustin Fresnel himself, who divided lenses into seven categories, based on size: hyper-radial, the largest with a focal length — the distance from the light to the lens body — of 1,330 mm (52.3 in); First Order lenses, with a focal length of 920 mm (36.2 in); on through to Sixth Order (150 mm; 5.9 in), the smallest classification of Fresnel lenses. The lens used at Moloka'i was a Second Order lens, with a focal length or distance of 700 mm (36.2 in). The hyper-radial lens was used at Makapu'u, one of the few ever used of this size and the largest ever installed in the Pacific area. The identifying marks on the Moloka'i lens is U.S. L.E.E. 2.11.
195. Talbot, *Lightships and Lighthouses*, p. 43.

196. Ibid., pp 43-44. The weight of the clockwork mechanism, developed originally by Chance Brothers and Company (the suppliers for the Moloka'i apparatus), was considered the most advanced of its time.
197. Molokai Light Sta, Drawing L-3-181, August 4, 1908, Designed by F.H.K[ales], signed by C.W. Otwell, Moloka'i Light Station, file 285575, records, U.S. Coast Guard, 14th Coast Guard District.
198. The development of the mercury float system is described in Talbot, *Lightships and Lighthouses*, p. 56.
199. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636. See further discussion, Dean, "Kaluapapa Lighthouse," pp. 144, 164 n. 30.
200. Carse, *Keepers of the Lights*, p. 63; Putnam, *Lighthouses and Lightships*, p. 182.
201. [U.S.] Department of Commerce, Lighthouse Service, Description of Moloka'i Light Station, Moloka'i Island, T.H., November 9, 1927., p. 5.
202. Carse, *Keepers of the Lights*, p. 63.
203. [U.S.] Department of Commerce, Lighthouse Service, Description of Moloka'i Light Station, Moloka'i Island, T.H., November 9, 1927.
204. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636.
205. Ibid.; also see Dean, "Kalaupapa Lighthouse," pp. 143-44.
206. U.S. Department of Commerce and Labor, Annual Report of the Lighthouse Board, June 30, 1909, *Annual Reports* 1909, p. 28; 1910, p. 508.
207. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636.
208. Laura E. Soulliere and Henry G. Law, Architectural Evaluation, Kalaupapa, Hawai'i, Unpublished Report (San Francisco: National Park Service, Western Region, 1979).
209. Typed notes, Moloka'i Light Station, Kalaupapa Historical Park files, Moloka'i, Hawai'i.
210. Survey Department, Territory of Hawaii, Revised — 1936 Moloka'i Light Station, Makanalua, Moloka'i, T.H., CSF No. 7927, TJKE 6-1-36.
211. Greene, *Exile*, p. 378; Department of Commerce, Lighthouse Service, *The United States Lighthouse Service 1915* (Washington, D.C.: G.P.O., 1916), pp 19, 78. See also Weiss, *Lighthouse Service*, p. 63.

212. Virginia McAlester and Lee McAlester, *A Field Guide to American Houses* (New York: Alfred Knopf, 1984), pp. 453-63. Other sources refer to the "Bungalow Style." See John J.-G. Blumenson, *Identifying American Architecture*, 2nd ed. (Walnut Creek, California: Alta Mira Press, 1981), pp. 70-71.
213. Eugene V. York, "The Architecture of the United States Life-Saving Station," M.A. thesis, Boston University, 1983.
214. [U.S.] Department of Commerce, Lighthouse Service, Description of Moloka'i Light Station, Moloka'i Island, T. H., November 9, 1927.
215. Report of the Governor of Hawaii to the Secretary of the Interior for the Fiscal Year Ended June 30, 1913 (Washington, D.C.: G.P.O., 1913), p. 45; also, U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 636.
216. U.S. Department of Commerce, *Annual Reports* 1916, p. 744.
217. U.S. Department of Commerce and Labor, *Annual Reports* 1909, p. 562; 1911, p. 609.
218. The original amount was announced in the U.S. Department of Commerce and Labor, *Annual Reports* 1907, p. 608; the final figure was published in *idem*, *Annual Reports* 1910, p. 508. See also, Dean, *Lighthouses*, pp. 101, 193 n.73.
219. U.S. Department of Commerce and Labor, *Annual Reports* 1910, p. 517; described in Dean, "Kalaupapa Lighthouse," pp. 144, 164 n.31; *idem*, *Lighthouses*, pp. 101, 192 n.74.
220. *Polk-Husted Directory* (Honolulu: Polk-Husted Directory Company, 1924); Dean, *Lighthouses*, pp. 101, 192 n.76.
221. A list of keepers and assistant keepers is provided by Dean in "Kalaupapa Lighthouse," pp. 168-69. Drawn-up from letters and remaining records, the list is reasonably complete, with some possible errors and omissions. The list is based on entries in the *Polk-Husted Directory* for the years 1903-1936, and on letters and miscellaneous notes examined in files held by the Hawai'i State Archives.
222. For example: Letters, December 30, 1910; January 5, April 28, 1911, Board of Health, U.S. Lighthouse Establishment, 1906-13, Hawai'i State Archives. See Dean, *Lighthouses*, pp. 101, 192 n.77. Initial permit requests were made for members of the crew of the transport ship *Kukui*: second officer Aubrey D. Shaw; machinist Charles Kort and Walter Jerret; seaman Robert Makaema, William Needham, Henry Au, David Kupukaa and Joseph Kaimana.. Later permits were issued to the keepers and their families.
223. Described in Ted Randolph in "36 Years of Memories," *New Pacific Magazine* 2 (May, 1944), p. 8. The article is based on interviews with Manuel Ferreira, keeper during the 1920s. Ferreira's recollections were also recorded by Jan Jabulka in an article in the

Honolulu Bulletin, May 13, 1934. An "outsider's" view is provided by Harry Frank, *Roaming in Hawaii* (New York: Frederick A. Stokes Company, 1937), pp. 189-91. Love Dean describes the life of the keepers at length in *Lighthouses*, pp. 103-06, based on an interview with Ed Marques, held at Kihei, Maui, November 12, 1988, and interviews with Anna Mae Ka'anele, in Honolulu, August 16 and 23, 1988.

224. Adamson, *Keepers of the Lights*, p. 292; U.S. Department of Commerce and Labor, *Annual Reports* 1907, p. 611; 1910, p. 508. See also Dean, *Lighthouses*, pp. 101-02, 193 n.78.
225. Letters, C. W. Otwell to Mark P. Robinson, April 28, 1911; May 12, May 20, June 16 and June 23, 1913, Board of Health, U.S. Lighthouse Establishment, 1906-1913, Hawai'i State Archives. The letters and Board of Health permits also list workers and contractors, including construction foreman Leslie E. Bailey; painters Thomas Kalawa, David Henry, William Kau and William Halcole; carpenters A. F. Cook and Gene Gomard; pipe-fitters Robert Weber and Charles Marse; mason J.C. Picanco; plumbers' helper K. Iwanaza; tinsmith T. Omori; and laborers George Kahapula and Joe Morse.
226. Henrietta McKaughan, "Lighthouses of Hawaii," *Honolulu Advertiser*, April 30, 1925.
227. Dean, "Kalaupapa Lighthouse," pp. 149-50.
228. [U.S.] Department of Commerce, Lighthouse Service, Description of Moloka'i Light Station, Moloka'i Island, T. H., November 9, 1927, pp. 7, 12.
229. Dean, "Kalaupapa Lighthouse," p. 146; idem, *Lighthouses*, p. 102.
230. Randolph, "36 Years of Memories."
231. [U.S.] Department of Commerce, Lighthouse Service, Description of Moloka'i Light Station, Moloka'i Island, T. H., November 9, 1927, p. 12. Fred Robins, Jr. remembers riding a mule up the *pali* trail for two years during the 1930s. Described in Interview, Fred Robins, Jr. by Anwei V. Skinsnes Law, Oral History Interviews, Kalaupapa, Hawai'i, Volume II, August 28, 1985, p. 5.
232. Randolph, "36 Years of Memories," [U.S.] Department of Commerce, Lighthouse Service, Description of Moloka'i Light Station, Moloka'i Island, T. H., November 9, 1927; Dean, "Kalaupapa Lighthouse," p. 148.
233. Greene, *Exile*, pp. 378-79.
234. Interview, Fred Robins, Jr. by Anwei V. Skinsnes Law, Oral History Interviews, Kalaupapa, Hawai'i, Volume II, August 28, 1985, pp. 1-2.
235. Quoted in Randolph, "36 Years of Memories," p. 8.

236. Ibid.
237. Interview, Fred Robins Jr. by Anwei V. Skinsnes Law, Oral History interviews, Kalaupapa, Hawai'i, Volume II, August 28, 1985.
238. Interview, Dr. Alfred Morris, October, 1988; cited in Dean, "Kalaupapa Lighthouse," pp. 153, 165 n.63.
239. Report of the Superintendent of the Leper Settlement to the Board of Health of the Territory of Hawaii for the fiscal year ended June 30, 1913 (Honolulu: Board of Health, 1914), p. 116.
240. Ibid., pp. 116-17.
241. The arrival of the first patients is described in Greene, *Exile*, pp. 20-21. See also Mouritz, *Path of the Destroyer* and Hasselblad, *Hansen's Disease* for a more recent discussion of the disease.
242. An Act to Prevent the Spread of Leprosy, January 3, 1865, *Laws and Regulations in Regard to Leprosy in the Hawaiian Kingdom* (Honolulu: [Government of the Kingdom of Hawaii], 1886), pp. 5-6.
243. Hawaii Board of Health, *The Molokai Settlement* (Honolulu: Hawaiian Gazette, 1907), p. 7.
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293. Holland, *America's Lighthouses*, pp. 52-53.
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305. Executive Order No. 8000, Converting and Amending Description of the Boundaries of the Molokai Lighthouse reservation, U.S. Coast Guard, records, Record Group 26, National Archives; also printed in *Federal Register*, 3, 216 (November 4, 1938), pp. 2615-16.
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363. Described in detail in Green, *Exile*, pp. 383-522.
364. Ibid., pp. 527-28. The transformation and impact on care is described in Ethel M. Damon, *Siloama: The Church of Healing Spring* (Honolulu: The Hawaiian Board of Missions, 1948), p. 45.
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367. Greene, *Exile*, p.527.
368. Ibid., p. 561.
369. Ibid., p. 564.
370. Ibid.
371. Ibid.
372. Although no new patients have been admitted since 1969, the state of Hawai'i continues to assure the continued residency of patients who wish to remain.
373. Quoted Greene, *Exile*, pp. 564-65. A Bill Authorizing a Study of the Site of the Kalaupapa National Historical Park, *Congressional Record*, December 16, 1975, E6713.
374. A Kalaupapa National Historical Park Advisory Commission was also established by the legislature and was charged with consulting with representatives of the U.S. Department of the Interior.
375. The process is described in Greene, *Exile*, p. 565. The 1978 study was entitled *Alternatives Study, Kalaupapa Leprosy Settlement*, dated July, 1978, and completed by the National Park Service at the Kalaupapa National Historical Park Advisory Commission.

376. Public Law 96-565.
377. Greene, *Exile*, p. 569.
378. See National Park Service, Statement for Management, Kalaupapa National Historic Park, Moloka'i, Hawai'i, 1980; idem, *A Proposal for the Establishment of the Kalaupapa National Historical Park, Moloka'i Hawai'i, April, 1980* (n.p.: National Park Service and the Kalaupapa National Historical Park Advisory Commission, 1980); and idem, *Kalaupapa National Historic Park, Island of Moloka'i, Hawai'i: Land Protection Plan, March, 1986* ([Moloka'i]: National Park Service, 1986).
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380. The separate form is entitled "Moloka'i Light, U.S. Coast Guard Moloka'i Light." The physical description is limited to "138 FOOT CONCRETE TOWER," U.S. Department of the Interior, National Park Service, National Register of Historic Places Inventory - Nomination Form for Federal Properties, Form 10-306, 1976.
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384. Ibid., p.2.
385. Ibid., p.3.
386. Ibid., p.2.
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389. Letter, Capt. B.D. Lovern to Susumu Ono, November 15, 1982, Moloka'i Light Station, file 28575, U.S. Coast Guard, 14th Coast Guard District, records.

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395. Ibid.; Memorandum, Lt. J.G. D. T. Noviello, to File, June 24, 1986, Moloka'i Light Station file 28575, U.S. Coast Guard, 14th Coast Guard District, records; see also Dean, "Kalaupapa Lighthouse," pp. 159, 167 n.86.
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APPENDIX

Keepers at Kalaupapa Light (Moloka'i Light Station)

[From Dean, Love, "The Kalaupapa Lighthouse" *The Hawaiian Journal of History* 23 (1989).]

1908	James M. Keanu was keeper of Makanahua, the first light at Kalaupapa.		
	<u>Keeper</u>	<u>1st Assistant</u>	<u>2nd Assistant</u>
1909	James M. Keanu	William F. Williams	Charles L. Martin
1910	James M. Keanu	William F. Williams	Ed L. Miller
1911	James M. Keanu	William F. Williams	Ed L. Miller
1912	James M. Keanu	William F. Williams	Ed L. Miller
1913	James M. Keanu	John H. Kanekoa	Robert Reid and Sam Leleo
1914	James M. Keanu	John Makahi	Ed Robins, Jr.
1915	James M. Keanu	John Makahi	Ed Robins, Jr.
1916	James M. Keanu	John Makahi	Ed Robins, Jr.
1917	James M. Keanu	John Makahi	Ed Robins, Jr.
1918	James M. Keanu	John Makahi	Ed H. Bartels
1919	James M. Keanu	William Enoka	Ed H. Bartels
1920	James M. Keanu	William Enoka	Charles K. Akana
1921	James M. Keanu	William Enoka	Frank Williams
1922	James M. Keanu	William Enoka	Frank Williams
1923	James M. Keanu	William Enoka	James K. Haleamau
1924	James M. Keanu	William Enoka	James K. Haleamau
1925	James M. Keanu	James K. Haleamau	
1926	James M. Keanu	James K. Haleamau	
1927	Manuel Ferreira	James K. Haleamau	W.K. Nihoa
1928	Manuel Ferreira	Fred E. Nihoa	C. Heim
1929	Manuel Ferreira	Fred E. Nihoa	James Keanu
1930	James M. Keanu	Fred E. Nihoa	William K. Nihoa
1931	James M. Keanu	Fred E. Nihoa	William K. Nihoa
1932	James M. Keanu	John Enos, Jr.	William K. Nihoa
1933	Fred E. Nihoa	John Enos, Jr.	William K. Nihoa
1934	Fred E. Nihoa	John Enos, Jr.	William K. Nihoa
1935	Fred E. Nihoa	John Enos, Jr.	Frank Pate
1936	Fred E. Nihoa	James Gibson	Ed Marques
1937	James M. Keanu*	Claude E. Platt	Ed Marques**

	<u>Keeper</u>	<u>1st Assistant</u>	<u>2nd Assistant</u>
1938	James M. Keanu*	Claude E. Platt	Ed Marques**
1939	James M. Keanu*	Claude E. Platt	Ed Marques**
1940	Fred Robins	Claude E. Platt	Ed Marques
1941	Fred Robins	Claude E. Platt	Ed Marques
1942	Fred Robins		Ed Marques
1943	Fred Robins		Ed Marques
1944	Fred Robins		Ed Marques
1945	Fred Robins		Ed Marques
1946	Fred Robins		Ed Marques
1947	Fred Robins		
1948	Fred Robins		
1949	Fred Robins		
1950	Fred Robins	Harry Kupukaa (1950s?)	
1951	Fred Robins		
1952	Fred Robins		
1953	Fred Robins		
1960	M.F. Becson, EN2		
1966	Daniel J. Bryson, Boatswain's Mate 1st Class James R. Creighton, Fireman 3rd Class		

* Possibly Fred Robins

** Possibly Fred Robins