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Florida Keys
Sea Heritage Journal

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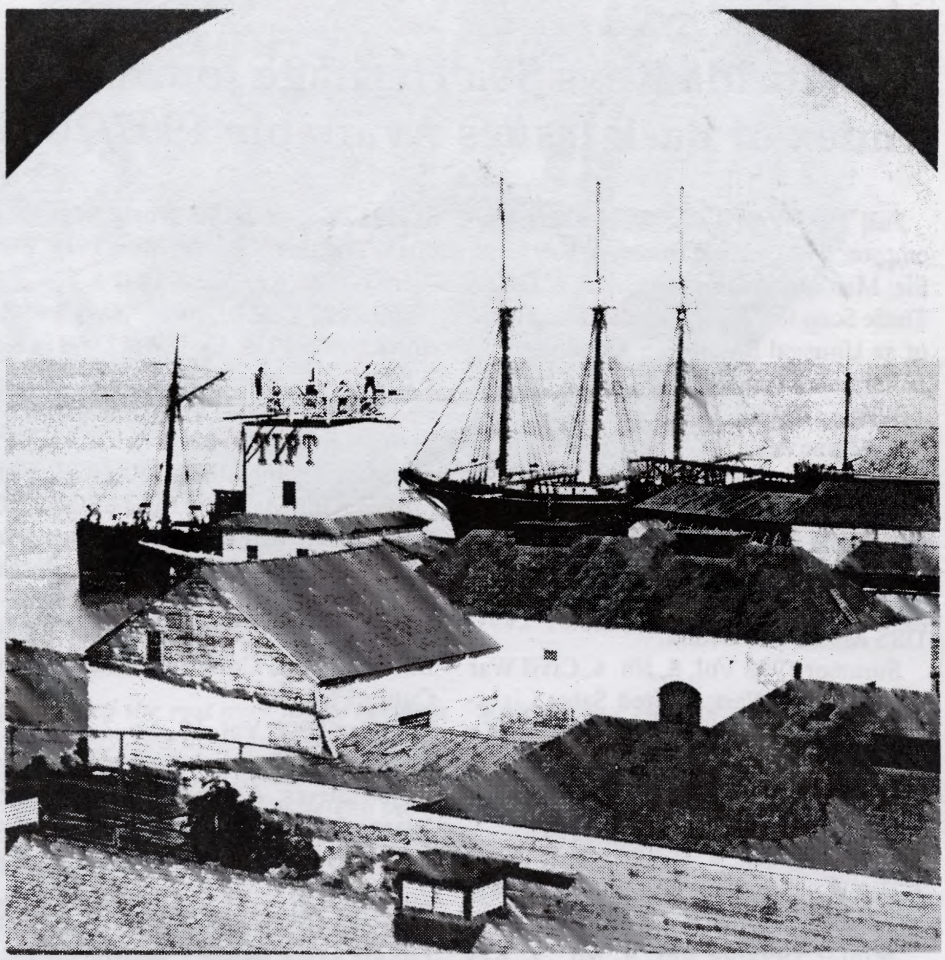
OFFICIAL QUARTERLY PUBLICATION OF THE KEY WEST MARITIME HISTORICAL SOCIETY

Key West's Search for Fresh Water Part Two

By Carston R. Heinlein

The early settlers of Key West were brave and spirited people, who had to be to overcome hardship and misfortune. In 1846 there were no more than eight hundred people living on the island. Most of them had experienced the hurricanes of 1835 and 44 which were minimal compared to the hurricane that bore down on the defenseless small island from the south on October the 11th of that year. They were unprepared for the rapid approach and intensity of the wind and waves.

The central barometric pressure was a low of 27.06 as the storm passed over Havana, Cuba, heading north. The Saffir-Simpson scale devised more than a century later in 1970 to measure the severity of a hurricane, states that a barometric pressure of 27.17 or below would have winds of 155 miles per hour and more and a storm surge of 15 feet above sea level or a category five hurricane. We have no reason to believe the storm lost any of its strength or diminished in any way crossing the Straits of Florida and the Gulf Stream. The eye grazed the east part of the town giving Key West the strongest part of the storm. The storm surge generated a coastal rise in the sea level that moved across the island as a large dome of water. "Trees were uprooted, fences blown down, houses unroofed. All families residing in that part of the city northwest of Eaton Street abandoned their homes and sought refuge on the higher parts of the island in the neighborhood of Southard and Simonton Streets which was thickly wooded." (Brown, Key West the Old and New) The elevation there is eleven feet above sea level. The island was nearly devastated, all but five of six homes were destroyed or washed to sea including the residence of Mr. William Curry, warehouses, wharfs and boats damaged or completely destroyed, three churches gone, even the lighthouse on Whitehead Point, built with the best bricks and mortar was washed away without a trace of its existence, taking the lives of seven people, only the lighthouse keeper Mrs. Mabrity escaped. Not only did the inhabitants, or survivors lose their homes and possessions but their personal drinking water supply. It would take months to rebuild their houses and rain water collection system, clean and "desalt" their cisterns and wait for the next good rain



Tift's ship chandlery and lookout tower. In the center with the inverted roof is a large cistern used to provide water to ships. Photo credit: Florida State Archives.

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Society News

By John Viele

The Lost Spanish Treasure Galleons - Old City Hall, November 27

As one of the events of Pirates in Paradise 2000, the Society sponsored an evening of slide-presentations on the history and archaeology of the Spanish galleons lost in the Keys in 1622. The presenters were Society members and directors John Cryer, John Viele, and Corey Malcom. John Cryer, former navigational consultant to the Mel Fisher Treasure Salvors, described how the Spanish navigators were trained, their navigational instruments, and the methods they used to guide the galleons on their voyages to and from the New World. John Viele, Keys historian and author, discussed the operations of the many Spanish salvage expeditions that came to the Keys over a period of fifty-six years to try to recover treasure from the sunken galleons. Corey Malcom, Director of Archaeology for the Mel Fisher Maritime Historical Society, described the modern archaeologic examination of the wreck sites and the contribution of the tremendous array of artifacts recovered to better understanding of the lives and times of the Spanish settlers and mariners in the New World.

Florida Keys Sea Heritage Journal Index of Back Issues Available 1997/2000

Fall 1997 Vol. 8, No. 1. Norberg Thompson; The Unusual History of Key Lime Pie; Maitland Adams; The Story of Green Turtle Soup Key West, Florida, is the Home of an Unusual Enterprise, Conducted by A. Granday Canning Co.

Winter 1997/98 Vol 8, No. 2. The Battleship Maine A Key West Legacy; Captain Collier's Schooner Speedwell Capsized; A Sailor's Diary; The Reverend Gilbert Higgs and The Spanish American War.

Spring 1998 Vol, 8, No. 3. Naval Cadet Taussig Goes to War; Letter from the USS Maine In Havana.

Summer 1998 Vol. 8, No. 4. Civil War Days in Key West; United Sates Lighthouse Tender Wisteria; The Origins of a Sports Fishing Mecca Key West's Legendary Charterboat Row; Hackley's Diary; What's in a Street Name?

Fall 1998 Vol. 9, No. 1. A Shipwreck Site at the Dry Tortugas; Civil War Days in Key West, Part 2.

Winter 1998/99 Vol. 9, No. 2. Key West's Search for Fresh Water; Civil War Days in Key West, Part 3.

Spring 1999 Vol. 9, No. 3. The Origin of the Florida Sponge Fishery; Civil War Days in Key West. Part 4; The Slaves Who were not Freed; Justice in Early Key West.

Summer 1999 Vol. 9, No. 4. Naval Air Station, Key West in World War One, Flight Training NAS Key West 1918; Civil War Days in Key West, Part 5.

Fall 1999 Vol. 10, No. 1. Navy and the Hurricane of 1919; Civil War Days in Key West, Part 6; The Newport Naval Academy Class of 1864; Frederick Douglass Visits Key West.

Winter 1999/2000 Vol. 10, No. 2. Fishing For King Mackerel In The "Good Old Days"; Civil War Days in Key West, Part 6, #2; Hackley's Diary; USCGC Joshua Appleby (WLM 556); U.S. Naval Station, Key West 1883; In Memory of Robert Elliott, Jr. and Colin Jameson; Revenue Cutter Florida.

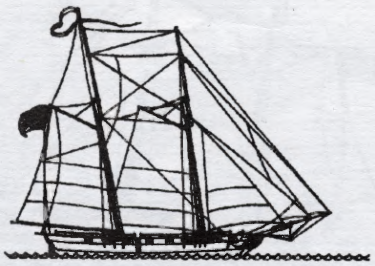
Spring 2000 Vol. 10, No. 3. The 1622 Tierra Firme Flota Salvage and the Florida Keys Natives; An Overview of the Evolution of the Historic Seaport at Key West Bight; Civil War Days in Key West, Part 7.

Summer 2000 Vol. 10, No. 4. Fishing: Florida's First Industry; Merritt-Chapman & Scott Corporation; In Memory of Wright Langley; Salvage of the Steam Tanker Capri; Civil War Days in Key West, Final Part.

Back Issues of these and other Florida Keys Sea Heritage Journals are available, call 305-292-7903.

New Members

Celeste Erickson,Key West: Peter Harrigan, Boca Raton; Tom Marmion Key West



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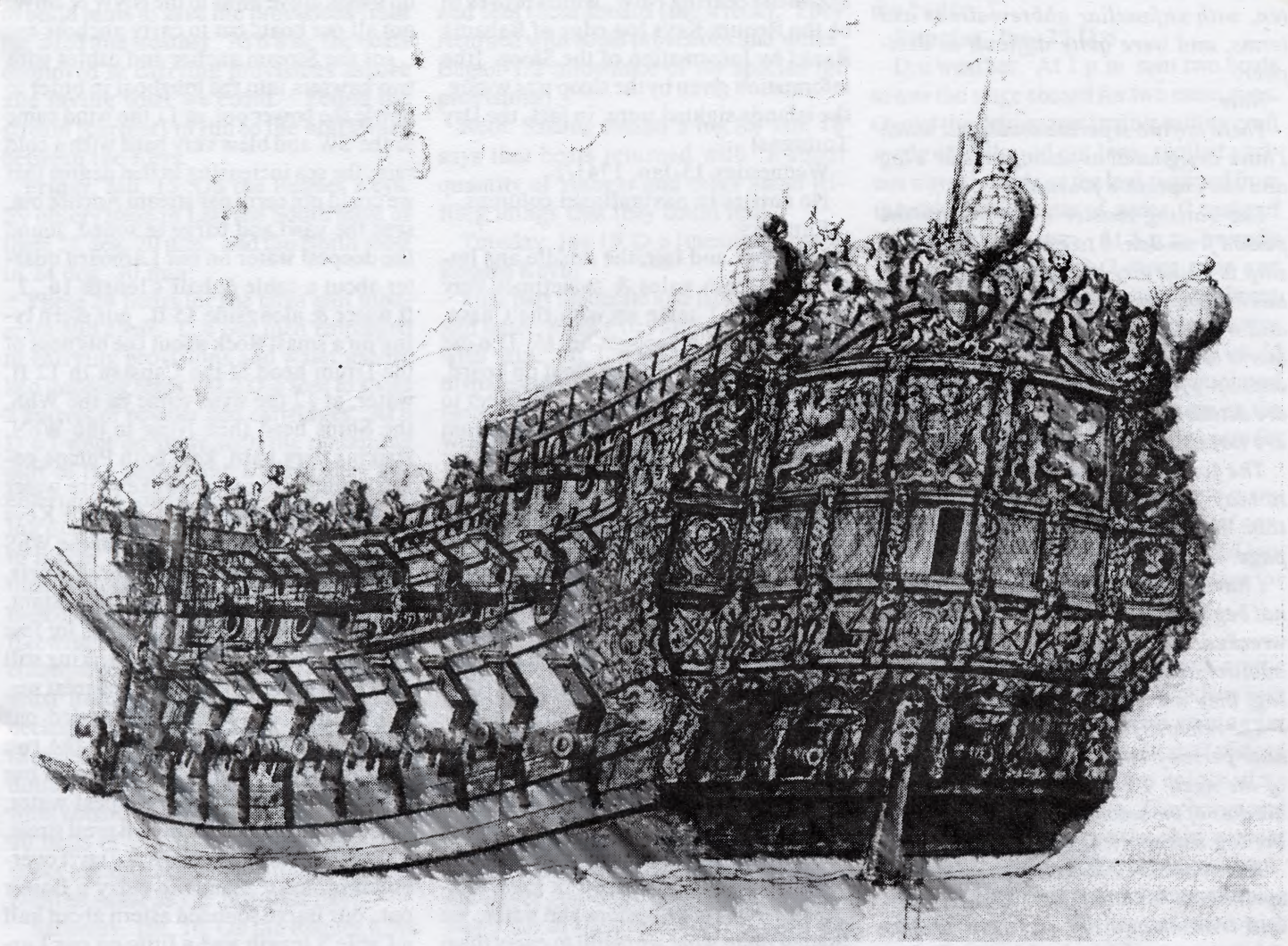
Editor: Lynda Hambright
Production: Tom Hambright

Letters and articles are welcome. Please write to: Editor, Florida Keys Sea Heritage Journal, KWMHS, P.O. Box 695, Key West, FL 33041 (305) 292-7903.

Log of HMS Tyger - January to May, 1742



*HMS **Tyger**, 50gun, fourth-rate ship-of-the-line lost at the Dry Tortugas, January 1742. Photo credit: Narional Maritime Museum, Greenwich, London, England.*

Transcribed and annotated by
John Viele

Introduction

*HMS **Tyger**, a 50-gun, English ship-of-the-line with a crew of 287, wrecked in the Dry Tortugas on January 13, 1742. At the time, England and Spain were at war in what was known as the War of Jenkins Ear. The ship's crew took refuge on Garden Key and was marooned there until March 18, when they began their return to Jamaica in a captured sloop, captured native boats, and the ship's boats. Soon after they were wrecked, the captain sent the ship's longboat to New Providence in the Bahamas for help, but it was captured by Keys natives on the way. The natives killed three of the longboat's crew and turned the rest over to the Spanish who imprisoned them at Havana. Using cannon from their partly-sunken ship, the crew fortified the island to defend themselves against the Spanish. An expedition in the ship's boats attempted to capture an armed Spanish sloop from Havana which had anchored near the island, but the attack failed. There was a near mutiny over the short rations of provisions. Another expedition in the ship's boats reached the Keys and found a sloop which had been captured by the Spanish and then abandoned. This was principal means of the crew's escape. The return voyage to Jamaica took almost two months, and the men were on the verge of starvation for most of the time. Upon arrival, the captain, two of the lieutenants, and a marine corps lieutenant were tried by court martial. The captain was charged with disobeying his orders and losing his ship, but because he had brought the crew back safely, he only lost his pay. The two lieutenants, charged with failing to prosecute the attack on the Spanish sloop sufficiently aggressively, were exonerated. The marine lieutenant, charged with aiding the near-mutiny, in view of his inexperience, was reprimanded.*

*Gail Swanson of Grassy Key, a dedicated Keys historian, discovered the story of HMS **Tyger**. Through a paid researcher in London, at her own expense, she obtained and transcribed copies of the court martials that were held Jamaica after the ship's crew returned.*

Following Gail's lead, John Viele of Cudjoe Key, engaged the same researcher

(Continued on page 3)

(*Tyger* from page 3)

to obtain copies of ***Tyger's*** *log and journal. As can be seen from the sample in the illustration, the documents were handwritten, with unfamiliar abbreviations and terms, and were quite difficult to decipher.*

Note:

There are two separate documents which I have designated as sailing master's log and the captain's journal.

The sailing master's log covers the period from Jan. 9 to Feb. 18. While the ship is underway before being wrecked, this log contains entries of courses, speeds, and winds on an hourly basis. The remarks are almost identical to those in the captain's journal, but occasionally there are details in the sailing master's log which are not in the captain's journal.

The journal covers the period Jan. 2 to May 13 and was written by the captain. His signature appears on the last page.

I have transcribed the captain's journal beginning the day before the ship was wrecked. Where there are differences or additional details in the sailing master's log, they are noted.

The remarks for each date cover the 24-hour period from noon of one day to noon of the next. I believe the date given is the date of the second day, the day on which the log was written.

After Jan. 13, I abandoned old English spelling, punctuation, capitalization, etc. and transcribed the text into modern English as best as possible.

The abbreviation "D:o" for "ditto" appears throughout the logs. I read it as "the same day, time, place, or subject as on the previous day or in the previous sentence."

LOG AND CAPTAIN'S JOURNAL - HMS TYGER - 1742

Tuesday 12 January 1741/2

Winds: EbS Courses: EbN1/2N Dist. in miles: 82 Lat: 24 07N Long: 78 50W Bearing & Dist. at noon: Cape St. Antonio 43 deg. 39 min. 197 miles. [Cape San Antonio is at the western tip of Cuba]

Remarks:

D:o wear [changed course by turning away from wind] at 8 AM Sounded no ground, at 12 D:o Sounded & got ground in 25 fath:m water, fine Sand. Tkt [tacked] ship to Soward, at 4 PM Tkt to Estward, Sounded, got ground in 25 fath:m Course Sand with Shells, at D:o Sounded, got ground in 45 fath:m fine sand & broken shells, at ? D:o Sounded 24 fath:m Rocky ground, D:o Saw sail to our NE gave chase. at 10 am sighted the Tortugases from Masthead bearing NbW, which proves to be the Reques Keys [on edge of Bahama Bank] by Information of the Sloop. [the information given by the sloop was wrong, the islands sighted were, in fact, the Dry Tortugas]

Wednesday 13 Jan. 1741/2

No entries in navigational columns.

Remarks:

Moderate and fair, the middle and latter parts fresh gales & sometimes very squally. At 1 came up with the Chase, we fired a gun & brought her to. D:o did the same. She having no Boat on board, sent our yawl aboard of her, found her to be a sloop loaden with Rum from Barbadoes, taken by a Spanish Privateer in Lat. 35 and retaken by the St. Andrews Privateer belonging to Rhode Island in the Old Streights of Bahamia, she having 8 English and one Spanish prisoner on board, which Prisoner, they put aboard [Tyger] as they thought him too dangerous a Person to keep on board them, he having once attempted cutting the cables while [there was] only a Boy on board her. They informed us we were on the Bahaimia Banks (we reckoning our selves off the Tortugas's) which proved a strong easterly current having sett us up so far. At 2 made an Easy Sail to make the Reques Plain [more visible]. found this Sloop in great Distress for want of Provisions and water. we Spared them what we could to carry them to Providence. Called to our boat to make haste on board. At 5 made the Reques bearing about NWbN 5 or 6 leagues [15 or 18 miles] from our main topmast head, have had gradual soundings from 25 to 16 fathoms. D:o brought too. at 6 our boat came on board with the master of the Sloop who was in want of some other Supplys. sent our boat aboard with him, at 8 she returned. Made Sail and hauled off up SW. 16 fathom 1/2 past 8 fathom. ready about she missing stay [would not come about], wore round on the other Tack 6 fathom then 7 fathom water 1/2 past the Ship Struck forward. hove all aback and backed off into 3 fathom. Clewed all up close and ordered the best bower anchor to be cleared. Then deepened our water to 1/2 4.

Called to lett go our best bower [anchor] to cutt him away. that not being Done, Soon the ship Struck again. her head Lying to WSW. tryd what we could with our Sails to gett her off but in vain. furled all our Sails. the Ship Stiking very hard. found Great Parts of the Sheathing come up which drove away to the NNW & NbW. got all our boats out to carry anchors out . got the Stream anchor and cables with two hawsers into the longboat in order to hawle the bower out, at 11 the wind came to the SW and blew very hard with a cold rain, the sea increasing to that degree that we could not carry our stream Anchor out, sent the yawl and barge to sound, found the deepest water on our Larboard quarter about a cable & half's length 16 _?_ ft water & alongside 15 ft. our stern lying on a small Rock about the bigness of the Drum head of the Capstan in 12 ft. water, at 12 the wind came up the WbS, the Ships head then lying to the WbN, striking very hard, kept both Pumps going briskly, found her make more water by 4 or 5 inches per hour. Saw the Keys several in number, bearing from the WbS to the NE with a great number of Reefs, the highest Key about a League distant. at 2 am struck yards and topmasts for fear the mast should go away, she striking still very hard as it blew fresh with a great sea. at 8 being more moderate, carried our stream Anchor with the Cable, the two hawsers bent to it and let him go on our Larboard Quarter in the deepest water, lightened her forward & hove a great strain, began to heave our Booms & Davit overboard to make a stage to carry a Bower out. our Barge sounded astern about half a Cable's length and a little on our Larboard Quarter had but 12 or 13 ft. water, a cables length astern, had 16 ft. at 9 am had 3 1/2 ft in the Hold, at 10, 5 ft. at 11 the Carpenter came & told me the water gained very fast on us, making 8 inches in 5 minutes. Called all the officers and Pilot together and asked them if any other method could be taken to Save the Ship, which everybody answered that all possible and Speedy methods had been taken to save her, but that she had 8 ft. water in the Hold & was certainly bilged [had a hole stove in underwater hull], then it was agreed to be best to turn all hands to and Save what provisions & water we could, to get for our Subsistence on one of the Keys.

Thursday, Jan. 14

These 24 hours for the most part fresh gales and clear weather. Found the water to have rose twice these 24 hours, a foot or 14 inches, but not regular as a tide.

D:o all hands employed in saving as much provisions and water as possible we could get at. At 3 pm sent the longboat ashore with spars and sails and some men in order to build tents to save the provisions from the wind and weather. At 6 a.m. the boats employed in carrying provisions ashore and saving what we could. Found the stream [current] to run to the northward between the Keys.

Friday, Jan. 15 On the Reques Keys. By observation in Latt the South most of them 24 deg. 20 min., and the North most in 24 deg. 30 min.

These 24 hours for the most part moderate and clear. D:o our men employed in carrying provisions and water ashore and building tents. At 2 D:o sent to shore 2 barrels of powder and cartridges. At 6 D:o I went on shore with the remaining part of the people and finding they had entertained some odd notion of their being disengaged from duty and at liberty to follow their own inclinations, called them all together and represented to them their duty in a proper light, reminding them likewise how dangerous and absurd the consequences of such pernicious sentiments must necessarily prove, to which they declared a general satisfaction and applied themselves cheerfully to their respective duties. At 6a.m. launched our boats and went aboard the ship. At 11 came ashore 10 butts of water, 3 casks of beef and 8 casks of rum. Found the stream running D:o[the same as the previous day].

Saturday, Jan. 16 On the Reques Keys

These 24 hours for the most part fresh gales and clear weather. D:o it was agreed to send the longboat to Providence [New Providence island in the Bahamas] for assistance. D:o the carpenter and his crew employed about getting the boat ready. D:o the other boats and men employed in saving the provisions and water from the ship. At 6 D:o hauled up our boats. At 6 a.m. launched all boats as usual. D:o we began to build a faschine [bundles of sticks] battery for our defence from the enemy.

Sunday, Jan. 17 On the Reques Keys

D:o Weather. At 4 p.m. our boat came ashore from the ship with some provisions and stores, at 6 D:o hauled up our boats as usual, gave orders to set the watch. At 6 a.m. launched the boats and sent them aboard [the wreck] to see what they could get. Our men employed in building a faschine battery, the carpenter about [working on] the longboat, the stream running D:o.

Monday, Jan. 18 On the Reques Keys

D:o weather. Our boats came ashore with provisions and stores. At 6 pm hauled them up as usual. At 6 a.m. launched them and sent them aboard [the wreck]. They returned with some provisions and stores. Began 1/2 allowance of all species [of provisions].

Note: Sailing master's log for Jan. 18 says that boats returned with "a small quantity of vinegar and other small trifling things that they could find."

Tuesday, Jan 19 D:o [meaning On the Reques Keys}

First part moderate and fair, the middle and latter, fresh gales and variable winds with rain. At 1 p.m. our longboat was dispatched to the Governor of these islands [at this time captain still thinks they wrecked in the Bahamas] at [New] Providence [in the Bahamas] with the master and 8 men for __?__. At 6 hauled up all our boats and gave orders to set the watch. At 6 a.m. launched our boats and sent them for a stage [raft] we had made to bring ashore rigging.

Note: Sailing master's log for Jan. 19 says "ordered every man to his tent, only the proper watch."

Wednesday, Jan. 20 D:These 24 hours moderate and fair. At 1 p.m. got 3 of our guns ashore. At 5 got 3 more upon the stage ashore. At 6 D:o hauled up our boats. At 6 a.m. launched them as usual. Sent the carpenter aboard to scuttle [cut open] the lower gun deck in order to get some water out of the ground tear [lowest tier of water casks].

Thursday, Jan. 21 D:o

D:o weather. At 2 p.m. came ashore a puncheon of beef, 2 casks of pork and a butt [cask] of water. The carpenter employed in ripping up the quarter deck to make a platform for the guns at the battery. At 6 D:o hauled up the boats. At 6 a.m. launched them. Sent some of them to another key to get faschines [bundles of sticks and brush] for the battery and the rest towing the stage aboard to get some more guns ashore. The stream running D:o.

Friday, Jan. 22 D:o

D:o weather. At 1 p.m. sent one boat a fishing and fowling. At 5 p.m. they returned from ship and from fishing, some with provisions and stores from the ship and the others with fish, fowl, and faschines. At 6 D:o hauled them up. At 6 a.m. launched them. Sent 2 of them to tow the stage ashore with 2 of our upper deck guns. One boat employed in carrying faschines to the battery.

Note: Sailing master's log for Jan. 22 adds "The people employed in finishing the battery."

Saturday, Jan. 23 D:o

D:o weather. At 1 p.m. sent two boats to tow the stage aboard for two more guns. One of the pettiaugres [native sailing craft made of hollowed out logs, spelled various ways throughout the log] returned from the ship with 2 butts of water, 2 casks of beef and one of rum. At 5 p.m. brought the stage ashore with 2 more guns and plank and lumber. At 6 hauled up the boats. At 6 a.m. launched them. Sent the barge and yawl aboard to see what they could get. D:o some of the carpenters employed on board and some of them ashore on the platform. Sent one of the pettiaugers for faschine to finish the battery.

Note: About two weeks previous to going aground in the Tortugas, ***Tyger*** *had captured three pettiaugres/periaguas and kept them, either by towing them astern or nesting them on deck.*

Sunday, Jan. 24 D:o

D:o weather. Mounted 8 guns on the faschine battery and scaled them [see note below]. D:o raised our poop awning for a guard house and our ensign staff instead of a flag staff. Hoisted our colors when we scaled [fired] the gun. Our barge and yawl returned from the the ship without any stores. At 6 a.m. launched our boats. Sent the barge, yawl and one canoe a fishing and fowling. At 12 they returned with some fish and fowl which were served to the ships company. Found the stream running D:o.

Note: "scaled" means to clean the inside of a cannon by exploding a small quantity of powder which blows out any interior dirt or scales of rust.

Note: Sailing master's log for Jan 24 says the boats returned with "3 seals and some boobies." Caribbean monk seals were once common in the Keys.

Monday, Jan. 25 On the Reques Keys

These 24 hours for the most part fresh gales and cloudy. At 2 p.m. sent the canoe to set turtle net. At 5 D:o she returned. At 6 D:o hauled up the boats. At 6 a.m. launched them D:o sent the yawl and pettiaugre a fishing and the canoe to the turtle nets. At 9 sent the barge aboard to see if any stores could be got. Our men employed in digging trenches for our defence from the enemy. At 11 D:o the

Continued on page 6)

(*Tyger* from page 5)

yawl and the pettiaugre returned with faschines and some fish. D:o the canoe returned with some shellfish which were served to the ship's company.

Tuesday, Jan. 26 D:o

D:o weather. At 6 a.m. launched the barge. Our 3rd Lieutant went aboard. At 1 p.m. he made a sign from the ship at which we sent the pettiaugre aboard. Our first Liutenant employed in drawing a draught of the Island and Keys , their bearing and distance; depth of water, shoals, and reefs about the island and the ship. At 4 p.m. came ashore 5 casks of meat, 2 of water and 2 of vinegar. D:o hauled up our boats. At 6 a.m. launched them. Sent the barge and yawl aboard to get our small bower and spare cable out of the hold which was done with great difficulty. The stream running D:o.

Wednesday, Jan. 27 D:o

D:o weather. At 1 p.m. came ashore 6 butts of water. At 2 D:o came ashore some water and a cask of beef. At 5 D:o came ashore a cask of beef and 4 of oatmeal, all wet and not fit for use. D:o was brought some planks. Hauled up all our boats. At 6 a.m. launched them. Sent them aboard with the raft for more guns. Brought 2 ashore with boatswain's stores. D:o came ashore some water.

Thursday, Jan. 28 D:o

D:o weather. At 3 p.m. came ashore the raft with 2 upper deck guns, rigging etc. Hauled up all our boats. At 5 a.m. launched them. D:o sent 2 on board with the raft. At 1/2 past 9 she returned with 2 more guns. At 11 got ashore several rounds double-head shot. The canoe employed in fishing and fowling. Our men employed digging trenches, sorting stores. D:o the canoe retuned with some turtle. The stream running D:o.

Friday, Jan. 29 D:o

These 24 hours moderate and clear. At 1 p.m. the boats and raft returned with 2 guns. D:o went aboard again. At 5 returned all the boats and the raft with 2 more guns and the mizzen mast which was got out and the rudder. D:o returned the canoe with 3 seals from the windward island where the men saw the wreck of a large ship and a piece of mahogany timber with one of her masts. D:o hauled up our boats and raft. At 5 a.m. sent our boats and the raft aboard and _?_ away the canoe a fishing. At 9 came ashore the raft with 2 guns. D:o went off again, returned the boats with boatswain, carpenter, and gunner stores. D:o got the sheet cable [for sheet anchor] up but obliged to cut it at the lower deck by reason of water in the hold.

Saturday, Jan. 30 On the Reques Keys

The first part fresh gales and clear and the middle to the latter moderate. At 2 p.m. the barge and yawl came ashore with the raft and 2 guns. At 1/2 past 3 D:o returned all our boats with 2 guns, boatswain's and gunner stores. D:o the canoe with 2 fish. Hauled up all our boats and raft. At 5 a.m. sent all the boats aboard and the canoe a fishing. At 9 came ashore 1 butt and 2 puncheons of water. Our men employed about the trenches, some in breaking up the raft and getting up the yards, spars, topmasts and fishes. D:o got all the upper deck guns ashore. Found the stream running D:o.

Note: Sailing master's log for Jan 30 adds that the canoe returned the first time with "4 small seals and 2 large shirks [sp]" and the second time with "2 turtles."

Sunday, Jan. 31 D:o

The first part fair, the latter fresh gales, Most of the hands employed in getting up the lower deck guns, cables and cordage out of the hold up on the upper deck. The carpenters employed in getting the iron work [chain plates?] ashore. D:o got 8 guns up. Two boats employed a fishing. At 6 hauled them all up. At 7 a.m. launched them. Sent two a fishing. At 12 they returned, one with seals and the other with shell fish. Hauled up the boats.

Note: Sailing master's log for Jan. 31 adds that the carpenters also got the mizzen chain plates ashore.

Monday, Feb. 1 D:o

Mostly strong gales and cloudy. At 6 a.m. launched all our boats and sent them aboard with 100 men to get the lower deck guns up on the upper deck and the carpenters for iron work. One boat employed a fishing, the rest of the hands employed in sorting stores. D:o the boat returned with some shell fish.

Note: Sailing master's log for Feb. 1 says hands were sorting "the rigging and blocks."

Tuesday, Feb. 2 D:o

Moderate and clear. At 4 p.m. our men employed about the lower deck guns. D:o got them all up on the upper deck. D:o came ashore all the boats and men with some shot. D:o hauled up all the boats. at 7 a.m. launched them. Some sent to the ship and the rest to the windward island. At 12 they returned from the island with faschines, fish, and fowl and the barge with some seals.

Note: Sailing master's log for Feb. 2 calls the windward island "Long Island" [probably Loggerhead Key]

Wednesday, Feb. 3 D:o

Fresh gales and hazy. P.M. returned the pettyagre from the ship with ropes and buoy, 2 poop lanterns, etc. Hauled up all boats. At 6 a.m. launched them Sent two aboard and two to the island for faschines and fish. At 12 they returned from the islands with faschines, seals, and shell fish which were distributed among the ships company. D:o the boats returned from the ship with water, old iron _?_ stores. Some of the men employed at the battery and the rest about the stores.

Note: Sailing master's log for Feb. 3: "pettyagre returned with a coil 3-inch rope, a nun buoy, 2 poop lanterns and several other things." "2 from the ship with 1 cask of water, 2 chests of old iron such as nails, locks, hinges, and 1 poop lantern and several things of gunner's and carpenter's stores."

Thursday, Feb. 4 D:o

D:o weather. Sent two boats for faschines and one a fishing. At 4 p.m. they returned. At 6 the boats returned from the ship with water, meat, etc. D:o hauled them all up. At 6 a.m. launched them. Sent 3 aboard, one to the island and the canoe to the turtle nets. D:o all returned with some faschines and seals.

Note: Sailing master's log for Feb. 4: "they returned from the ship with 2 butts of water and 1 barrel of pork, some iron hoops, stoves, and 2 coils of ? inch rope"

Friday, Feb. 5, D:o

D:o weather. At 4 p.m. came ashore from the ship 6 butts of water, a barrel of pork, etc. D:o unstocked the anchors and sent onshore. D:o got the spare cable and shroud hawser up out of orlop. At 6 p.m. came ashore all our boats. D:o hauled them up. At 6 a.m. launched them. Sent the canoe to the turtle nets. D:o returned with 2 seals.

Note: Sailing master's log for Feb. 5 : "unstocked the anchors and sent the 3 stocks ashore...got the spare cable and shroud hawser out of the orlop with 2 main tacke [tackles?] and 2 new ? and one old. D:o and 1 messenger"

Saturday, Feb. 6, On the Reques Keys

Fresh gales and clear. The carpenter employed in repairing the yawl to go in quest of the longboat to Providence. At

6 a.m. sent the canoe to the nets which returned with one small turtle. At 8 D:o launched the barge and sent her aboard with 20 men. The carpenter employed as before and the men about the trenches. Found the stream running D:o.

Note: Sailing master's log for Feb 6 "...the carpenter employed in raising the yawl a strake higher..."[adding a plank to give the yawl greater freeboard]

Sunday, Feb. 7 D:o

The first part fresh gales and clear, the latter moderate. At 1 p.m. the barge retuned from the ship without any stores. D:o the carpenter employed about the yawl. At 5 D:o hauled up the barge and small canoe. At 1/2 past 8 a.m., the carpenter made an end of [finished] the yawl. D:o the 2 pettiaugres were sent a fishing. At 10 D:o having no appearance nor intelligence of the longboat since her departure, we were under some apprehension of her miscarriage either by falling into the hands of the enemy or the badness of the weather, whereupon in a general consultation, it was judged necessary to dispatch another boat to hasten the proceedings if the former had succeeded or in case of her failure to acquaint the governor of Providence with our situation and demand the necessary assistance with all possible expedition, as our provisions were lessening daily and no water to be found except what we saved from the ship. The yawl was immediately fitted up and Mr. Craig, our 2nd Lieut. sent away with 8 men, provided with arms and provisions suitable to the occasion, having first agreed to leave him tokens how to proceed in case the vessels we had expected should arrive and we should find it convenient to leave the place before his return. At 11 sent the barge a fishing.

Monday, Feb. 8 D:o

The first part moderate and clear. At ½ past 1 p.m., the boats returned with shellfish. At 3 D:o sent the boats for more shellfish and the canoe to the turtle nets. At 4 p.m. DD [died?] Thomas Pixley. At 1/2 past 5 D:o returned the boats from fishing. D:o hauled all the boats up. At 5 a.m. sent the canoe to search the turtle nets. At 6 D:o sent the barge and one canoe aboard to try what they could get at. Some of our men employed in breaking the shellfish. At 9 D:o sent the barge from the ship to the Long Island for faschines. The large pettyaugre employed in carrying the shells off the island and laying them upon one of the reefs. [possibly because of their foul odor?] The rest of the men employed about the trenches.

Note: Sailing master's log for Feb. 8 "...the hands employed in heaving sand out of the trenches."

Tuesday, Feb. 9 D:o

D:o weather. At 3 p.m. the barge returned from Long Island and the pettiaugre with faschines. D:o sent the canoe to catch seals. D:o sent the barge aboard to tow the pettiaugre ashore. At 1/2 past 5 came ashore the barge and pettiaugre with 4 butts of water and the small canoe returned with two seals. D:o hauled up all the boats. At 5 a.m. launched the canoe and sent her to the turtle nets. At 1/2 past 6, D:o launched one of the pettyagres and sent her with 20 men aboard to try what they could get. D:o sent one pettiaugre a fishing. Some hands employed at the battery and trenches. The carpenters employed in caulking the barge. Found the stream running D:o.

Note: Sailing master's log for Feb. 9: "At 3 p.m....the hands employed in carrying the shells off the island and laying them on the reef. ... At 1/2 past 6...the rest of the hands employed raising the battery and digging another trench."

Wednesday, Feb. 10 On the Reques Keys

D:o weather. At 1/2 past 3 sent the canoe to search the turtle nets, the carpenter employed in caulking the barge. At 1/2 past D:o came ashore the pettiuagre from the ship with boatswain, carpenter and gunner stores. D:o hauled the boats up. At 1/2 past 5 a.m. sent the small canoe to fetch the turtle nets ashore. The men employed in digging trenches.

Note: Sailing master's logfor Feb. 10: "The first part fresh gales and clear weather. At 1 p.m. the small canoe went to search the turtle net..." [no mention of bringing the turtle net ashore]

Thursday, Feb. 11. D:o

D:o weather. At 1 p.m. sent the small canoe to Long Island to kill some seals. At 6 D:o, returned with six seals which were distributed among the ship's company. D:o hauled her up. At 1/2 past 5 a.m. launched the barge and the pettiauger and sent them aboard with the 3rd Lieut. and 22 men. D:o sent the small canoe to search the turtle nets. The rest of the men employed at the battery digging trenches.

Friday, Feb. 12 D:o

D:o weather. At 6 p.m. came ashore from the ship the barge and one pettiaugre with 2 butts of water, 2 puncheons of beef, etc. D:o hauled all the boats up . At 4 a.m. launched the small canoe and sent her to the windward keys to kill seals. At 6 D:o launched the barge and two pettyaugres. Thearge was sent to sound between the islands and sent the two pettiaugres aboard. At 10 D:o returned the canoe with six seals which were served to the ship's company. At 1/2 past 10 a.m. came ashore one pettiaugre from the ship with a butt of water and puncheon of beef etc. The rest of the men employed at the battery, digging trenches. Found the stream running to the northward below the keys.

Note: Sailing master's log for Feb. 12: "The first, middle, and latter parts moderate and clear weather...At 6 D:o came on shore from the ship the barge and one pettyaugre with 2 butts of water... and some purser's and gunner's stores...At 10 a.m. came on shore...1 puncheon of beef and some carpenter's stores."

Saturday Feb. 13 D:o

Moderate and cloudy. At 2 p.m. came ashore the other pettiaugre with stores etc. At 3 p.m. sent the small canoe to set 2 turtle nets. D:o sent the pettiaugre aboard. At 1/2 past 5 came ashore the barge and two pettyagres from the ship with lumber. D:o hauled all the boats up. At 4 a.m. sent the small canoe to search the turtle nets. At 5 D:o launched the barge and one pettyaugre. Sent both aboard with the 3rd Lieut. and 20 men. The barge went a sounding with the 1st Lieut. At 10 D:o sent one pettiaugre to Long Island for faschines. The rest of the hands employed at the trenches and spreading some wet provisions to dry.

Sunday, Feb. 14 D:o

The first part moderate and cloudy, the middle and latter, fresh gales. At 2 p.m. returned the pettiaugre from the Long Island with faschines. At 1/2 past 3 D:o sent the canoe to the island for more faschines. D:o sent the small canoe to set the turtle nets. At 6 D:o the first Lieut. returned from sounding and brought 35 rock fish ashore which were distributed amongst the ships company. The 3rd Lieut. returned in the pettiaugre from the ship with a butt of water and gunner's stores. At 1/2 past 5 a.m. launched the small canoe and sent her to search the turtle nets. At 1/2 past 9 D:o sent the barge a fishing. Found the stream running to the northward between the keys.

To be continued in the next issue of the Florida Keys Sea Heritage Journal.

(Water from page 1)

to replenish their water supply.

The faithful "Middle Springs" on the corner of Simonton and Angela Streets would not have been a source of potable water for them at this time of need, It would have been a large pond, the spring flooded over with storm trash, salt water and possibly dead animals. There was no natural outlet for the pond to drain, receding of the pond water would be by evaporation or to sink downward into the ground. The area has flooded many times from heavy rains, over the years, before it was filled in, a drainage system installed and the city building constructed on Angela Street. The wells primarily on higher elevations of the island protected from foreign objects, rain water run off by a short masonry wall, covered with a wood frame and trapdoor may have escaped the flooding water and waves of the storm. Rebuilding one's home, cleaning and "desalting" their cisterns and preparing them for the next rain after a hurricane is still fresh in the minds of some people living on the Florida Keys today. Key West had other hurricanes and always will, as it is in a hurricane zone. The Army opened up the Key West Barracks to survivors in need of temporary housing. The barracks survived the storm with little damage.

On the sixteenth of May 1859 a large fire of unknown origin was discovered in the warehouse of Mr. L.M. Shaefer on Front Street near the corner of Duval Street. It ignited the Wall and Company's warehouses just eight feet away stored with cotton and lumber. Due to no organized body of firemen and inadequate fire apparatus. The fire spread relentlessly helped by a stiff breeze consuming seventy one business and houses and forty outhouses in the area bounded by Front, Greene, Simonton and Whitehead Streets. The fire was only prevented from going farther than Fitzpatrick and Greene Streets by Mr. Henry Mulrennan blowing up his own home which was in the path of the fire with a keg of gun powder. The fire destroyed eighteen acres and left not only ashes but insufficient finances to rebuild due to regrettable lack of insurance, and in this case too the loss of their personal rain water supply.

They managed somehow to rebuild it all back and twenty seven years later had a thriving metropolis, when on April 1, 1886 a fire of suspicious nature originated in the San Carlos building located on Duval Street in the heart of the business section. The fire company turned out promptly for the early morning fire but with little or nothing to work with. The old steam fire engine they had for ten years was in New York for repairs and only a small hand operated fire apparatus was available as the wind drove the fire north easterly across Duval Street into Fleming, Bahama, Caroline and Simonton consuming everything in its path as it turned north to the commercial area on the water front. Finally brought under control at the Naval Station, but not before it took Asa Tift's Chandlery and warehouse. Approximately fifty acres reduced to ashes in twelve hours leaving the appearance of a neglected cemetery with stone foundations of their homes as tombstones and cisterns as tombs.

A typical home cistern. Photo credit: the Author.

After the fire, rebuilding commenced on a large scale, a building program was already underway to accommodate new people in town. The island was experiencing the largest population growth in any one decade. 8,190 new citizens were added to the 1890 census records making a total population of 18,080, not including transients. The fire added to an overburdened water problem nearing the end of the dry season. It's doubtful they were able to rebuild and benefit from the year's rainy season to replenish the water supply. If not it would possibly be a year before they could realize any appreciable amount of water in their cisterns.

The early settlers survived by sharing with what they had, a custom that continued up through the great depression days of the 1930's, but sharing can become limited when there is not enough.

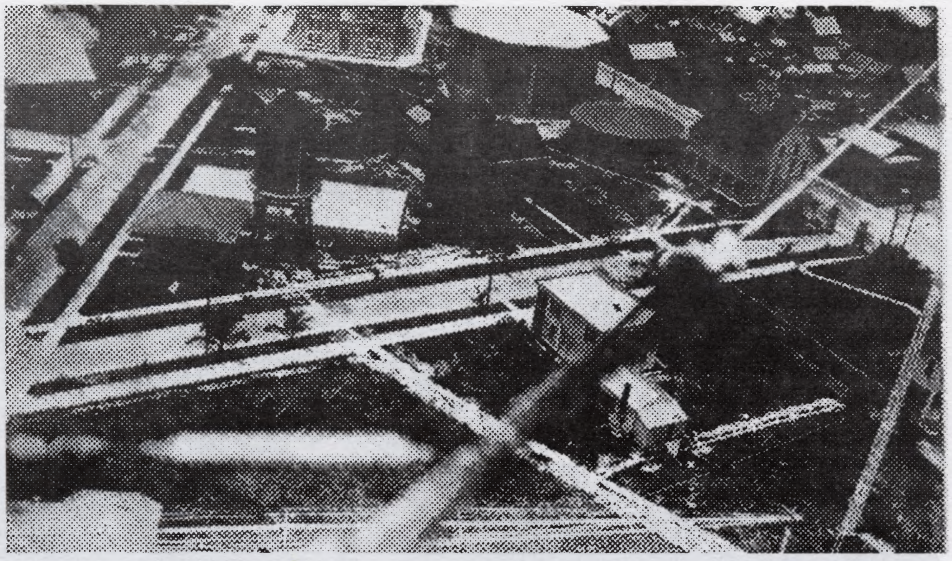
The Army had their turn sharing what they had. For years during the time between the Civil and Spanish American Wars when Fort Taylor was on a housekeeping status the Army opened the doors of the fort and the trap doors of the cisterns to the citizens of the city. Sergeant Davis, as custodian of the fort was under orders to open the fort twice daily at a designated time and see that everyone was served their turn to draw as much water as they needed or could carry from the cisterns. Hundreds of citizens would walk to the fort with buckets, demijohns or other containers, some unable to carry the heavy load brought their containers in hand drawn carts or wagons. Sergeant Davis was not specially fond of his assignment and had a low opinion of the town's citizens. When they became unruly ignoring his orders to stay in line and wait their turn, it made matters worse. Being a military man of rank and accustomed to men following his orders, thought the civilians should do the same. One day with his patience exhausted, he slammed the cisterns doors shut and told the waiting men, women and children in no uncertain words to leave and stay off the reservation. This ended the distribution of water at the fort. This was equally hard on many people who in need of water and unable to go to the fort had engaged a Mr. Rosam to bring water to them at a small cost for a demijohns. Mr. Rosam had equipped his horse-drawn dray with a frame work to accommodate the glass demijohns that kept them from falling off, making two rounds a day, delivering

full demijohns and at the same time collecting the empties. Closing the fort put an end to his little business. What a shame, 58 cisterns with water and hundreds of people deprived of water because some people could not behave themselves and a sergeant who may have been more strict than necessary.

It is interesting to note here the use of the demijohn, when it was first introduced to Key West is unclear. Demijohn is a fanciful name of a large bottle of green glass with a short narrow neck and a wicker casing, fashioned after a French green wine bottle of the Seventeen Hundreds. They were of various size. The capacities of those made in Cuba were measured in liters, while the ones made in the United States, particularly South Jersey marketed theirs as quarts up through five and ten gallons. The name demijohn is an alteration of a French lady's name, Dame Jeanne.

The sponge industry was big business, a close second to the cigar manufacturing in stabilizing and strengthening the local economy after the Civil War and enabling the city to rebuild after the fire. Hundreds of boats of various sizes and at least twice as many men (sponge fishers) made up a sponging fleet that would set out on a month cruise with their meager stock of provisions to the warm and shallow waters of the Florida Keys. They were not to concerned about food, there was always fish, crawfish, turtles and plenty of fresh water. No Name Key, Big Pine, Little Pine, Middle Torch, Big Torch, Ramrod, Cudjoe and Sugarloaf Keys all had natural fresh water sites, small ponds and natural wells of various sizes and shapes while others were definitely Indian wells. Legend says that the Indians dug wells by burning the rock then pouring cold water on the hot stone. These and similar fresh water sites on Key Vaccas and the natural wells on the north end of Lower Matacumbe provided the spongers with water on their trips up and down the Keys. The most reliable water in the Lower Keys other than Key West was on Big Pine Key a much larger island with higher elevation averaging eight feet, maintained a good supply of ground water the year around, even the small Key deer gathered there during the dry season. Some of the people toyed with the idea of acquiring land on Pine Key and piping fresh water to Key West. A good idea at the time that never materialized.

The fire was a severe lesson and was generally believed throughout the city that the fire would not have spread beyond the city block it originated had there been adequate fire fighting equipment. The city immediately purchased two new powerful horse drawn steam fire engines and the county bought one. (This was before the days of motorized vehicles.) A coal fired boiler supplied steam to power the fire pump. It was exciting to watch the big new steam, red and shining brass fire engines racing down the street drawn by a team of large draft horses with black smoke from the stack confirming there will be steam when required. They took pride in their new fire equipment and were going to make sure never again a large fire will bring hardship to the city, and bought another steam fire engine, a new chemical engine, a hook and ladder and hose outfit.



The Naval Station Pump House building to the left, the steel storage tank, standpipe, and the concrete and steel storage tanks. Photo credit: Monroe County Library.

More and deeper fire wells were dug as the city expanded inland, farther away from the waterfront where the fire engines had an inexhaustible supply of sea water. The officials of the city turned their attention to deep well drilling to meet the demands of the powerful new fire pumps.

In 1887 there was a well bored, "or drilled" at Key West, no information surfaced other than they found roots, wood and well-preserved leaves or trees at a depth of eight hundred feet. However, about this period of time it was reported in one of the bulletins of the Geological Survey a careful study was made on Key West of the possibility of boring an artesian well. It further reported that Vicksburg limestone had been found underlying the island, which is a water-bearing rock, and it only assumed that pockets of fresh water would be found by drilling artesian wells. An artesian well is a well drilled deep enough to reach water draining down from higher surrounding ground above the well so that the pressure will force a flow of water upward. Such a well would be unlikely (or improbable) because any such pocket of fresh water would have to be fed from the mainland of Florida, a distance of more than a hundred miles and an elevation of at least fifty feet above sea level.

In 1895 the city undertook to secure a supply of fresh water, and an artesian well was sunk to a depth of 2,000 feet. Samples of borings were taken every 25 feet from the surface to the bottom. The samples indicated a shallow water origin, most solid rock from a depth of 150 feet to 175 feet, from surface inclusive. No traces of fresh water was found.

In 1897 the county financed a project to bring fresh water to the island by means of an artesian well to be located on the southwest corner of Jackson Square. This plot of ground was set aside as public property by the proprietors before the survey was made by William A. Whitehead in 1829. Bounded by Whitehead, Southard, Thomas, and Fleming Streets. It is the property of the city as it holds in trust the streets and side walks for public use only, and shown on the map delineated by William Whitehead in 1829.

After drilling several thousand feet and no fresh water was found, a stand-pipe

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and engine house were located on the spot, the corner of Southard and Thomas Streets and from the well the city was supplied with salt water for fire purposes, and because of the high salt content, was found to be an excellent fire extinguisher. A stand pipe is a high steel cylindrical tank for storing water and keeping it at a desired pressure, which is gravity pressure, and equipped with vents and overflow. In this case it supplied salt water through fire mains to hydrants at various places throughout the city. The desired water level was maintained during a fire by the steam engine driven water pump in the engine house. There was always immediate water pressure at the fire hydrants with this system. In 1910 due to the expanding city two new boilers and two one hundred horse power steam engines and pumps were installed. In the same year six thousand dollars was appropriated to extend the fire mains to the County Road.

Following the failure of the well on Jackson Square to produce fresh water the county constructed a large rectangular cistern in the northwest corner of the square to replace an older one. To supply fresh water to the increased capacity of the Jail built in 1880 plus the new Court House completed in 1890. It was replenished by rain water collected from these two buildings. It was built of masonry, mainly below ground level with a gable roof. The longer side parallel to Fleming Street within an arms length of a short masonry wall that surrounds the square. The cistern was demolished in 1953 to construct a new building for the County Health Department.

There was some discussion between Henry Flagler and local officials concerning the idea of an aqueduct to be built along the railroad which would bring fresh water from artesian wells on the mainland to solve the water problem. Whether Henry Flagler voiced his intend to build an aqueduct or someone locally initiated the idea is unclear, but Mr. Flagler came to the conclusion that this would be a very expensive arrangement and was doubtful of success.

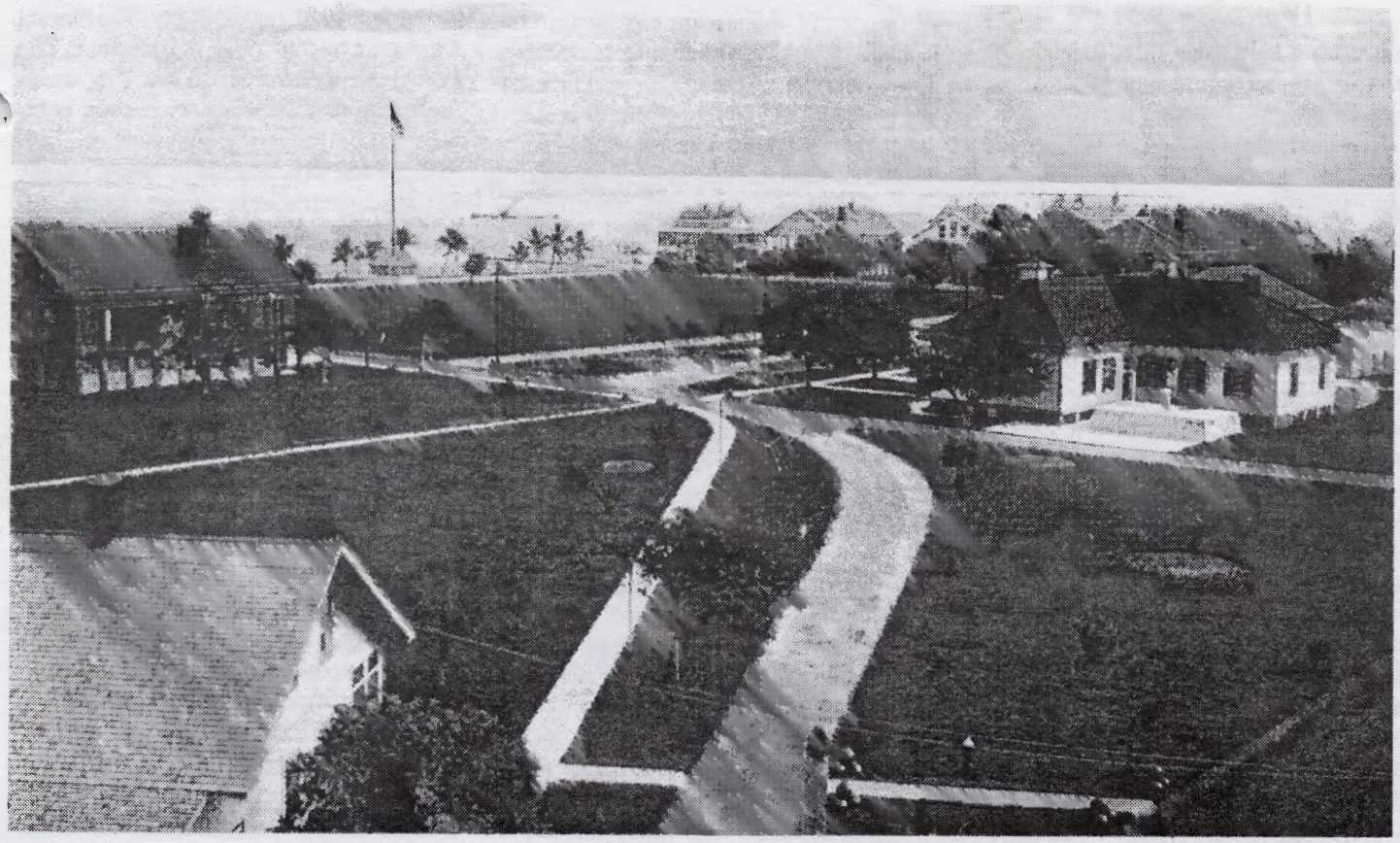
In the days when railroads were the masters of land transportation, water towers were placed at specific intervals along the routes for steam locomotive's new supply of water. The people of Key West watched, with interest, Mr. Flagler's experiment to secure a flowing fresh water well on the Keys for the Key West Extension of his Florida East Coast Railway. During the construction water was hauled from their well at Homestead or Springs near Manatee Creek near the Monroe-Dade County line in large round cypress wood tanks aboard flat cars for personal use and mix cement for the concert bridges. These trains with two tanks to a flat car stretching nearly a mile was a common sight along the Keys. Approximately 700 tanks a month were required for construction. Looking ahead when the railway is completed, and taking into consideration the water situation in Key West, that a round trip from Homestead is 260 miles, securing fresh water locally along the route for water towers would eliminate hauling water from Homestead and a well drilling project became part of the railroad construction beginning in 1902 through 1906. Two wells were drilled in the vicinity of Indian Key, three on Key Vaca (Marathon), one on Knights Key, one on Big Pine Key and one on Key West. All were less than 700 feet except one on Marathon was of comparatively large size and included 589 feet of ten inch diameter, 605 feet of eight inches diameter and 1,128 feet of six inches diameter casing to a total depth of 2,322 feet, in every case excessively salt water was obtained, another complete failure.

Florida East Coast Railway flat cars with cypress wood fresh water tanks. Photo credit: Monroe County Library.

The post Spanish-American war period gave the appearance that the Navy, again, returned to little more than a housekeeping status, few ships remained, other ships returned to their home operating bases. In terms of personnel, only a few remained to operate refueling facilities, communications and normal maintenance activities, however the base was physically expanding. Various structures under construction were completed, and appropriations for more slowly followed. Naval officials were more sensitive to the fresh water supply after their bitter experience during the War of 1898.

The failure of the city and county to find fresh water by drilling wells and Henry Flagler's decision not to build an aqueduct along his railroad encouraged the Navy in the one option they had, the storage of an immense quantity of rain water. The Navy believed that if they could collect and store rain water during the rainy season in sufficient amounts to maintain a reasonable supply throughout the year when little or no rain falls, they would have their fresh water problem solved. They did not have the space to implement their plan but they did have a good start.

Navy building number One, Storehouse and Administration was on the corner of Whitehead and Front Streets, the Steam Engineering and Machine Shop building Seven, the Foundry number Nine, Smithery number Eleven, and Bureau of Equipment Building consisting of a store house, workshop, the steam electric generating plant and offices, and building number



The Key West Army Barracks with the building on the right with cisterns on both sides. Photo credits: Monroe County Library.

Twenty One were all on the westerly side of Front Street, the boundary line in 1902. In late 1902 funds were appropriated to purchase the triangle shaped property bounded by Eaton, Front and Whitehead Streets for badly needed officers quarters and complete the proposed water storage plan. By 1915 the Pump House building number Forty Five had been constructed on the corner of Front and Caroline Streets, an 80,000 gallon steel elevated tank and a 202,000 steel standpipe had been removed from the Dry Tortugas and erected east of the pump house, a 202,000 gallon steel storage tank had been erected near the Navy-Whitehead Street boundary line, a short distance to the north a large 1,500,000 gallon concrete and steel storage tank had been constructed and a large storehouse on the northern most area of the new property, building number Forty Eight had been completed in 1910. (Both the large tank and the building Forty Eight exist today, the tank can be seen from Whitehead Street and the building from Greene and Front Streets).

Rain water collected from all the buildings just mentioned (with the exception of building One that had its own cisterns) drained first into a 260,000 gallon cistern a few feet north of the pump house or into another 260,000 gallon cistern on the inside corner of Front and Eaton Streets, by gravity through six inch diameter conduits, then pumped into the storage tanks through underground six inch diameter pipes. Fresh water was drawn from six good wells on the base and into the storage tanks. One was a distance of six-hundred feet from the pump house on the inside corner of Whitehead and Eaton Streets one of the oldest and best fresh water wells on the island, now buried under the T.I.B. Bank.

The Navy's elevated tank and stand-pipe worked on the same principal as the county's fire system at Jackson Square. Fresh water from the elevated tank was distributed to all requirements of the Base, officers quarters, barracks, ship repair building, equipment building and boiler, mess hall, laundry, dispensary and dock connections to supply ships. The Weather Bureau was not part of the Navy Base but was granted water. The stand-pipe was a salt water supply for fire purpose, for sewers and drains and maintained a continuous flow through the latrines.

The 15,000 gallon per day distillation plant built near building One, in 1898, was operational and inter-connected with the rain-water system and it also had a straight line to the boilers in building Twenty One and could furnish water to the main storage if needed. It also had the ability to supply distilled water for the batteries of the Navy's new submarines stationed at the base during World War I.

Much has been said or written about rainfall, an every day item on weather records in inches, hundreds of an inch or none, habitation on Key West depended on its thirty nine and one half inches of rainfall. What is the meaning of one inch of rain? For one example an acre of ground that measures 208.71 feet on each of its four sides contains 43,560 square feet, consequently a rainfall of one inch over one acre of ground would mean a total of 6,272,640 cubic inches of pure water, this is equivalent of 3,630 cubic feet, as a cubic foot of water weights about 62.4 pounds, the exact amount varying with the density, it follows that the weight of an uniform coating of an inch of rain over one acre would be 226,512 pounds or about 113 short tons. The weight of one gallon of pure water is about 8.34 pounds, con-

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sequently a rainfall of one inch over one acre of ground would mean 27,143 gallons of water.

Using the dimensions of the buildings One, Seven, Nine, Eleven, Twenty One and Forty Eight as a fair facsimile of their roof areas (dimensions of roof areas not available) gives a total area of approximately 52, 328 square feet, 8,768 more than an acre. Taking in consideration these figures are not perfect and there was undoubtedly some loss in collecting the rain, we can only say for every one inch of rainfall the amount delivered to storage was in the vicinity of one acre or 27,143 gallons. In 1918 two new barracks were built, for sailors and marines, building numbers 66 and 67, giving 18,114 more square feet of collecting area. The total storage area was 2,318,200 gallons. Evidently their plan was a success, reports of water problems during World War I are hard to find. The system was upgraded with automatic controls and serviceable during World War II.

Ironically during the early part of World War I, Colonel J.J. Hughs, commanding Officer of the Key West Barracks, requested the city council to allow a water pipe line from the Columbia Steam Laundry on Simonton Street along Angela Street to Fort Taylor. The Colonel emphasized the importance of the line in view of the large number of soldiers that will be quartered there. The request was granted without one dissenting vote. (The Fort's rain-water-collection system and half of it's 58 cisterns were destroyed when the top tier was removed in 1898. Florida Keys Sea Heritage Journal Winter 1998.)

At the same city council meeting Captain Harnes of the Barracks made an address urging the council to cooperate with the Florida East Coast Railway, the Army and Navy in providing fresh water to Key West by way of an eighteen inch diameter pipeline that would bring fresh water from Dade County. He added that only the cooperation of the council, railroad and heads of the Army and Navy could make it happen. The cost would be a million dollars. Captain Harnes' plan did not materialize. The city council had been advertising throughout the country welcoming proposals from engineering firms for erection of sewer and fresh water plants, still believing the deep artesian wells was the solution to their water problem.

In January 1917 the engineering firm of George W. Sturtevant of Chicago sent Mr. E.E. Ladd to the city to investigate sewer and water possibilities. The company was said to be one of the largest and most reliable engineering firms in the United States and should their engineering report be favorable they are financially able to carry out any terms of a franchise. Mr. Ladd was impressed after members of the council furnished him with the information at hand, copies of drawings, specifications and franchise. He stated the sewer system would be a simple one, the water question would require grave consideration but was of the opinion a deep water artesian well could be had here. The success of a test well would decide whether the company would ask for the franchise. This was the second attempt of the city council to secure for Key West a fresh water supply and sewer system. They were of the opinion that they were on the right track this time. The year previous, the city council introduced an ordinance providing the sinking of a deep well, construction of a water works and laying of pipes to William Clayton Jones and Charles E. Starr, promoters from Philadelphia who have valuable interests in the city, the enterprise would entail no expense to the city unless fresh water is obtained, both ventures were failures.

After Captain Harness unsuccessfully tried to convince the city council to cooperate with the Florida East Coast Railway, Army and Navy to construct a pipeline from Dade County, Major John L. Hughes, the new Commanding Officer of the Key West Barracks started a movement in October 1917 whereby he would endeavor to bring the four establishments together to bring fresh water from the mainland in the same way previously described by Captain Harness, a pipeline from Dade County. He believed that an abundant of fresh water supply would assure the success for future rapid expanding of Key West. As many industries would come here, and everyone was greatly interested in the movement, after thirty years of unsuccessful deep well drilling the people of Key West realized to solve their problem the source would be from some place other than the island they live.

We cannot question or criticize the councilmen or the well drillers. Because we do not know all the details or how much was known about the geology of this region but drilling for an deep artesian well expecting fresh water to emerge from the well is almost an impossibility. The Florida Keys are a narrow ridge of limestone. The Lower Keys from Big Pine Key down including Key West is very porous, composed of oolite, a tiny spherical or ellipsoid particle with concentric layers, usually of calcium carbonate about the size of a grain of sand, formed by wave-agitated sea water and cemented together. (Oolite: from the Greek work for egg). The limestone is permeable or that can be penetrated, especially liquid that can be easily moved from one place to another as in this case, saltwater intrusion from the ocean the limestone accepts as if it was sponge. Anywhere a deep well drilled on the island would naturally produce salt water, any fresh water would be from an underground stream and isolated by some material so as not to mix with the salt water and come from a higher location as previously stated, if such a stream did exist and cut into by drilling it would break the insolation and the fresh water would mix with the salt and would not be known if they discovered fresh water or not. However, underground streams and caverns are not unusual in limestone regions.

The ridge of limestone in the lower Keys is overlain by a shallow marl soil, occasionally the limestone breaks through the surface, called outcropping, which is the exposure of bedrock or strata projecting through the overlying cover of detritus and soil, (detritus is material produced by disintegration and weathering or rocks that has been moved from its site of origin.) This outcropping gives the island of Key West it's higher elevations. The highest starting with the coastal ridge on the western part of the island and thins toward the eastern section, maintaining its ability to absorb and store water.

The fate of any rain not lost to evaporation or runoff is to sink into the ground, on the areas of this outcropping it also filters through the small cracks in the caprock. The caprock was formed when rainwater mixed with carbon dioxide from decaying organic material to form a mild acid solution that dissolved the oolitic limestone leaving a thin and dense layer of rock, on the surface, no more than two inches thick that forms the top of an aquifer, an aquifer is essentially a porous formation, such as limestone, sand or gravel over an impermeable or nonporous layer such as clay or shale. The impervious layer serves to trap and channel the water accumulated in the level above, on the is-

Home on the Keys with the cistern to the left of the large house. Photo credit: Monroe County Library.

land, because salt water is denser and heavier (64.4 pounds per cubic foot) than fresh water (62.5 pounds per cubic foot). The fresh water floats on the salt water in an area called the transition zone controlled by the constant changes of the ocean tides, resulting in the configuration of the floating fresh water now referred to as the "lens." Due to its similarity to the lens in optical instruments and eyeglasses. This lens averages about five foot thick in the western part of the old town section of the island and thins toward the shoreline and in the down slope to the east, approximately three city blocks east of White Street. But also thins toward the north and Army Barracks area. The lens contains about 20 million gallons of fresh water during the dry season and about 30 million gallons during the wet season. During the time of rising tides the sea water also infiltrates through the porous underground limestone rising the transition zone. If a head pressure occurs the lens will force the fresh water through fractures in the limestone appearing in the ocean off the island. The author experienced cool fresh water coming through the sandy bottom in the water off of Rest Beach, a beautiful beach between White and Bertha Streets, and could see the turbulence in the sand as it emerged into the sea water. No known sturdy has been made of these passages. Under its own weight water will seep through fractures into some of the lower levels or down slopes in the island and become springs, specifically the familiar "Middle Springs" near the corner of Angela and Simonton Streets or Lt. Daniel Patterson's Spring. Bernard Romans described the well he found as "excellent fresh water." (Search. Part one vol. 9 no. 2, winter 99.) Wells dug into the lens on higher elevations did produce excellent water.

In later years when pumps were available, suction pipes extending to deep was in danger of the transition zone or deeper, into the sea water, brackish or plain salt water would be drawn through the pump bringing with it a stifling odor of sulfur or rotten limestone taste, spoiling their drinking water.

Older residents believed fresh water from sink or solution holes in the eastern section of the island moved toward the old town residential district by way of underground streams. The theory was strengthened when digging trenches for a sewer system during the W.P.A. days of the Depression they uncovered an underground steam of fresh water on Newton Street. A number of these sink holes can be seen in the salt pond area near the old Army missile site and others that have been filled but continue to settle are noticeable by a low area or dip in the streets at Duck Avenue near Twentieth Street, Fourteenth Street near Northside Drive, Junior college Road near the American Legion entrance and in front of the Kmart Garage in Key Plaza. The contractor of a housing development tried to fill one in the 2900 block of Fogarty Avenue, after excavating to a depth of sixty feet and not finding a solid bottom, abandoned the idea and just filled it in with marl.

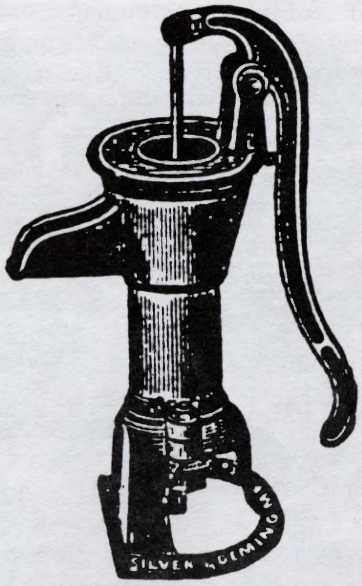
In the far southeastern part of Florida is an outcropping of oolitic limestone, the same composition as the one in Key West. However, much broader and longer in its range from about the Dade-Broward county line, southward past Homestead and a ways past Florida City trailing off to the west where it thins to a feather edge and interface of other limestone. This outcropping or rock ridge averaged fourteen feet thick as it parallels the coastline. Geologists termed the composition Miami oolite. Beneath this comparably shallow lime-

(Continued on page 14)

(Water from page 13)

stone ridge, as well as all South Florida are other formations of water bearing limestone to a depth of 15,000 feet where it meets an impervious layer of clay, shale or some other substance it cannot soak. The aquifer below a porous and permeable surface with much open space is recharged with local rainfall, averaging 60 inches a year, wells needed only to be drilled or dug into this rainfall now "groundwater" in order to reach an inexhaustible supply of potable water. The level of the groundwater varies with the amount of rain fall. The area, today, named the Biscayne aquifer, will resist salt infiltration as long as the fresh water remains higher than sea level.

Before the days of White Man's habitation and city development the aquifer was always full, many are the stories by seamen and explorers of excellent fresh water most anyplace a hole was cut into the surface of the ground, or good drinking water seeping out of the rock embankments along the shore and from supposing Indian wells. The Miami river ran with a strong current. Fresh water bubbled up through the salt water of Biscayne Bay miles from shore, "springs of the sea." One of the first documentations comes from Dr. Jacob R. Motte, surgeon to the Army during the Seminole Wars, who describes how fortunate they were when they came ashore about 20 miles south of Cape Florida to find a "remarkable spring of water of the coolest and most delicious flavor he ever drank.... the spring was considerable below the high-water mark of the beach and consequently covered by salt water twice every twenty four hours." Twenty miles south of Cape Florida would put Dr. Motte's encampment near present day Cutler Ridge, in the Deering Estate, east of Perrine. There were other Bayside springs in this area and delicious water flower from rock bluffs on the shore. Not far from this area someone sank a pipe, mounted with a hand operated pitcher spout pump into a bubbling outlet of an offshore fresh water spring with a platform to support it, capturing the pure cool water, saving the inconvenience of going ashore. Ralph M. Munroe, long time resident of Coconut Grove, said there are many fresh water springs in the neighborhood, most of them boiling up through the salt water of the bay. "Mangrove Spring" also in the Coconut Grove supplied water for the United States Fleet at Havana in 1898



The noble but sometimes reluctant cast iron pitcher spout pump was available by mail order from the Sears, Roebuck catalog in 1897, and probably purchased locally. They were widely used on cisterns and wells throughout the Island some old and weathered pumps and wells can be seen in the older section of the city cemetery.

Flowing at a rate of one hundred and fifty gallons a minute (Florida Geological Survey Bulletin No. 31.65.) Nixon Smiley, as late as the 1950's spoke proudly of his well at his new house in South Dade County saying "We have never sampled better tasting water." Lake Surprise was a fresh water lake until the railroad workers dredged into it for fill for the railroad bed. Off shore springs or artesian wells can be simply explained as water trying to seek its own level through cracks, fissures, underground channels or some other passage. Southeast mainland Florida was literally bursting at the seams with what Key West needed. Providing the islands to the south with this water on a more permanent basis than transporting by ship or rail and still be economically within their means, was yet to be determined.

The years following World War I, brought a downward turn in the recurring cycle of prosperity and recession, growing industries and war military expenditures were always a boon to the local economy, following successively with hurricanes, fires and failing industries, there was nothing to respond to the financial income lost after the war, cigar making the main industry damaged by fires, hurricanes and labor problems moved to Tampa, sponge fishing was declining from foreign interference and sponge blight, new navigation aids, steam powered vessels and changes of sea lanes, wrecking had died from lack of wrecks, the railroad was never a great wage earner for the local people, it did however bring in tank cars of water and a few tourists and break the isolation, also a way out for those decided there was better opportunities on the

mainland where the short lived real estate boon was underway, the population in Key West declined. The Florida Keys were to know hard times before the Great Depression.

Conflicting reports gives us very little to go on in saying any action was taken to stimulate new industry by suppling the island with a reliable source of water at this time. As suggested by Major Hughs, by way of a pipe line from the mainland. When the Florida land boom collapsed in 1926, financial backing would have been difficult, the crash of the stock market in 1929, the beginning of the Great Depression, no facility had money to back an island so remote with their problems. Even the Navy gave up in 1932, leaving the Naval Base to a bare maintenance status. The commercial fishing and products of the sea, the longest and most stable industry had not the tax base to carry the city in its financial obligations.

When federal assistance started coming off the drawing boards in Washington under the new deal polices, the National Recovery Act, (N.R.A.) Adapted by President Franklin D. Roosevelt in 1932 to advance economic recovery and social welfare, Key West was one of the cities in Florida to receive Federal aid through the years 1932, 33 and 34 under the Federal Emergency Relief Administration (F.E.R.A.).

The F.E.R.A., other than provide school lunches, employ more teachers for vocational courses did very little to address the real problem, people needed employment, money to pay bills, buy food and pay taxes. The city had financial problems since 1928. The population continued to decline from 19,945 in 1910 to 12,831 in 1930, a loss of 7,114 people. By 1934, 80 per cent of the remaining population of 12,317 were on relief. City employees had not been paid for months and the city was deeply in debt. City officials concluded they no longer could fill the power of self government, and on July 2, 1934 yielded "to the Governor all legal powers conferred upon the officers of the City of Key West in such a way he deemed proper." (Sholtz papers July 2, 1934). Governor David L. Sholtz immediately turned to Julius F. Stone administer for the F.E.R.A. in Florida. Arm chair policy makers in Washington believed it best to evacuate the island, relocate all the inhabitants to the mainland. Stone believed he could turn Key West into a tourist town through a work relief program. The F.E.R.A. would provide the people with direct relief, to be fed, rehabilitated and governed. The city would provide voluntary labor to clean and make the city presentable to accommodate tourists and be employed in various jobs in the industry. The plan was set into motion on July 15, 1934. The influx of tourists in 1934 and 1935 justified additional expenditures where by under the auspices of the W.P.A. (Works Projects Administration) local able-bodied men with picks and shovels dug ditches and constructed a sewer system and a fresh water works distribution system for the pay of one dollar a day. Approximately eleven and a half miles of mains, four to fourteen inches in diameter were laid by April 1938, including 105 hydrants at intervals of 500 feet, and 2,400 copper pipe service connections. Cast iron pipe with lead joints was used for the mains that had a working pressure of 150 per square inch, an excess of 40 to 70 P.S.I. under normal conditions. A distribution of ample capacity, the problem now is the development of a supply of adequate quantity and proper quality.

On June 11, 1937 Governor Frederick P. Cone, signed into law the bill that created Florida Keys Aqueduct Commission (FKAC) consisting of five members appointed by the Governor. (To construct and maintain a water supply system serving Key West and the Keys from wells on the mainland near Homestead, to purchase, construct or otherwise acquire sewage disposal system and to improve, extend or reconstruct sewage systems.)

Three local business men were appointed by the Governor: William T. Doughtry, Jr. Chairman, William M. Arnold, Secretary and Earl R. Adams. Consultants for Engineering; L.L. Lee and Associates, Public Works Consultants, Miami, Florida and Elson T. Killam, Hydraulic and Sanitary Engineer, New York City. Pay for the three local men was a dollar a year and pay their own expenses.

To be continued in future issue of the Florida Keys Sea Heritage Journal.

Carston R. Heinlein, originally from Ohio, enlisted in the U.S. Marine Corps before WWII. He was stationed in Key West during the early days of the war before joining the First Marine Division in which he served in the Pacific Theater and North China. He married Camille Louise Pierce of Key West and settled here after after the war.

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The Key West Naval Station in September 1941. Taken from the corner of Duval and Greene Streets looking southwest. Photo credit: Monroe County Library.

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