U.S. NAVAL BASE, GUAM MUNITIONS SITE, MAANOT RESERVOIR
Santa Rita vicinity
Guam
Guam

HAER GU-7
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PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
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HAER No. GU-7

Location: Santa Rita vicinity, Guam

North Latitude 13.20490, West Longitude -144.40539

Significance: The Maanot Reservoir was constructed in 1941 under the direction of the United States Navy (USN) as an upgrade to the Guam municipal water system. The reservoir is located on a ridgeline in the southwest mountains of the island, fed by the Almagosa Springs. At 1,200,000 gallons, the reservoir doubled the capacity of the island's water supply system, which had been built up incrementally by the USN, over the previous three decades.[1]

Guam became a possession of the United States in 1898. In December 1941, within hours of the Japanese attack on Pearl Harbor, Guam was invaded and occupied by Japanese forces. The United States retook Guam from the Japanese on August 10, 1944. As the American air, sea and ground forces advanced across the Pacific, the lack of potable water on the small islands and atolls became an issue.[2] The Maanot Reservoir was a large freshwater supply source with the potential to replace the logistical trail of water tankers stretching 3,500 miles back to Hawaii.[3] As soon as the invasion beachheads were established, the 53rd Naval Construction Battalion, Fifth Brigade, surveyed the reservoir system and the 59th and 25th Battalions began repairs to Maanot. Under enemy fire, the Seabees, and the liberated Guamanians who knew the system, reestablished the reservoir and springs in thirty-nine days, including 5 miles of pipeline leading to the harbor at Sumay.[4] The Maanot system delivered up to 2,000,000 gallons per day (gpd) and became the primary source serving the large ground forces on the island and the fleet transiting the harbor. The capacity and reliability of the Maanot Reservoir coupled with the quality of the Almagosa Spring water, helped establish Guam as the strategic hub for military operations for the war in the Pacific, and into modern times.

Description: The Maanot Reservoir is a rectangular reinforced concrete structure 113.5' x 139.5', with 12.5' high walls providing 1,200,000 gallons of storage. The reservoir layout conformed to Navy Yards and Docks designs of the period with two equal bays, and no roof.[5] The reservoir sits at an elevation of 398.5' and is gravity fed by a series of mountain springs approximately 2 miles to the

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[1] Lieut. Comdr. Armknecht USN, "The New Water Project," *The Guam Recorder*, August 1940, p. 183.
[2] Lieut. W. A. Lawrence USNR, *United States Naval Institute Proceedings* 72, no. 518, part 1 (April 1946): p. 561.
[3] Ibid., p. 562.
[4] Ibid., p 566.
[5] Ibid., p 562.

south. The path of the 10" steel pipeline from the springs to the reservoir includes 900 lineal feet of 4' x 6' tunnel excavated in 1940 and 1941 by hand.[6] In 1953 a steel and concrete reservoir roof was added by Pacific Island Engineers (PIE).[7]

History: The Maanot Reservoir was the culminating achievement of the USN's thirty-year effort to establish and improve a municipal water system for pre-war Guam. Until 1910, water on Guam was collected by hand from springs, rain catchments and wells.[8] From 1907 to 1910, the United States Navy Civil Engineer Corps completed the Fonte River Reservoir and built the first piped water supply to Agana, the capitol and major population center of the island. Fonte supplied 200,000 gallons of water per day.[9] Over the next fifteen years, and $100,000 in USN investment, the system expanded to 350,000 gpd incorporating multiple sources and developing sufficient line pressure for fire protection. In 1930, a second separate collection and distribution system with a capacity of 175,000 gpd was completed for the southern villages of Piti, Agat and Sumay.[10] By the late 1930s both systems were under the stress of population growth and new sources were sought. A survey was conducted of Guam in 1937 by the United States Geological Survey by Doctors Harold and Norah Stearns, a married couple who were experts in underground water and volcanic geology.[11] Dr. Stearns issued a confidential report to the Navy and within thirty months, $325,000 was made available by Naval Appropriation Act to bring water from the mountain springs at Almagosa to the Piti Sumay area.[12] The water source, a pristine group of remote mountain springs at 620' to 650' elevations was located at a geological layer of porous limestone mountain cap sitting above an impervious volcanic base.[13] Guam's annual average rainfall of 100" is stored in the limestone aquifer and gathered year round at the various Almagosa springs at an average rate of 1,450,000 gpd. In 1941, the capacity of the Maanot system allowed the realignment of the entire Guam municipal water system, upgrading and standardizing supply for 75 percent of the island population.[14] In 1952 the Fena Lake Reservoir and water treatment facilities, with a 5,000,000 gpd capacity were constructed in the vicinity of the Maanot Reservoir. Today, the Maanot Reservoir and Almagosa Springs remain in service as a component of the expanded Fena system.

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[6] Lieut. Comdr. Armknecht USN, "Tunneling in Guam," *The Guam Recorder*, November 1940, p. 318.
[7] Anonymous, "Record Report for Contract NOy13626," Volume II, Part II, no date available, p. 84.
[8] W.G. Johnston, "The Water Systems of Agana," *The Guam Recorder*, June 1926, p. 66.
[9] Ibid., p. 66.
[10] Lieut. A. Martin USN, "Public Works and Industries," *The Guam Recorder*, July 1929, p. 68.
[11] Anonymous, "Distinguished Geologists Arrive In Guam," *The Guam Recorder*, May, 1937, p. 38.
[12] Armknecht, "The New Water Project," p. 183.
[13] Chief Engineer, United States Army, "Military Geology of Guam Marianas Island," 1962, p. 19, map area 4 b.
[14] Armknecht, "The New Water Project," p. 184.

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Anonymous. "Distinguished Geologists Arrive in Guam." *The Guam Recorder*, May 1937, p. 38.

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Historian: This report was researched and prepared by Richard Reed AIA, NCARB, LEED AP, Guam PEALS # 266, CNMI # A106. The report was completed October 31, 2011.

Project Info: This report was prepared as mitigation in the event of the demolition of the Maanot Reservoir.