

AWWA-HIWPS
Research Section

Assessment of the Maui 1 and 4 Shaft Wells

Presented by: Yvonne Cabrera



Commonwealth Utilities Corporation
Saipan, CNMI

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Maui 4 Shaft Well

Maui 1 Shaft Well

Acknowledgements



Prezi

Shaft Well

Acknowledgements



John Riegel and Robert Malate (CUC)

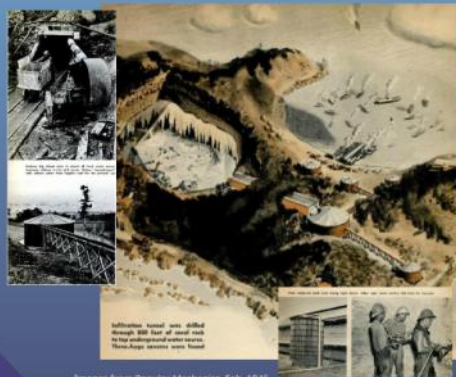
Prezi

Overview

1. Brief history of the Maui Wells
2. Engineering Assessment
3. Operator and Engineering Challenges
4. Recommendations and Solutions
5. Questions & Answering



Brief History of the Maui 1 & 4 Shaft Wells



Images from Popular Mechanics, Feb. 1946

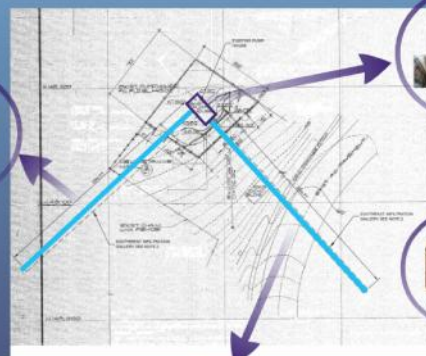


Brief History of the Maui 1 & 4 Shaft Wells

- Constructed by the U.S. Military Forces in 1945-46
- Maui-type wells consist of a shaft with infiltration tunnels at the base
- Four (4) Maui-type wells were constructed: Maui 1, 2, 3 and 4
- Maui 2 Shaft Well was operation from 1945-50 and abandoned due to a tunnel cave in
- Maui 3 Shaft Well was abandoned before tunnels were dug because no water was encountered
- Historical yield from 1952-1954 for Maui 1 and Maui 4: Avg: 460,000gal/d



Maui 1 Well Shaft



Maui 1



Vertical Shaft ~110ft



Maui 1



Platform and basin at the bottom of the shaft well

SOUTHEAST INFILTRATION
GALLERY SEE NOTE 2



Maui 1

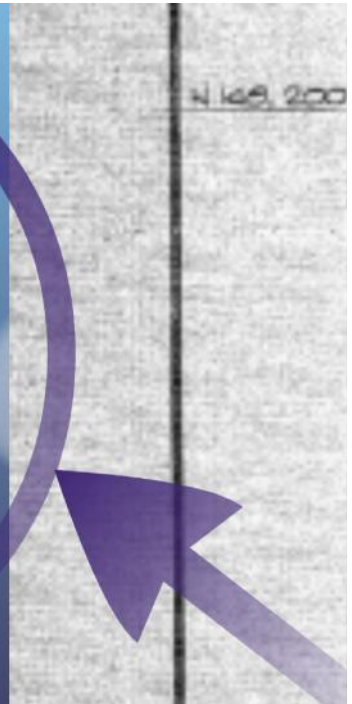


Southeast Infiltration Gallery
~200ft

Maui 1



Southwest Infiltration Gallery
~200 ft long



operated by the U.S. Military
1945-46

The wells consist of a shaft with
horizontal tunnels at the base

Maui-type wells were
operated: Maui 1, 2, 3 and 4

Maui Shaft Well was operation from
1945 and abandoned due to a
collapse in

Maui Shaft Well was abandoned
horizontal tunnels were dug because no
water was encountered

Water yield from 1952-1954 for
Maui 4: Avg: 460,000gal/d



Maui 4 Shaft Well



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Maui 4



Vertical Shaft ~220ft



Maui 4



Platform and basin



~855ft

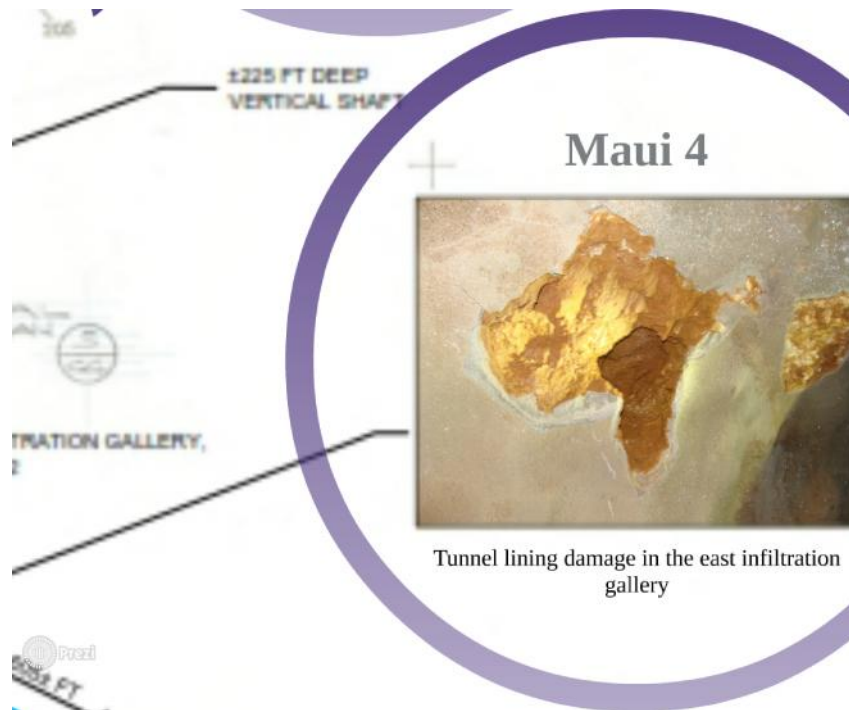


0 ft into the West
ion Gallery

Maui 4



East Infiltration Galleries ~855ft



Maui 4



Tunnel lining damage in the east infiltration gallery



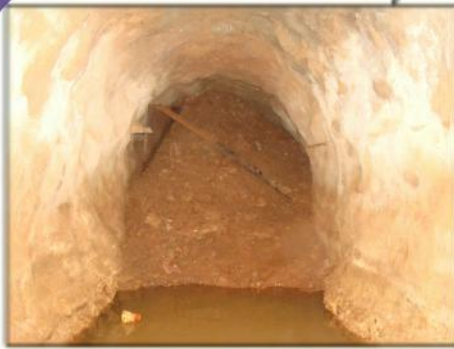
Maui 4



West Infiltration Galleries ~270ft



Maui 4



Cave-in at 70 ft into the West Infiltration Gallery



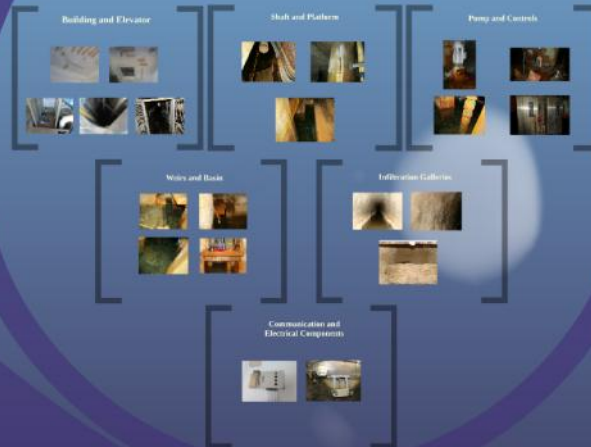
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Engineering Assessment

1. Evaluate safety of the existing elevators
2. Evaluate the existing shaft and other components
3. Evaluate the condition of the infiltration tunnels
4. Evaluate the existing pumping configuration and recommend alternative options
5. Evaluate the different type of feasible non-elevator options



Maui 1: Assessment Results



Building and Elevator



Shaft and Platform



Pump and Controls



Weirs and Basin



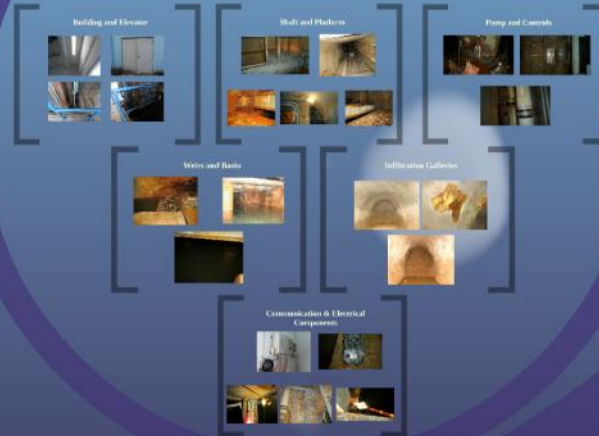
Infiltration Galleries



Communication and Electrical Components



Maui 4: Assessment Results



Building and Elevator



Shaft and Platform



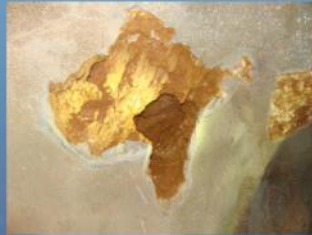
Pump and Controls



Weirs and Basin



Infiltration Galleries



Communication & Electrical Components



Operator and Engineering Challenges



Recommendation Solutions



Safety Concerns



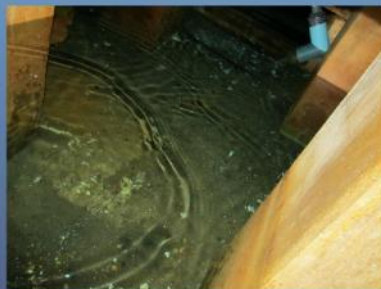
Lack of Space, Communication and Lighting



High Corrosion and Weight of Components



Cave-in and Debris in the Basins



Budget



In 1991-1993 Rehabilitation of Maui 1 and 4 Wells cost approximately \$1.4M

Recommendations and Solutions



Quest



Install Submersible Pumps



Use Temporary and Portable Lighting and Communication Devices



Remove Elevators and Replace with a Hoist and Gantry for Transportation of Material and Equipment



Remove Cave-in Material, Repair Concrete Lining and Clean Basin Free of Debris



Building Improvements



NOTE: After building improvements are made, then CUC is to begin testing for E. coli at a frequency of once a month for one year. The results from this testing will be used by USEPA and BECQ to make a determination if the water from the shafts are GWUDI.



Questions and Answering



Thank you!

1. GHD Inc Reconfigura
2. Image fro Saipan, pp 2
3. Van der Resources a Survey, Wat



References

1. GHD Inc., (May 2014). Engineering Investigation Report for Reconfiguration of Maui Well 1 and Maui Well 4.
2. Image from Popular Mechanics. (Feb. 1946). Running Water for Saipan. pp 28-30, 162.
3. Van der Brug, Otto. (March 1985). Compilation of Water Resources and Hydraulic Data of Saipan, Mariana Islands; USGS Survey, Water-Resources Investigation Report 81-4121. pp 568.

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Maui 4 Shaft Well

Maui 1 Shaft Well

Acknowledgements
GHD
USGS
AWWA
MWH

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MWH

Prezi

The slide features a satellite map of Saipan, CNMI, with two callouts: 'Maui 4 Shaft Well' pointing to the northern coast and 'Maui 1 Shaft Well' pointing to the southern coast. The slide includes logos for AWWA-HIWPS, Research Section, Commonwealth Utilities Corporation, and GHD. It also lists 'Acknowledgements' for GHD, USGS, AWWA, and MWH. The date 'April 14, 2015' and the presenter's name 'Yvonne Cabrera' are also present.