

*An Overview of the State of
Hawaii's Deep Monitor Well
Program*

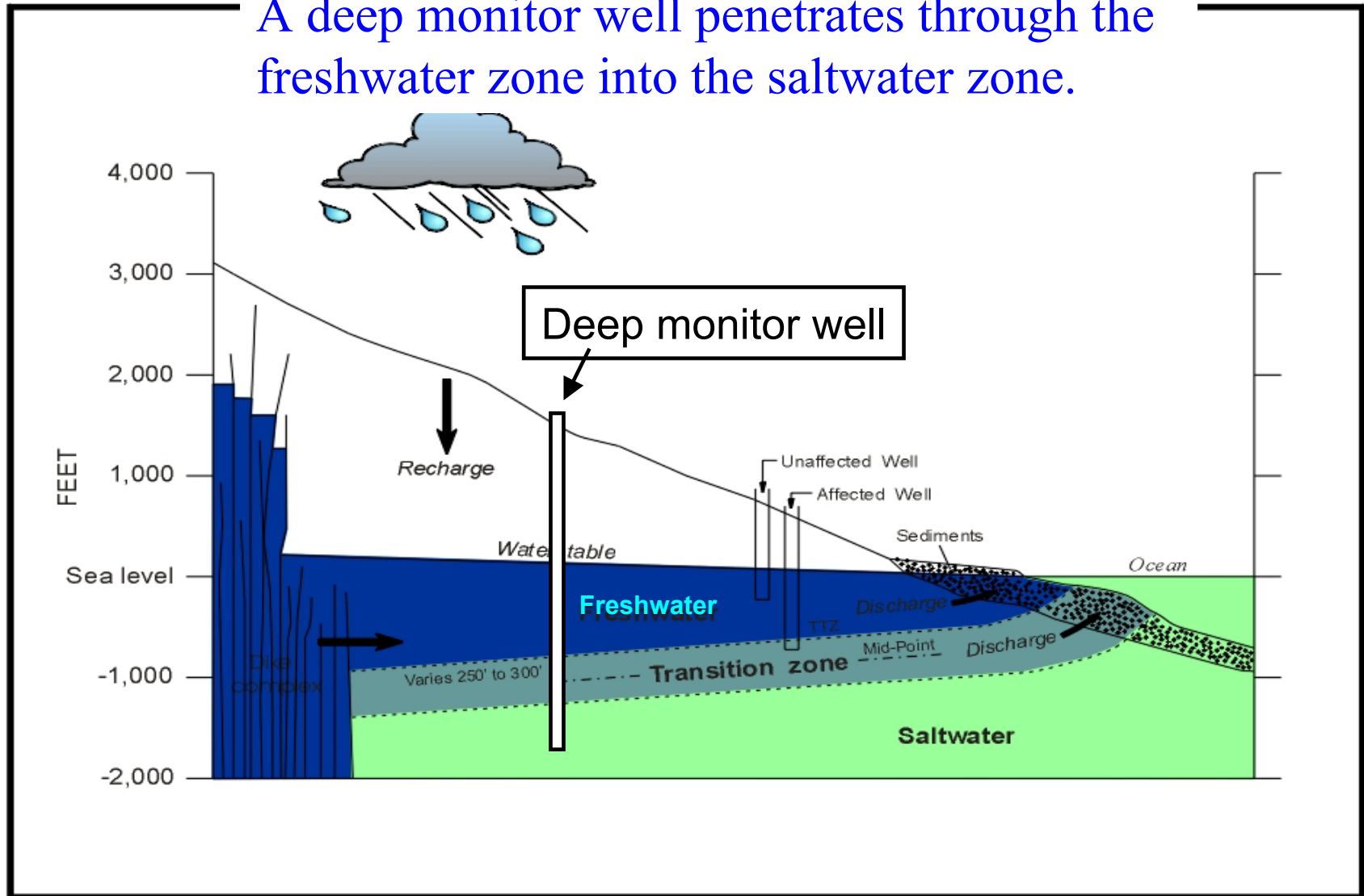
What is a deep monitor well?

It's not just another hole in the ground....

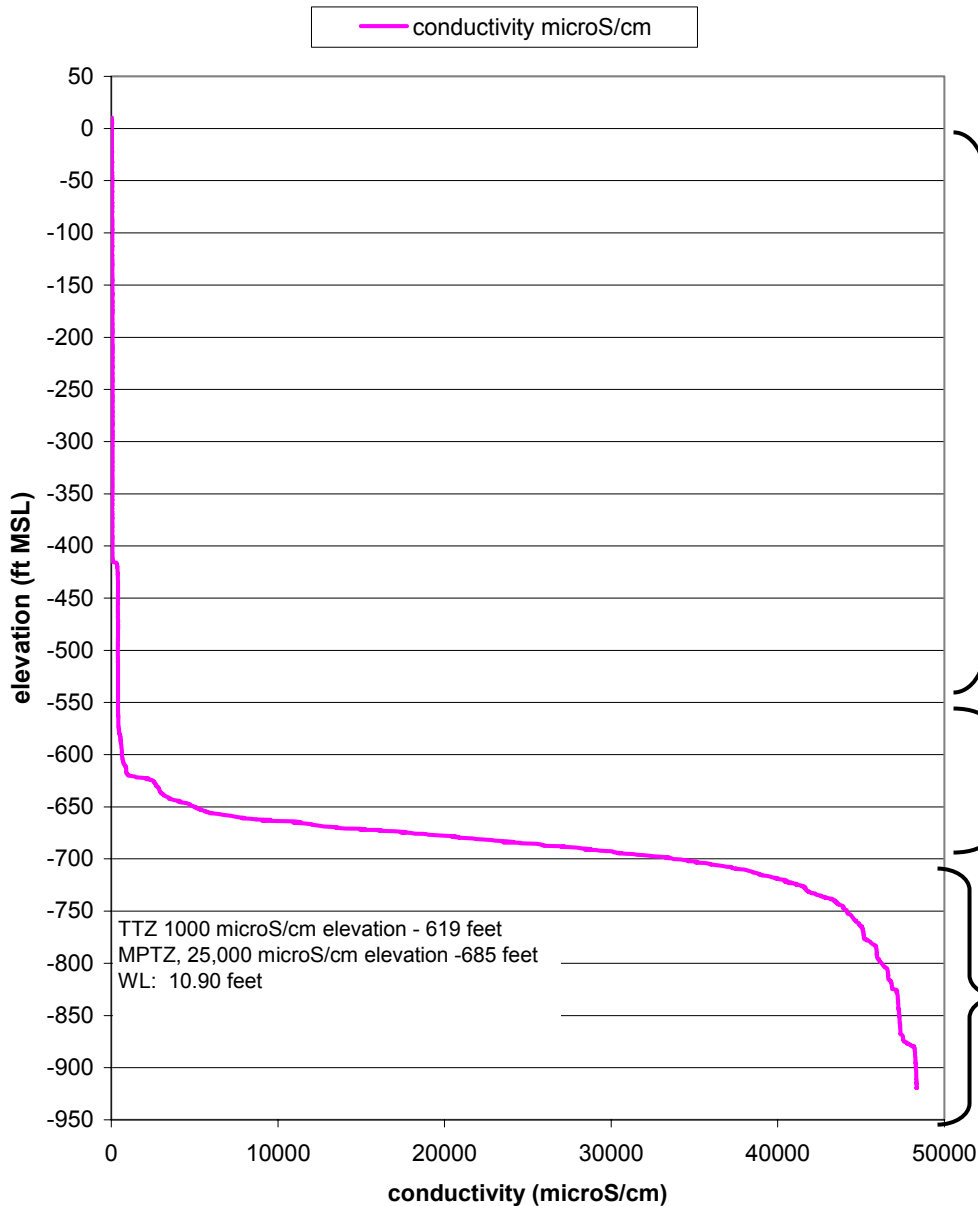
- It is used to detect changes in the thickness of the freshwater lens
- It provides access to study the entire water column
- It can also be used as a water level observation well
- Other researchers have used deep monitor wells to sample the water chemistry at depth.

Monitor Wells

A deep monitor well penetrates through the freshwater zone into the saltwater zone.



Waiehu Deep Monitor Well (5430-05) CTD
April 29, 2004



This is a graph of conductivity data collected from a deep monitor well. Conductivity is an indicator of how much seawater is mixed with the freshwater. The top of the transition zone (1000 microS/cm) is about 2% seawater. The midpoint of the transition zone (25,000 microS/cm) is about 50% seawater.

Freshwater zone

Transition zone

Saltwater zone

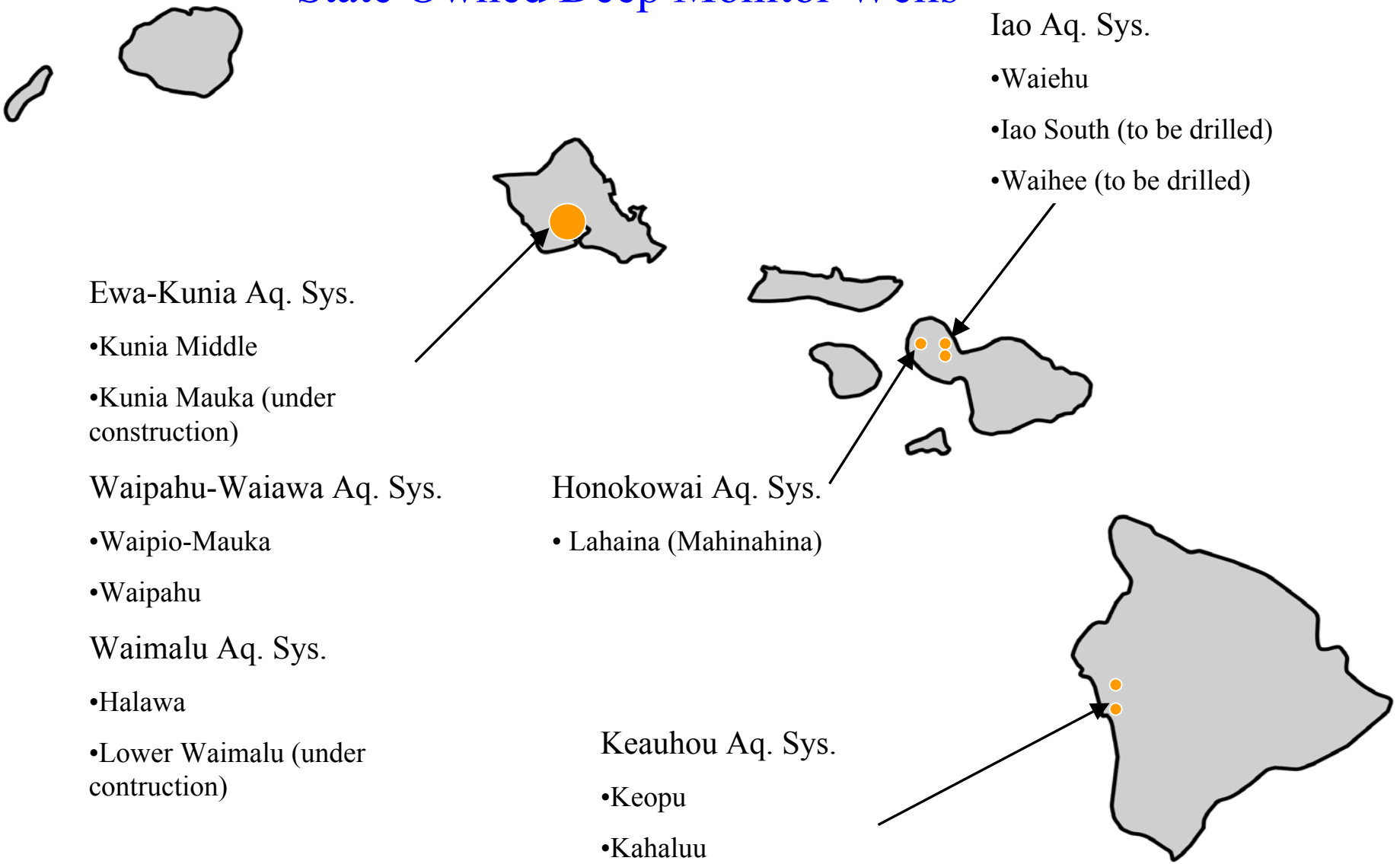
Statewide Program

(Wells Owned by the State)

- Oahu
 - 4 existing wells in the Pearl Harbor Sector
 - 2 wells under construction
- Maui
 - 1 existing well in the Iao Aquifer System (Waiehu)
 - 1 to be drilled next year in Iao (south of Iao Stream)
 - 1 to be drilled in Waihee Aquifer System
 - 1 existing well in the Honokowai Aquifer System, Lahaina (Mahinahina)
- Hawaii
 - 2 existing wells in the Kailua-Kona Region

The Honolulu Board of Water Supply
and the U.S. Geological Survey also
own and collect data from deep
monitor wells

State Owned Deep Monitor Wells



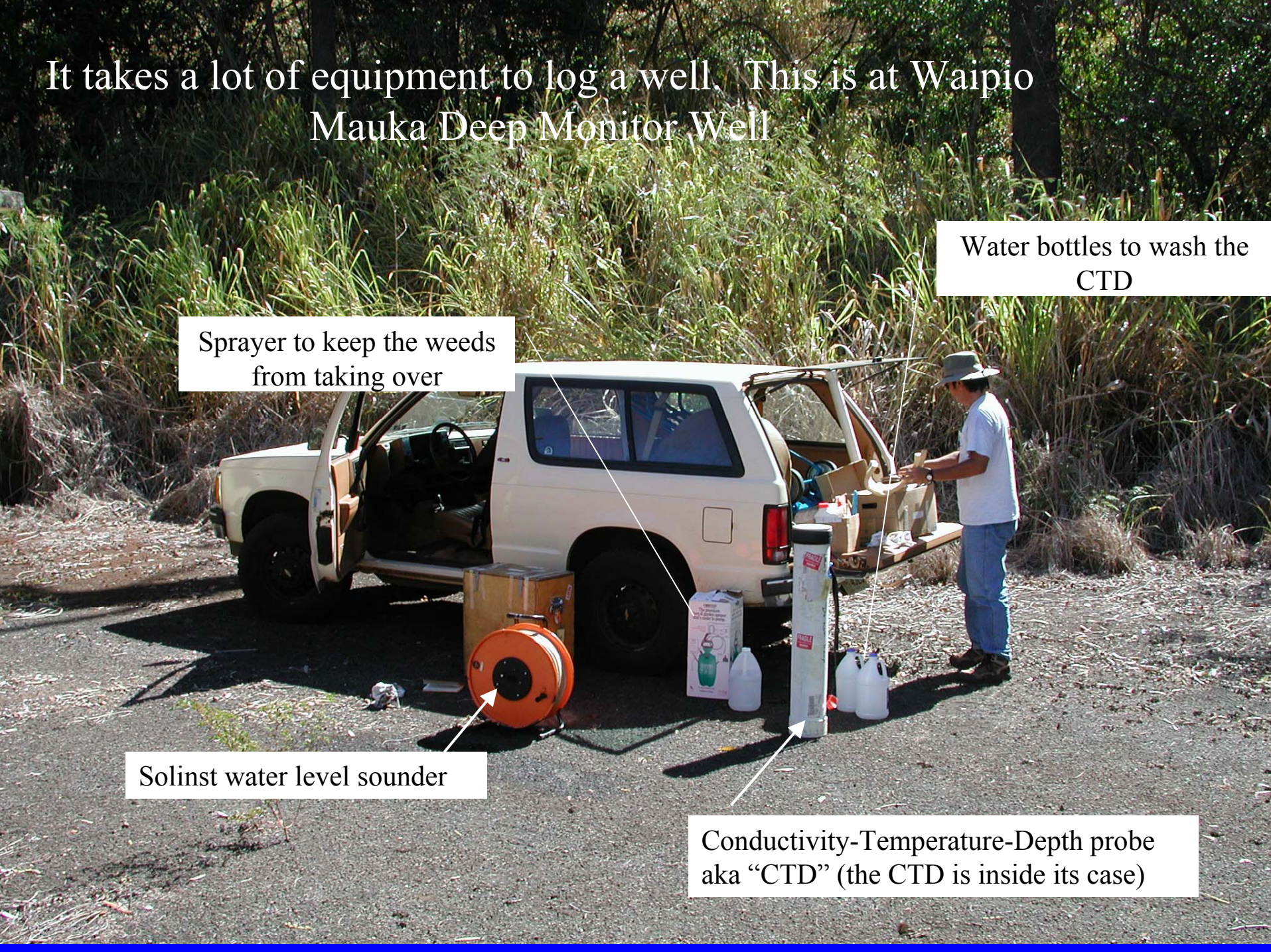
It takes a lot of equipment to log a well. This is at Waipio
Mauka Deep Monitor Well

Sprayer to keep the weeds
from taking over

Water bottles to wash the
CTD

Solinst water level sounder

Conductivity-Temperature-Depth probe
aka "CTD" (the CTD is inside its case)



Waiehu Deep
Monitor Well, Maui



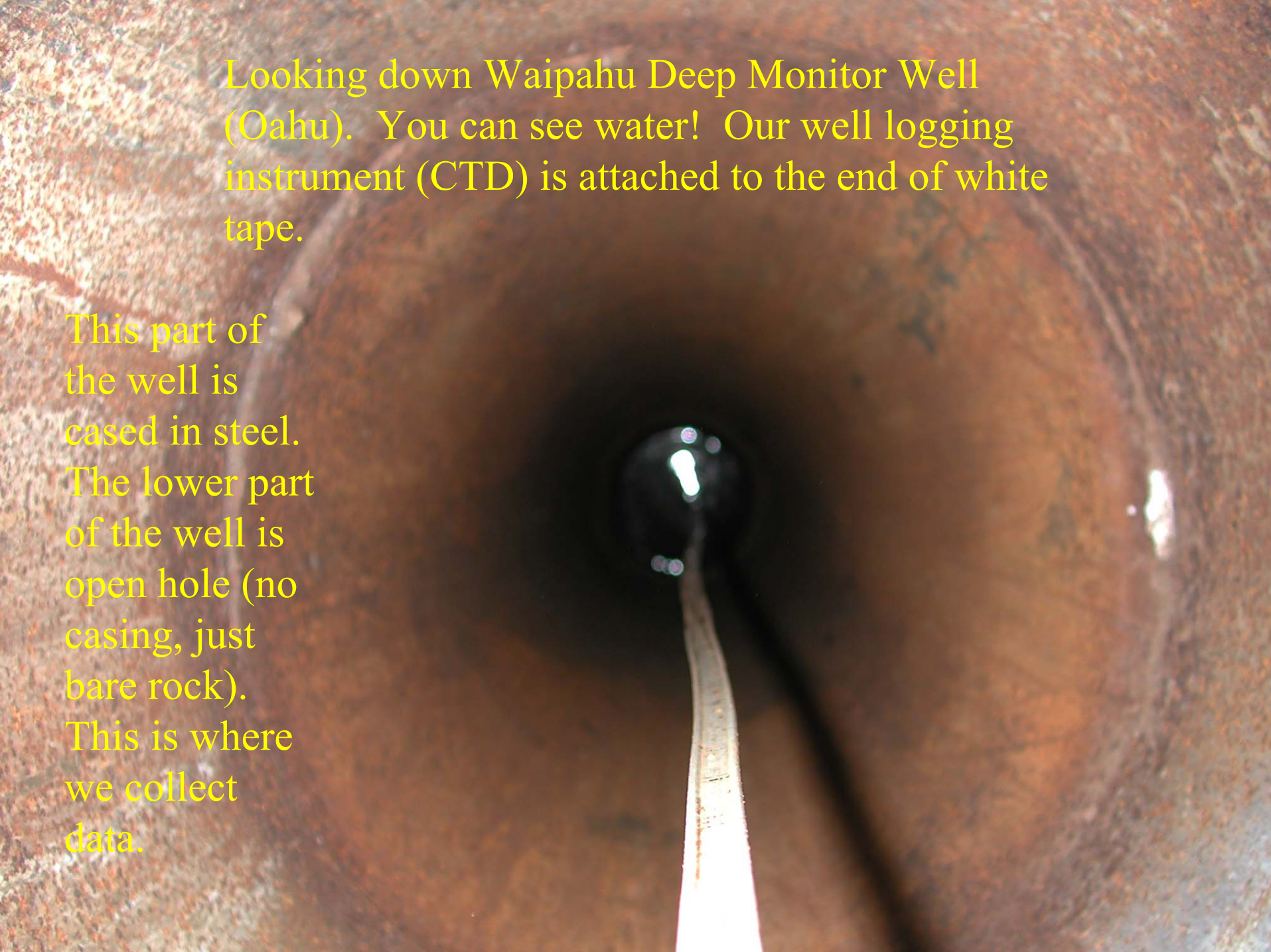
*Conductivity
Temperature
Depth Probe
(CTD)*

We lower the CTD down the well by hand
at about 1 foot/second.



Logging Mahinahina Deep Monitor Well, Maui



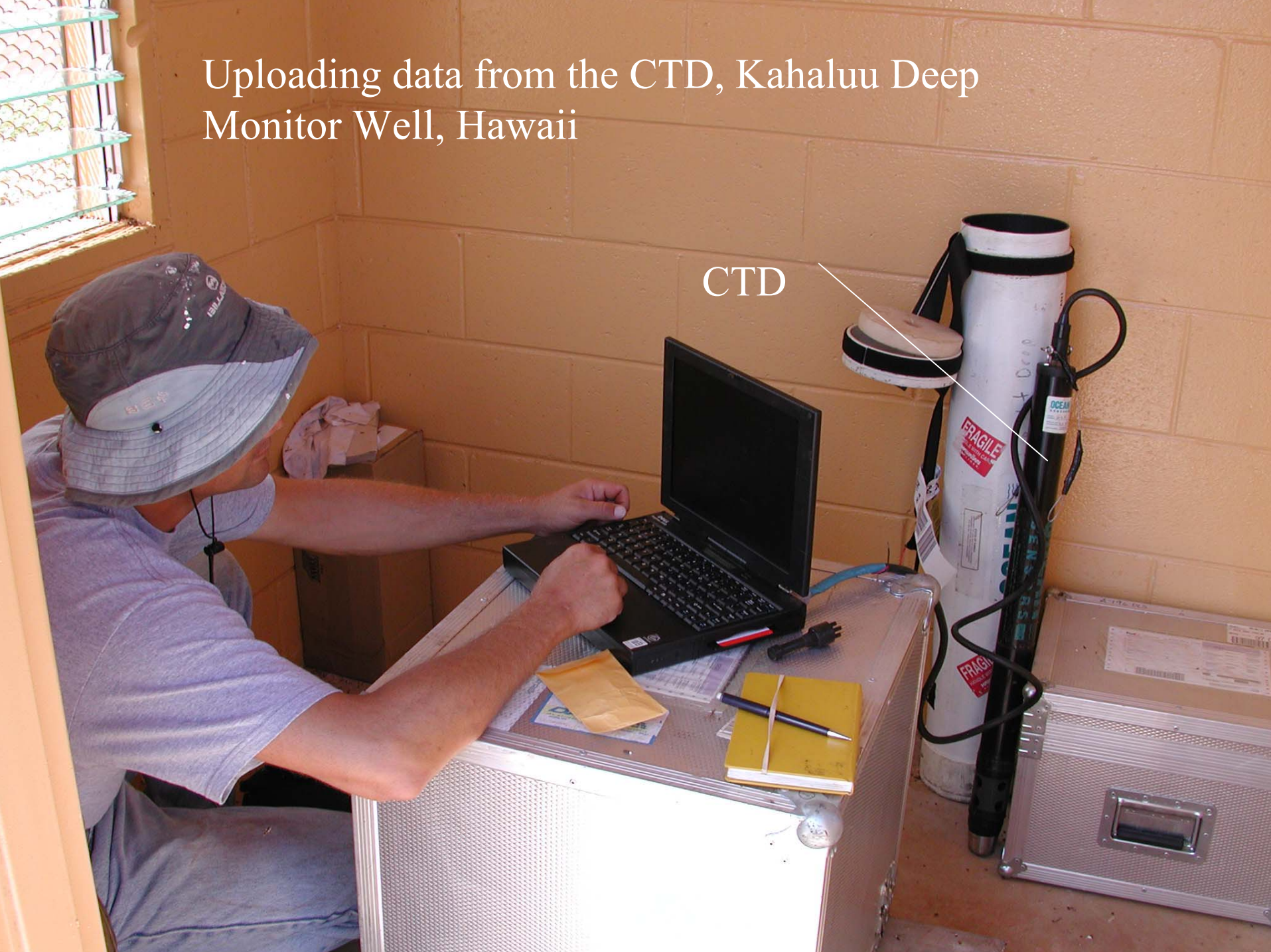


Looking down Waipahu Deep Monitor Well (Oahu). You can see water! Our well logging instrument (CTD) is attached to the end of white tape.

This part of the well is cased in steel. The lower part of the well is open hole (no casing, just bare rock). This is where we collect data.

Uploading data from the CTD, Kahaluu Deep Monitor Well, Hawaii

CTD



Practical Application of the Data Collected

- Data used to manage ground-water resources in designated ground-water management areas.
- Provide insight into regional hydrology.
- Provide data to construct analytical and numerical ground-water models

Future Deep Well Sites

- Primary locations:
 - Where the aquifer is a major potable resource and/or is being heavily pumped (examples Iao, Pearl Harbor).
 - Where there is uncertainty about the sustainable yield, and the correlation between pumpage and movement of the mid-point (example Waihee).
- Secondary locations:
 - Collect baseline data from an aquifer before it is developed to capacity (examples Kailua-Kona, Lahaina).
 - Where an additional well in an aquifer will provide greater understanding of the ground-water hydrology (example Pearl Harbor).