

# 2013 Training Hawaii Well Construction & Pump Installation Standards - HWCPIS

#### 1st Annual Joint State Water Conference January 14-18, 2013

Roy Hardy, P.E.
Hydrologic Program Manager
Commission on Water Resource Management
roy.hardy@hawaii.gov 808-587-0274











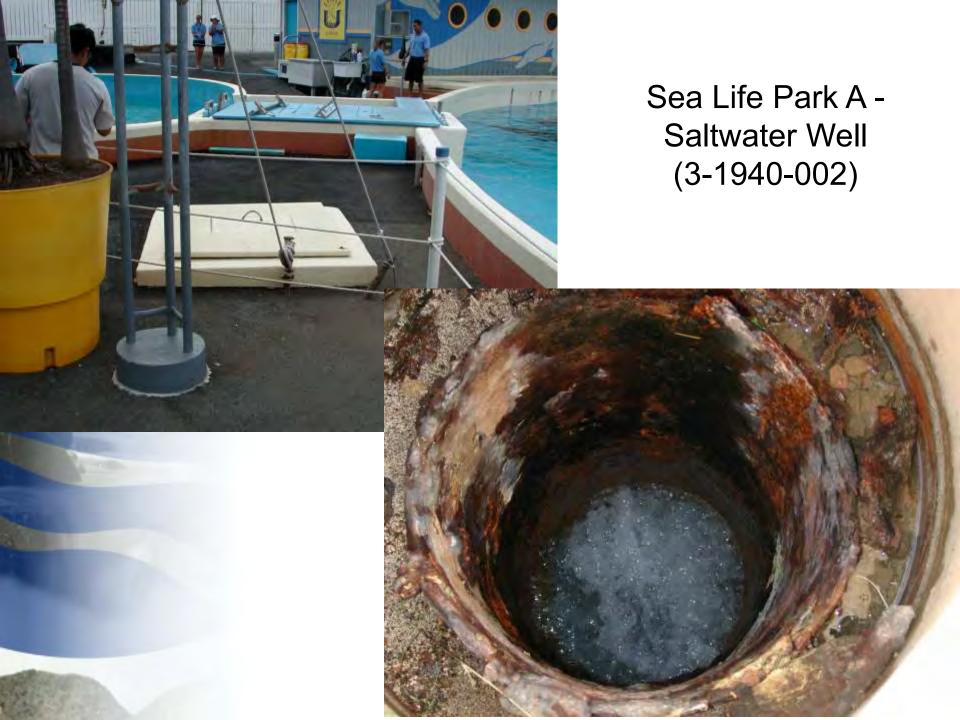






MDWS Kanoa I Production Well (6-5731-002)







# **Training Outline**

Authority & Purpose

Background & Scope

# **HWCPIS** Considerations

- Regulatory
- Well Construction Details
- Pump Installation Details
- Reporting Responsibilities







## **Authority & Purpose**

- HRS 174C-86: The Commission shall adopt minimum standards for well construction and pump installation... to ensure safe and sanitary maintenance and operation wells, to prevent waste, and to prevent contamination of ground water.
- **HAR** 13-168-14: Requires the Commission to adopt minimum standards for:
  - ✓ Well construction
  - ✓ Pump and pumping equipment installation, repairs, and replacements, and specifications
  - ✓ Abandonment and permanent sealing of wells



### **Authority & Purpose**

HRSminiminstallamainteand to



- HAR 13-168-14: Further, as amended in 1997 when standards were first adopted:
  - ✓ Incorporated into administrative rules by reference



# **Authority & Purpose – Simply Stated**



# The reasons for well standards are to:

- protect aquifers
- prevent well contamination
- maintain resource sustainability



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- CWRM adopted first HWCPIS in 1997
- Updated in 2004, & new Commission policy to review and update every 5 years
- CWRM staff behind but working on update
  - ✓ Increase ease of use and clarity
  - ✓ Address comments, concerns, and FAQs from water resource professionals and contractors
  - ✓ Refine minimum requirements for well construction to ensure water resources are protected



#### COMMISSION ON WATER RESOURCE MANAGEMENT

Ke Kahuwai Pono

The trustee who aversees the rightful during of water

NEWS & EVENTS INFORMATION PLANNING

SURFACE WATER GROUND WATER

#### Well Construction and Pump Installation Standards



improperly and inadequately constructed wells can cause poliution, or increase the chances of salt-water intrusion to ground water sources to the point of requiring cessation of use or expensive treatment before use. The Hawmi State Water Code and the Administrative Rules of the Department of Land and Natural Resources require the Commission on Water Resource Management to develop minimum standards for the construction, modification, repairmaintenance

and seeling/abandonment of wells in order to protect the quality and quantity of Hawas's ground-

The Hawaii Well Construction and Pump installation Standards were amended to the Hawaii Administrative Rules in January 1997, and have subsequently been revised in February 2004. In accordance with the State Water Code, and as stated in \$13-168-14. HAR, the goal of the standards is to 'ensure the safe and santary maintenance and operation of wells, the prevention of waste, and the prevention of contamination of ground water aquiters "

To Click to view the Hawrii Well Construction and Pump Installation Standards (225 KB)

#### Free Online Training for Homeowners with Water Wells

Class is a fiee, step-by-step education of understand groundwater basics, well care best practices, and how to find assistance. If will also teach well owners how to sample their well, how to interpret sample results, and what they can do to protect their well and source water from contamination. The program combines a 10-part online class with live, interactive webinar events in which the material will be reinforced and questions answered. Steve Wilson, a groundwater hydrologist with the Illinois State Water Survey with over 20 years of experience working with private well owners, will serve as the primary instructor for The Private Well Class. To register, please visit. http://privatewelkilass.org



- Activities
- · Hydrologic Linits
- Well information Request
- Well Standards

Free Online Training for Homeowners

- Water Management Areas
- Water Use Reporting







Department of Land and Natural Resources COMMISSION ON WATER RESOURCE MANAGEMENT

> HAWAII Well Construction & Pump Installation STANDARDS

> > Honolulu, Hawasi Revised February 2004



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#### **CWRM Standards and Permits**

- Well Construction Permit
  - ✓ Required statewide (production, permanent monitor, or sealing of these wells)
  - ✓ C-57 license required (DCCA) & WCP issued to C-57
  - ✓ New or modification construction
  - ✓ Not required for geotechnical holes (structural), test borings, temporary monitoring wells, injection & dry wells (DOH & County), or geothermal wells (DLNR)
- Pump Installation Permit
  - ✓ Required statewide
  - ✓ C-57, C-57a, or A license required (DCCA) & **PIP** issued to licensed contractor
  - ✓ New or increases in existing pump capacity
  - ✓ Not required for new pumps with same capacity as existing pump in well or routine maintenance



**CWRM Standards and Permits** 

- **Ground Water Use Permits** 
  - ✓ GWUP issued to well owner
  - ✓ Required in designated Ground Water Management Areas
    - All of Oahu except Waianae area



lao Aquifer on Maui



- ✓ Can drill exploratory well (WCP) without GWUP
- ✓ No PIP without GWUP



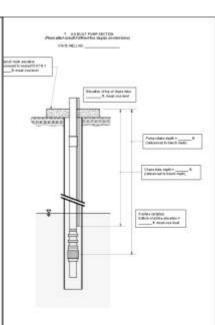
**CWRM Standards and Permits** 

- Routine Maintenance
  - ✓ No WCP or PIP required
  - ✓ Appropriate completion reports are required typically pump restoration

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#### **CWRM Standards and Permits**

- Emergencies
  - ✓ Not addressed in HRS or HAR
  - ✓ However, by reference in HWCPIS allowable to do emergency work without permit so long as CWRM immediately notified and within 60 days of completion report submitted
  - ✓ Emergency to prevent or minimize loss of life, risk to public health and safety, or damage to property
  - ✓ If permit required and not an emergency, CWRM may levy fines of up to \$5,000/day.



## **Other standards may apply**

- Other governmental agencies in Hawaii have critical roles in preventing contamination of water resources, aquifer protection, and maintaining safe drinking water sources
  - ✓ State Department of Health (DOH)
  - ✓ County Hawaii Water System Standards (2002 as amended)
- Professional and trade organizations
  - ✓ AWWA, ASTM, NSF, ANSI
- More stringent controls than minimum standards may be required to achieve water resource protection goals

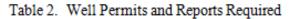
# Regulatory Considerations Other standards may apply Department of Health – Well Construction



DOH permits and requirements

- ✓ NPDES general permit for "treated wastewater effluent" associated with drilling activities
  - Authority: § 11-55, App. I, HAR
  - Well drilling slurries, lubricating fluids wastewater, well purge wastewater
  - Notice of Intent & filing fees to DOH for coverage under general permit
  - Well construction permit holder responsible to comply
- ✓ Regulation of construction noise





Well Type	Proposed Activity		Applicable Well Standards		
		Permit	Report	Enforcing Agency	
Water Well (fresh, brackish, & salt water)	Drill new well. Modify existing well. Redrill existing well. Deepen existing well. Abandon/seal existing well.	Well Construction	Well completion report.  Well abandonment/sealing report.	Commission	These Standards
	Install new pump.  Modify existing pump to a larger capacity.  Replace existing pump with a larger pump.	Pump Installation	Well completion report.	Commission	These Standards
Monitor Well	Drill new well or modify an existing well. Abandon/seal existing well.	Well Construction	Well completion report.	Commission	These Standards
Injection Well	Construct; Operate; Modify; Abandon/Seal.	Underground Injection Control (UIC)	Refer to Chap. 11-23, HAR	State Department of Health	Chapter 11-23, HAR
Geothermal Well	Drill; Modify; Modify use; Abandon/seal.	Geothermal	Refer to Chap. 13-183, HAR	State Department of Land & Natural Resources	Chapter 13-183, HAR
Test Boring	Excavate/drill. Abandon/seal.	None	None	None	None
Drainage wells	Construct; Operate; Modify; Abandon/Seal.	Underground Injection Control (UIC)	Refer to Chap. 11-23, HAR	State Department of Health	Chapter 11-23, HAR

Note:

- (1) New water wells to be used to supply a public water system must meet the requirements of Chapter
- 11-20, entitled, "Rules Relating to Potable Water Systems" of the State Department of Health.
- (2) Test borings related to UIC and/or environmental monitoring or remediation are subject to the State Department of Health.

HAR = Hawaii Administrative Rule.





# **Training Outline**

Authority & Purpose

Background & Scope

# **HWCPIS** Considerations

- Regulatory
- Well Construction Details
- Pump Installation Details
- Reporting Responsibilities



- Location
- Depth limitations
- Pump Tests
- Casing
- Grouting Annulus
- Well Pad
- Benchmarks
- Capping
- Water Level Measurement Access
- Sealing/Abandonment



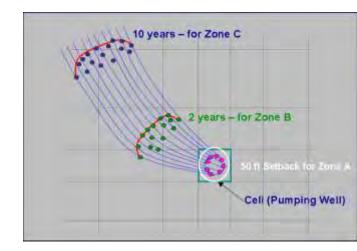


#### Location



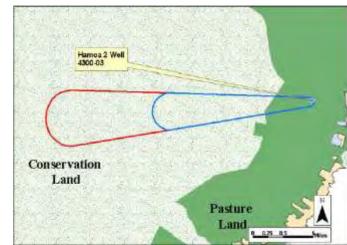
Shall be sited away or upgradient from pollution sources

- ✓ Public wells (15 connections or 25 individuals DOH definition)
  - 1000 ft. from pollution source
  - SWAP considerations
- ✓ Private wells at their own risk

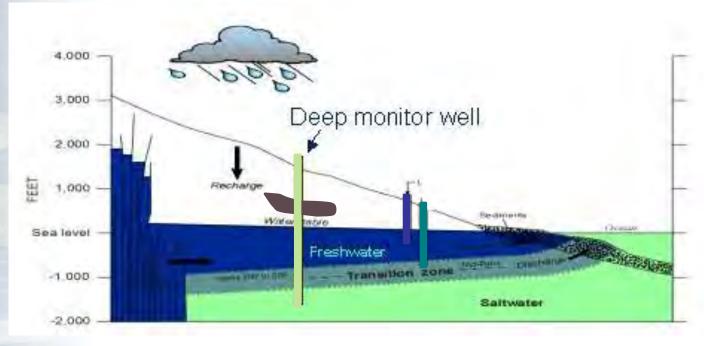


#### DOH review considered

- ✓ Environmental Management Division
  - CWB, SDWB, WWB, also HEERO
- ✓ SWAP Source Water Assessment Program - long list of risk levels and capture zone delineations



Depth limitations



Only one aquifer can be tapped at a time:

✓ Prevents cross-contamination between aquifers

Basal aquifers 1/4 depth limitation

✓ Optimization & prevention of upconing contamination



Saltwater wells must go to ≥ 17,000 ppm cl-

#### Pump Tests

To assess behavior of the source

✓ Local well & aquifer sustainability

#### Step-Drawdown for wells ≥ 70 gpm

- ✓ Determine well specific capacity & hydraulic conductivity
- ✓ Chloride sensitivity to pumping

#### Constant Rate for wells ≥ 50 gpm

- ✓ Determine aquifer storage coefficient & boundaries (streams)
- ✓ Chloride sensitivity to pumping

Table 8. Minimum Test Period for Constant-Rate Tests

Proposed Use of Well	Proposed Capacity (gpm)	Minimum Test Period (hours)
Non-Public Water	0 - 50	0
Supply	51 - 100	8
	101 - 300	24
	301 - 700	48
	701 - 1000	72
	1001 +	96
Public Water Supply		96



### Casing

Materials allowed

- ✓ Carbon Steel
- ✓ Stainless Steel
- ✓ ABS
- ✓ PVC
- √ Thermoset



No Minimum Casing Diameters for Water Supply Wells.

✓ The driller or consultant can determine the proper diameter for the casing

#### Length/Depth of Solid Casing

- ✓ ≥ 90% depth to water (unconfined)
- ✓ Enough to prevent leakage (confined)
- ✓ Saltwater Wells : all the way to saltwater (≥ 17,000 ppm cl-)

Top of casing ≥2 ft. above 100-yr flood elev when capped



## Grouting Annulus

#### Materials allowed

- ✓ Neat cement
- ✓ Concrete
- ✓ Cement-bentonite
- ✓ Sand-cement slurry
- ✓ Bentonite
- ✓ Cement must conform to ASTM C150 Type I

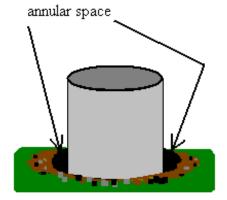
#### Minimum Annulus Width

- ✓ Positive Displacement (1.5-inch annulus)
- ✓ Non-positive Displacement (2-inch annulus)
- ✓ Public System Non-positive Displacement (3-inch annulus)

#### Minimum Depth of Grout

- ✓ 70% depth to water or 500 ft., whichever is less.
- ✓ Enough to prevent leakage (confined/perched aquifers)
- Saltwater Wells: all the way to saltwater (≥17,000 ppm cl-)







## Grouting Annulus

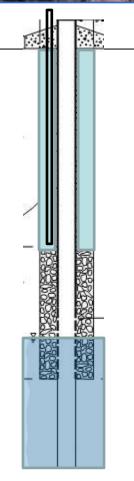
#### Rock/Gravel Pack

- ✓ Locally produced
- ✓ Basaltic
- ✓ Larger than slotted casing openings
- ✓ Disinfected before placement
  (drenched with 100 mg/l chlorine solution)

#### Placement of Grout

- ✓ Soon as possible after casing installed
- ✓ Positive Displacement
- ✓ Non-positive Displacement
  - (tremie pipe freefall [gravity])
  - (freefall ok for ≤ 20 ft. below ground surface)
- ✓ 200 ft. lift limit for PVC casing







#### Well Pad

To Protect Well Head

#### Concrete Base

- ✓ Water tight contact with annular seal & casing
- ✓ ≥ 4 inches thick
- ✓ Slope away from casing

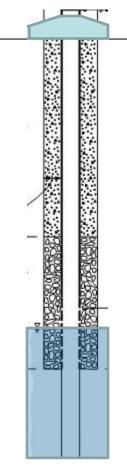
#### Pits or Vaults

✓ Should be avoided

#### Protection from Vehicles

✓ Shall install steel posts or equivalent where there is significant traffic







#### Benchmarks

To provide for accurate

- ✓ Elevations
- ✓ Well Dimensions
- ✓ Aquifer information
- ✓ Well number ID





- ✓ Public water supply wells
- ✓ Private
  - ≥ 70 gpm pump capacity
  - Deferred for ≤ 70 gpm pump capacity
- ✓ Not required for saltwater wells
- ✓ Licensed surveyor (DCCA)







## Capping

To prevent unauthorized entry into non-pumping wells

#### Required

- ✓ Lockable Cover
- √ Or
- ✓ Casing Cap
  - 1 ½ inch diameter

Sanitary cap (optional)

#### If Vented

- $\checkmark \ge 1$  ft. above ground
- ✓ turned down
- ✓ screened





#### Water Level Measurement Access

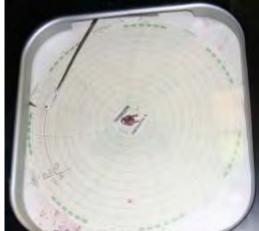
#### Required for

- ✓ Public water supply wells
- ✓ Wells with ≥ 70 gpm capacity
- ✓ Wells with casing diameter ≥ 6 in. I.D.

#### Methods

- ✓ Airline
- ✓ Sounding /chase tube (≥ ¾ in. I.D.)
- ✓ Permanent transducer
- ✓ Others must be approved by Chairperson





### **Well Construction Details**

## Sealing/Abandonment

Materials allowed:

- ✓ Neat cement
- ✓ Concrete
- ✓ Cement-bentonite
- ✓ Sand-cement slurry
- ✓ Bentonite not allowed for brackish or salt wells
- ✓ Cement must conform to ASTM C150 Type I
- ✓ In extreme cases gravel allowed with approved variance

Material used depends on section of well

Casing must be perforated if no record of grouted annulus

Entire length of hole must be filled

Special attention to artesian well situations

✓ Video logs, Packers, discussion with staff





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- Pump Types
- Mercury seals not allowed
- Cross Connections
- Flow Meters





Pump Types

Must conform to ANSI/AWWA E101-88

- ✓ Vertical turbine pump-line shaft
- ✓ Submersible
- ✓ Centrifugal

#### Lubrication

- ✓ Water preferred
- ✓ Oil conforms to USDA or FDA food contact grade

### Mounting

- ✓ Reinforced pad may be required
- ✓ Effective seal between pad and all pumping equipment









**Mercury Seals not are allowed** 







### Cross Connections

Must eliminate potable and non-potable cross connections

- ✓ Backflow preventors
- ✓ Air Gaps

### Chemigation

✓ Backflow prevention acceptable to DOH in accordance with 149A-31(6) HRS





### Flow Meters

All non-saltwater pumping wells require a totalizer installed at manufacturer's specifications

- ✓ To track stresses placed on the public trust resource
- ✓ To meet well owner pumping report required by rule, under HAR 13-168-7 Report of Water Use
- ✓ If owner refuses to allow contractor to install we allow contractor to finish but well owner must install and report installation before using well.





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- Well Construction Report
- Pump Installation Report
- Meter Installation Report
- Certificates of Completion

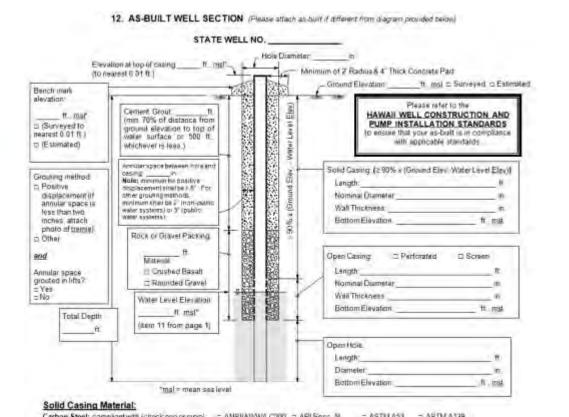




### Well Completion Report

Must submit to Commission within 60-days of completion

Use online forms

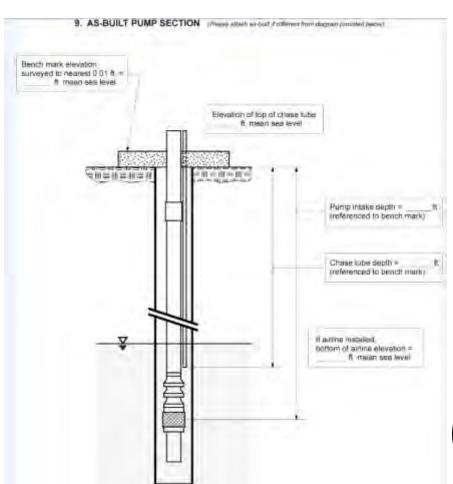




### Pump Installation Report

Must submit to Commission within 60-days of completion

Use online forms





### Certificates of Completion

### Certificate of Well Construction Completion

- ✓ Acceptable WCR to contractor
- ✓ CWCC to landowner of well
  - ✓ Landowner becomes responsible for sealing

### Certificate of Pump Installation Completion

- ✓ Acceptable PIR to contractor
- ✓ CPIC to well owner operator
  - ✓ Well owner responsible for pumpage reports
- ✓ Not issued if meter not installed where required
  - Well cannot be pumped
  - CPIC when well owner submits acceptable meter installation report



### **MAHALO**

see http://hawaii.gov/dlnr/cwrm/



