



# Water Meter Replacement Program



**TOM MOODY**  
**GENERAL MANAGER**

September 29, 2021

# Council Consideration

What is the appropriate age for water meter replacement to minimize revenue loss due to decreased meter efficiency ?

# Agenda

- ◆ Overview
- ◆ Case Study
- ◆ Analysis
- ◆ Recommendations

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# Overview

# Meter Replacement

|                | 10 Years | 15 Years + | Broken | Volume |
|----------------|----------|------------|--------|--------|
| City of Corona | X        |            |        |        |
| Western        |          | X          |        |        |
| Norco          |          |            | X      |        |
| Elsinore       |          |            |        | X      |
| TVWD           |          |            | X      |        |

# Case Study

Determining The Economical Optimum Life Of  
Residential Water Meters

Dr. Hans D. Allender, P.E.

Published In The Water And Wastes Digest; Dec 28,  
2000

# Anne Arundel County

- ◆ **Current population – 586,656**
- ◆ **Total Square miles – 588**
- ◆ **Annual rain fall – 42 to 44 inches**
- ◆ **Annual snow fall – 14.1 inches**
- ◆ **Water production and distribution**
  - Each year, the Bureau produces, treats, and safely delivers nearly 13 billion gallons of public water to more than 110,000 properties
  - This is an average 118,200 gallons per meter annually
    - According to the agency's statistics, a typical household is composed of four persons and consumes about 108,000 gallons of water per year.

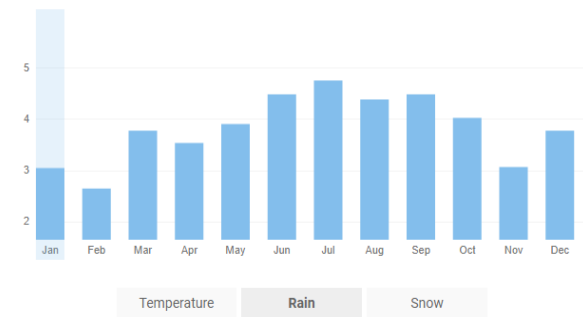
## Weather history for Anne Arundel County, Maryland

Average rainfall

January

3.05 in | cm

Rain 18 days  
Snow 12 days  
Avg temps 44° / 27° F



Current forecast · Radar map · Data from Weather Trends

# Study

## ◆ Flow

- ◆ Low flow 0 to 0.25 gpm
- ◆ Intermediate flow 0.25 to 2 gpm
- ◆ High flow 10 gpm

## ◆ Consumption (pattern of use)

- ◆ Low flow 12%
- ◆ Intermediate flow 86%
- ◆ High flow above 2 %

# Formula

Determine the meter accuracy at each flow rate

Multiply the meter accuracy and the corresponding consumption rate

Add each group together for real meter accuracy



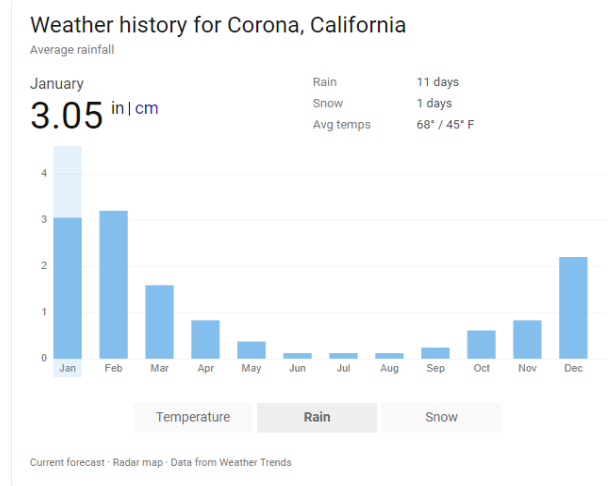
# Anne Arundel Results

The results of the study showed a loss of about .6% at year 15 with diminishing accuracy over time. Based on the results and continued diminishing accuracy, an economic replacement at year 16 to avoid future losses was recommended.

# Analysis

# Corona

- ◆ **Current population – 172,652**
- ◆ **Total Square miles – 39**
- ◆ **Annual rain fall – 12.2 inches**
- ◆ **Annual snow fall – 0.12 inches**
- ◆ **Water production and distribution**
  - Each year, the utilities department produces, treats, and safely delivers on average 9.7 billion gallons of water to more than 43,500 properties
  - This is an average 222,988 gallons per meter annually
    - The department's three-year average of single family and multi-family meter data shows an average of 203,000 gallons annually for residential water meters



# Volume comparison

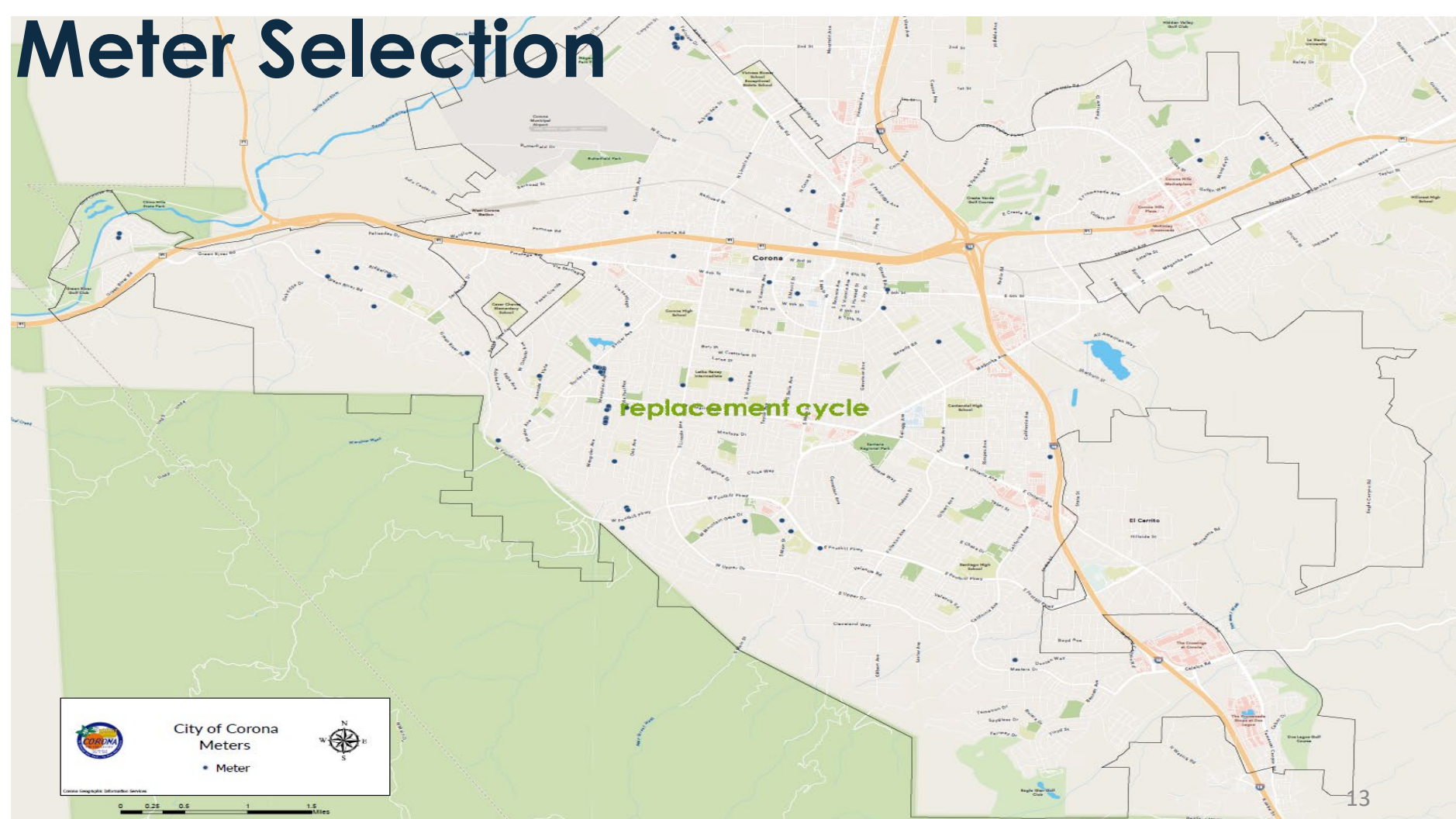
Total volume based on years for each agency

| Location | Gallons annually | Total volume at 16 years | Total volume at 20 years | Total volume at 25 years |
|----------|------------------|--------------------------|--------------------------|--------------------------|
| AAC      | 108,000          | 1,728,000                | 2,160,000                | 2,700,000                |
| Corona   | 203,000          | 3,248,000                | 4,060,000                | 5,075,000                |

Time to get to the Anne Arundel County volume

| Location | Gallons annually | Total volume at 16 years | Total volume at 20 years | Total volume at 25 years |
|----------|------------------|--------------------------|--------------------------|--------------------------|
| AAC      | 108,000          | 1,728,000                | 2,160,000                | 2,700,000                |
| Corona   | 203,000          | 8.5 years                | 10.6 years               | 13.3 years               |

# Meter Selection



# Corona Meter Testing

|     | Low Flow<br>- 15%* | Intermediate<br>Flow - 70%* | High Flow<br>- 15%* | Weighted<br>Average | Pass \ Fail |
|-----|--------------------|-----------------------------|---------------------|---------------------|-------------|
| Age |                    |                             |                     |                     |             |
| New | 99.4               | 100.02                      | 99.97               | 99.92               | Pass        |
| 8   | 90.38              | 95.88                       | 98.99               | 95.51               | Fail        |
| 10  | 83                 | 94                          | 98.86               | 93.08               | Fail        |
| 12  | 81.86              | 93.13                       | 98.77               | 92.28               | Fail        |
| 14  | 75.00              | 91.13                       | 98.75               | 89.85               | Fail        |
| 15  | 76.13              | 96.25                       | 98.64               | 90.79%              | Fail        |

- Weighted average is the Pattern of use formula -  $MRL(pul) + MRI(pui) + MRH(puh)$
- \*Industry standard – (Future AMI DATA)

# Economics

Annual Average Cost of 3/4" Water Meters using GMS Test Results

| Years | Meter Cost | Cost of Use | Accumulated Cost | Average Cost Per Year | Revenue Loss* |
|-------|------------|-------------|------------------|-----------------------|---------------|
| 1     | \$ 169.28  | \$ -        | \$ 169.28        | \$ 169.28             | \$ -          |
| 2     |            | \$ -        | \$ 169.28        | \$ 84.64              | \$ -          |
| 3     |            | \$ -        | \$ 169.28        | \$ 56.43              | \$ -          |
| 4     |            | \$ -        | \$ 169.28        | \$ 42.32              | \$ -          |
| 5     |            | \$ -        | \$ 169.28        | \$ 33.86              | \$ -          |
| 6     |            | \$ -        | \$ 169.28        | \$ 28.21              | \$ -          |
| 7     |            | \$ -        | \$ 169.28        | \$ 24.18              | \$ -          |
| 8     |            | \$ 26.54    | \$ 195.82        | \$ 24.48              | \$ 1,620.40   |
| 9     |            | \$ 33.75    | \$ 229.57        | \$ 25.51              | \$ 14,578.60  |
| 10    |            | \$ 40.97    | \$ 270.54        | \$ 27.05              | \$ 47,376.45  |
| 11    |            | \$ 43.33    | \$ 313.87        | \$ 28.53              | \$ 95,712.84  |
| 12    |            | \$ 45.68    | \$ 359.55        | \$ 29.96              | \$ 158,945.85 |
| 13    |            | \$ 52.89    | \$ 412.45        | \$ 31.73              | \$ 248,945.68 |
| 14    |            | \$ 60.10    | \$ 472.55        | \$ 33.75              | \$ 368,473.54 |
| 15    |            | \$ 54.53    | \$ 527.08        | \$ 35.14              | \$ 482,042.90 |
| 16    |            | \$ 53.36    | \$ 580.43        | \$ 36.28              | \$ 598,659.00 |

\* Revenue loss is calculated by subtracting the lowest average cost per year(base year) from any given year, then

15 multiplying the value by the number of years beyond the base year and then the quantity of meters associated with the base year. Example: ((Y 10 – Y 7) x 3) x 5,500

# Summary of Analysis

## Usage

- Corona usage per meter is higher, almost twice the volume of the study group.

## Testing

- Test data shows meters eight (8) years and older have lower accuracy ranges than new meters.

## Economic evaluations

- The economical optimal life for meter change outs is 8 years

## Study

- The economic evaluation is using Corona specific data and is using the methodology outlined in the AAC study. A Corona specific study could be developed by a third party.



# Options

# Option #1: 8-year replacement cycle

Based on the data, adjust from a 10 year replacement cycle to an 8 year cycle.



## Pros

- City study supports earlier replacement time frame
- Minimizes revenue loss due to inefficiency

## Cons

- Increased annual cost to meter replacement program

# Option #2: 10-year replacement cycle

**Maintain the current 10-year meter replacement cycle**



## Pros

- Current program
- Volume, economics, and test data support program
- Minimal revenue loss

## Cons

- Revenue loss
- Data supports earlier replacement

# Option #3: 12/14/16 yr. Replacement Cycle

Adjust meter replacement program to a  
12, 14, or 16-year cycle



## Pros

- Lower annual cost of meter replacements

## Cons

- Replacement beyond year 10 has significant revenue loss
- Results in some residents subsidizing the cost of other residents water usage

# Summary of Options

|                | Option #1<br>Shorten Replacement Cycle                                                                                                                   | Option #2<br>Maintain Current Replacement Cycle<br>[RECOMMENDED]                                                                                          | Option #3<br>Extend Replacement Cycle                                                                                                                             |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Option summary | <ul style="list-style-type: none"> <li>Adjust meter replacement to an 8-year replacement cycle</li> </ul>                                                | <ul style="list-style-type: none"> <li>Leave meter replacement program on a 10-year replacement cycle</li> </ul>                                          | <ul style="list-style-type: none"> <li>Adjust meter replacement program to a 12, 14, or 16 year cycle</li> </ul>                                                  |
| Pros           | <ul style="list-style-type: none"> <li>City study supports earlier replacement time frame</li> <li>Minimizes revenue loss due to inefficiency</li> </ul> | <ul style="list-style-type: none"> <li>Current program</li> <li>Volume, economics, and test data support program</li> <li>Minimal revenue loss</li> </ul> | <ul style="list-style-type: none"> <li>Lower annual cost of meter replacements</li> </ul>                                                                         |
| Cons           | <ul style="list-style-type: none"> <li>Increased annual cost to meter replacement program</li> </ul>                                                     | <ul style="list-style-type: none"> <li>Some revenue loss</li> <li>Data supports earlier replacement</li> </ul>                                            | <ul style="list-style-type: none"> <li>Significant revenue loss</li> <li>Results in some residents subsidizing the cost of other residents water usage</li> </ul> |

# Council Consideration

What is the appropriate year for water meter replacement to minimize revenue loss due to decreased meter efficiency?

# QUESTIONS?



951-736-2477



Tom.Moody@CoronaCA.gov



www.CoronaCA.gov





[www.CoronaCA.gov](http://www.CoronaCA.gov)

