Indoor Water Conservation

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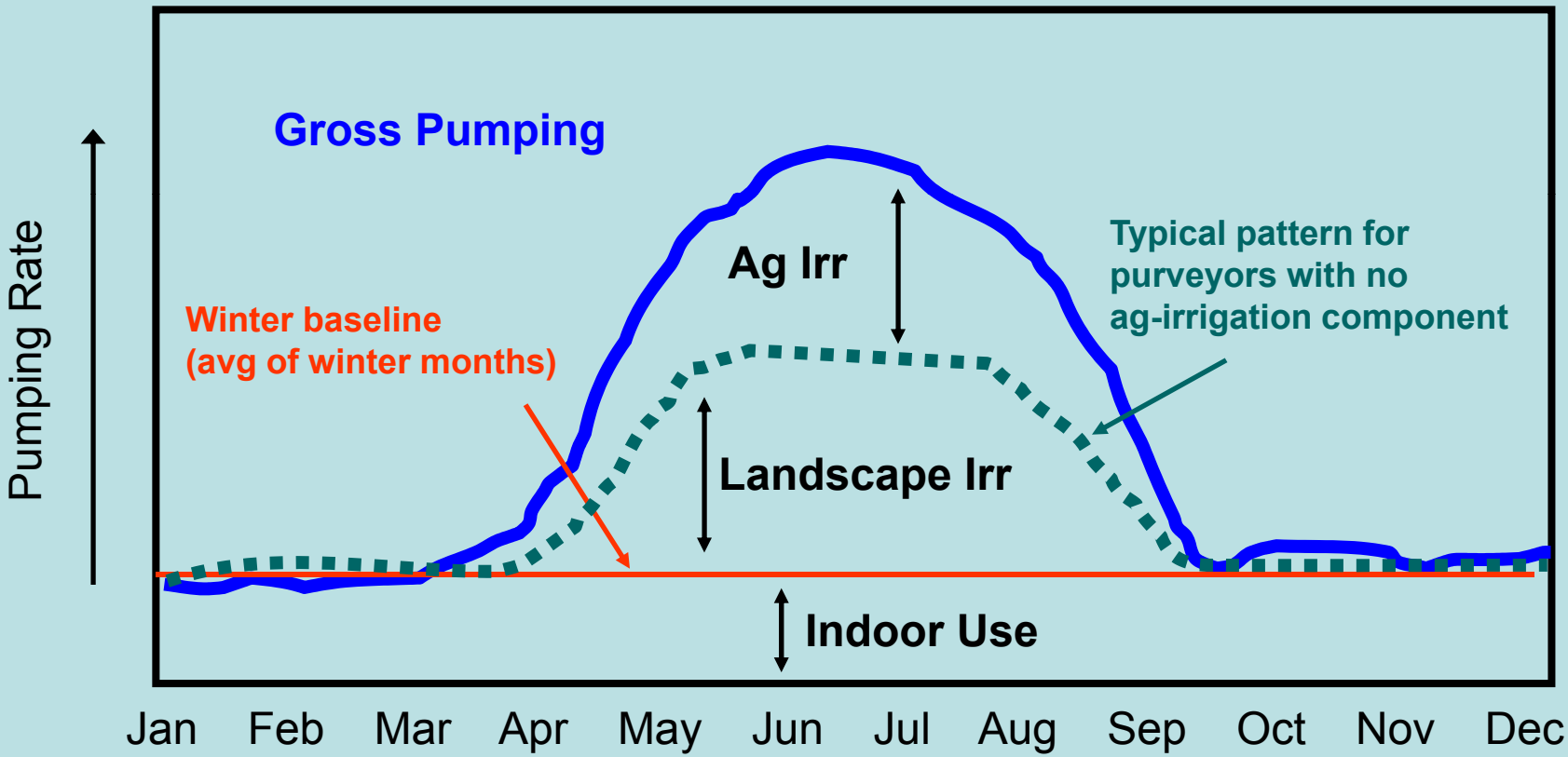
SPOKANE COUNTY

General Components of Water Use

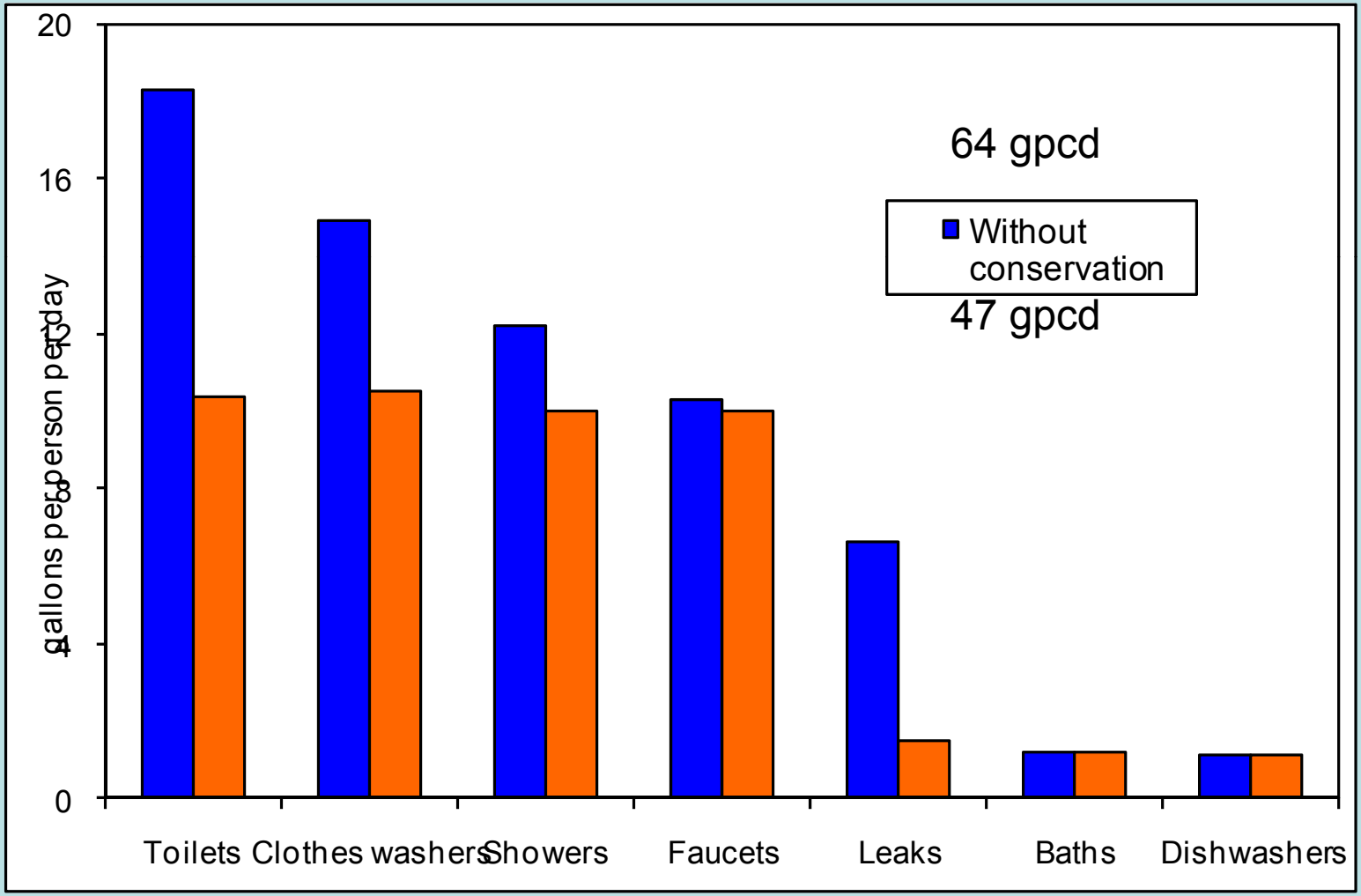


From Guy Gregory, Water Resources, WA Dept of Ecology, 2007

Indoor Water Conservation

- Background
  - Water use
  - Benefits
  - Conservation measures
  - Western water conservation programs
- Spokane County Program
  - Goal
  - Strategy
  - Implementation
- Water Rates

Average Residential Water Use with Conservation



From: AWWA Waterwiser, *Household end use of Water with and without Conservation*," 1997, cited in USEPA, *Water Conservation Plan Guidelines*, 1997.

Cost v Benefits

- Positives
  - Cost avoidance
    - Decreased source demand and treatment
    - Decreased distribution infrastructure
    - Decreased wastewater capacity and treatment
  - Increased growth capacity
  - Environmental protection
- Negatives
  - Demand hardening during droughts
  - Increased wastewater strength

Cost v Benefits

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  - Increased growth capacity
  - Environmental protection
- Negatives
  - Demand hardening during droughts
  - Increased wastewater strength

Conservation = a new water supply

Implementation Measures

- Hardware upgrades
  - Residential
  - Industrial/Commercial/Institutional (ICI)
- Education and outreach
- Code changes
- Water rates

Hardware Upgrades

- Residential
- Industrial, Commercial, Institutional (ICI)

Residential

- Rebates or give-aways
- Water saving kits
  - Showerheads – 2.5 gpm vs 1.5 gpm
  - Faucet aerators – 5 gpm vs 2 gpm
  - Toilet leak detection kits
- Toilet replacements
  - Ultra low flush toilet (ULFT)
    - 3.5 gpf vs 1.6 gpf
  - High Efficiency toilet (HET)
    - 3.5 gpf vs 1.3 gpf
- Washing machine upgrades
  - 40 gpl vs 25 gpl

ICI

- Facility specific review
- Cost sharing or rebates
  - Showerheads, toilets, washing machines
  - Cooling equipment upgrades
    - Ice machines – save 1000 gpd
    - X-ray – save 6000 gpd
    - Cooling towers
  - Food service upgrades
    - Food steamers – save 300 gpd
    - Pre-wash nozzles – save 70 gpd

Education and Outreach

- Demonstration school
- School/community education programs
- Advertising
- US EPA WaterSense program
  - Promotional Partner
  - Certify
    - HET
    - Faucets
    - Showerheads
    - Irrigation efficiency

Code Changes

- Better-than-code fixtures
  - Toilets
  - Urinals
  - Showerheads
  - Single showerhead per shower
- Facility inspections
  - Prior to sale

Western Water Conservation

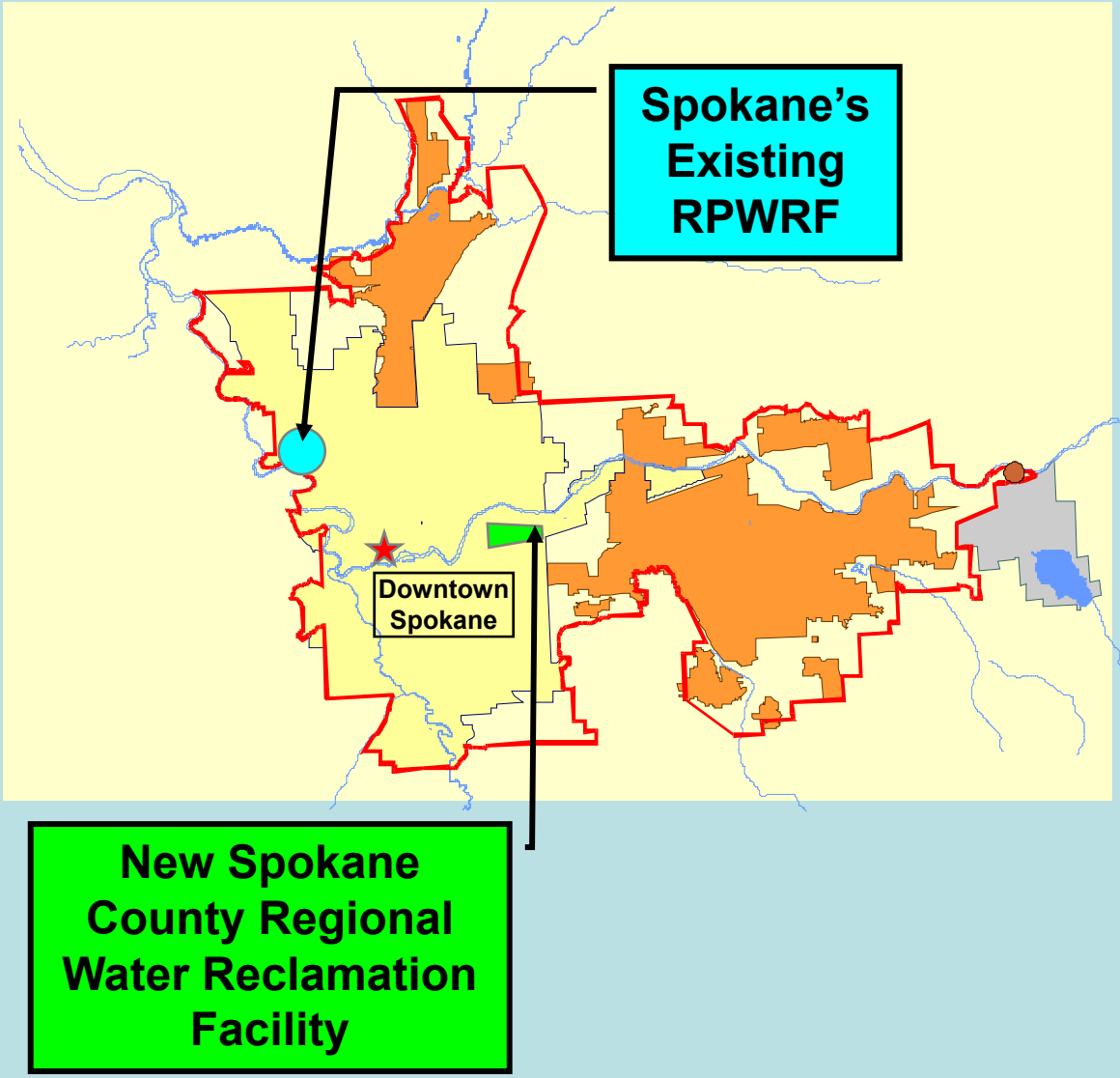
Western Water Conservation

- Seattle
- Lacey, Olympia, Tumwater, Thurston Co. (LOTT)
- Everett
- California Urban Water Conservation Council (CUWCC)
- Energy conservation = water conservation

Spokane County
Indoor Water Conservation Plan

Background

Spokane County
Regional Water Reclamation Facility



Spokane River Dissolved Oxygen

- *Foundational Concepts for the Spokane River TMDL Managed Implementation Plan*
  - Required Actions
    - **Conservation**: Public NPDES permit holders... will as soon as possible develop..."LOTT-style" indoor conservation efforts
      - 20% water conservation per household in older urban areas (built 1992 or earlier)
      - 10% per household (built 1993 or later)

Goal

- All mapped Spokane County sewer basins
  - Approx. 35,000 single family residences
    - 75% built 1992 or before
  - Approx. 878 multi-family facilities
    - estimate 11,000 residential units
    - 90% built 1992 or before
- **Indoor conservation goal: 1.6 MGD**
  - estimate 90 gpcd in older homes
  - estimate 80 gpcd in newer homes

Funding and Timeline

- Funding
  - $1 million per year for four year
- Timeline
  - Start in 2008, continue for four years

Strategy

Focus on mechanical, quantifiable conservation

1. Residential hardware upgrades
2. Education and outreach
3. Industrial, Commercial, Institutional (ICI) hardware upgrades

Cost Effectiveness & Life Cycle

- Cost effectiveness threshold
  - $15.00 for an average flow reduction of one gallon per day
  - New treatment capacity:

    $120M / 8 MGD = $15.00 per gallon
- Life cycle
  - 15 years or more
  - Lower cost items (showerheads) will not meet this life cycle threshold

Goal Tracking

- Rebates and give-aways
  - Estimate old water use and new water use
- Sample area
  - Work with several water purveyors
  - Track winter time water use
- Individual facilities
  - Large upgrades for multi-family or ICI will be quantified

Planning for 2008

- High efficiency toilet (HET) rebate - $100
- Energy Star washing machine rebate - $100
- Home indoor water conservation kits – give-away
- Voluntary commercial water survey
- Demonstration school

Cost Effectiveness

- Toilet rebate ($100)
  - 27 gallons per day
  - $3.64 per gallon
- Washing machine rebate ($100)
  - 15 gallons per day
  - $6.67 per gallon
- Water conservation kit ($20)
  - 37 gallons per day
  - $0.31 per gallon

Rebate Level Setting

- HET - $200 to $300 per toilet
  - Ultra low flush toilet - $100 to $200
- Washing machine rebates
  - 80 utilities in WA, ID, MT, and OR
  - 30 provide a $100 maximum rebate
  - 23 provide a $50 maximum rebate

Example Implementation

- 10% of 36,000 older residential units
  - Toilet replacement
  - Washing machine upgrade
  - Water conservation kit
  - 0.39 MGD saved for $792K
    - $2.03 per gallon
    - 24% of the 1.6 MGD goal

Education and Outreach

- Media and bill inserts
- Vendor information
- USEPA WaterSense
  - Promotional partner

Industrial, Commercial, Institutional

- Voluntary water survey program in 2008
- Demonstration School
  - Replace inefficient water fixtures in a school

Spokane County
Indoor Water Conservation Plan

- Toilets are largest residential indoor water use
- Multiple opportunities for water conservation
- Spokane County indoor water conservation program
  - Starting in 2008
  - Proposed measures
    - Residential indoor water conservation kits
    - Clothes washing machine rebates
    - HET rebates
    - ICI voluntary water survey program
    - Demonstration school

Water Rates

Residential Water Rates

- Block Rates (price per gallon)
- Base Rates
- Total Monthly Bill
- Total Price Per Gallon

Water Rates

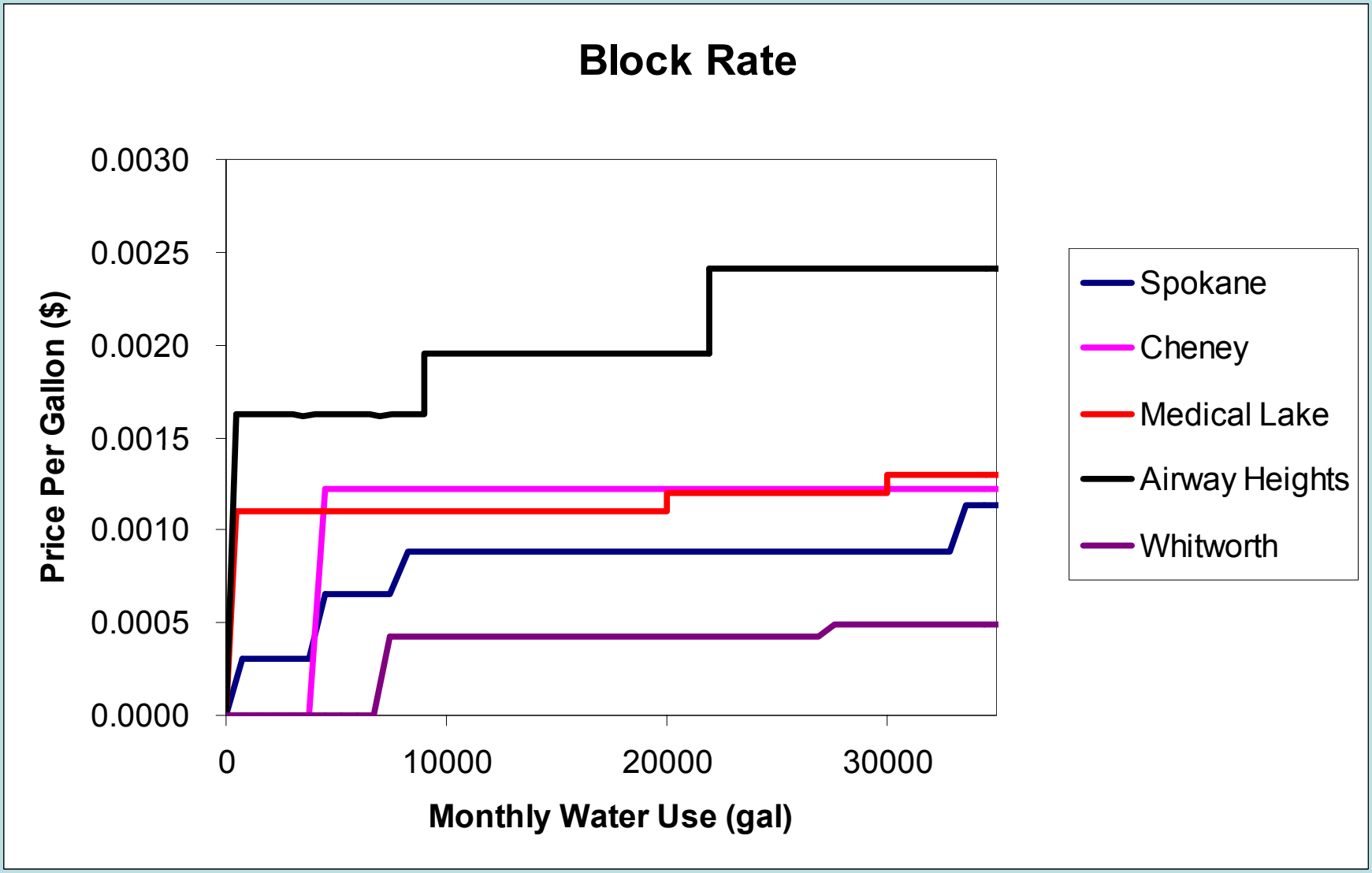
- City of Spokane
- Cheney
- Medical Lake
- Airway Heights
- Whitworth Water District #2

Water Rates

- City of Spokane
- Cheney
- Medical Lake
- Airway Heights
- Whitworth Water District #2
- Tacoma
- Phoenix
- Austin
- Tucson

Block Rates

Block Rates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Price Per Gallon ($)
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0.0015
0.0010
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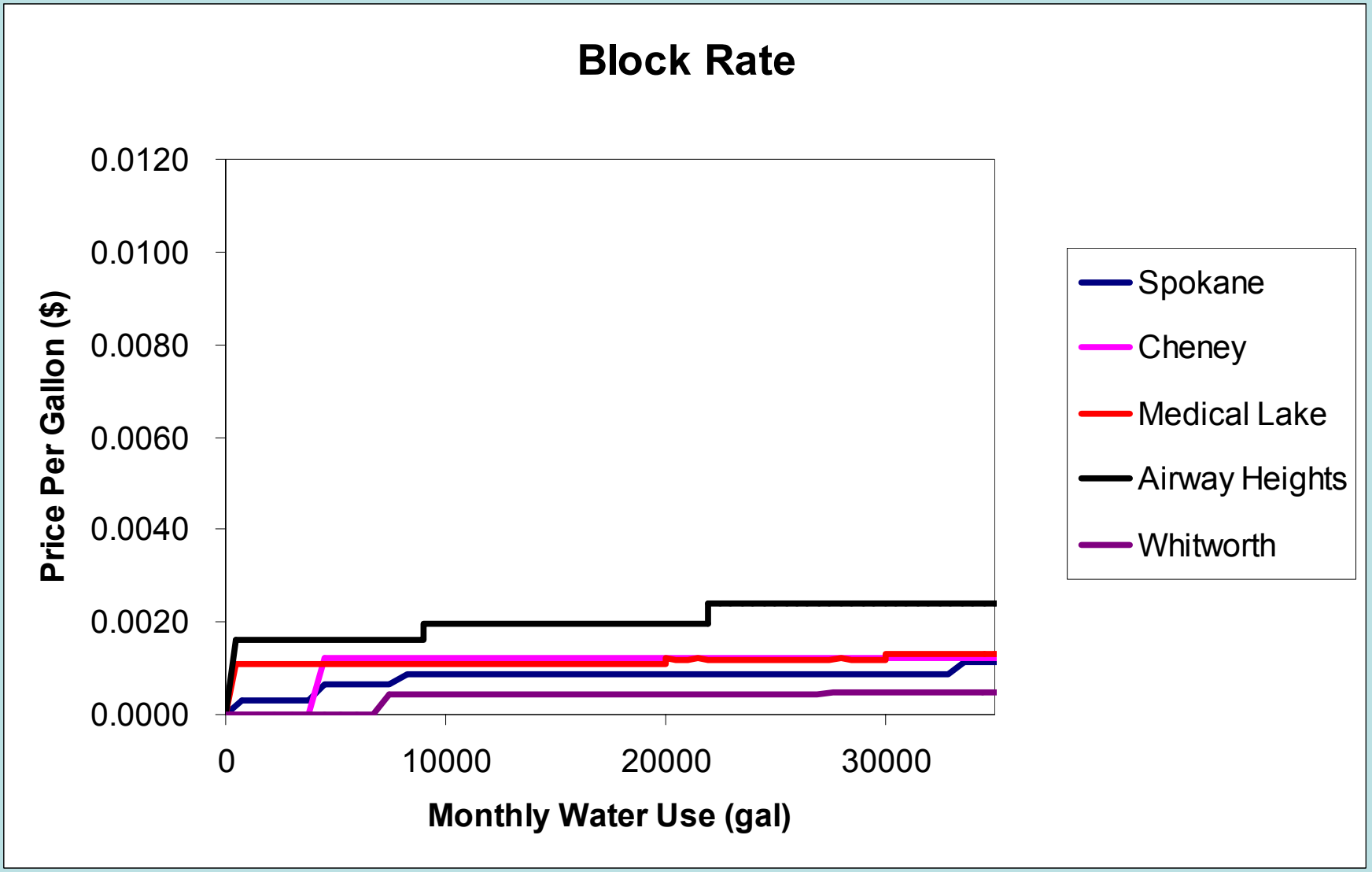
10000
20000
30000
Monthly Water Use (gal)
Spokane
Cheney
Medical Lake
Airway Heights
Whitworth

Block Rates


Block Rate
Price Per Gallon ($)
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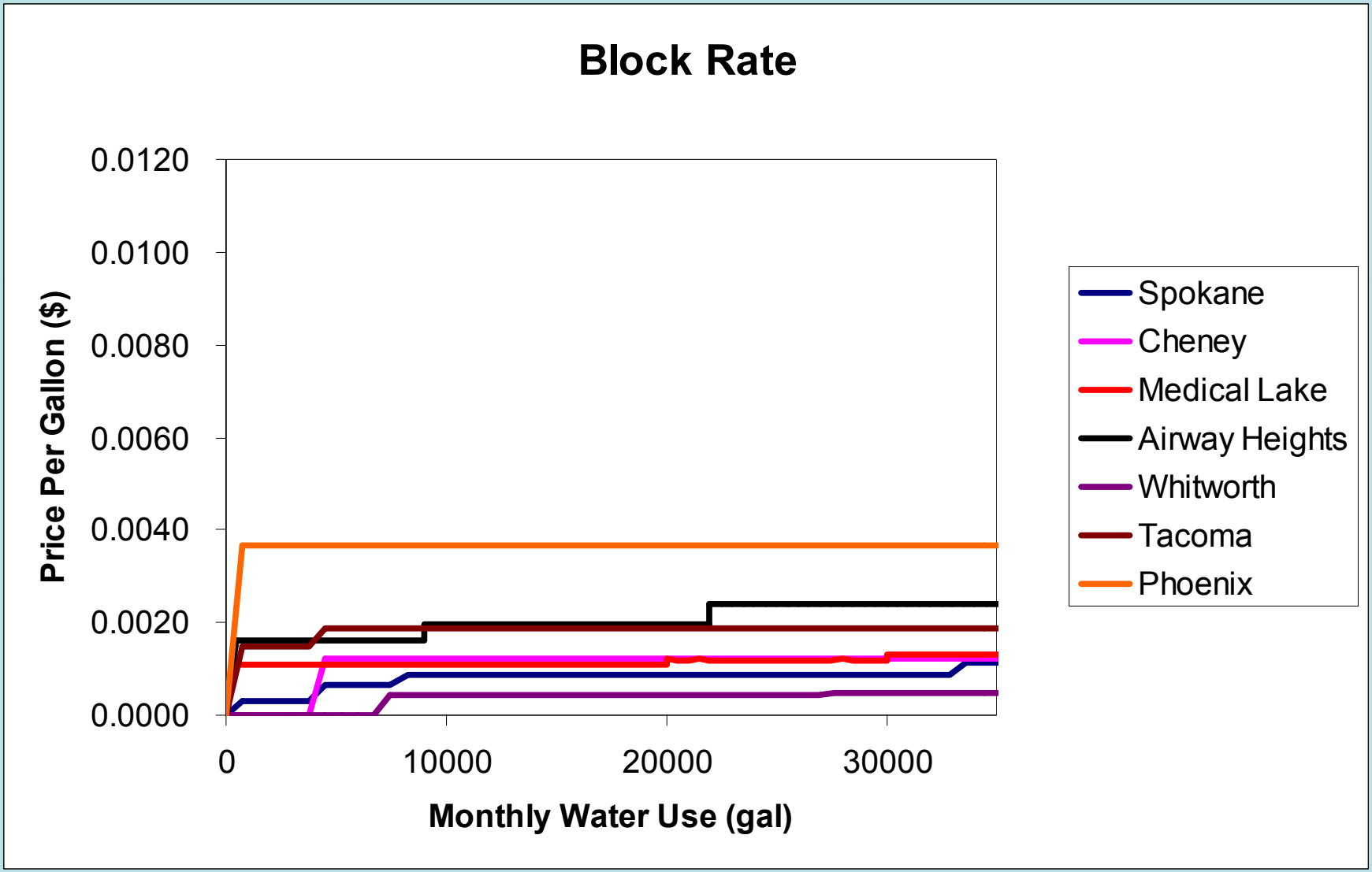
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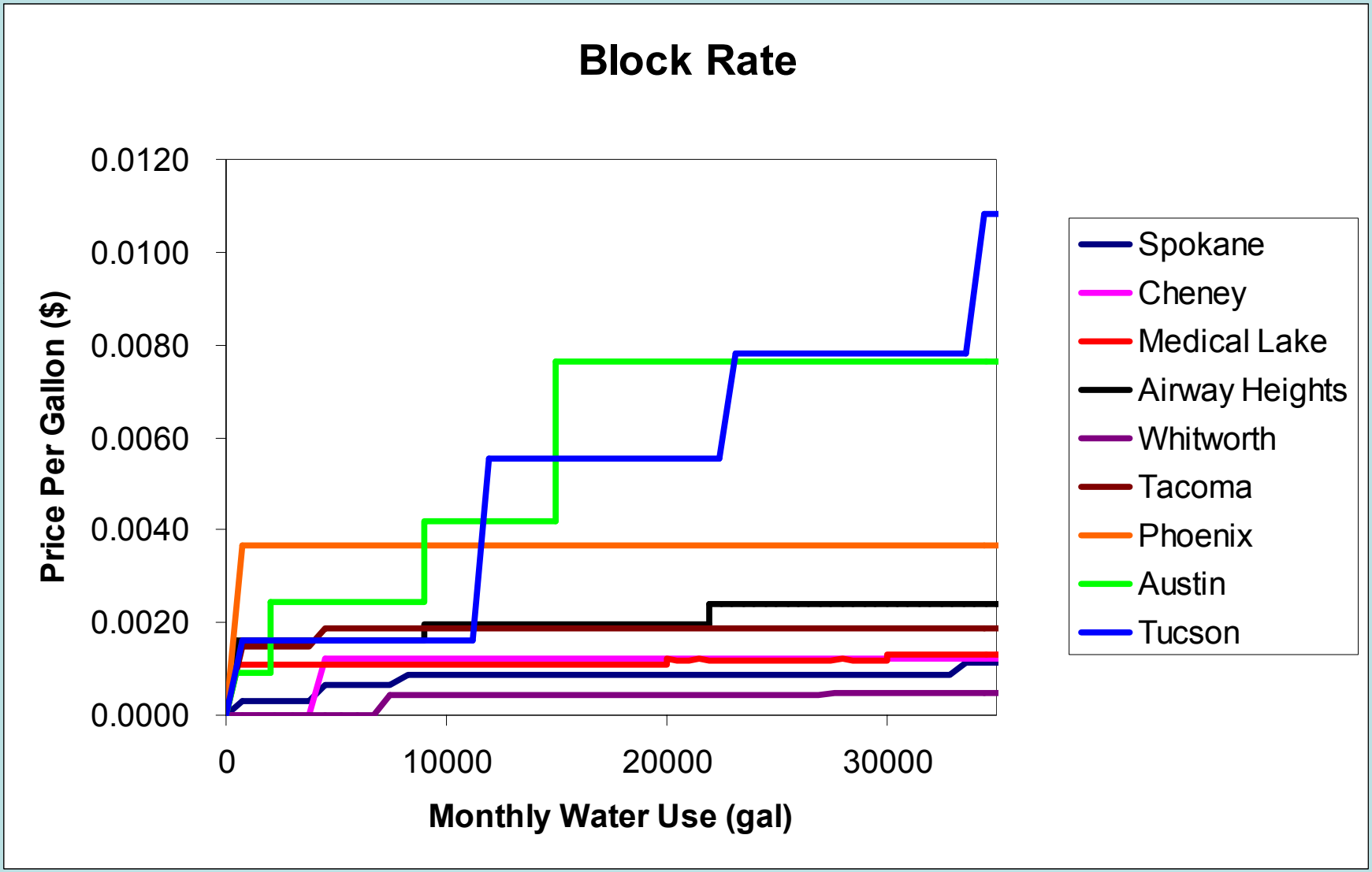
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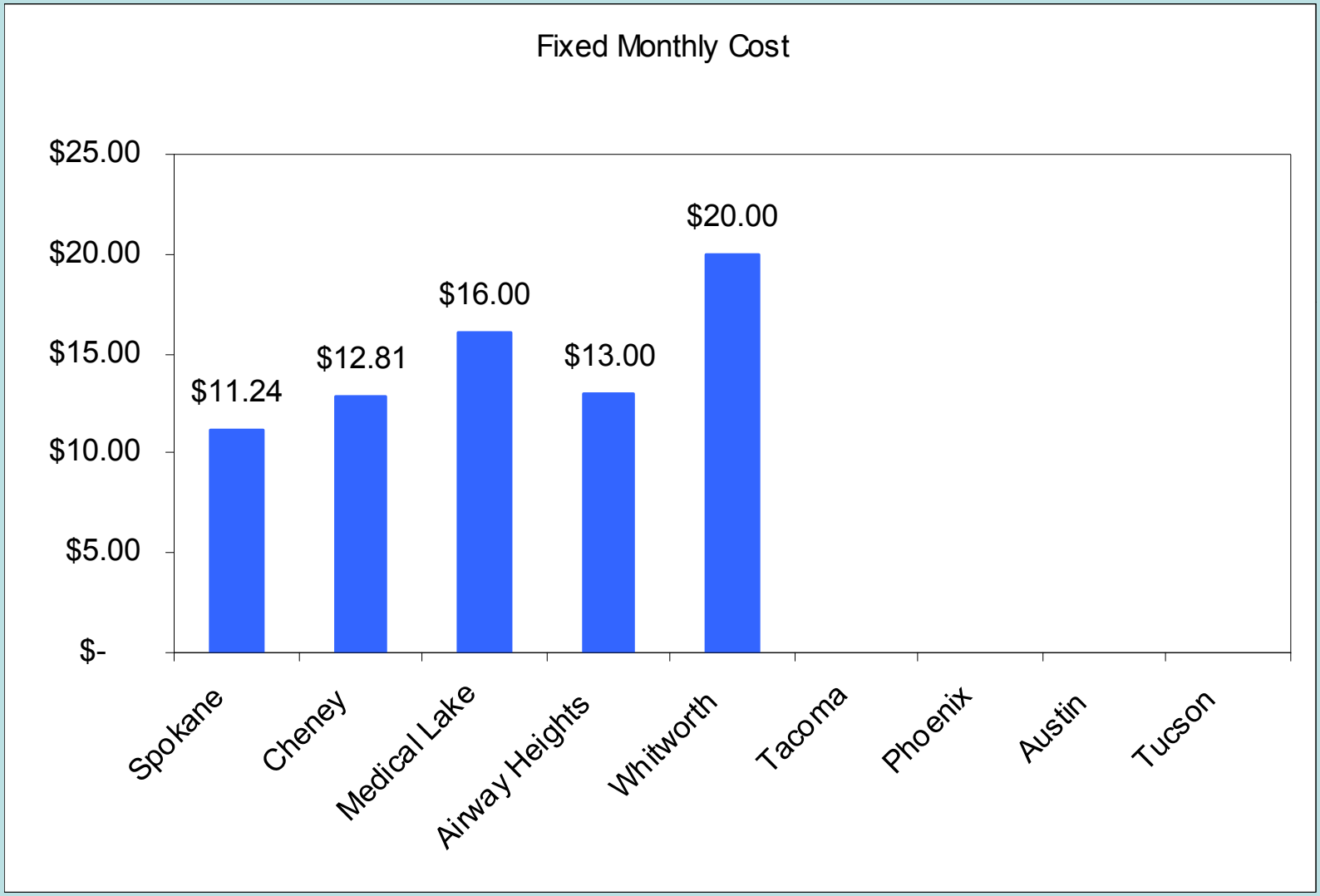
Base Rates

Base Rates


Fixed Monthly Cost
$25.00
$20.00
$15.00
$10.00
$5.00
$-
$11.24
$12.81
$16.00
$13.00
$20.00
Spokane
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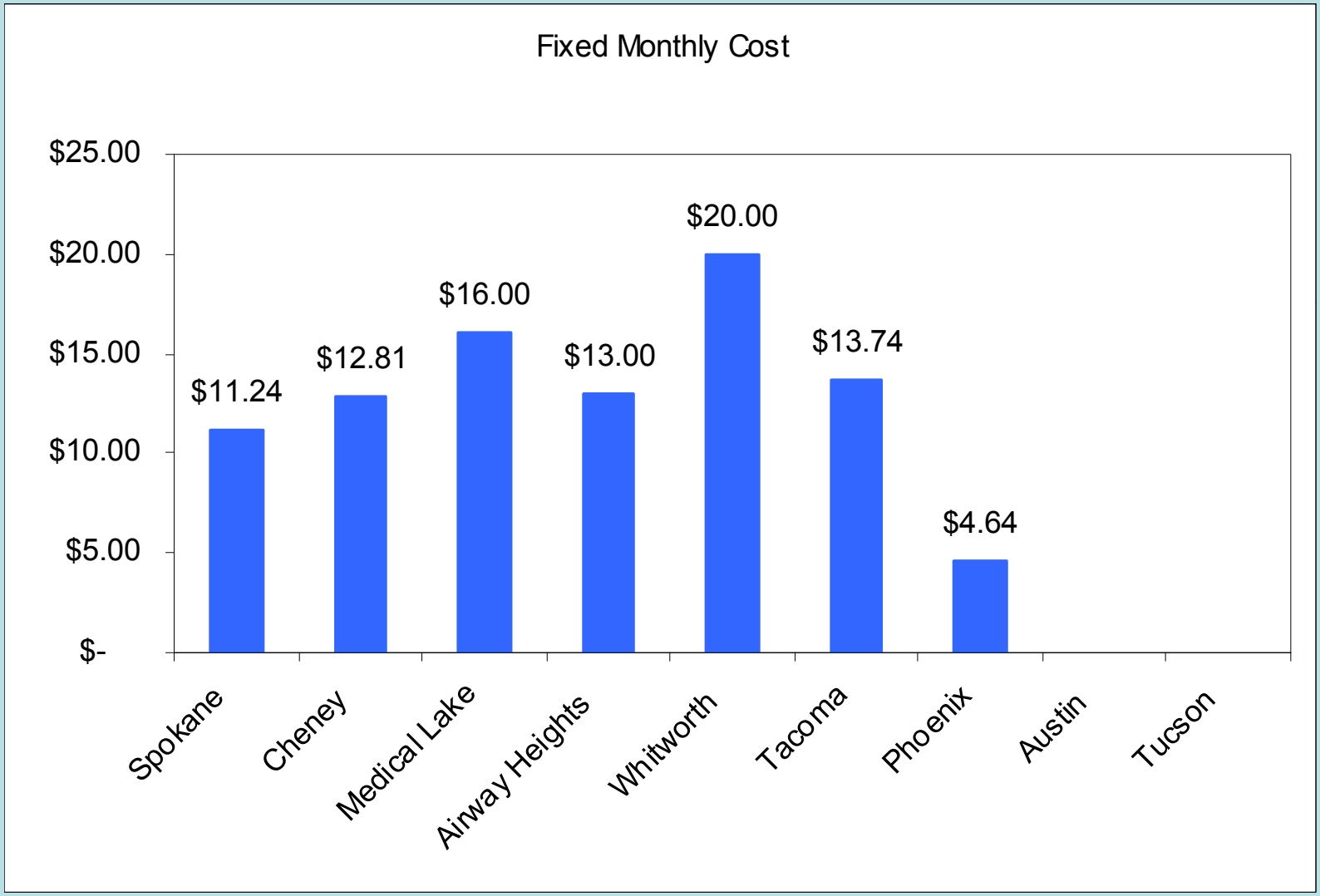
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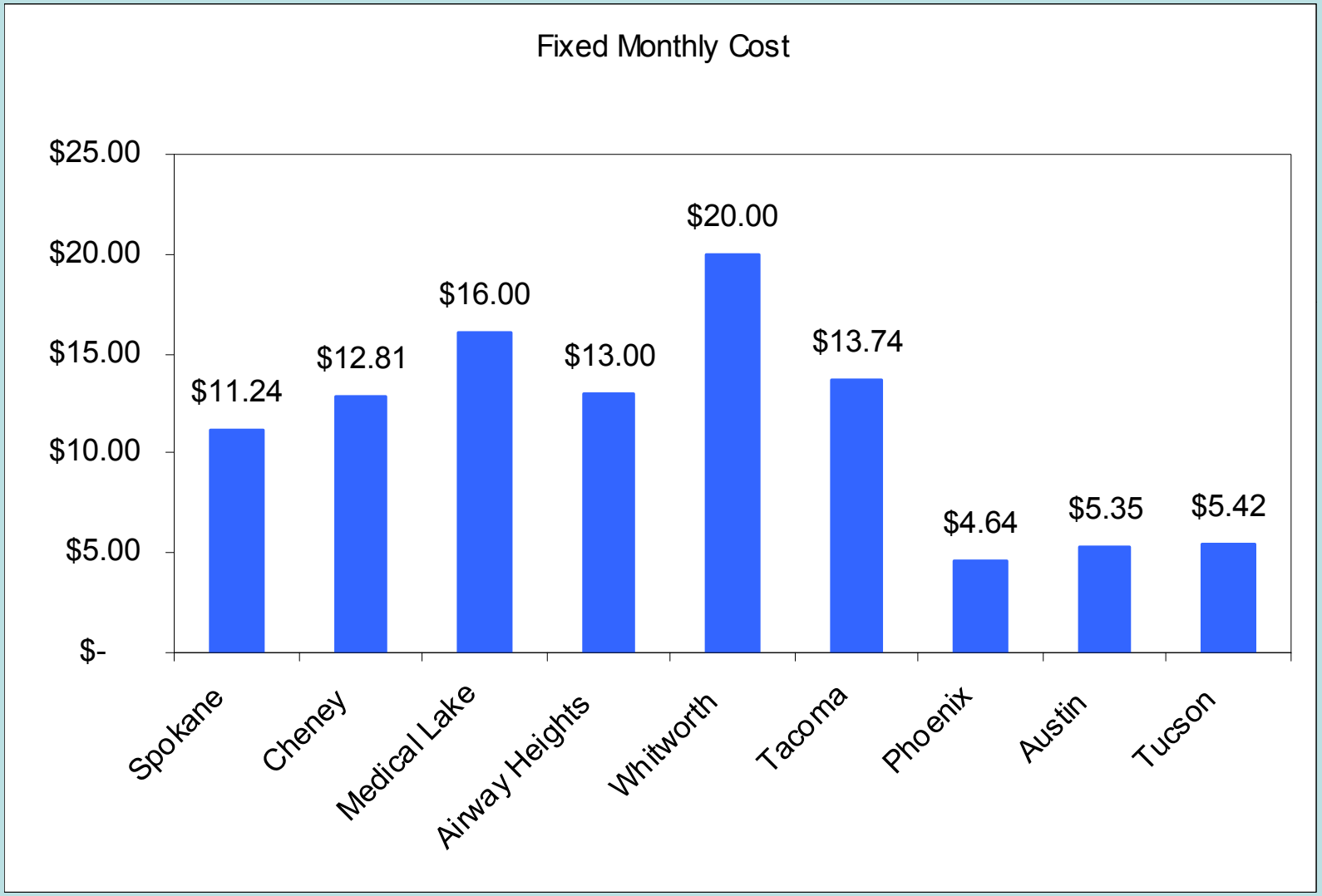
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Total Monthly Bill

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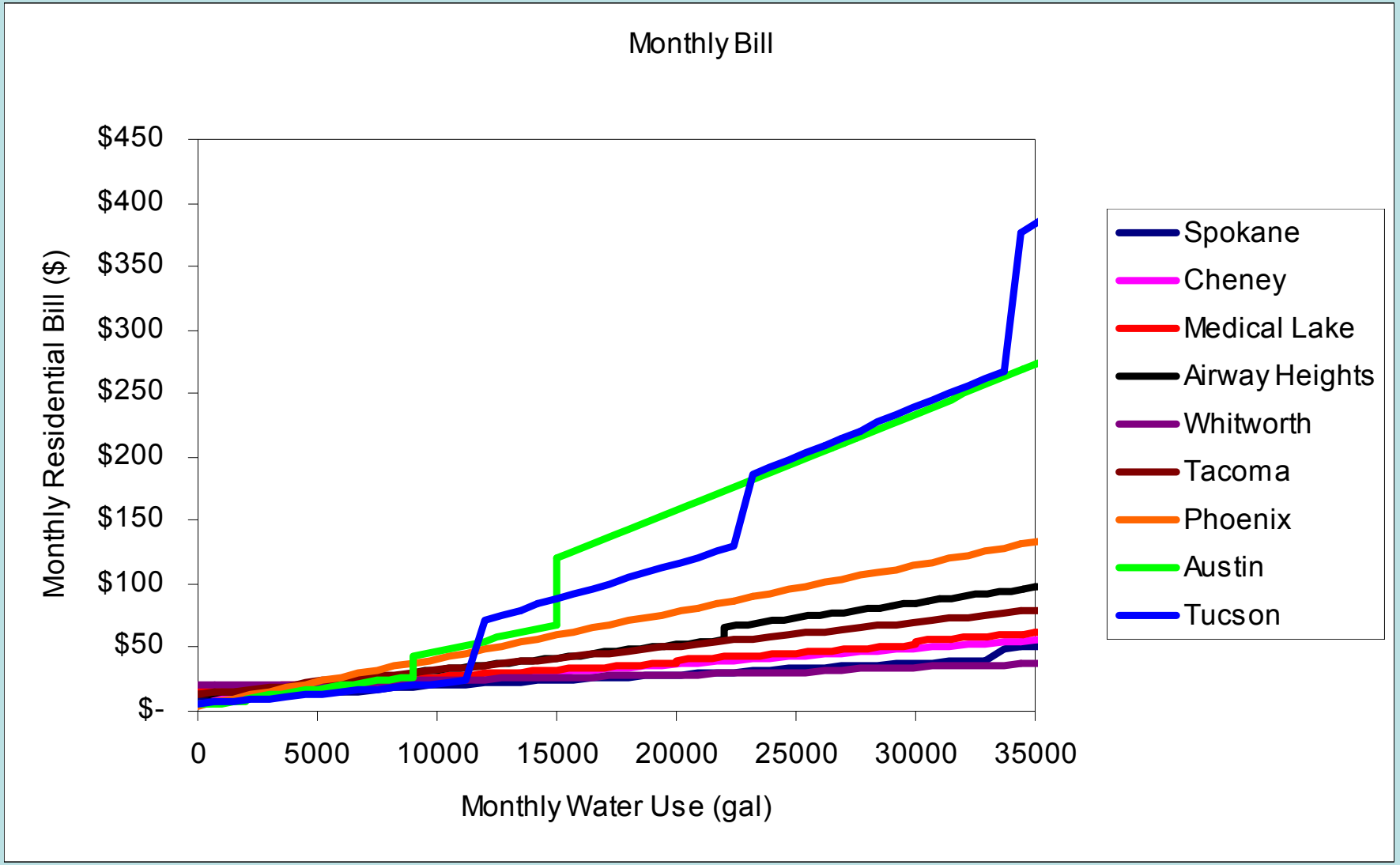

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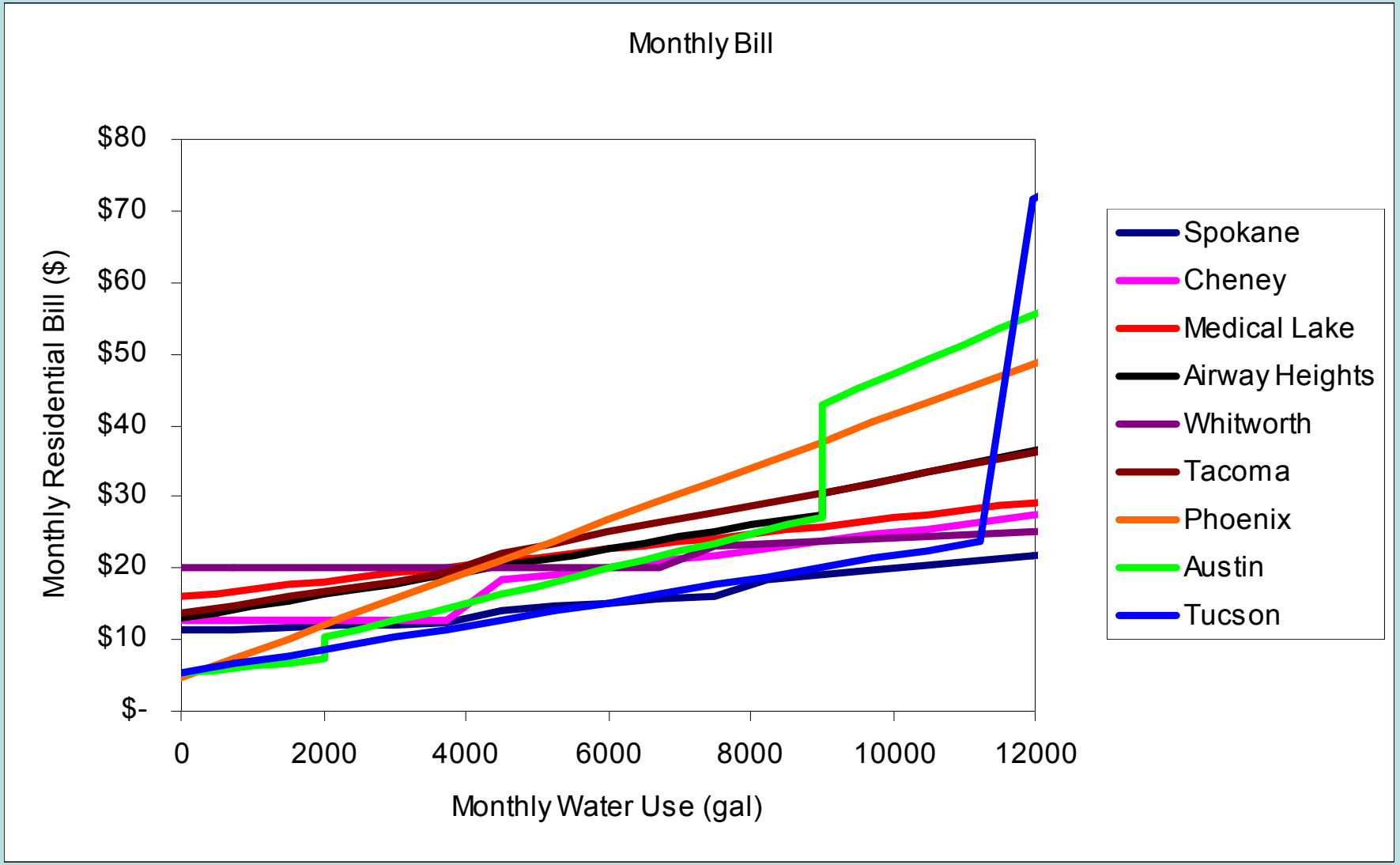

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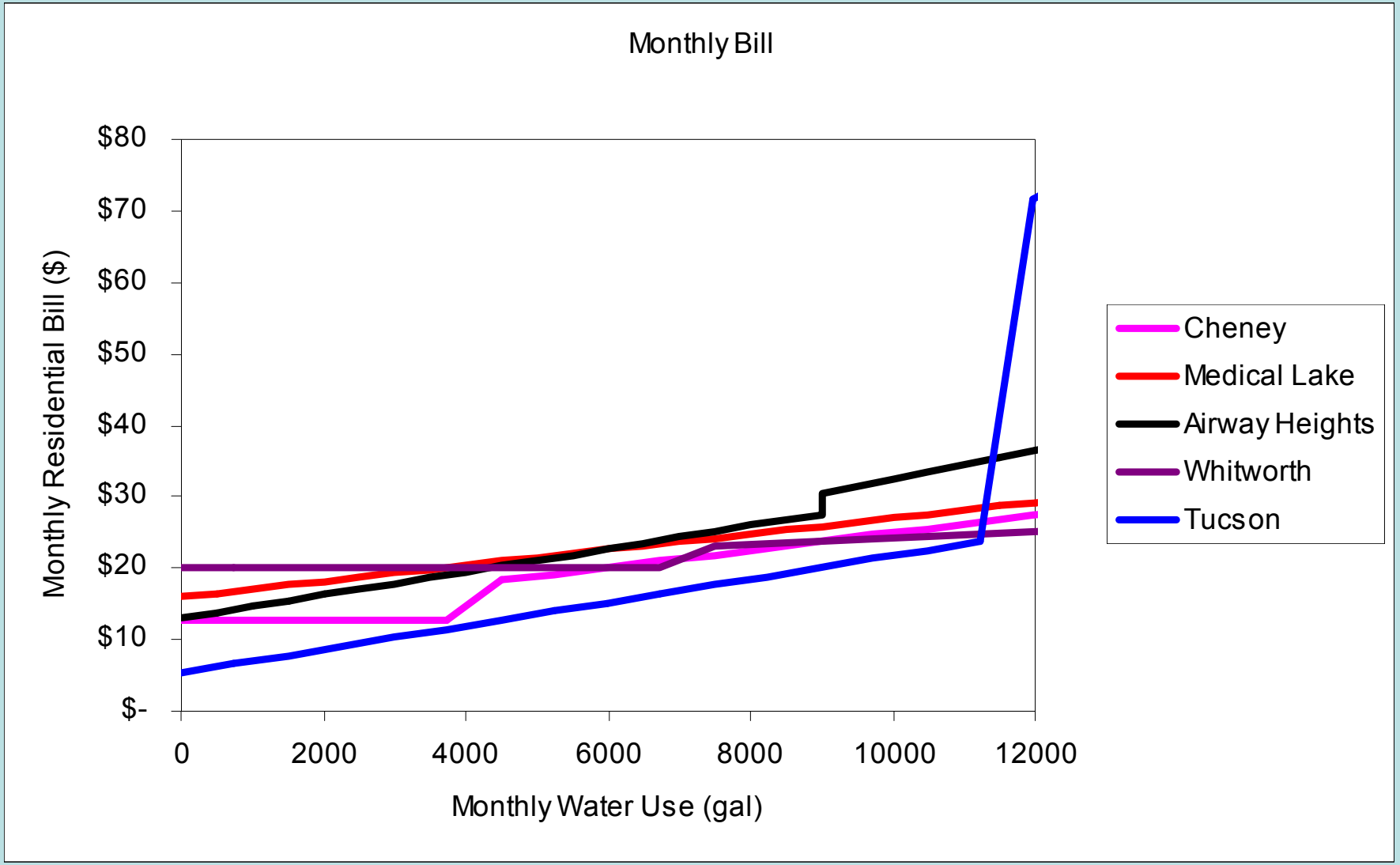

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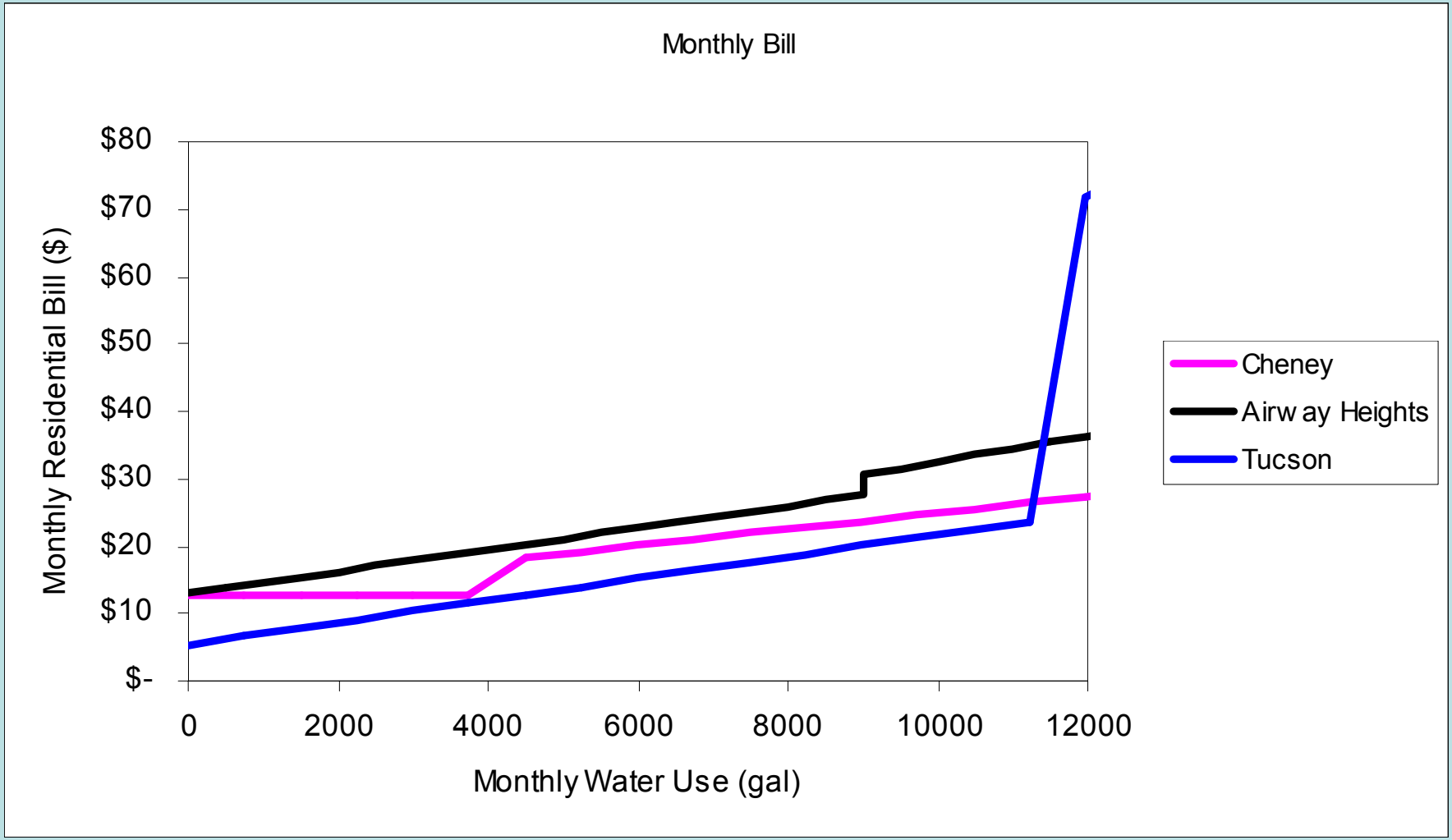

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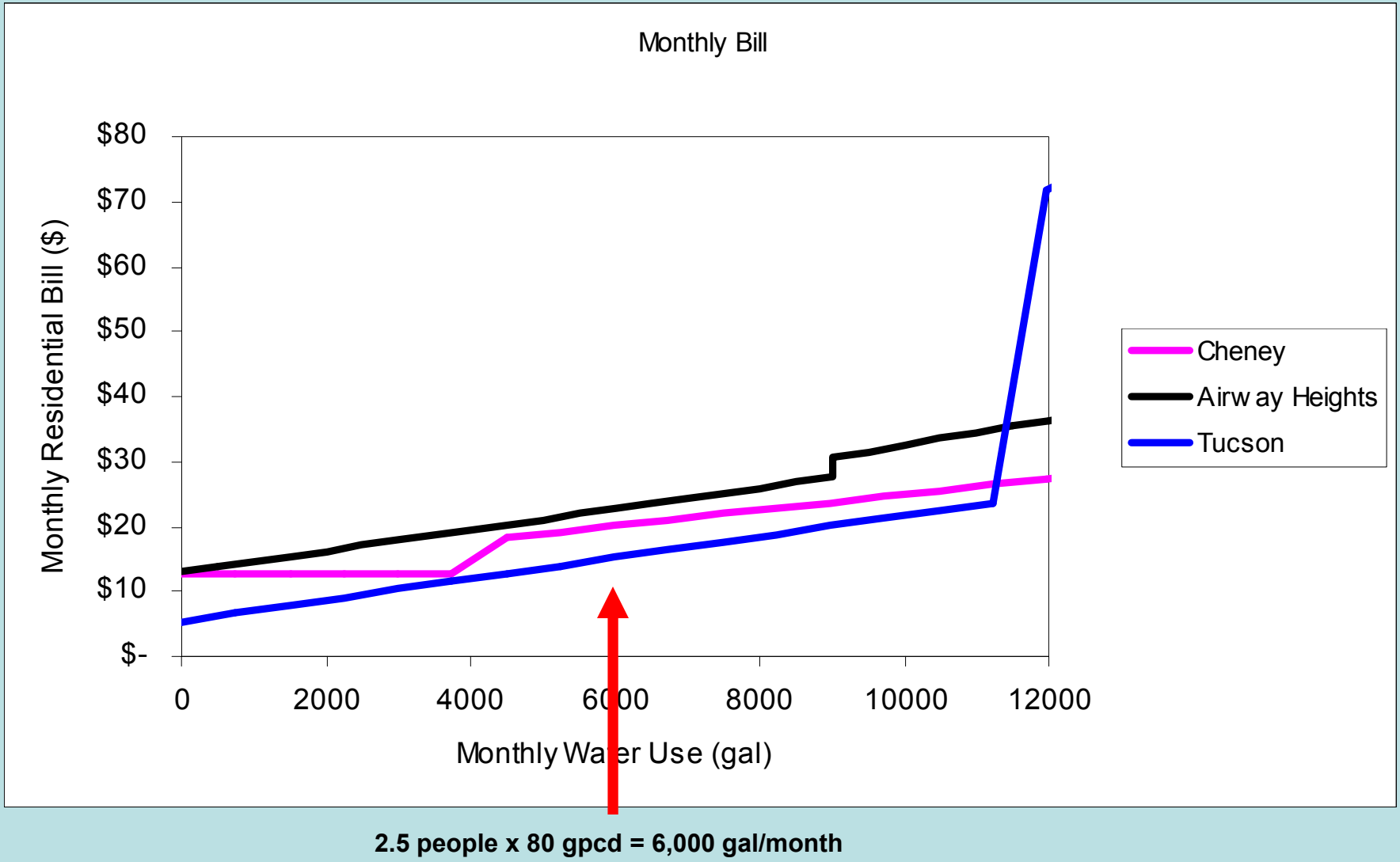
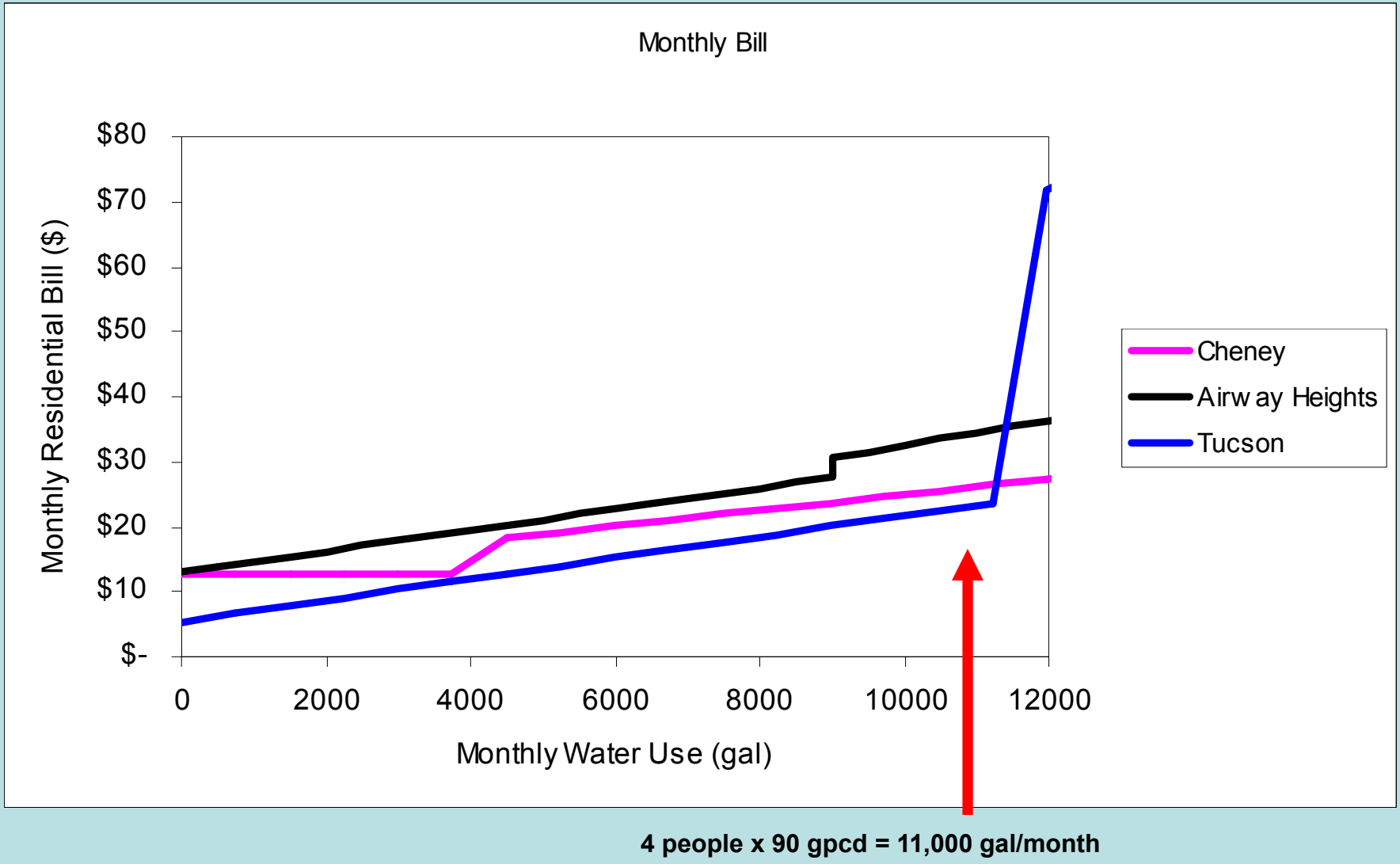


2.5 people x 80 gpcd = 6,000 gal/month

Total Monthly Bill



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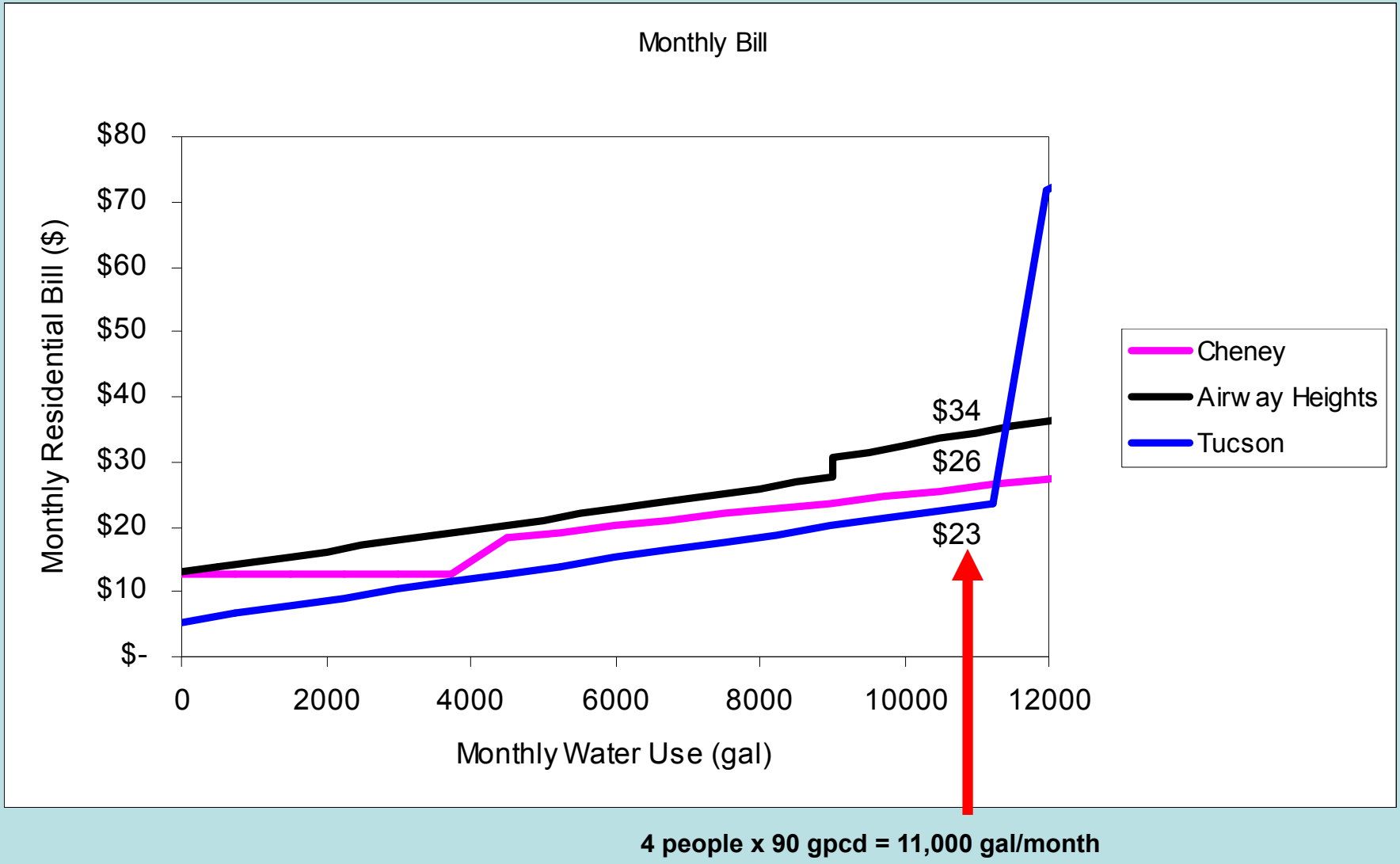

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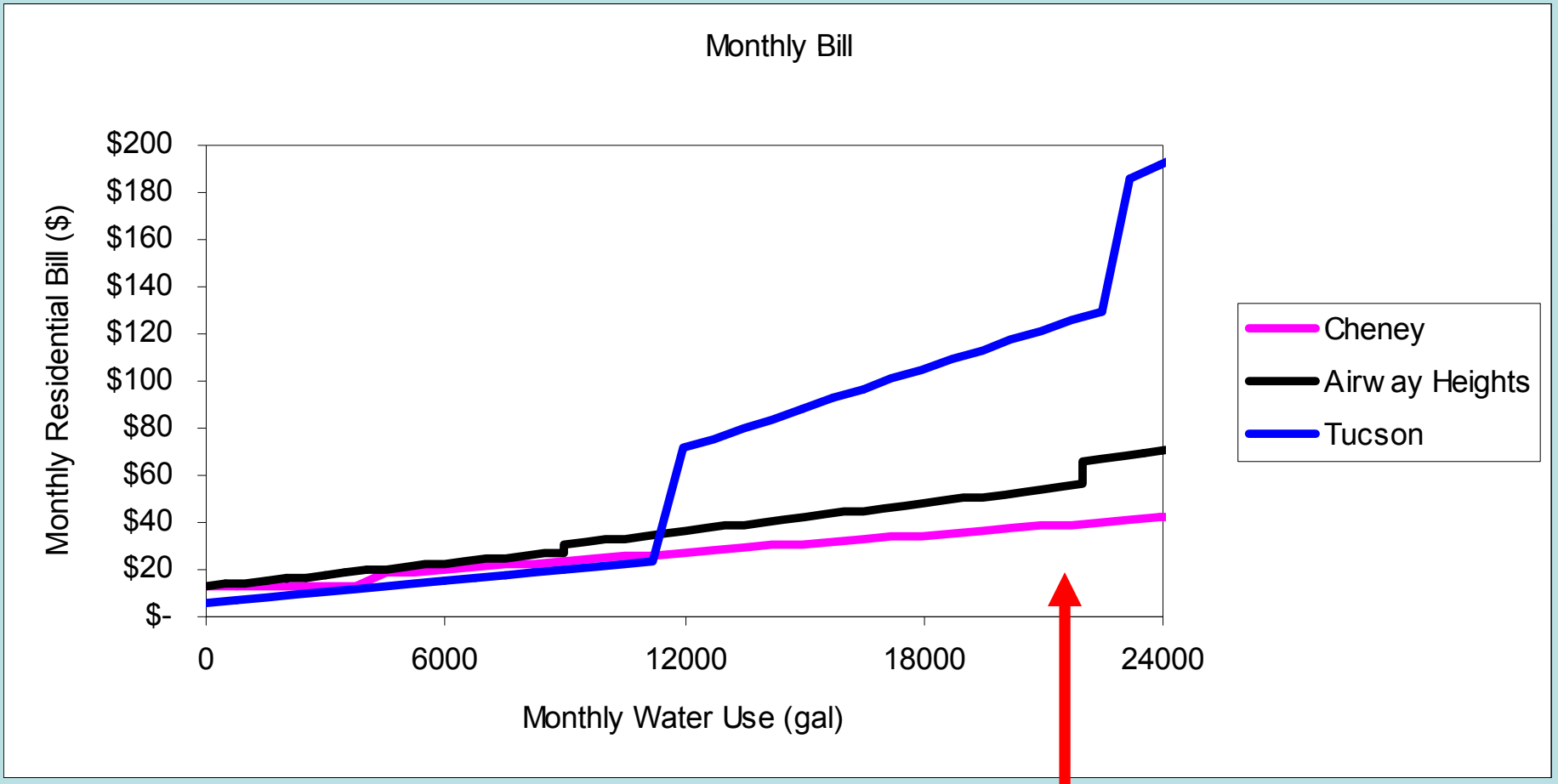
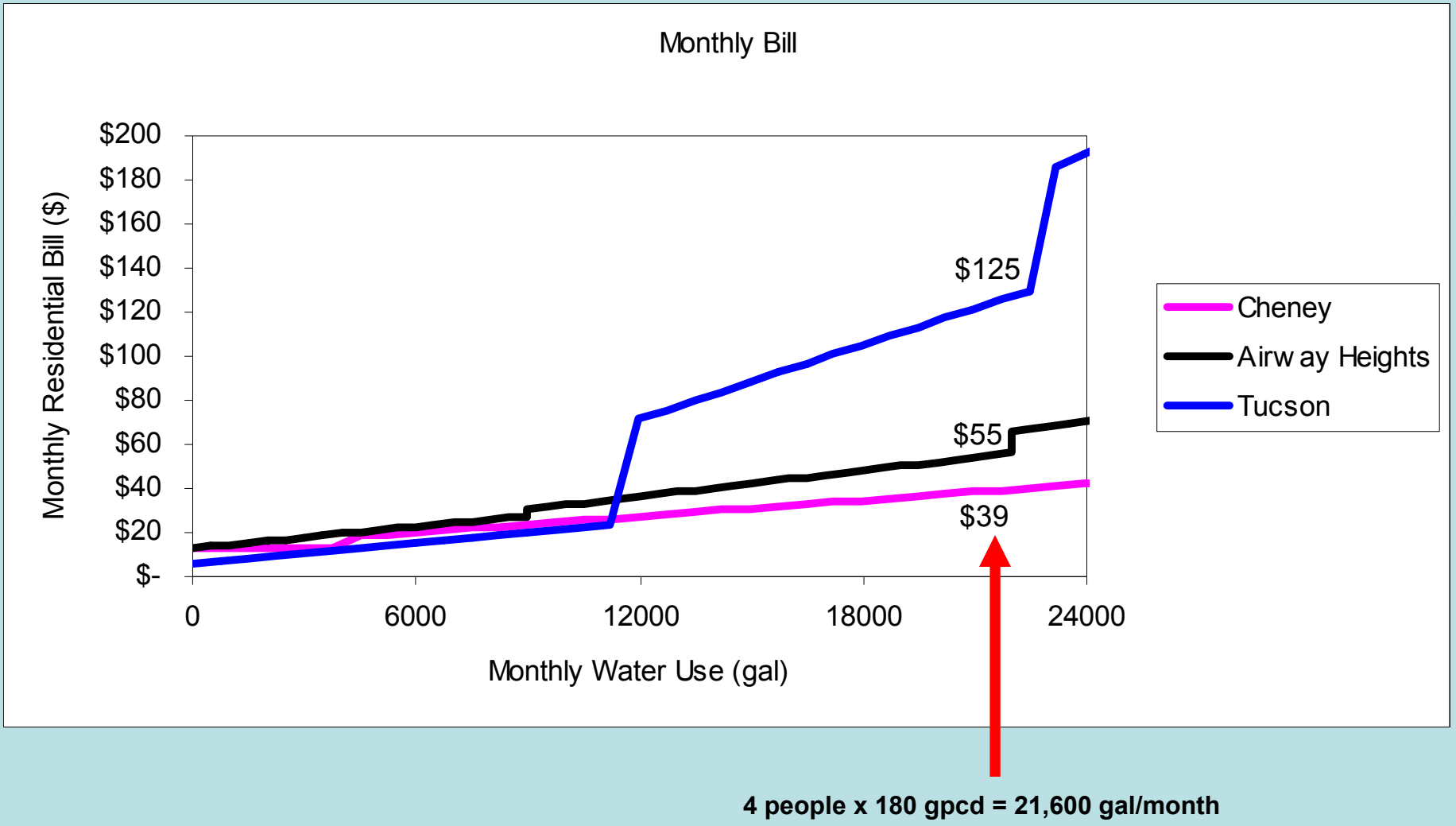


4 people x 180 gpcd = 21,600 gal/month

Total Monthly Bill



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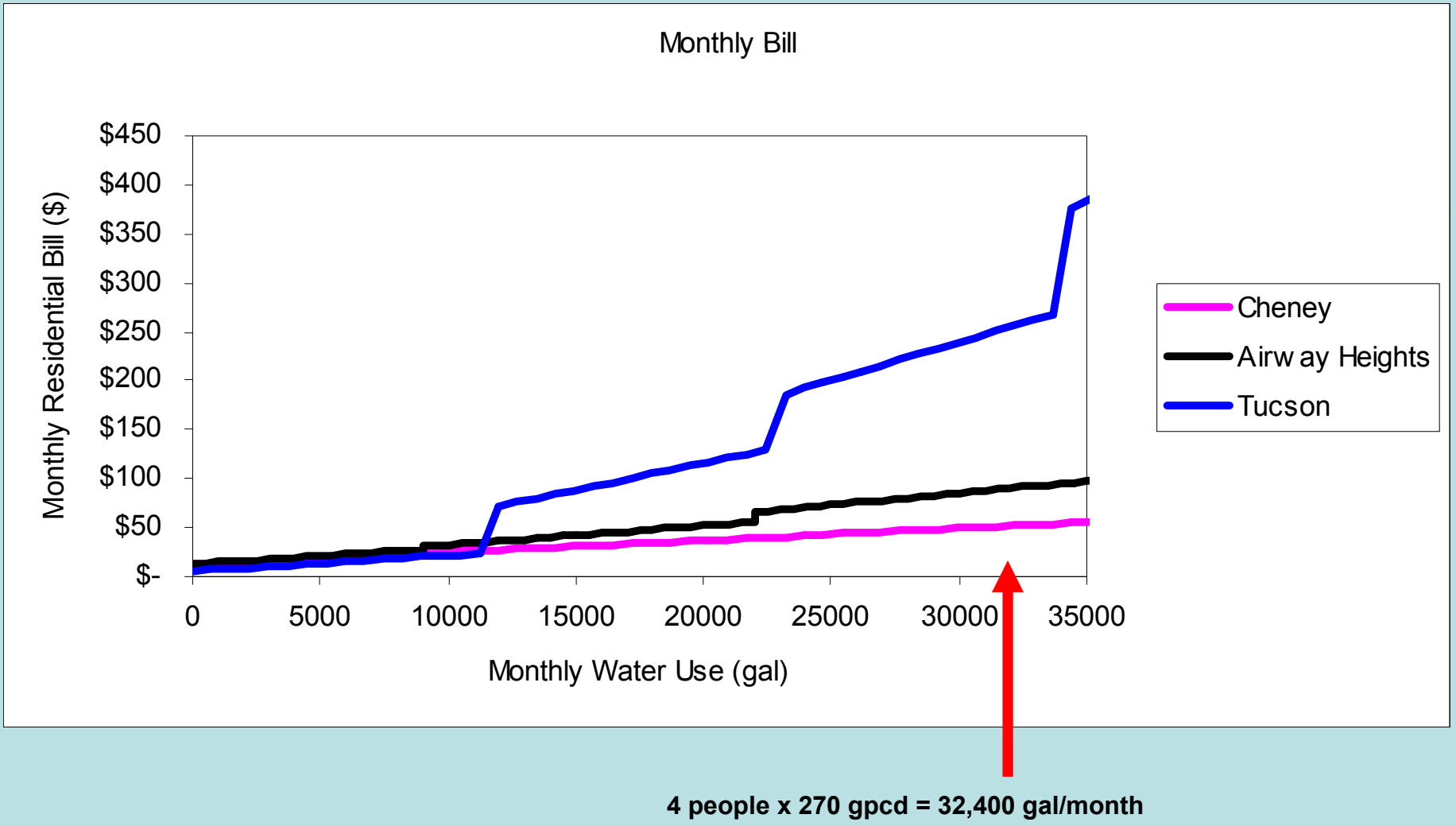

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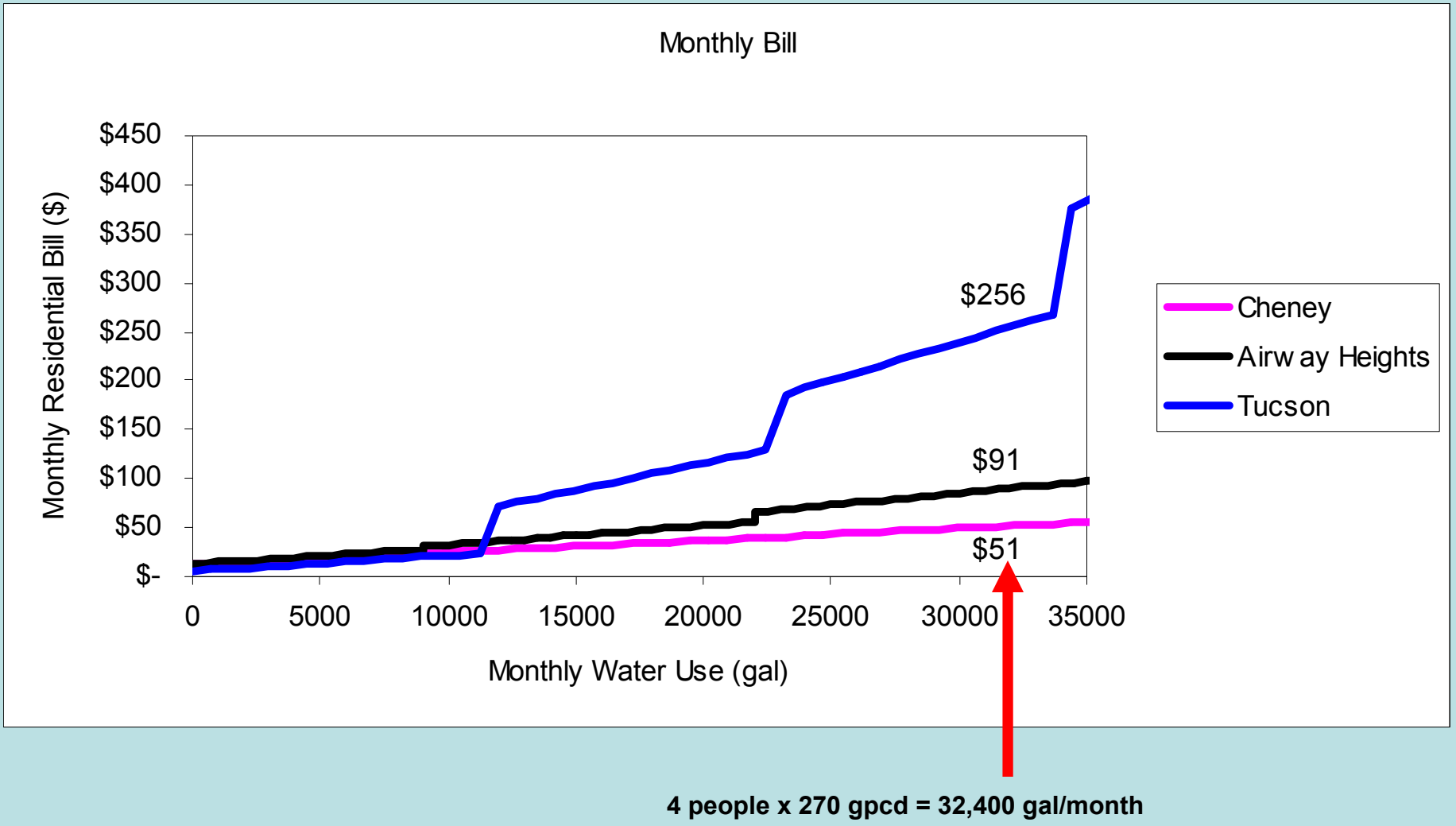

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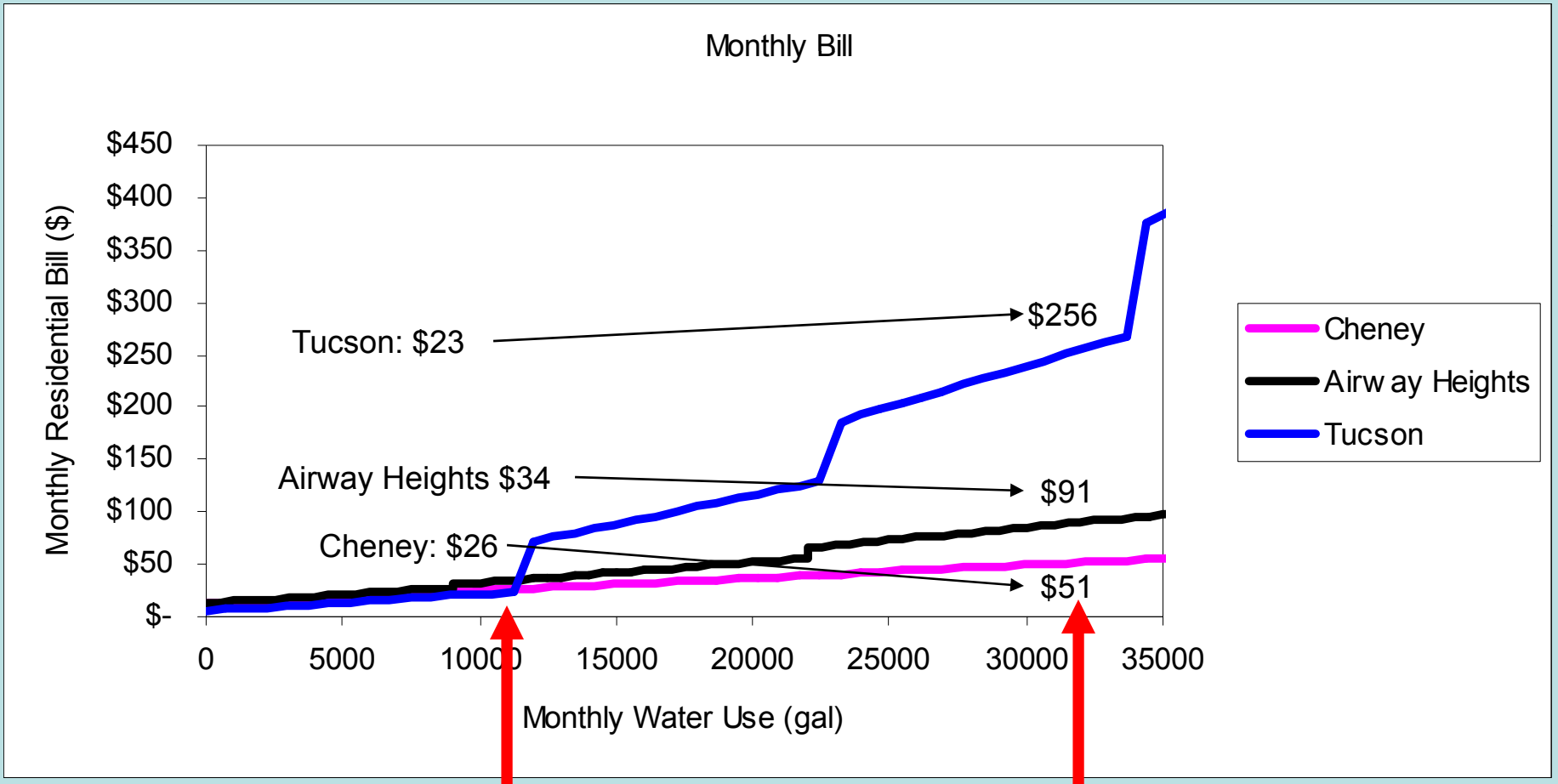

4 people x 90 gpcd = 11,000 gal/month

4 people x 270 gpcd = 32,400 gal/month

Total Price Per Gallon

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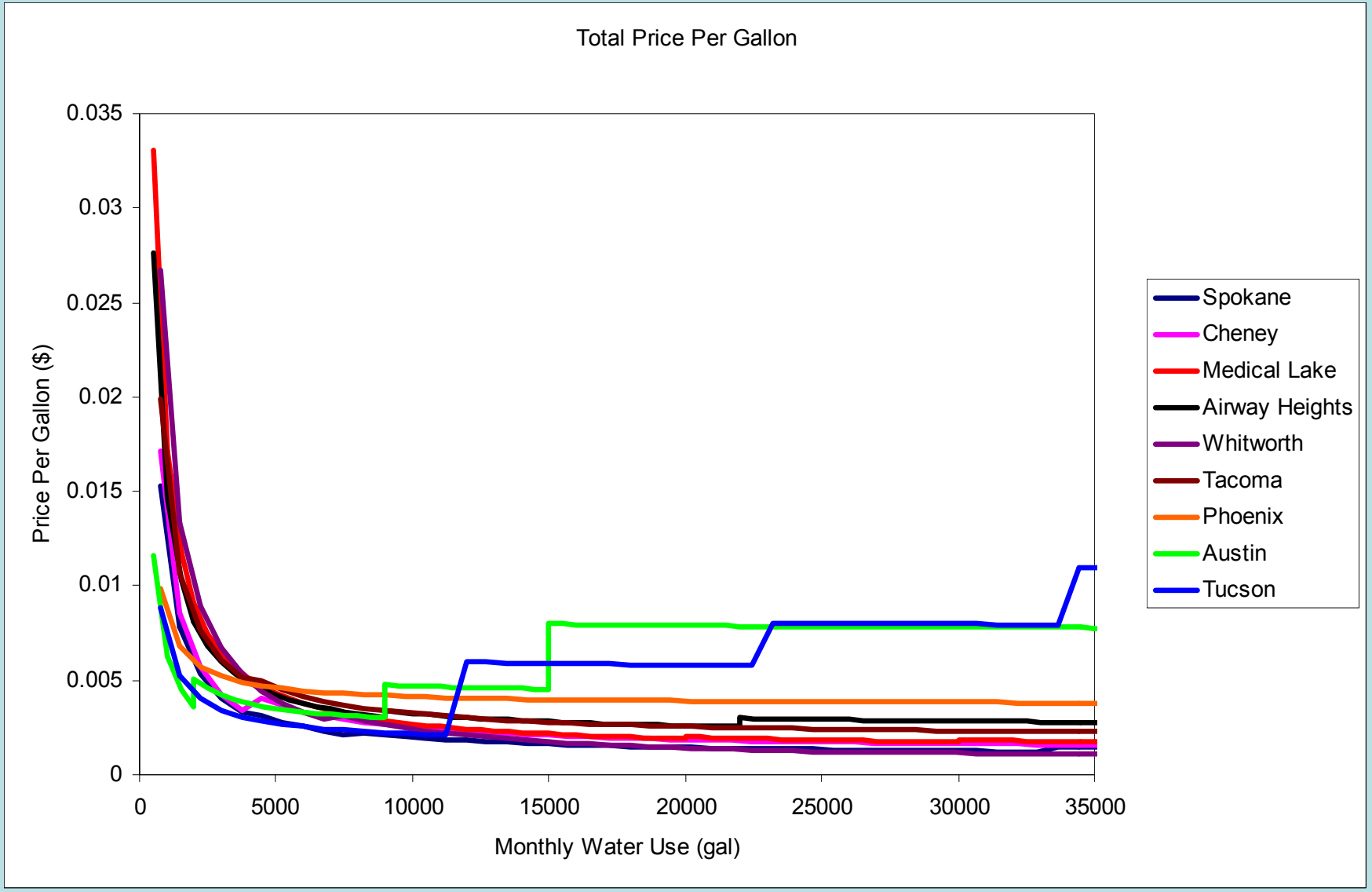

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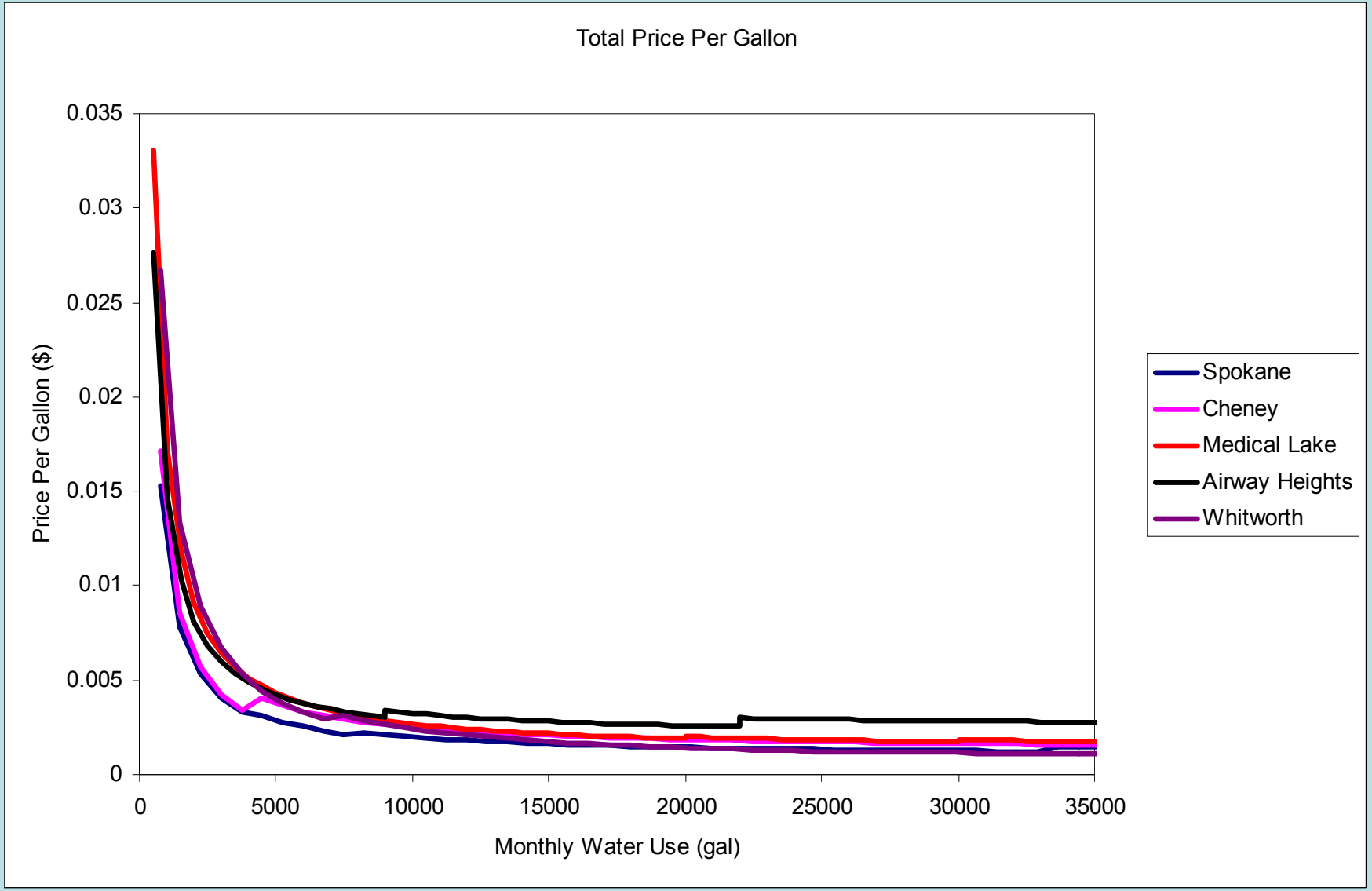

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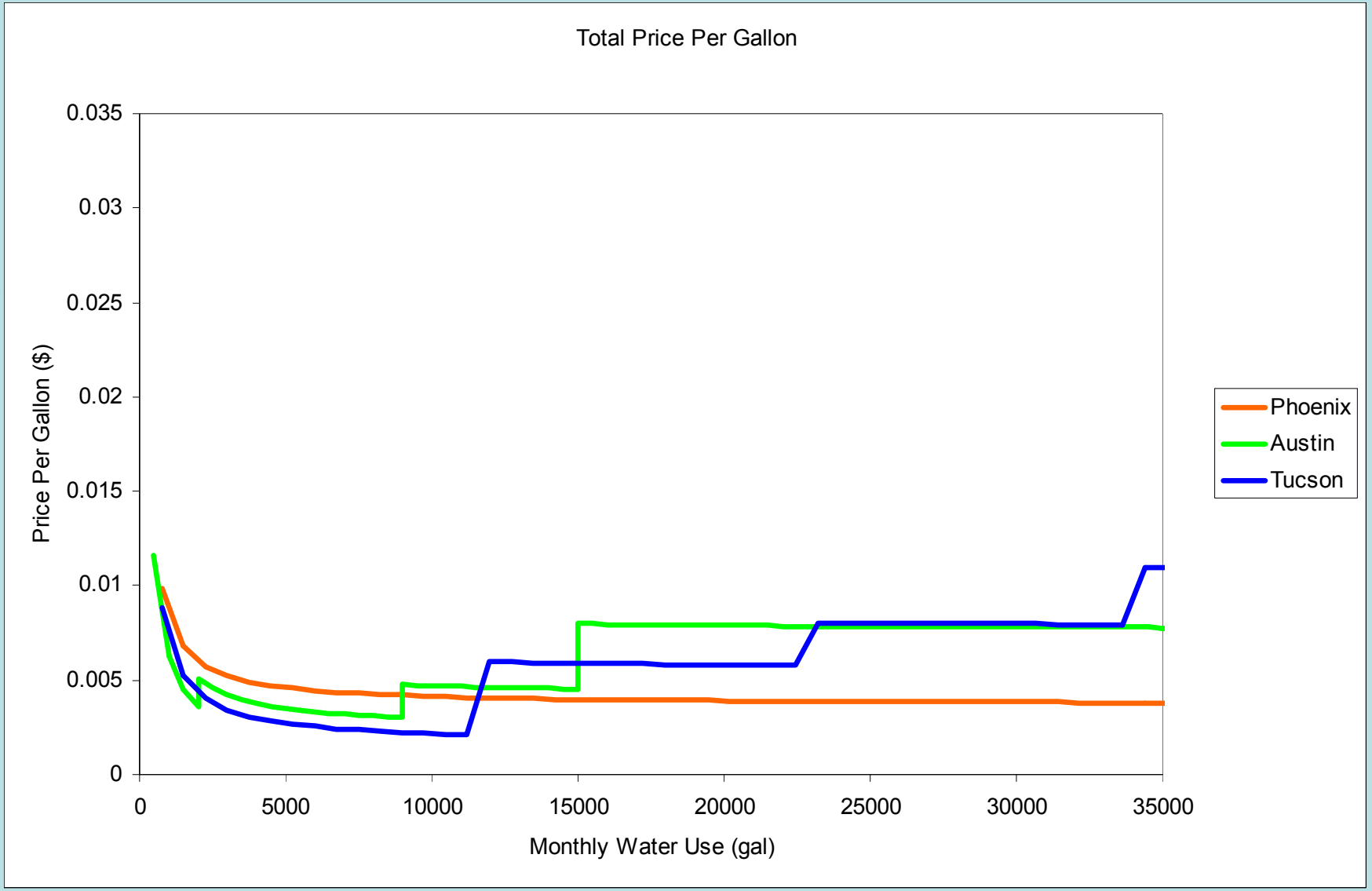

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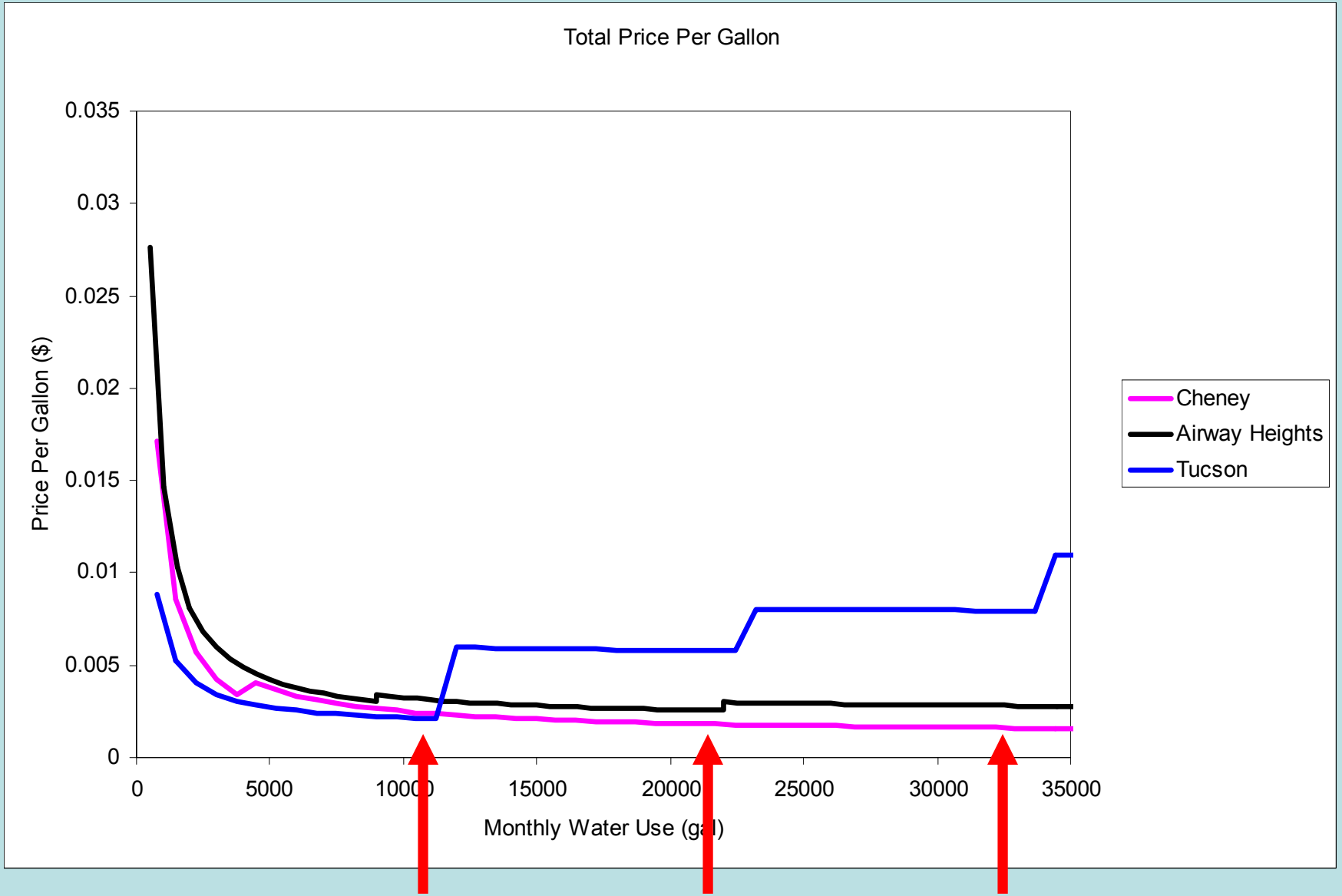

Water Rates Conclusions

- Water billing with conservation is difficult to predict
- Base rates impact price points
  - Base rates can be set low to reduce the cost for low water users
- Inclined blocks can be designed to meet specific goals
  - Block rates can be placed at predicted usage

Conservation Measures

- Hardware upgrades
  - Residential
  - Industrial/Commercial/Institutional (ICI)
- Education and outreach
- Code changes
- Water rates