

Water Minimization

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Introduction

- TI Tucson
- Water Usage in Fabrication Facility
- Etch Processes - BOE and HF
- Cleans - ST-200
- Strip - EKC830

TI- Tucson

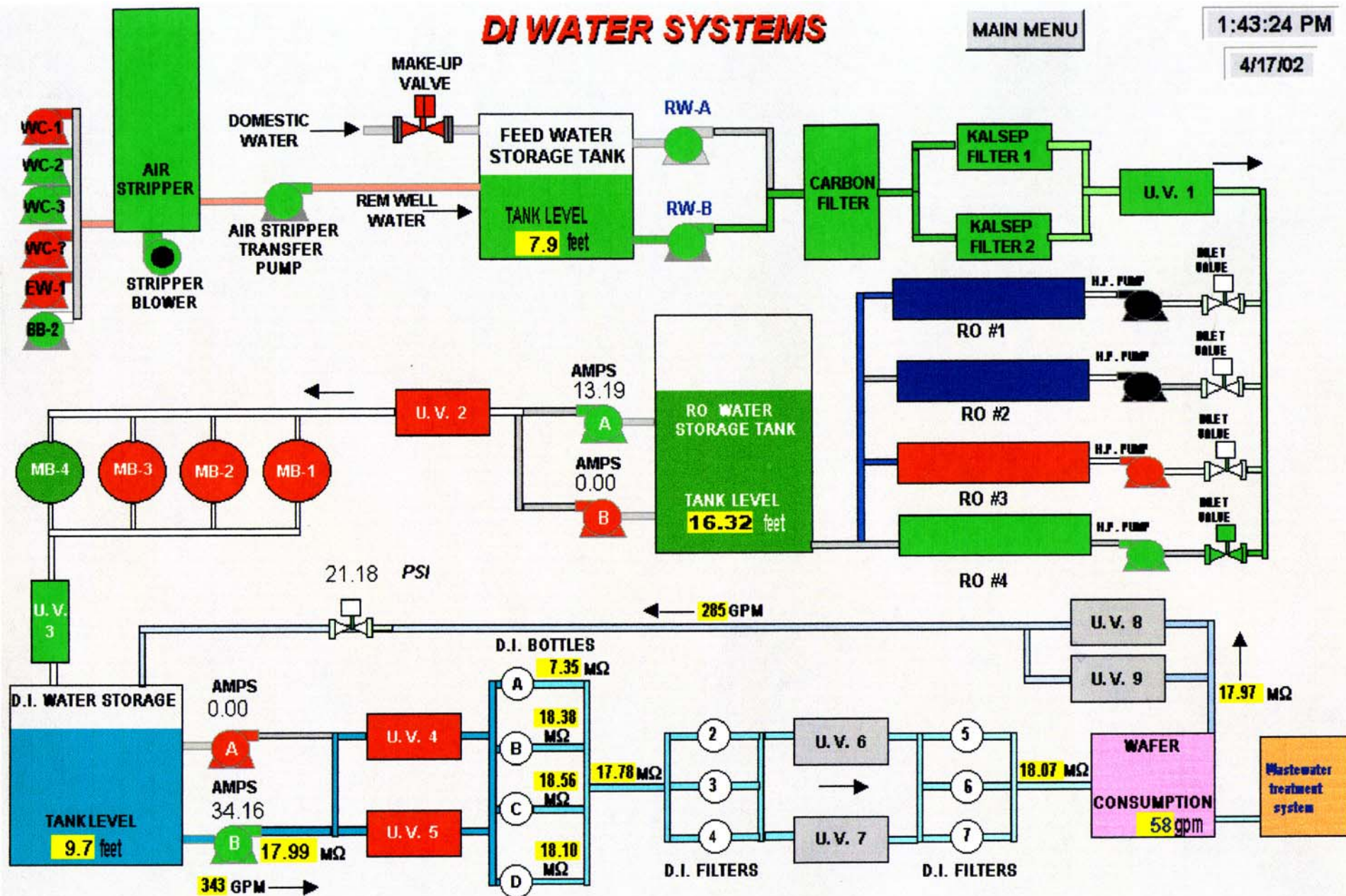
- 4” Wafer Fabrication Facility
- Specialty Analog Products
 - CD player components
 - MRI machines

DI WATER SYSTEMS

MAIN MENU

1:43:24 PM

4/17/02



Water Minimization in Fab

Overall Usage

- Usage
 - 2000 - 3000 wafer starts a week
 - 50 -80 gpm

Water Minimization in Fab

Where used?

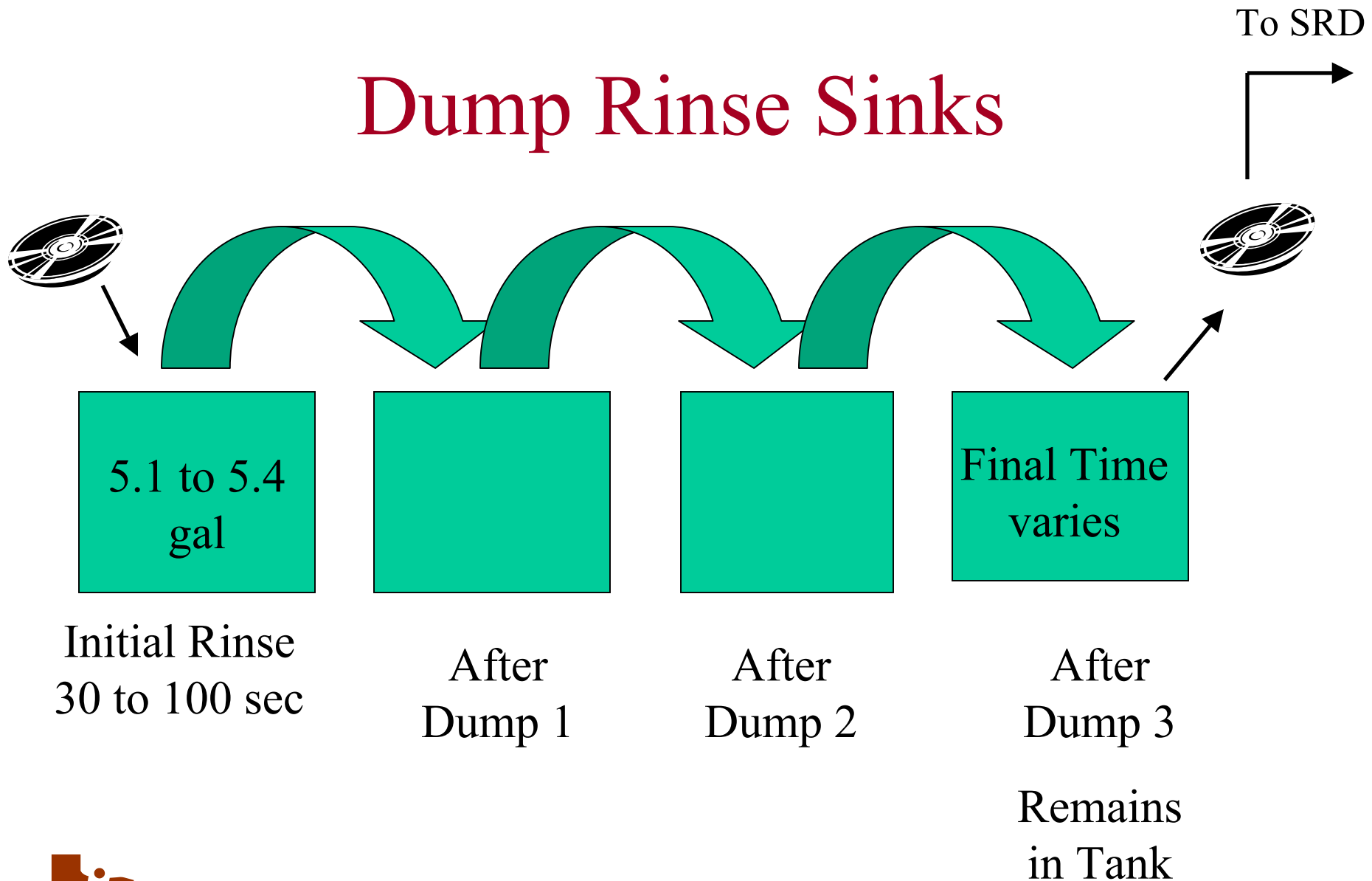
- Sinks - back ground flow
 - Glove rinsers and dump rinsers
 - 0.025 to 0.1 gpm
- Sinks - dump rinse cycle
 - 5 to 5.4 gallons per dump
 - 25 to 30 sinks
- SAT and WST - 2 to 4 gpm - 8 to 10 machines
- SRD - 1.5 to 1.75 gpm - 25 to 30 machines



Water Minimization Process Modifications

- Dump Rinse tanks
- Initial Rinse
- Processes
 - BOE 15:1/ BOE 10:1
 - HF 100:1
 - ST200 Solvent
 - EKC830 Stripper

Dump Rinse Sinks

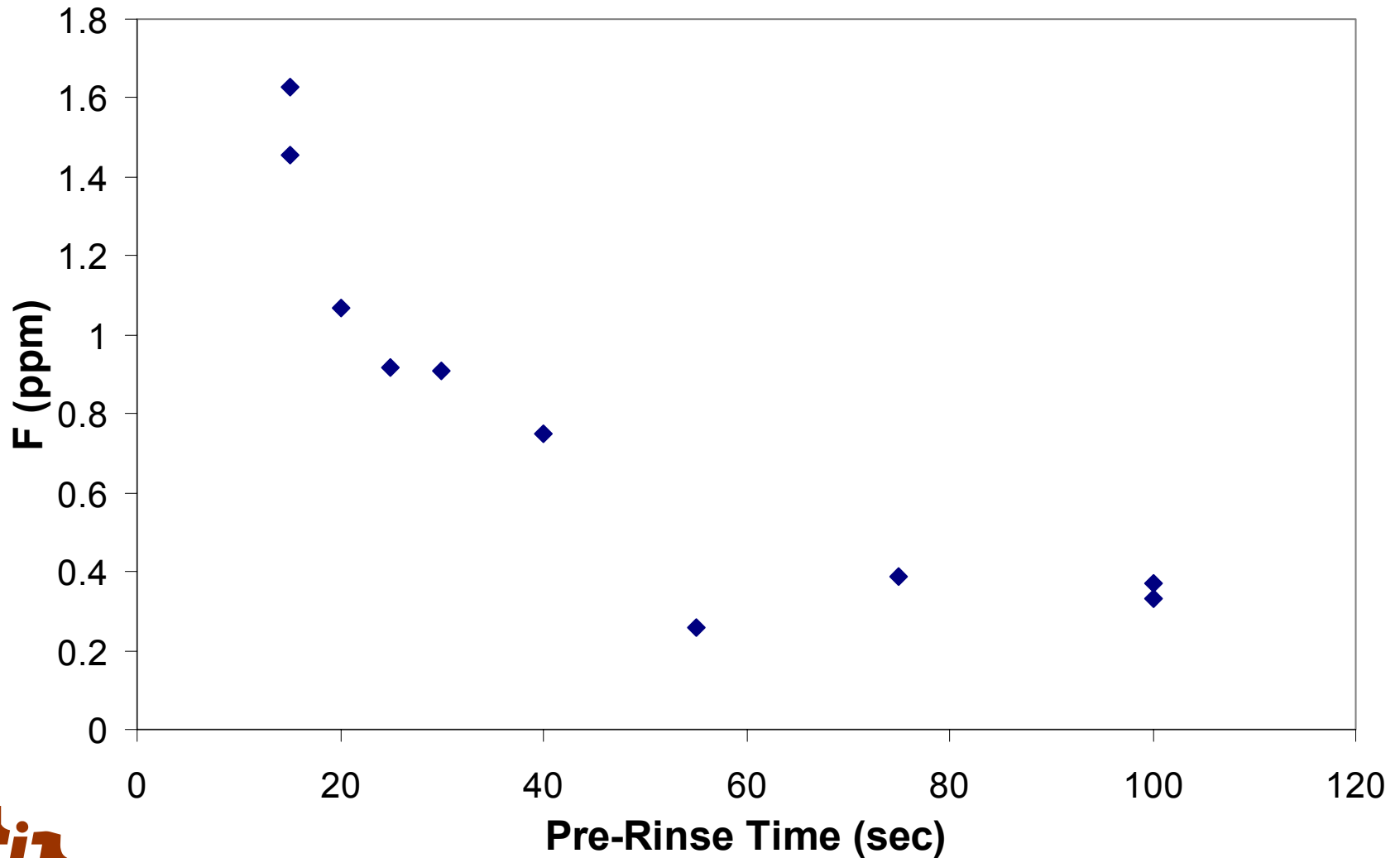


BOE Etch

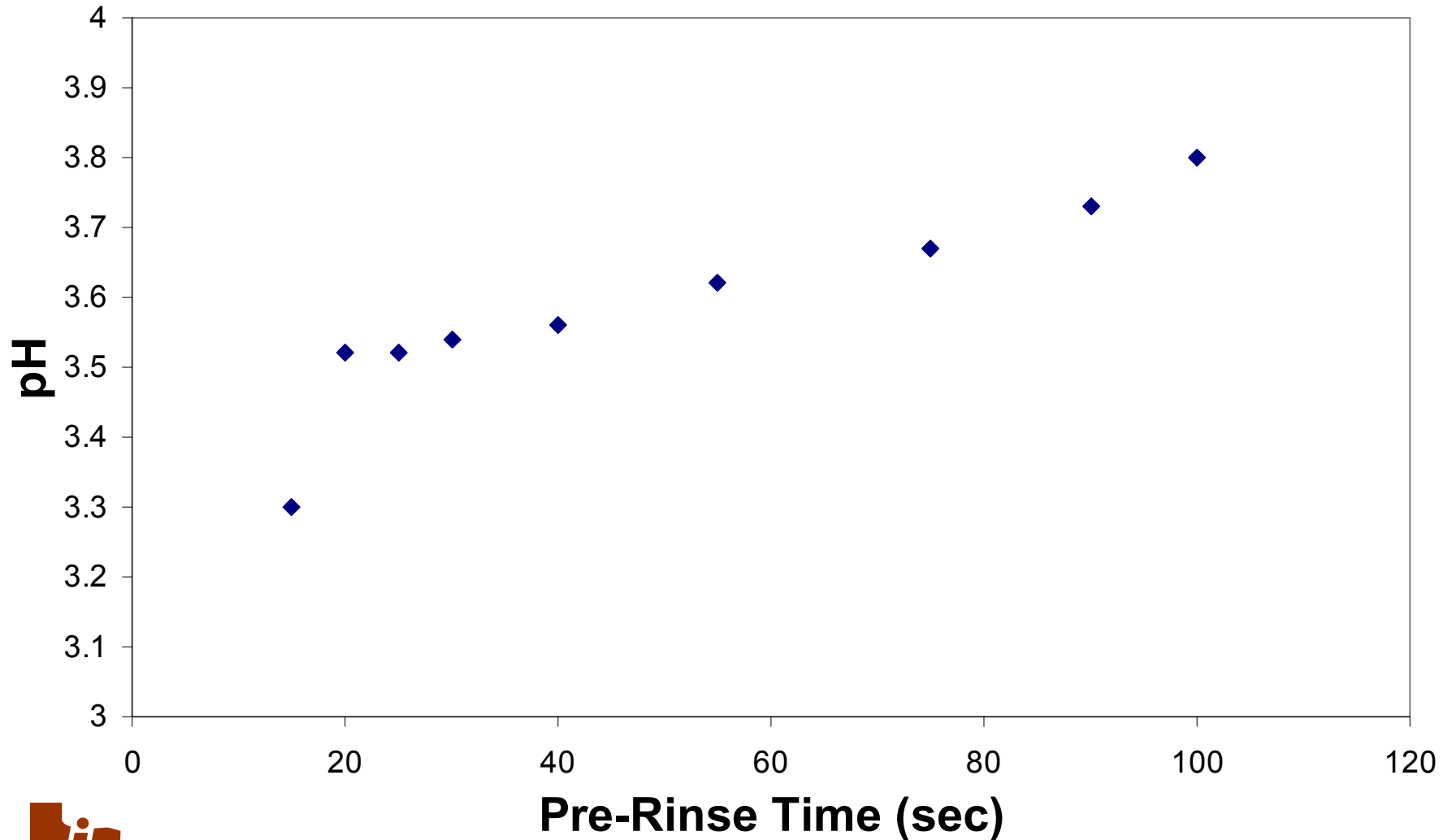
- Oxide Etchant
- Fluorine Chemistry
 - HF
 - NH_4F
- Better Control than HF and Prevents Resist Liftoff
- Better Control of Isentropic Etch
 - Lower Temperature
 - Lower Concentration



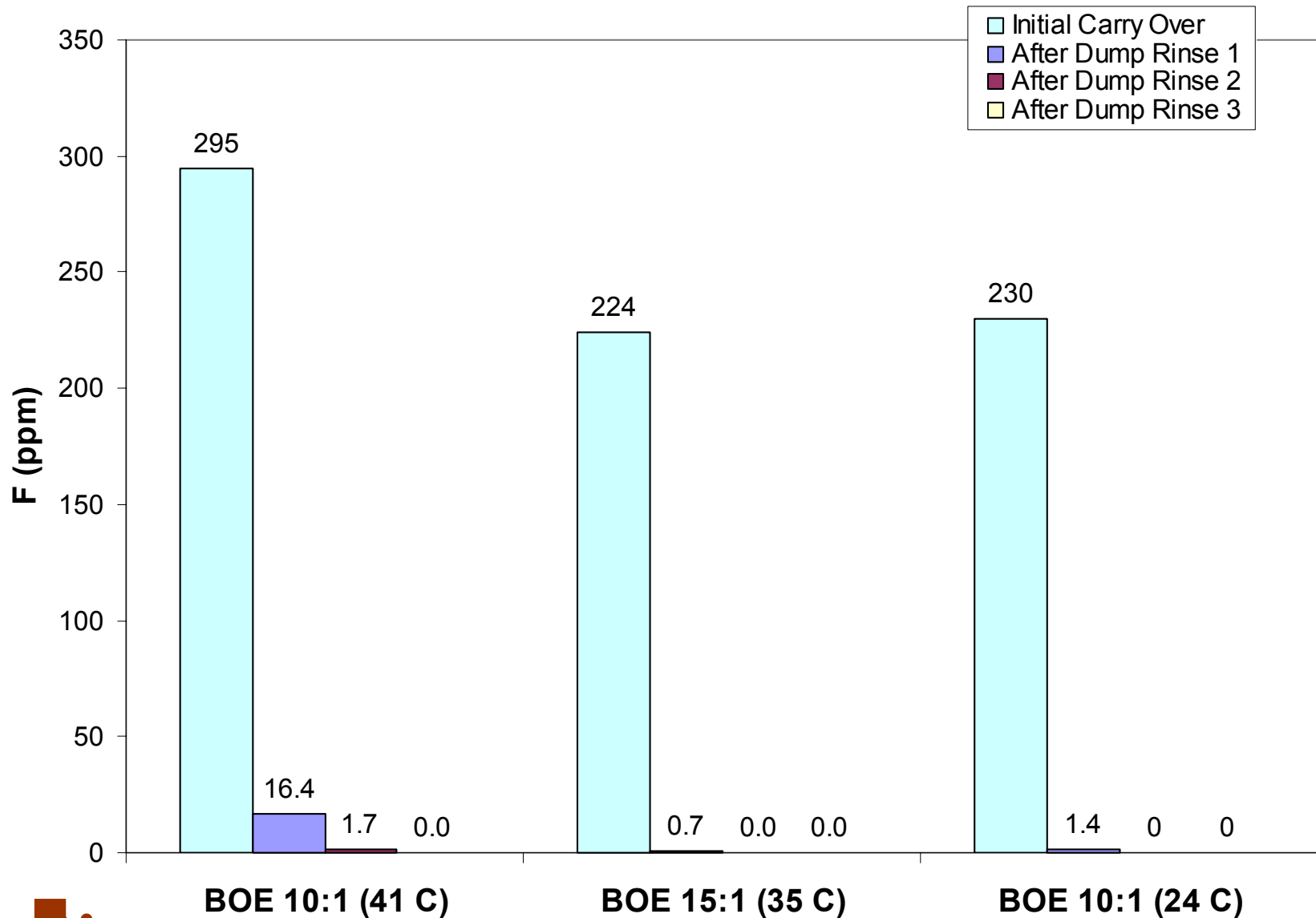
Ion Concentration in Tank Prior to First Dump Rinse Cycle



Variation of pH in Rinse Tank Prior to First Dump Rinse Cycle

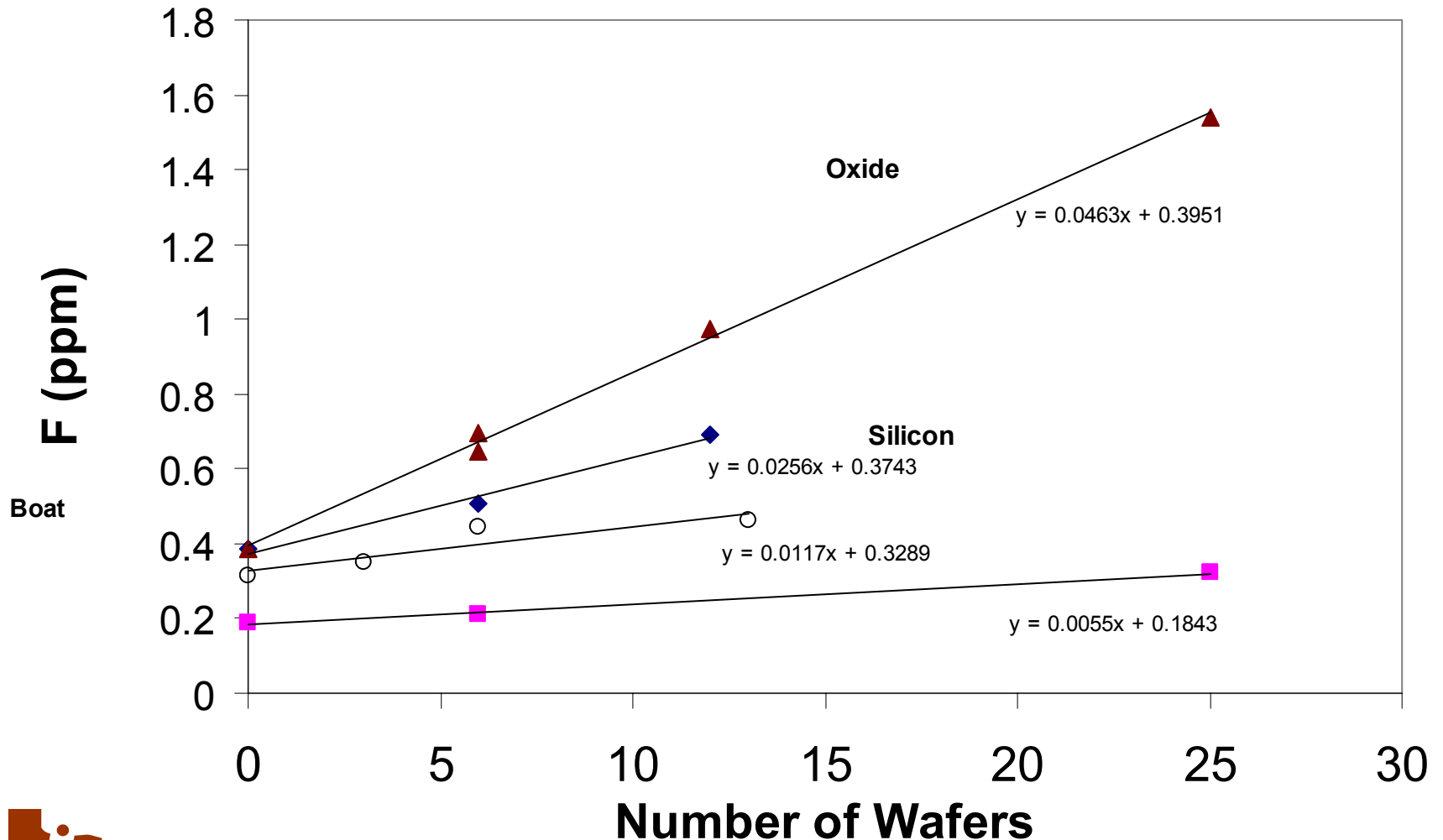


Comparison of Anions in Rinse Tank for the BOE Processes 6 Oxide Wafers

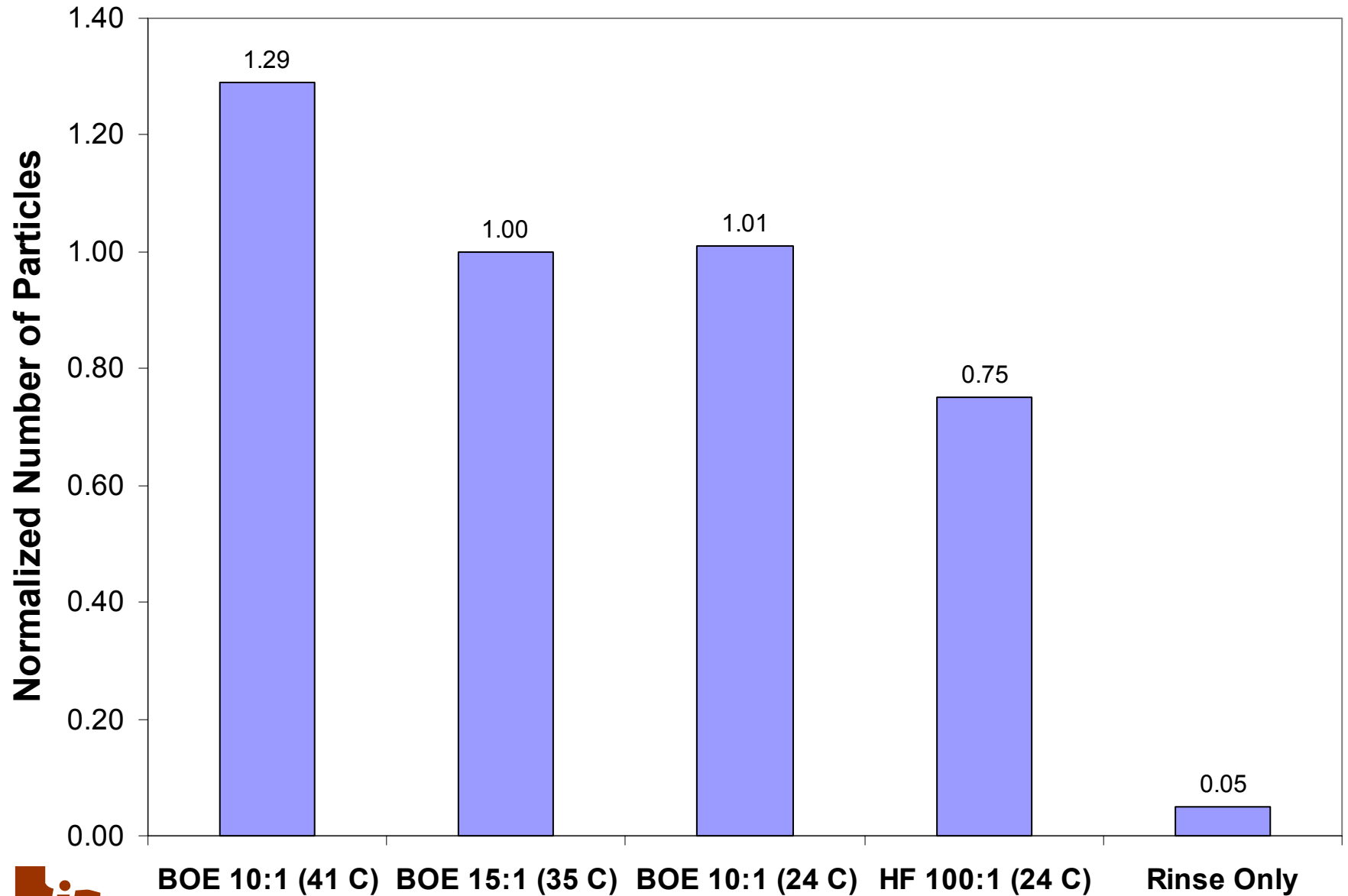


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Residual F⁻ after First Dump Rinse Cycle



Comparison of Particles Remaining on Silicon Surface

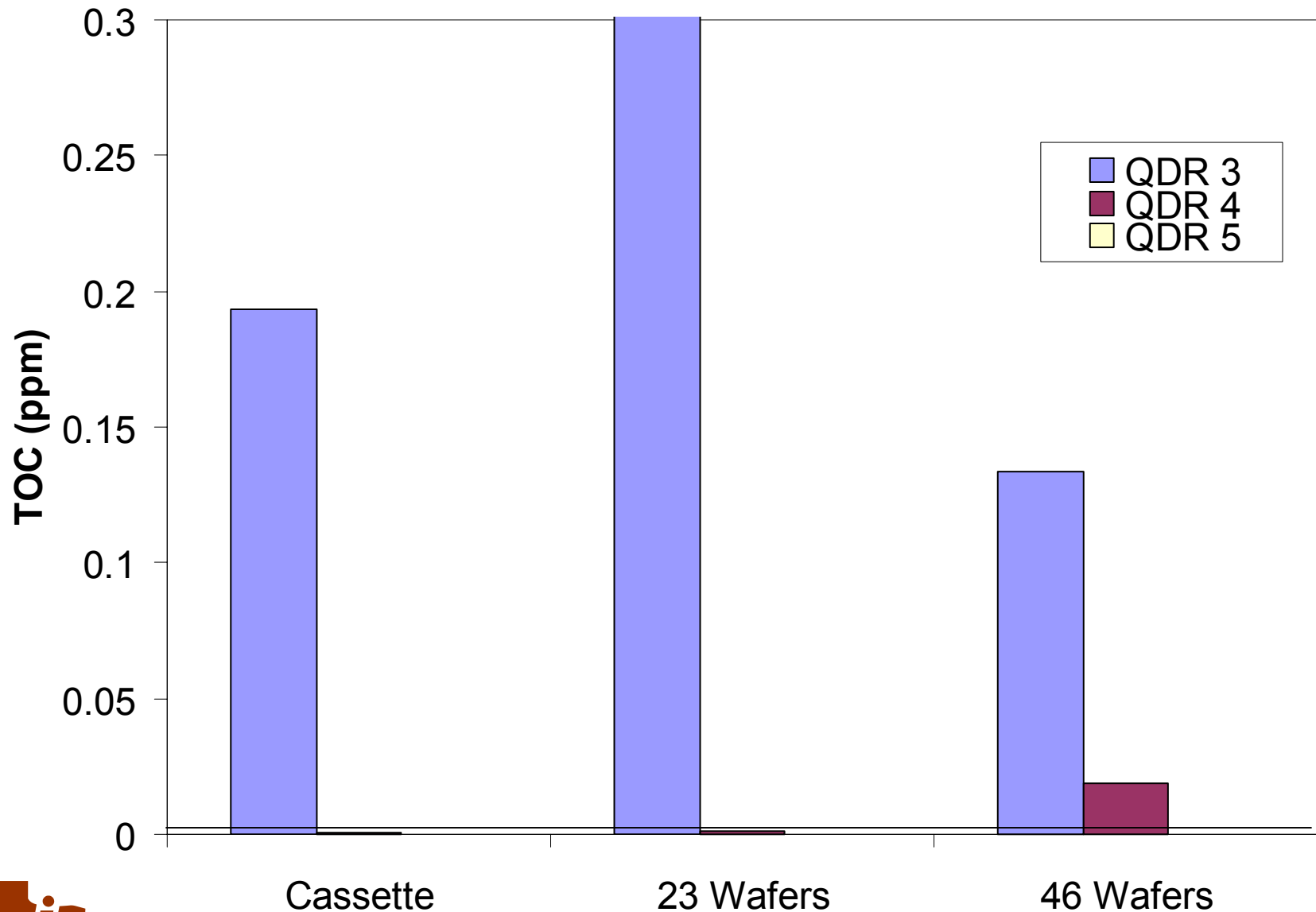


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ST-200 Clean

- Solvent Clean
- Metal Surfaces
- Room Temperature
- Extremely Viscous Material

Rinse Minimization for ST-200 Cleans

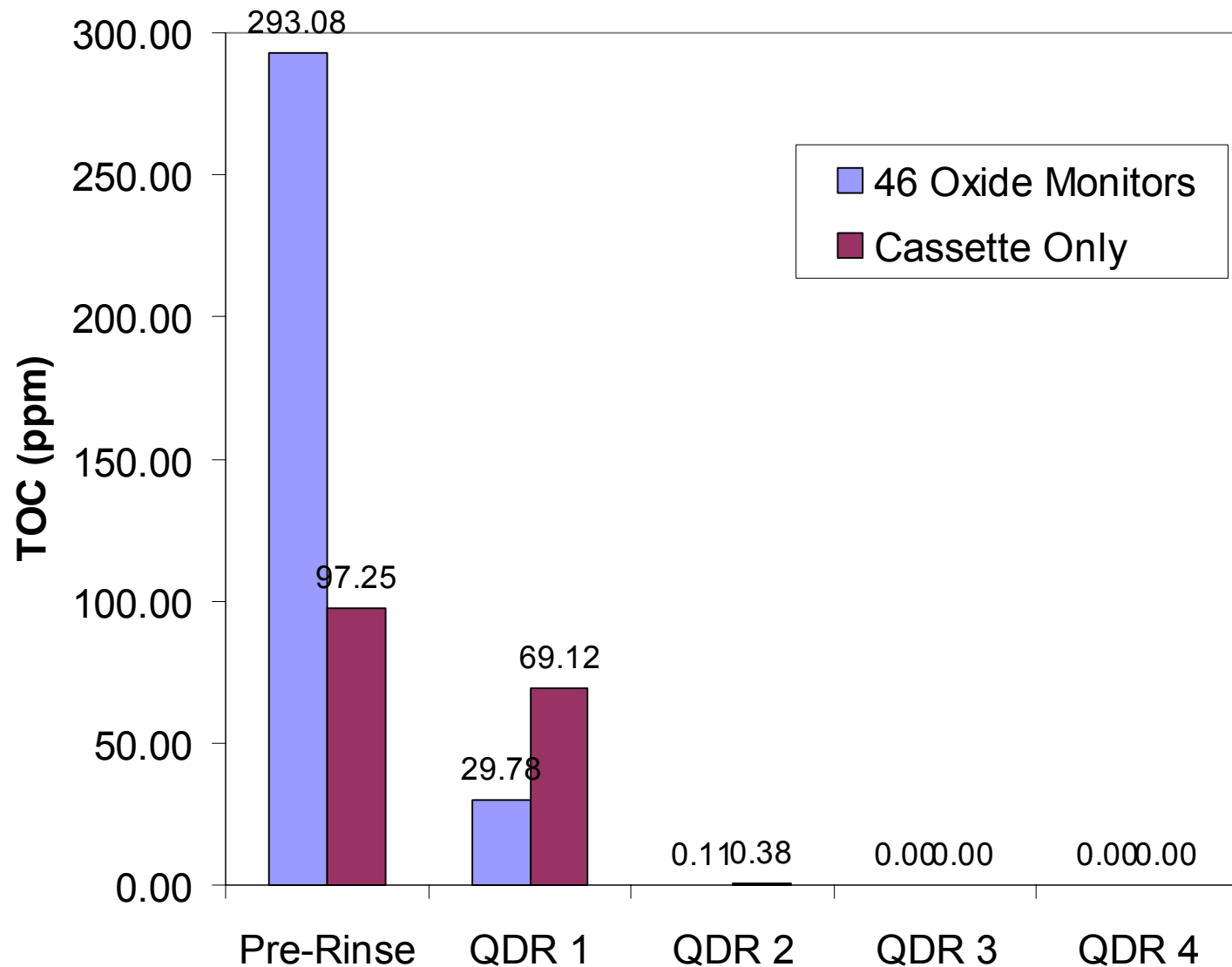


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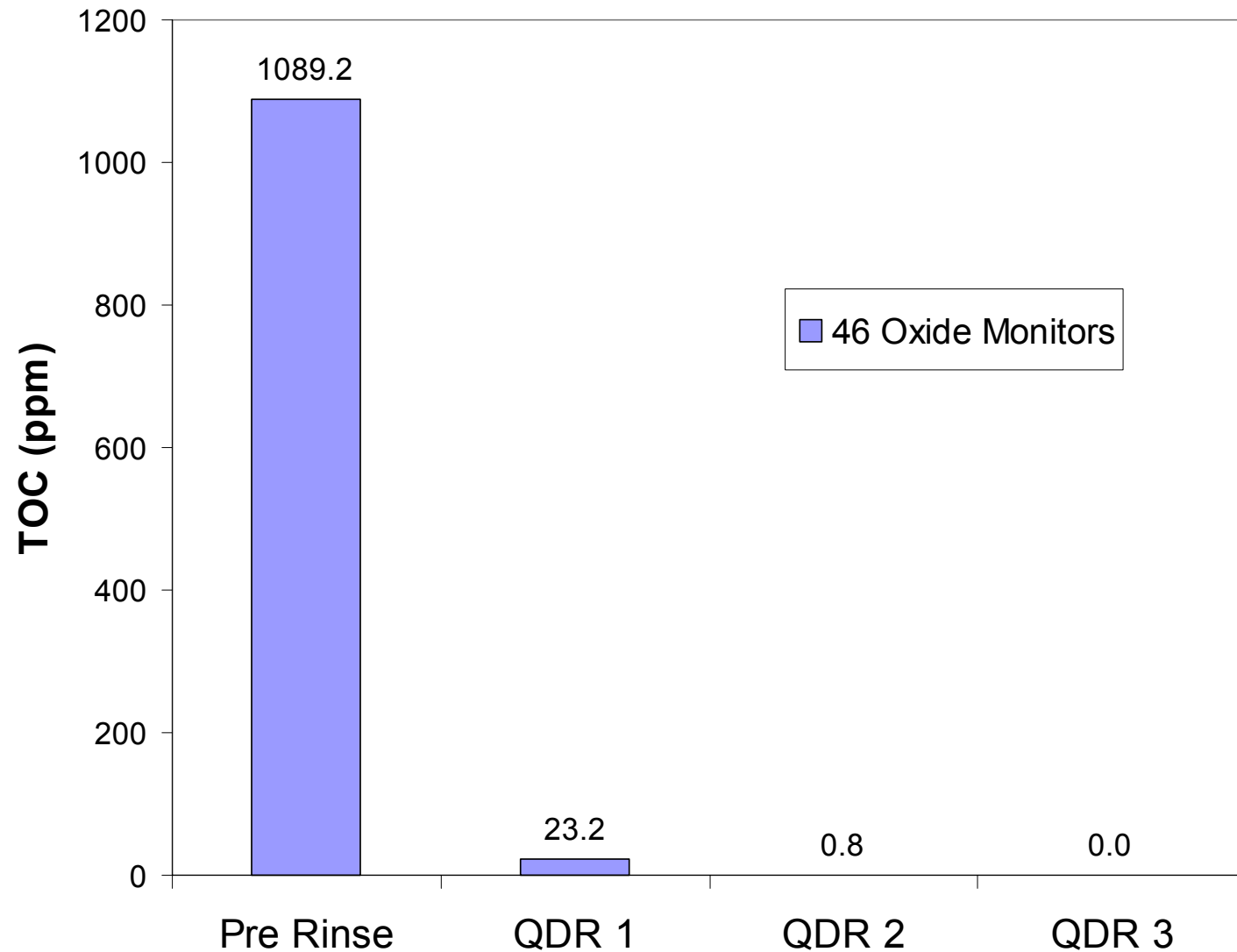
EKC-830

- Positive Resist Stripper
- Evaluating
 - EKC830/IPA/Water Processes
 - EKC830/Water Processes
- EKC830 93 C
- IPA 25 C

EKC-830/IPA Rinse Minimization



EKC830 Alone Rinse Minimization



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Recommendations

- Initial Carry-over Rinse time - 20 to 30 sec
- Upon implementation of BOE 15:1
 - Two dump rinse cycles
- 100:1 HF Clean (24 C)
 - Decrease to Two dump rinse cycles
- 20:1 BOE Two dump rinse cycles
- 10:1 BOE cold (24 C)
 - Decrease to Two dump rinse cycles



Recommendations - cont.

- 10:1 BOE hot (42 C)
 - Three dump rinse cycles
- ST-200
 - Change from Six to Four dump rinse cycles
- EKC830
 - Use IPA
 - Remain at Three dump rinse cycles



Recommendations - cont.

- pH - excellent initial indicator for number of dump rinse cycles
- Initial dump rinse compared to cascade rinse is crucial for removal of 85⁺ % of material
- IC and TOC measurements give quantitative results