



# Spancion FAB25 Resource Conservation

Environmental Defense Fund  
April 18, 2008

Dan Wilcox – P.E.  
Facilities Engineering Manger  
Spancion FAB25 Austin, TX

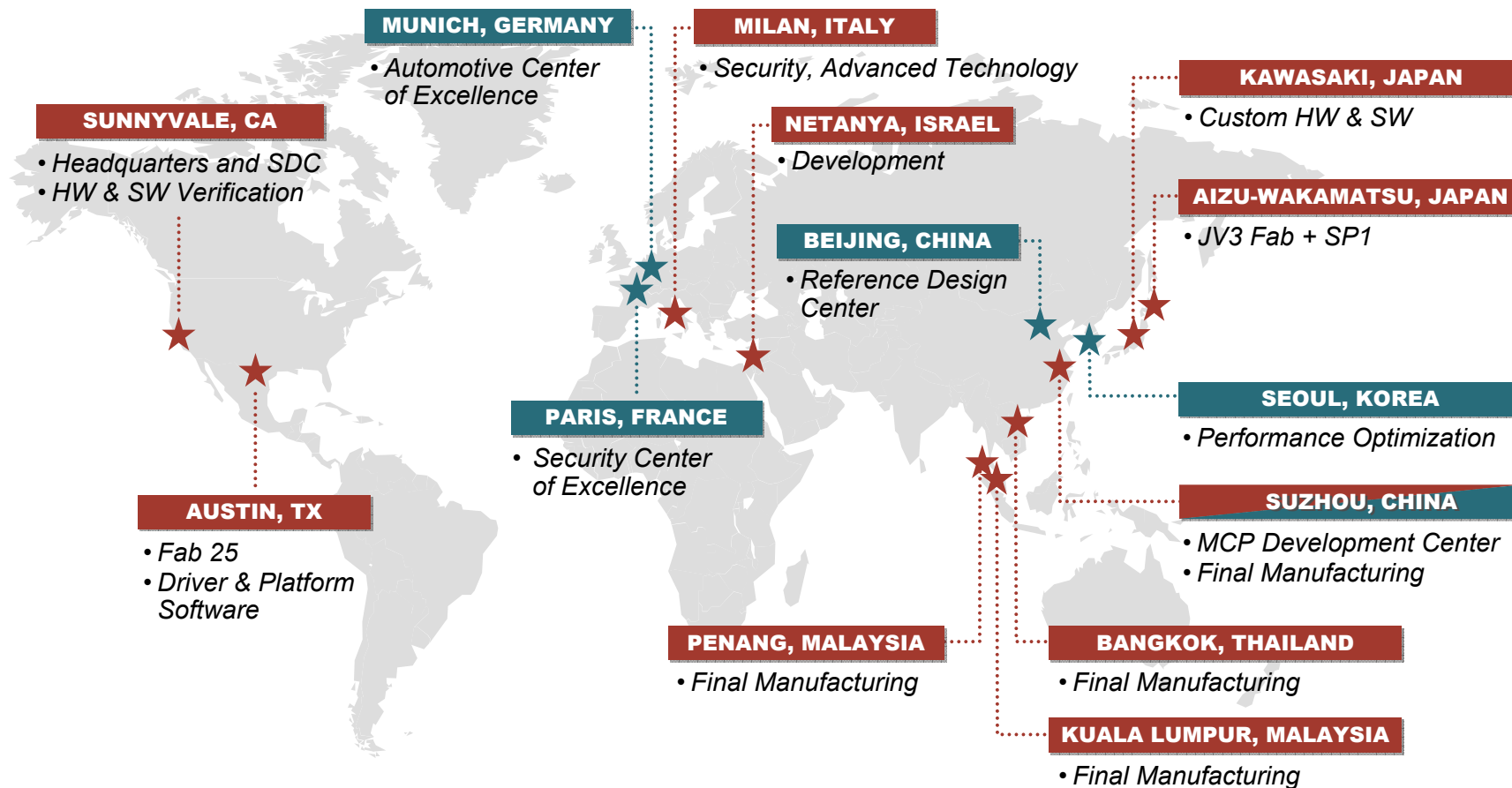


**FLASH** FORWARD



# Spancion: A Global Presence

## DESIGN CENTERS



# Spansion Corporate Highlights

- Largest Company Exclusively Dedicated to Flash Memory

- #1 in NOR Flash Memory

- \$2.5 Billion Revenues (2007)

- Top OEM Customers

- Top 10 Mobile Phones
  - Top 10 Consumer Electronics
  - Top 10 Automotive

- 3 Fabs, 4 Final Assembly Facilities

- SP1 300mm in Japan
  - FAB25 200mm in Austin, TX

- 9,500 Employees Worldwide

- 2,100 Employees in Austin

- Proprietary MirrorBit® Technology



**Consumer  
Electronics**



**Mobile  
Phones**



**Automotive**



**Networking**

# Environmental, Health and Safety (EHS) Policy



- Spansion's culture is rooted in respect for individuals. Our values commit us, as individuals and as employees, to actions that enhance the quality of life and protect the environment of the communities in which we do business.
- Our EHS Program is designed to provide a safe workplace for employees, protect the environment, prevent damage to property, enhance employee morale, and assure compliance with applicable laws and regulations worldwide.
- We hold ourselves -- management and individual employees -- responsible for complying with Spansion's EHS standards and fulfilling the intent of this policy.

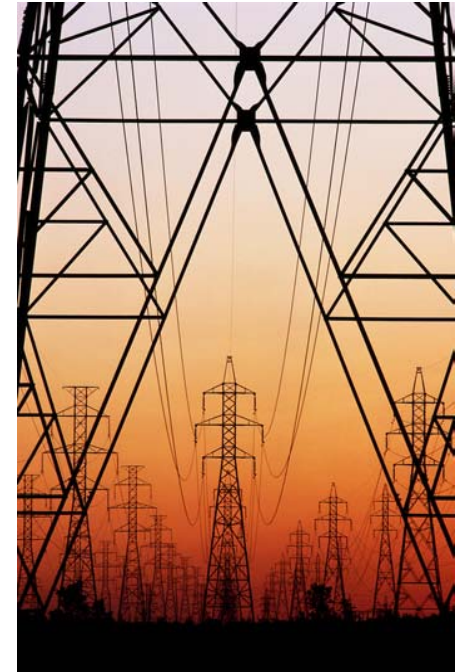
# Participation in Green Choice Program

- **FAB 25 has participated since its inception, and purchases approximately 12 gigawatt hours (GWh) of renewable energy annually with a 10-year contract**
- **In January 2007, FAB 25 consumed 22.7 GWh total, including one GWh of green energy**



# Overall Energy Savings

- **FAB 25 has reduced energy consumption by 11,000 megawatt hours (MW/hr) since 2005 through conservation projects**
- **This is equivalent to a 1.2 MW average (4%) load reduction**
- **Spancion Austin invested over \$933,000 in capital to achieve these results**



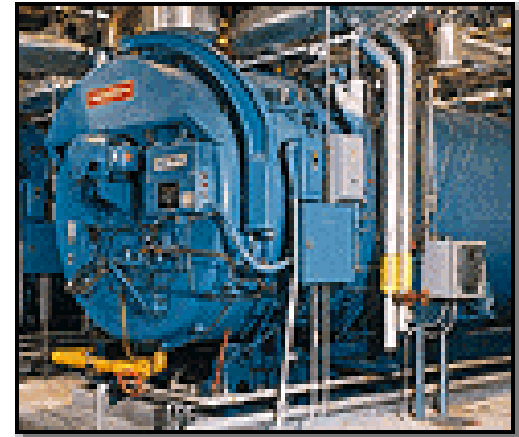
# 2005 Energy Conservation Projects

- **FAB25 reduced energy consumption by 2,000 MW/hr in 2005**
- **RODI high bay lighting replacement**
  - Saves 200 MWhr/yr
- **UPW high bay lighting replacement**
  - Saves 260 MWhr/yr
- **CUB high bay lighting replacement**
  - Saves 300 MWhr/yr
- **RODI Forwarding Pumps VFDs**
  - Saves 960 MWhr/yr
- **RODI Ultrafiltration Pump VFD**
  - Saves 297 MWhr/yr



# 2006 Energy Conservation Projects

- **FAB25 reduced energy consumption by 1,600 MW/hr in 2006**
  - **Fab Expansion (Flex) Project Phase I**
    - Saved 700 MW-hr/yr
  - **Process Cooling Water Motor Generator Changes**
    - 268 MW-hr/yr
  - **Fab Expansion (Photo Annex)**
    - Saved 250 MW-hr/yr
  - **Boiler #1 efficiency improvements**
    - Saved 70 MW-hr/yr
  - **Boiler #2 & 3 efficiency improvements**
    - Saved 96 MW-hr/yr
  - **Phase II Process Cooling Water Motor Generator Changes**
    - Saved 268 MW-hr/yr





# 2007 Energy Conservation Projects

- **FAB25 reduced energy consumption by 1,800 MW/hr in 2007**
  - **VFD RODI Raw Water Pumps**
    - Saved 266 MW-hr/yr
  - **VFD High Pressure Air Compressors**
    - Saved 298 MW-hr/yr
  - **VFD Building 1 Scrubber packing removal and VFD**
    - Saved 104 MW-hr/yr
  - **VFD Building 2 hot water pumps**
    - Saved 102 MW-hr/yr
  - **Installed high efficiency (ECM motors) on 361 new Fan Filter Units**
    - Saved 537 MW-hr/yr
  - **Installed Chiller Monitoring instrumentation and software**
    - Saved 16 MW-hr/yr
  - **VFD Boiler Controls B4**
    - Saved 68 MW-hr/yr
  - **Phase 2 PCW Motor Generator Removal**
    - Saved 415 MW-hr/yr



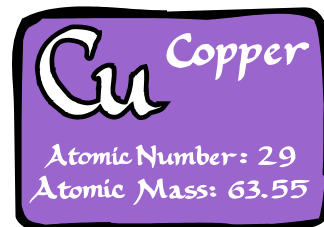
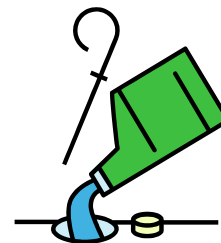
# Employee Resource Conservation

- **Annual Computer Recycling Event:** Spansion sponsors a city-wide consumer electronics recycling drive every April, with all proceeds benefiting Austin FreeNet
- **Employee Scrap Recycling:** Site employees can take boxes, packaging, lumber, and anything else that would otherwise cost money for Spansion to dispose of and/or take up landfill space, for reuse at home
- **Site Recycling:** In 2007, Spansion recycled 1.08 million pounds of solid waste, including metals, plastics, CRTs, wood, batteries, ballasts, cardboard, bottles, cans, and paper. Total landfilled waste was slightly less than one million pounds, for a site recycling rate of 53%.
- **Commute Solutions:** The roughly 10% of Austin employees who participate through carpools, vanpools, telecommuting, biking, or riding the bus saved a total of 114,000 miles (removing cars from Austin roads) in 2007, and avoided putting 69 tons of CO<sub>2</sub> into our air

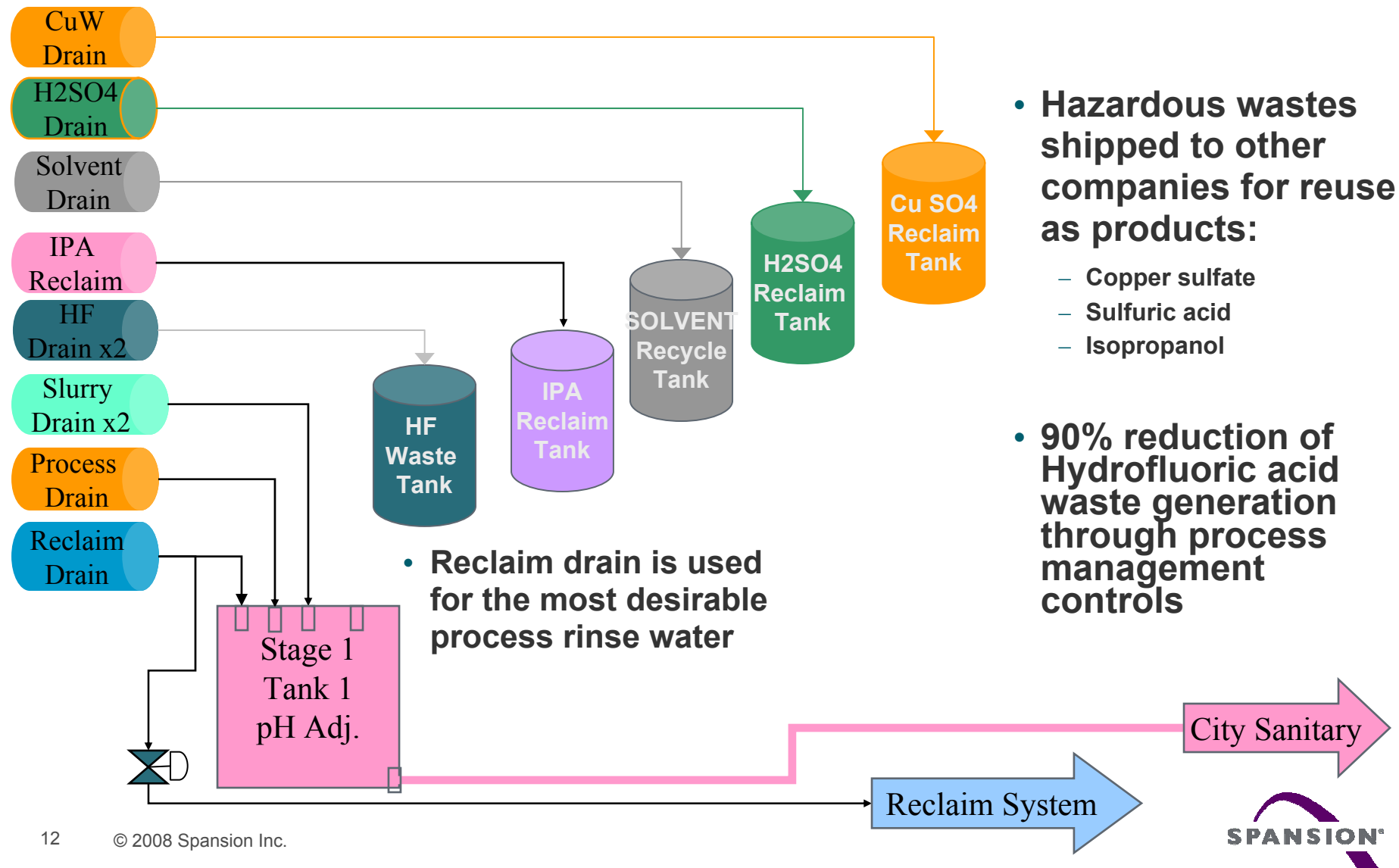


# Recent Waste Management Projects

- **Used Motor Oil:** Spansion generates 5000 pounds per year, previously collected with mixed solvent waste - now recycled and no longer classified as a hazardous waste
- **Sulfuric Acid Reuse:** Spansion generates 2.9 million pounds per year, previously recycled (processed back into sulfuric acid) - now reused by a third party as a product in the manufacture of ferrous sulfate, resulting in combined total savings of \$85,000/yr
- **IPA (isopropanol) Reuse:** Spansion generates 207,000 pounds per year, previously collected with mixed solvent and burned for energy recovery - now sold as a product for use as a cleaning solvent, with a savings of \$27,000/yr
- **Copper Plating Bath Reuse/Recycling:** Spansion generates 82,000 pounds per year, previously treated off-site as a hazardous waste - now reused by a third party to digest other waste streams and produce a copper sludge, saving \$23,000/yr and removing a hazardous waste stream



# Reusing Hazardous Waste Streams



# Spancion FAB25 Water Reclaim & Recycle Projects



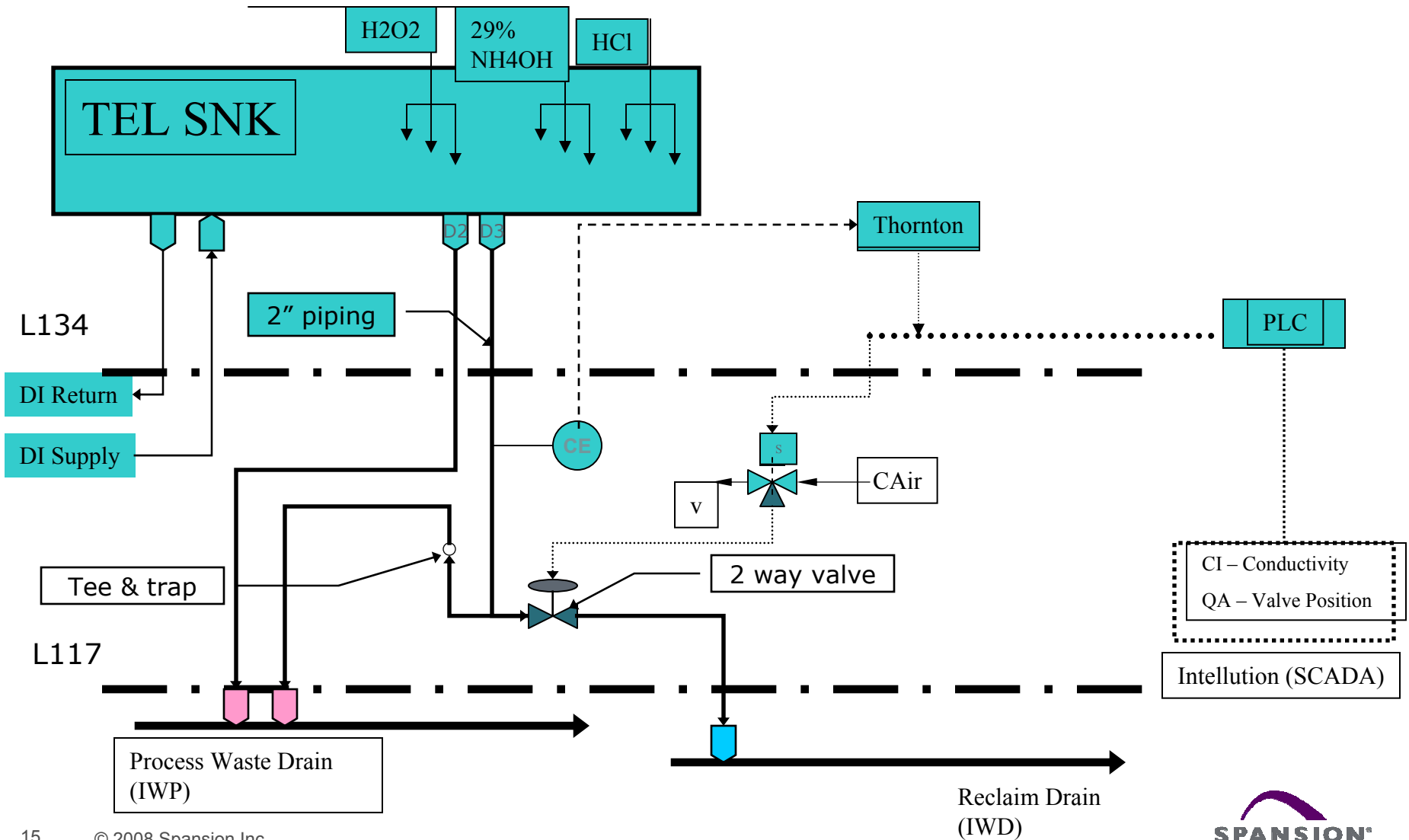
- **FAB25 conserves 1.5 million gallons per day from these projects. This is a 60% decrease of water usage since 2000**
  - **February 2000: Reclaim RO**
    - Installed Reverse Osmosis Water purification system that allowed 500 gpm (gallons per minute) or 720,000 gallons per day (GPD) of process water to be reclaimed and used for ultrapure water system supply
  - **March 2003: Process Waste Water Reclaim**
    - Installed conductivity/diversion monitors (quality) on (10) process tool connected to a dedicated reclaim drain that allowed 288,000 GPD of process water to be reclaimed and used for cooling tower supply
  - **November 2005: Process Waste Water Recycle**
    - Installed Ultra-filter (UF), instrumentation, and controls to enable additional 288,000 GPD of process waste water (totaling 30 tools) to be recycled to the Ultrapure Water supply
  - **2006 – 2007: Expanded Capacity**
    - Added conductivity/diversion monitors on 12 additional process tools
  - **2008 Q3: System Build-out**
    - Design in place for additional 360,000 GPD of fab process water reclaimed for facilities equipment

# Process Water Reclaim & Recycle

- **Active Quality Segregation**
  - Diverts Process Tool rinse water to reclaim based on conductivity
  - Installed on and operating on 43 process tools
  - Design developed at Spansion FAB25
  - The only semiconductor facility in the U.S. that recycles FAB process water
- **Fully integrated into plant control system**
  - 100% data acquisition
  - Real time operator interface



# Active Quality Segregation Schematic





# Active Quality Segregation Piping



Passive By-pass

2 channel conductivity transmitter serves 2 SNK's

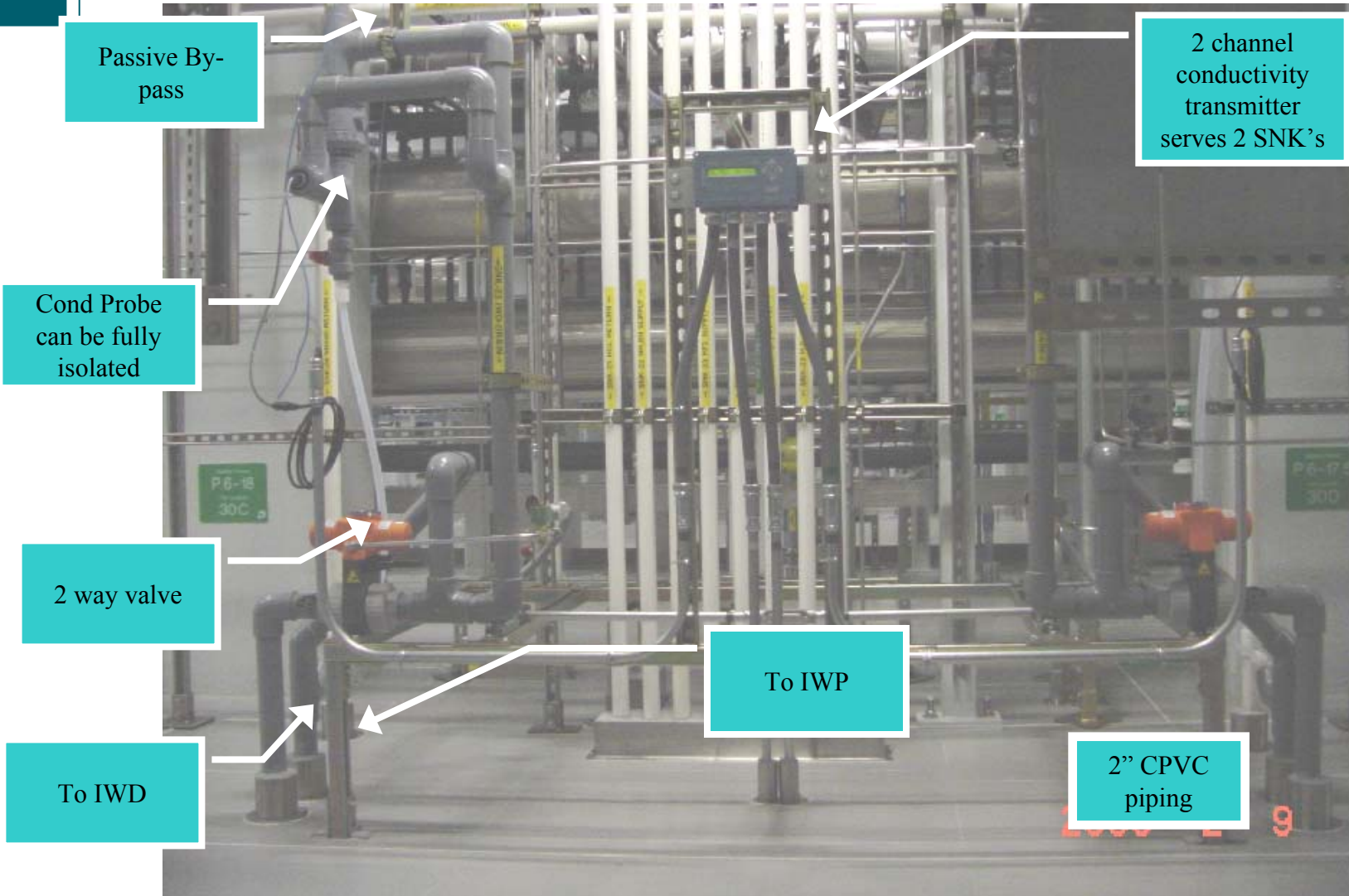
Cond Probe can be fully isolated

2 way valve

To IWP

To IWD

2" CPVC piping

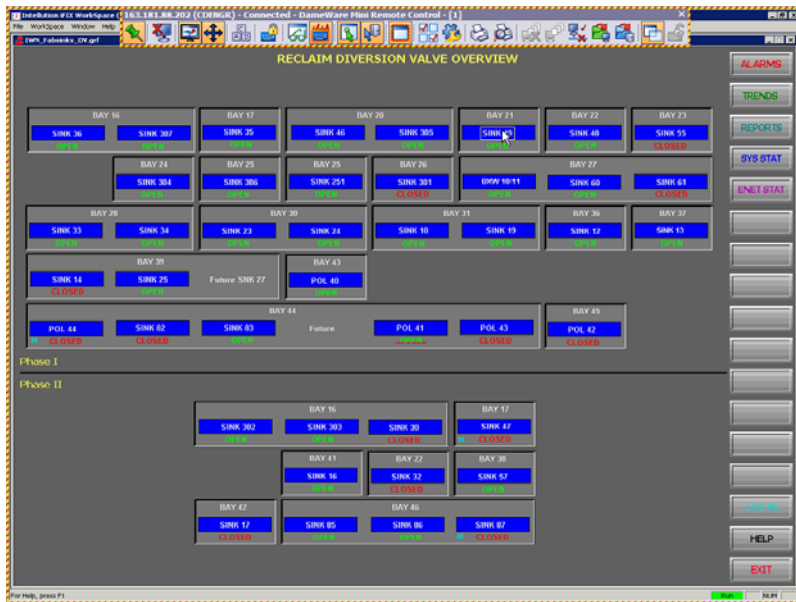




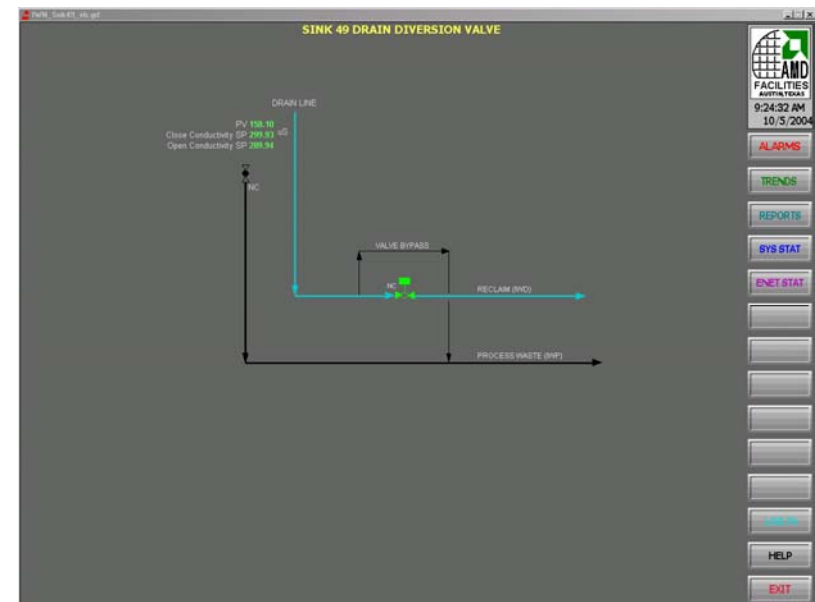
# Plant Control System

## Interface Screens

- Main Control Screen



- Tool Control Screen



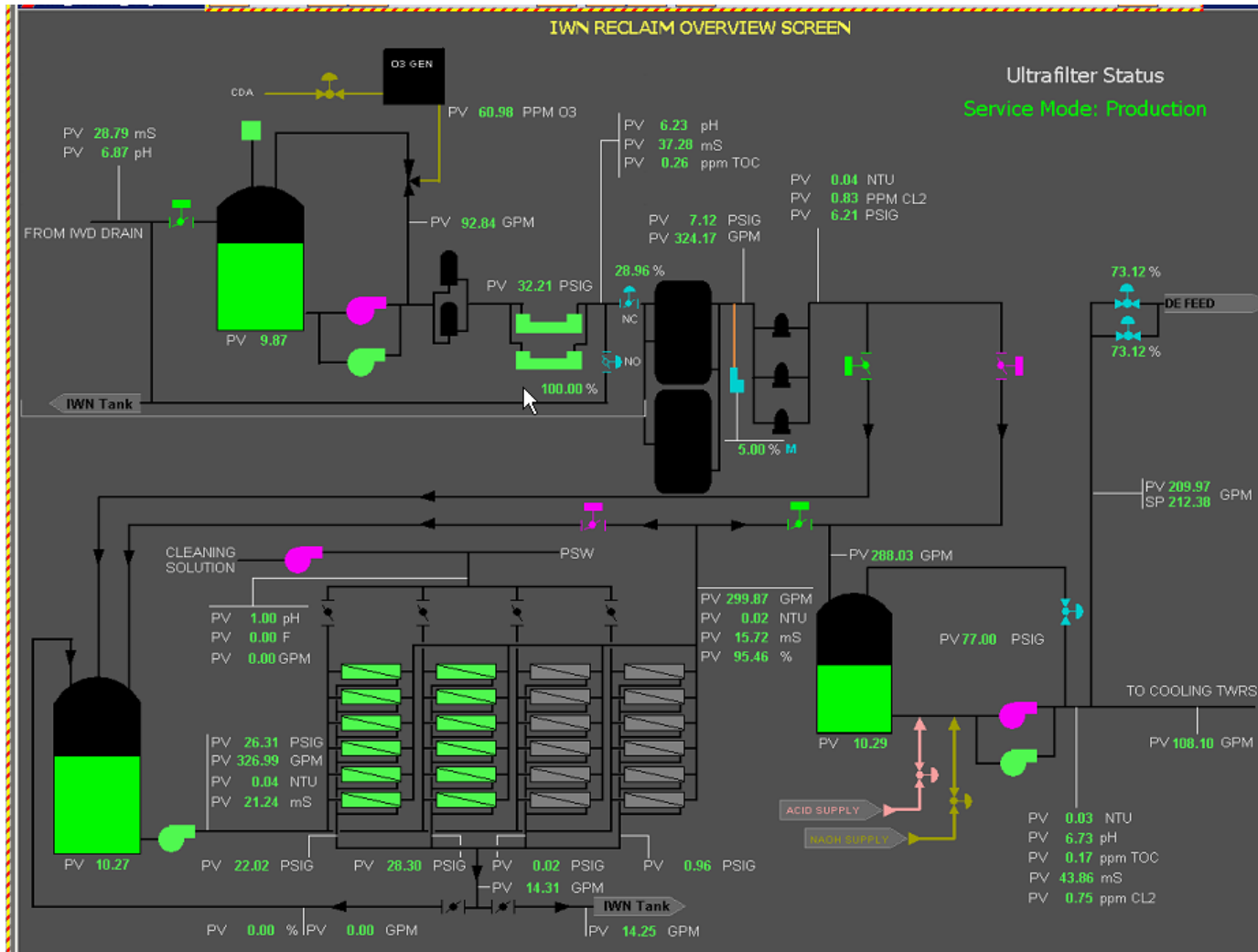
# Why Active Quality Segregation?



- **Select only the best rinse water from process tools based on conductivity**
- **Gives real-time data on all water entering the reclaim system**
- **Can isolate bad sources using remote manual override**
- **Removes errant discharge to reclaim found in tool recipe segregation method**
- **Simple design uses single 2-way valve with passive by-pass trap**
- **Helpful to process tool owners for troubleshooting**
- **Substantially reduces treatment system capital and O&M cost**

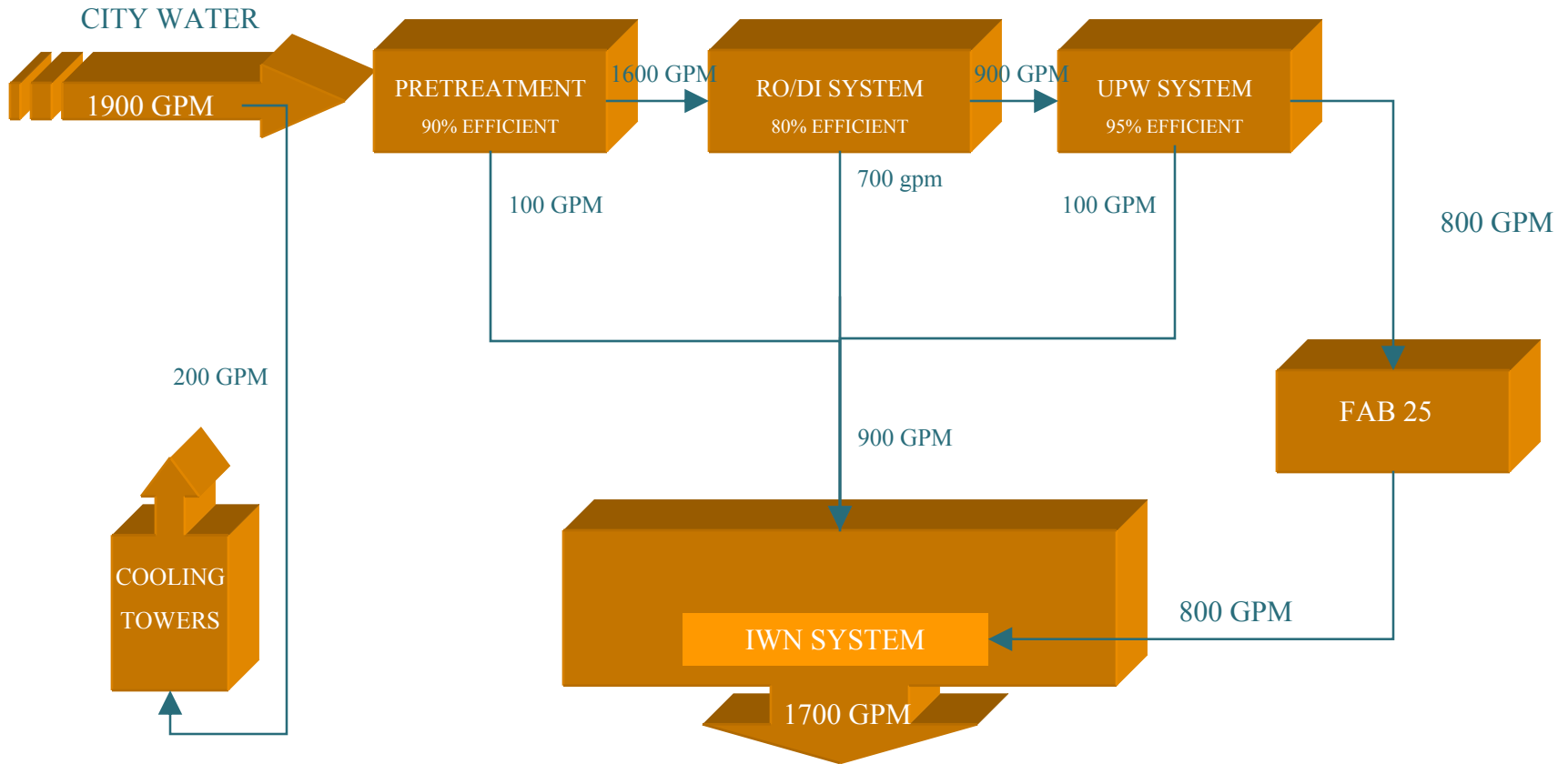
# Process Water Reclaim Treatment

## Process Flow Diagram



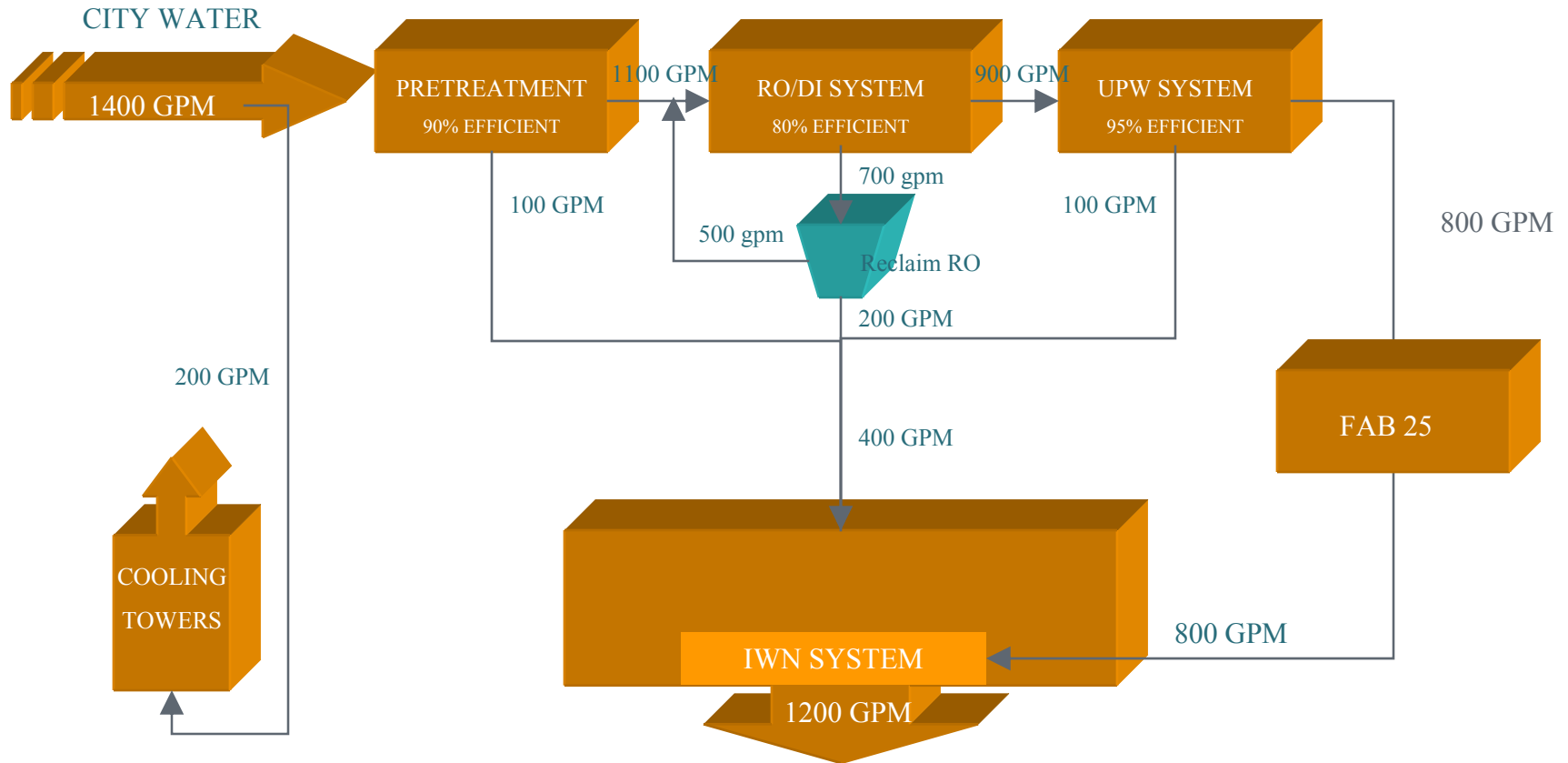
# FAB 25 Water Mass Balance

## Original Construction



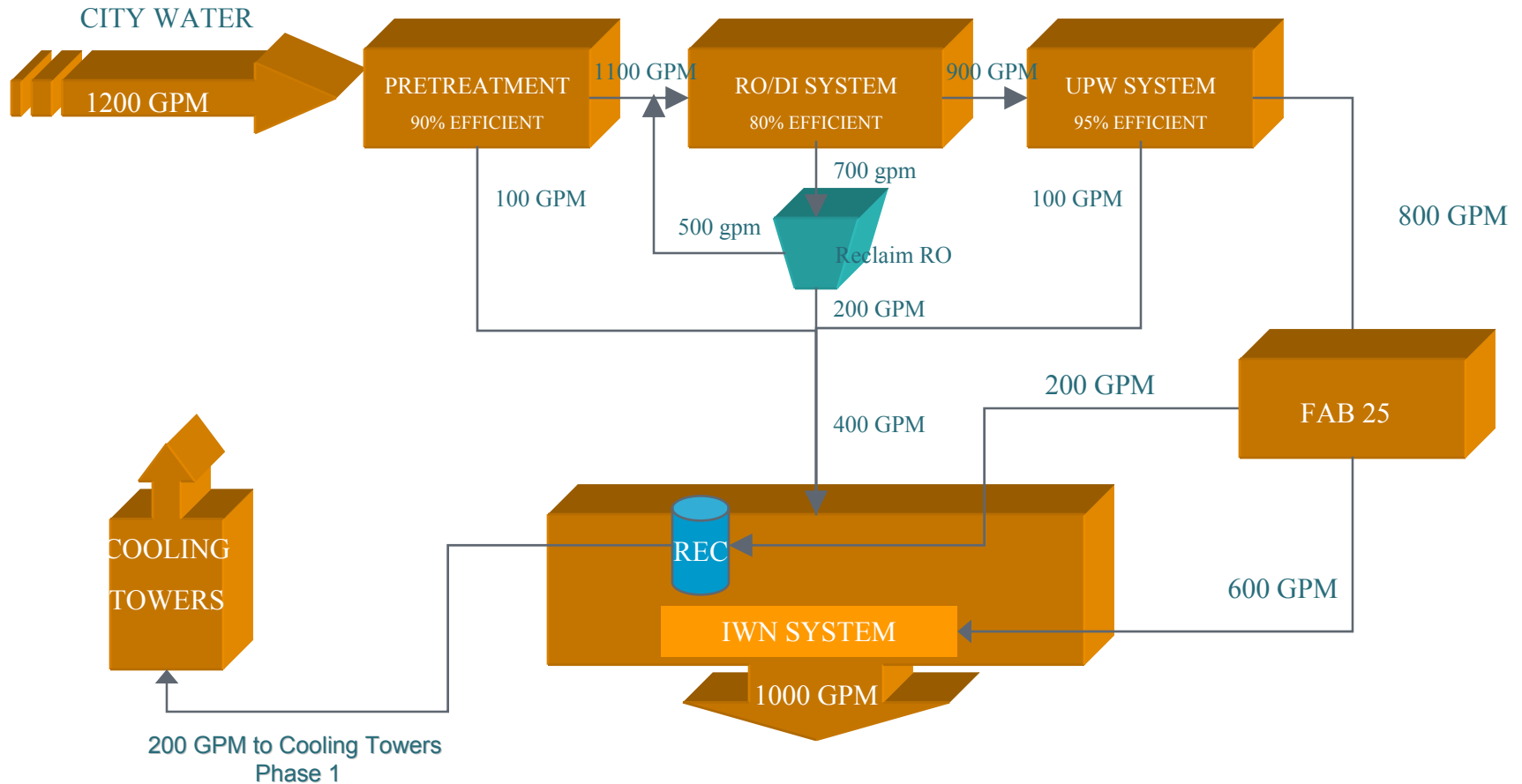
# FAB 25 Water Mass Balance

## After Reclaim RO Installation



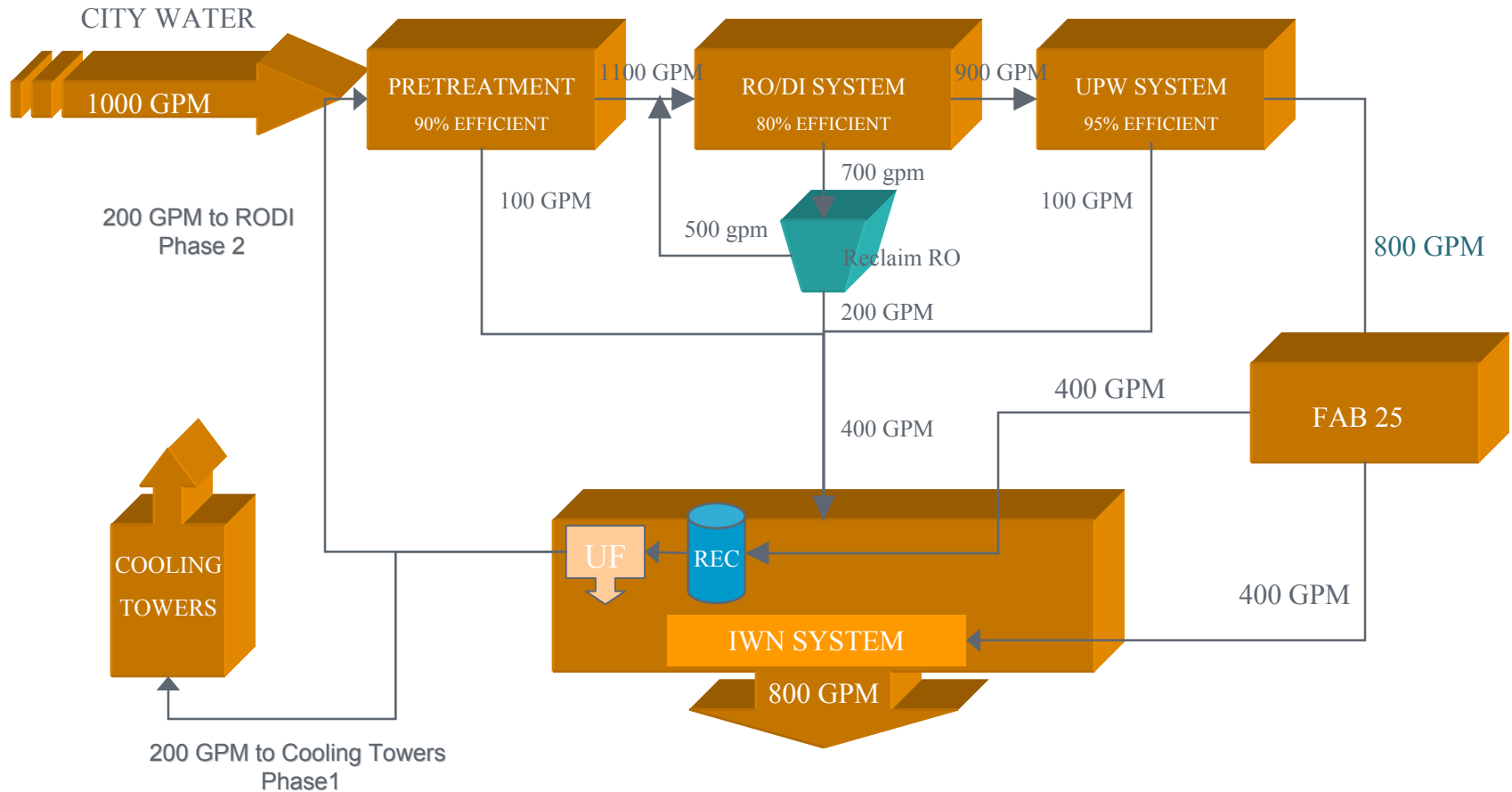
# FAB 25 Water Mass Balance

Flow Balance after Process Wastewater Reuse to Cooling Towers



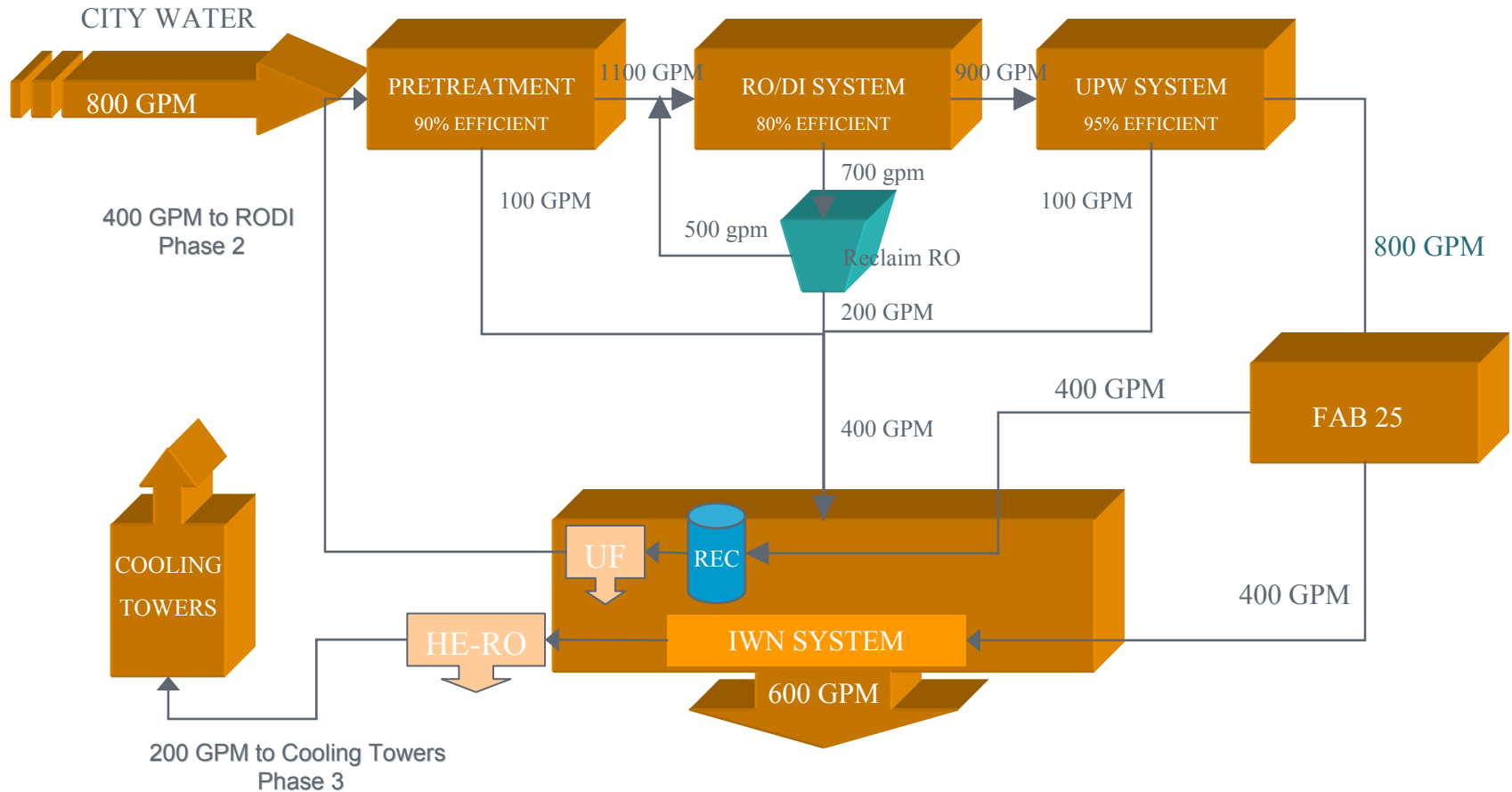
# FAB 25 UPW/IWN PFD

*After SNK Reuse to RODI makeup & Cooling Towers*



# FAB 25 UPW/IWN PFD

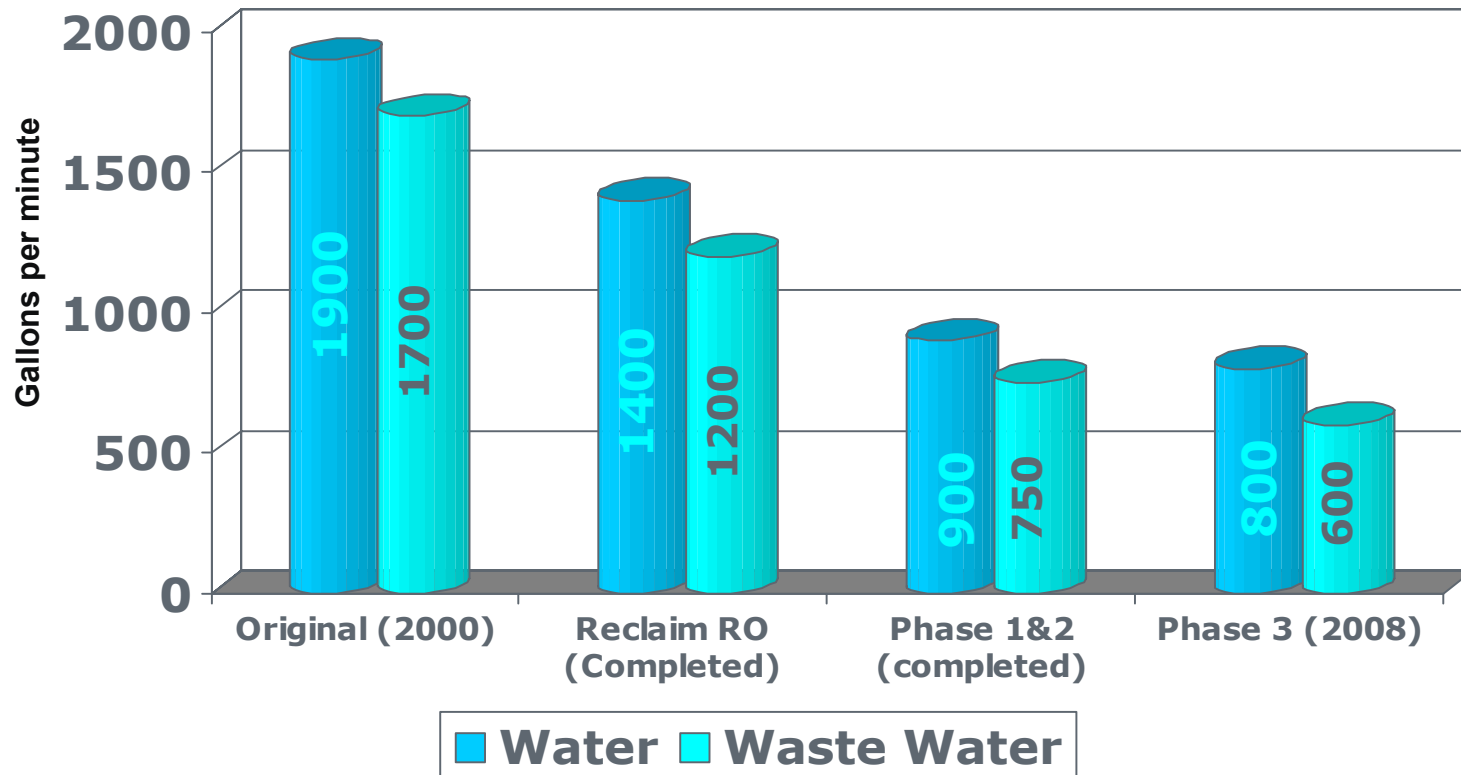
*After SNK Reuse to RODI makeup & IWN to Cooling Towers*



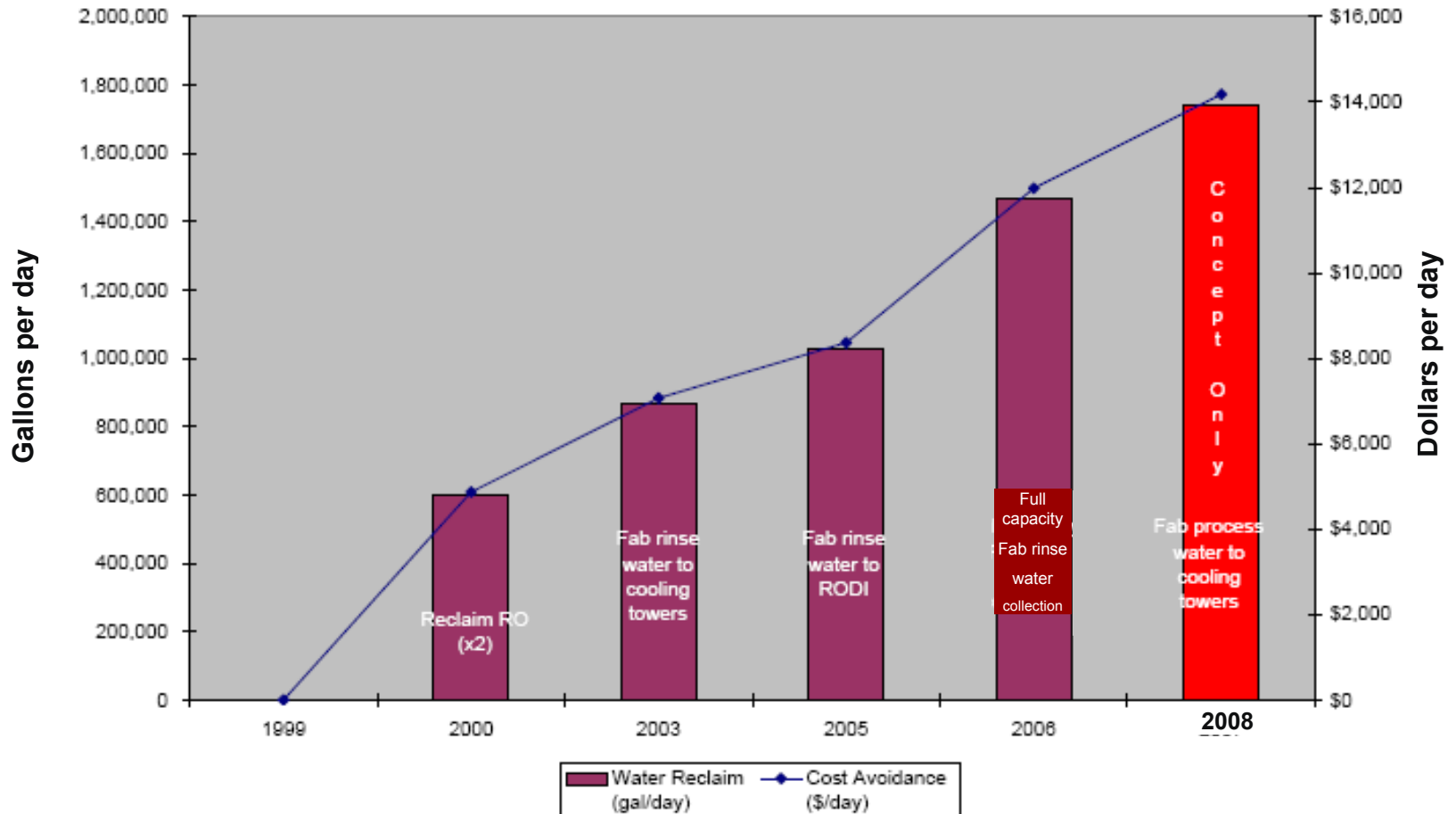


# FAB 25

## City Water & Wastewater Throughput

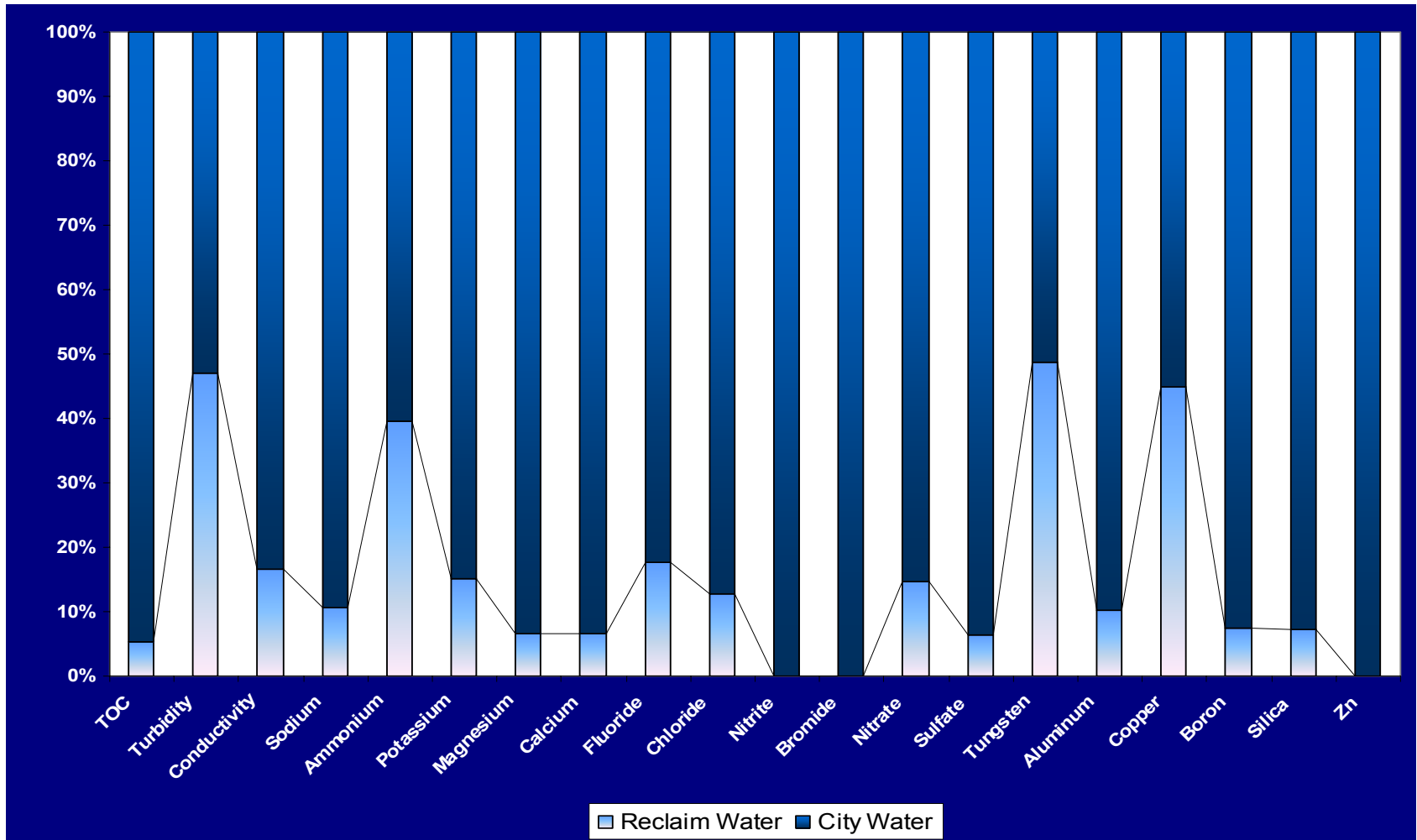


# FAB 25 Water Reclaim Progress since 2000



# City Water – Reclaim Water

## Quality Comparison



# Austin Industrial Water Customers



- A group of major employers in the Austin area have recently formed a group called the “Greater Austin Water Forum” or GAWF.
- Started in 2006 GAWF membership consists of 8 major businesses in the Austin Metro area including 3M, Applied Materials, Freescale Semiconductor, Hospira, Samsung Austin Semiconductor, Semitech-ADTF, Spansion Inc., and University of TX.
- The companies that make up GAWF employ more than 14,000 Austin citizens with high wages and competitive benefits and have a major impact on the economic well-being of the city and region.
- In addition our businesses affect supporting companies and numerous contract jobs in the Austin metro area.

# GAWF Vision and Mission



- Vision: ***“To develop a forum for large volume water consumers and Austin Water Utility to interact leading to a partnership that will improve communication and promote innovative and cost effective water management practices promoting water conservation, recycle and re-use.”***
- Mission Statement: ***“To promote the exchange of best practices and benchmarking, and communicate and work with the Austin Water Utility on short-term and long-term planning objectives.”***

# Austin Industrial Water Customers & Water Conservation



- The Industrial customer class has invested millions of dollars in numerous water conservation projects to reduce water and wastewater utility costs and become more profitable.
- These projects have contributed to the City Council Water Conservation Task Force (CWCTF) goals by providing a combined reduction of water usage and wastewater discharge of over 2.4 million gallons per day (26% of the Industrial class total usage and 1% of the total current peak demand day of the Austin Water Utility).
- We believe these are significant accomplishments in water conservation which greatly benefit the Austin community.
- Further, these efforts demonstrate the lengths that the Industrial Customer class can go to assist the CWCTF in meeting its 1% annual goal for the next 10 years.

# Trademark Attribution



**Spansion, the Spansion Logo, MirrorBit, MirrorBit Eclipse, HD-SIM, ORNAND, ORNAND2, and combinations thereof are trademarks of Spansion LLC. Other names used in this presentation are for informational purposes only and may be trademarks of their respective owners.**

**This document is for informational purposes only and subject to change without notice. Spansion does not represent that it is complete, accurate or up-to-date; it is provided “AS IS.” To the maximum extent permitted by law, Spansion disclaims any liability for loss or damages arising from use of or reliance on this document.**

