ERC Roundtable Telecon

CMP Water Use Optimization: International SEMATECH Project Perspective

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INTERNATIONAL SEMATECH

Main source of DI water use in Member Company fabs:

Wet cleans and CMP

Increased use by CMP in manufacturing:

FEOL: Oxide (STI, PMD), poly (DRAM),

BEOL: Oxide, W, Cu

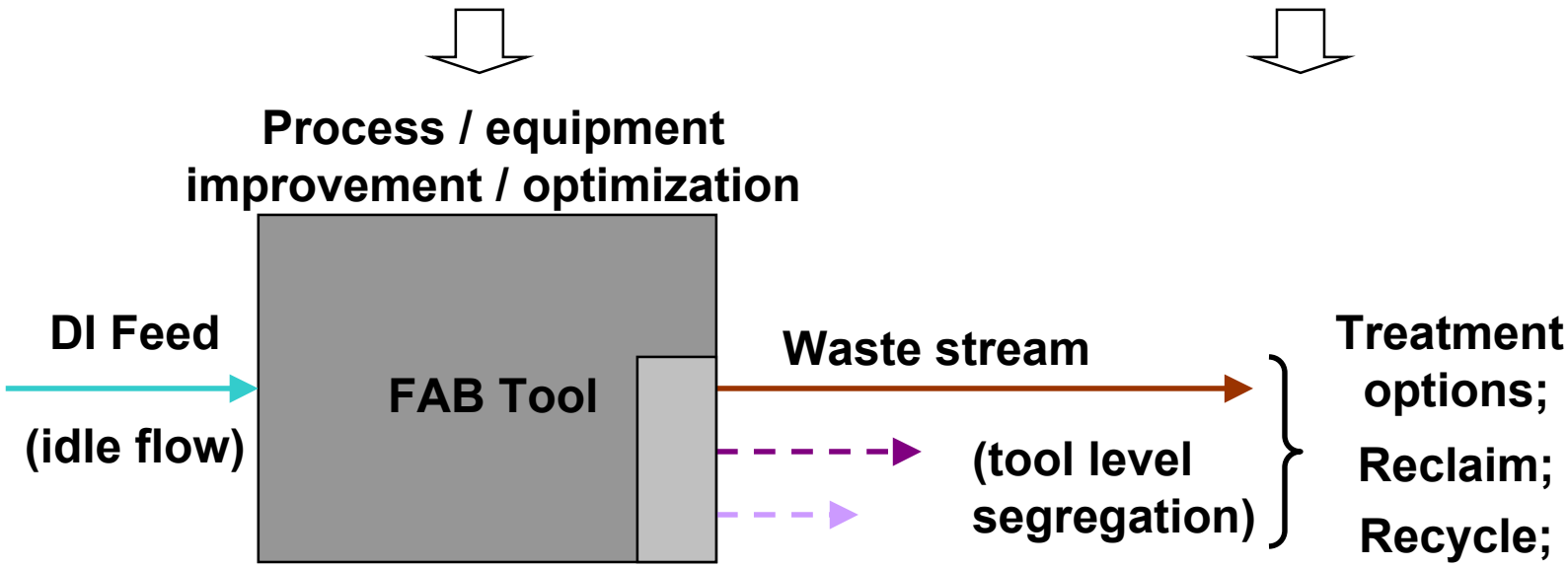
Drivers for optimized water use:

- Water availability
- Cost of city water and discharge
- Expansion vs. DI plant capacity
- Need to treat CMP effluent before discharge

Water Use Optimization: Project Strategies

Tool / Process Focus
- – Optimized rinses
- – CMP water reduction/ optimization

DI Water Recycle Focus
- – Enabling technologies
- – Integrated POU & site strategies



CMP Water Use Optimization: 2000

Project Objectives

- **Reduce/optimize water use in CMP/post CMP cleans**
  - reduce NET water use in CMP operation
  - match quality of water with operation
  - no negative impact in CMP process performance
- **Ensure continuity in technology transfer from 200mm to 300mm wet tools**
- **Promote the enabling technologies for risk free rinse/CMP water recycle & reuse**

CMP Water Use Optimization: Tool Level Focus

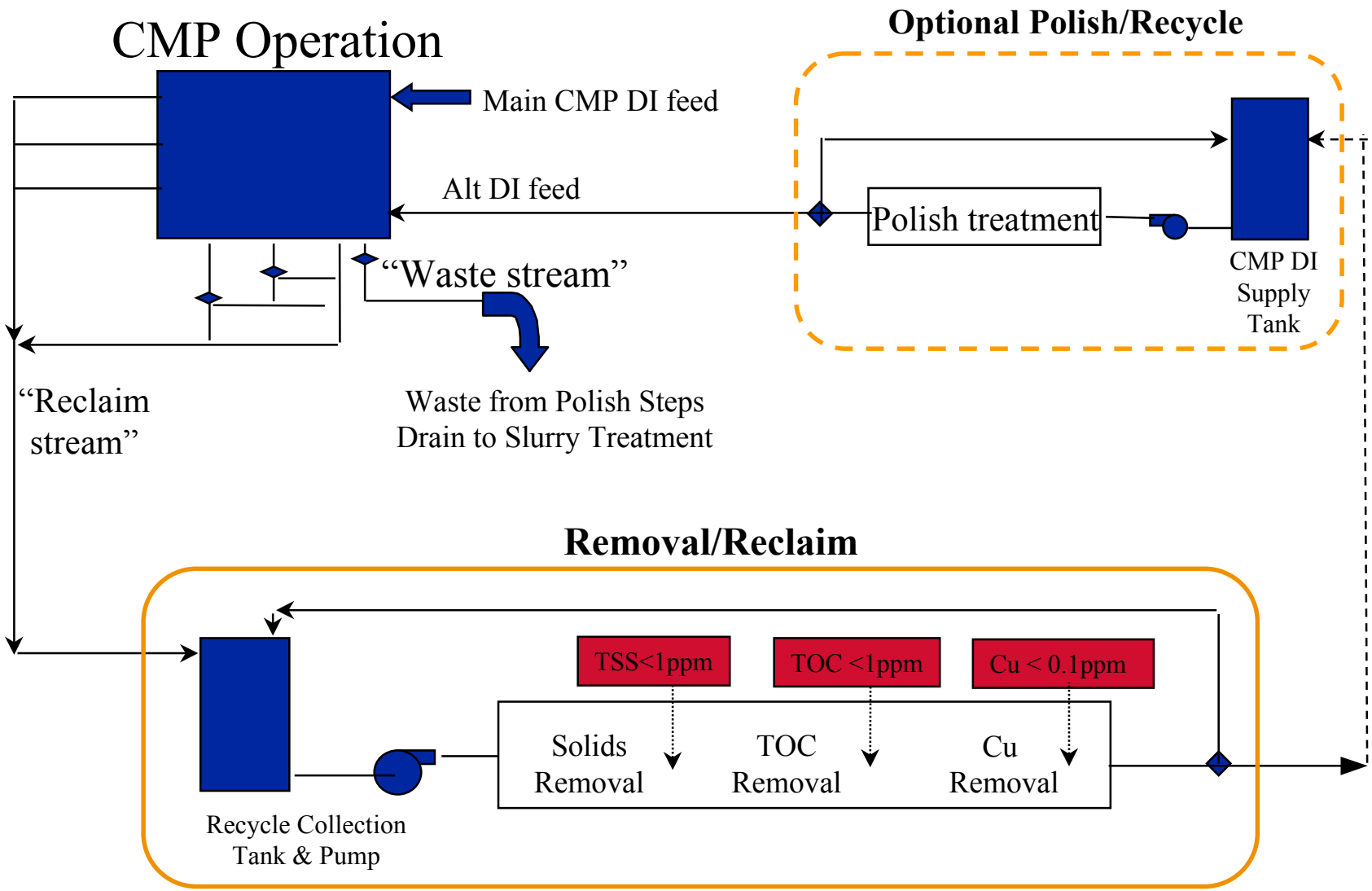
- Benchmarking: CMP tool water usage
  - Member Company/Supplier participation
  - data from manufacturing fabs
  - individual tool characteristics
- Programmed flow rates:
  - no-process (“idle”)
  - pad conditioning (“buffing”)
  - polish
  - standardized/recommended flow rates
- Optimized hydrodynamic design in hardware

CMP Water Use Optimization: 2000

CMP Water Quality Requirements

- Tool Supplier specs/data: 18 ohm (?)
- Member Company experience:
  - CMP performance vs DI water quality
  - conductivity measurement at the tool/POU
  - dedicated CMP DI water supply loop
  - practice of local reuse/reclaim
- Collaboration with SRC/NSF ERC:

Supplier Concept of an Integrated CMP Water Use Reduction Strategy



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1999 ITRS: Water Use

ESH Table 72a Resource Conservation Technology Requirements - Near Term

FACTORY INTEGRATION							
YEAR	*1999*	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*
TECHNOLOGY NODE	*180 nm*			*130 nm*			*100 nm*
Decrease net feed water use Liters/cm² (gal/ in²)	**7.6 (13)**	**7.6 (13)**	**5.9 (10)**	**5.9 (10)**	**3.5 (6)**	**3.5 (6)**	**2.9 (5)**
Decrease UPW use Liters/cm² (gal/ in²)	**6.0 – 8.0 (10.2 – 13.6)**			**5.0 - 7.0 (8.5 - 11.9)**			**4.0 – 6.0 (6.8 – 10.2)**

ESH Table 72b Resource Conservation Technology Requirements - Long Term

YEAR	*2008*	*2011*	*2014*
TECHNOLOGY NODE	*70 nm*	*50 nm*	*35 nm*
Decrease net feed water use Liters/cm² (gal/in²)	**1.2 (2)**	**1.2 (2)**	**1.2 (2)**
Decrease UPW use Liters/ cm² (gal/ in²)	**3.0 – 5.0 (5.1 – 8.5)**	**3.0 – 5.0 (5.1 – 8.5)**	**3.0 – 5.0 (5.1 – 8.5)**