Joint Case Study:
Working with Suppliers to Reduce Water Use

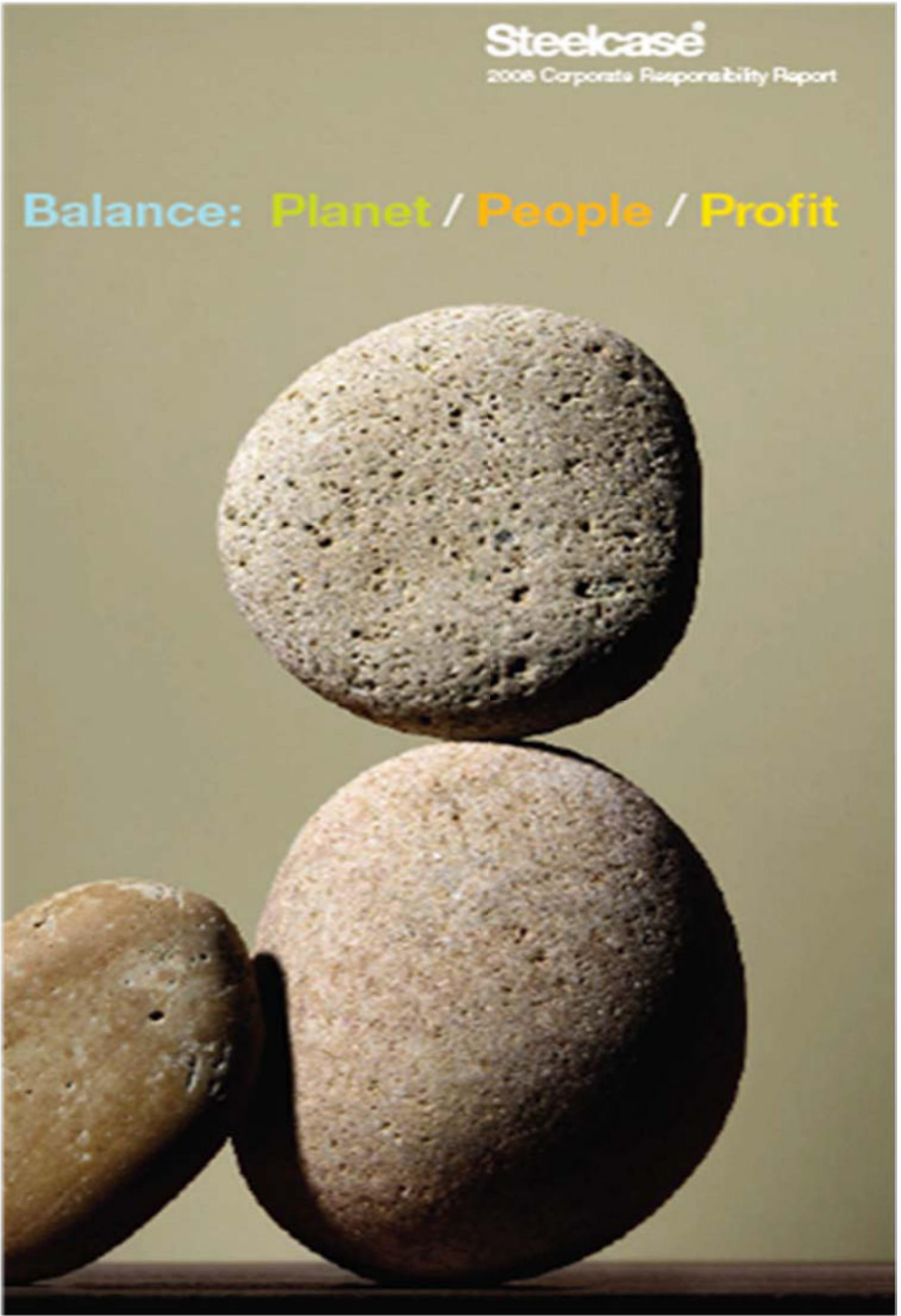
Mary Ellen Mika, *Supply Chain Manager,* **Steelcase**
Keith Lane, *Regional Account Director,* **DuBois Chemicals**

2 December, 2008

Steelcase

- Global leader – office furniture industry.
- Network of over 600 dealers.
- Approximately 13,500 employees worldwide.
- Fiscal year 2008 revenue was $3.4 billion.
- Mfg. space consolidation (13MM to 5.5MM ft^2)
- Sustainable growth via “industrial reinvention.”
- Strong set of core values.

Steelcase



Our three corporate environmental initiatives…

1. *Recycling & Reuse*

2. *Materials Chemistry*
3. *Life Cycle Assessment*

Life Cycle Thinking

Materials

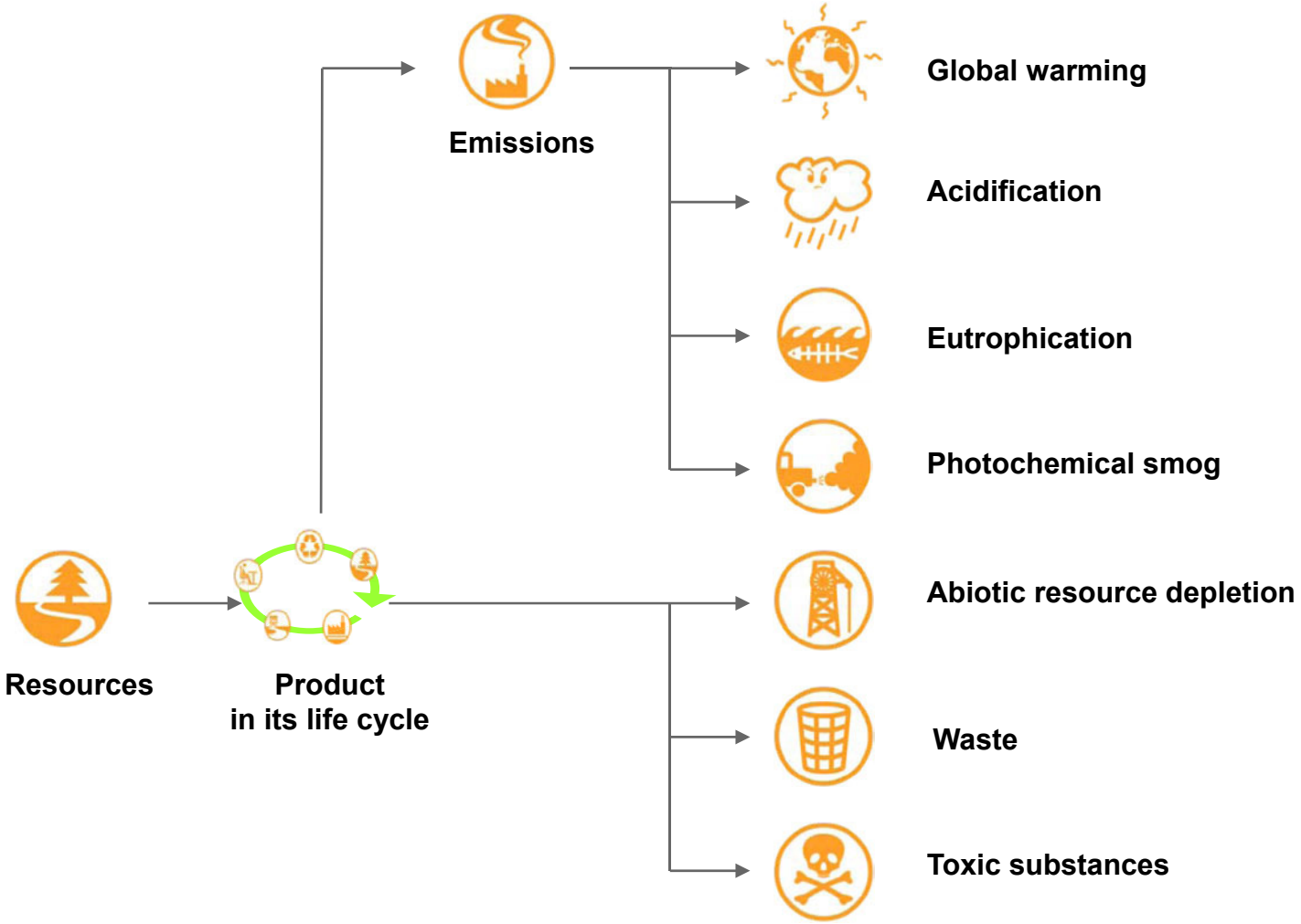
Production

Transport

Use

Disposal

Life Cycle Assessment - environmental impact at each stage of the product life cycle



How did DuBois begin to reduce water usage at Steelcase? …from inconsistent requests…

Steelcase pretreatment chemical buyer asked DuBois for a price per pound.

Steelcase supply chain sustainability representative asked DuBois to participate in the Green Suppliers Network

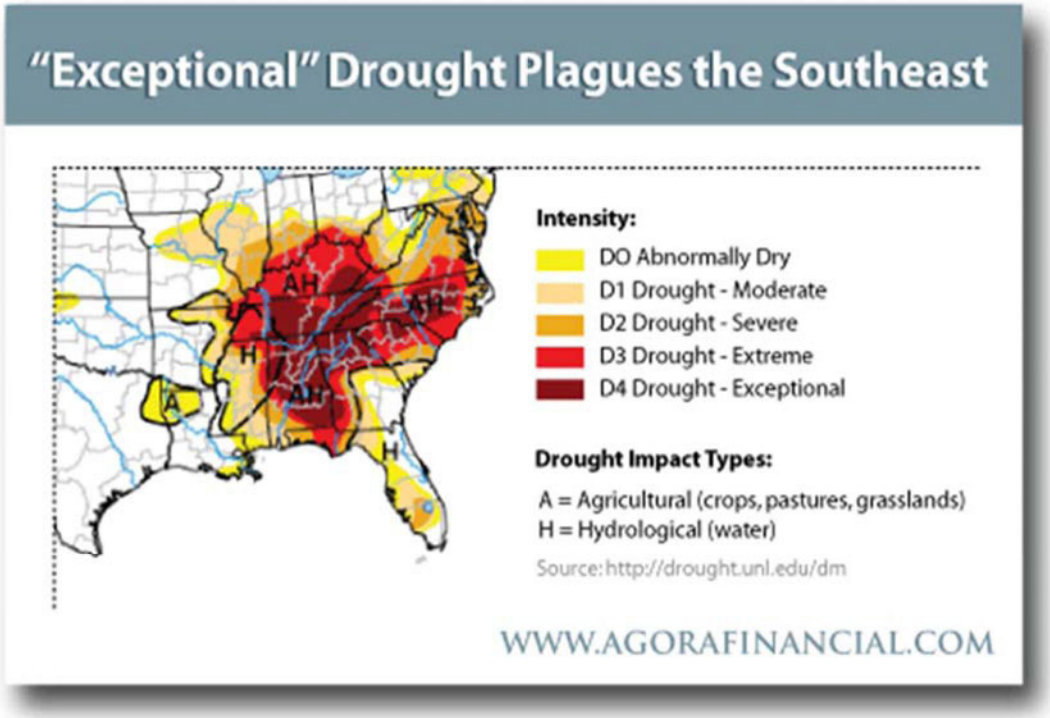
- DuBois was reluctant to give only a price per pound – they also did not think a “Green Suppliers” assessment at their Ohio manufacturing plant was necessary; instead, they wanted to be creative and asked for a demonstration opportunity or “assessment” of Steelcase’s finishing system

- At first, our finishing technology group was not open to change which might adversely affect finish quality

- Eventually, DuBois was given complete access to one of our lines to conduct their demonstration

- Steelcase locations with finishing operations

Some of the pressures to reduce water use… Water crisis in Georgia in the fall of 2007



We received a letter from the State of Georgia in the fall of 2007 requiring a near-immediate 10% reduction in water usage.

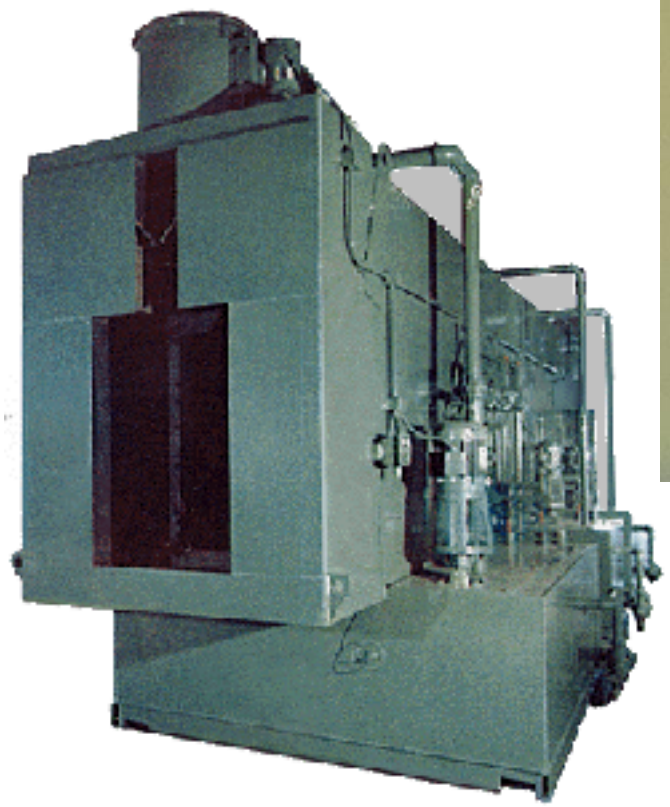
DuBois Chemicals Division facts

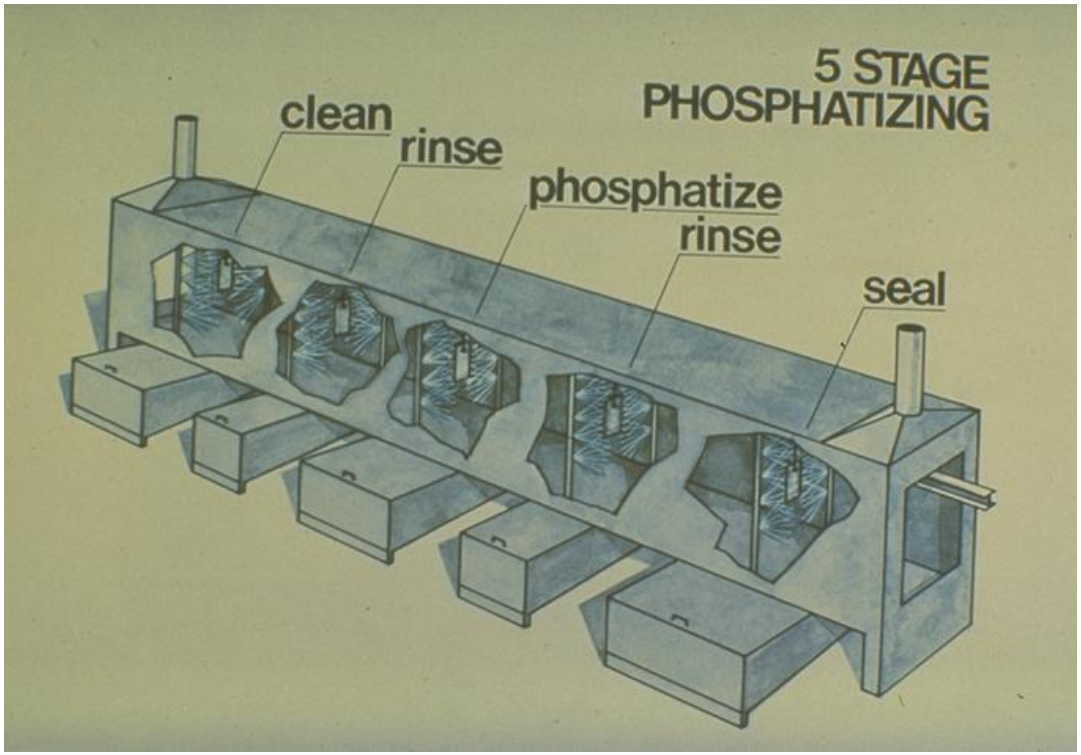
- Headquartered in Cincinnati, Ohio
- 80 year history of helping customers
- ISO 14001 Certified

Markets include: Surface Finishing, Food, Paper, Transportation, other Specialty markets

Applications include: Food C&S, Water & Wastewater treatment, Facilities Maintenance, Lubrication, MWF Fluids, Processing of Metals, Plastics prior to paint, PSB's etc.

Typical industrial spray washer





"TCO" Background

- ***"TCO" – Total Cost of Ownership*** , package of information from US EPA's Waste Management Resource Center. Promotes "life cycle thinking" for products and processes and incorporates cost of operation into the equation.

- Adapted to apply to industrial washer system for "snap shot" clarification of significant realities.

- Utilized as way to highlight and focus in on ***Key Performance Indicators*** *(KPI's) for a given system.*

Fundamentals of "TCO-*ing*"

- Importance of getting a baseline that all can agree on.

- Not usually just a water meter attached to supply to washer (gas meter, labor hour clock, etc. either). This provides need to get creative. Do things like:
  - **Turn off water make up source for time period to measure depletion.**
  - **Get into drain areas with bucket and stop watch.**
  - **Completely measure system and assess out of service.**
  - **Full inspection and observation of system in operation.**
  - **Complete current state maps/documents for discussion and agreement prior to proceeding.**

Having a fully understood and agreed upon "Current State" is the only way any "Future State" savings have credibility.

Steelcase

DuBois

Steelcase Kentwood West Plant Kentwood, MI

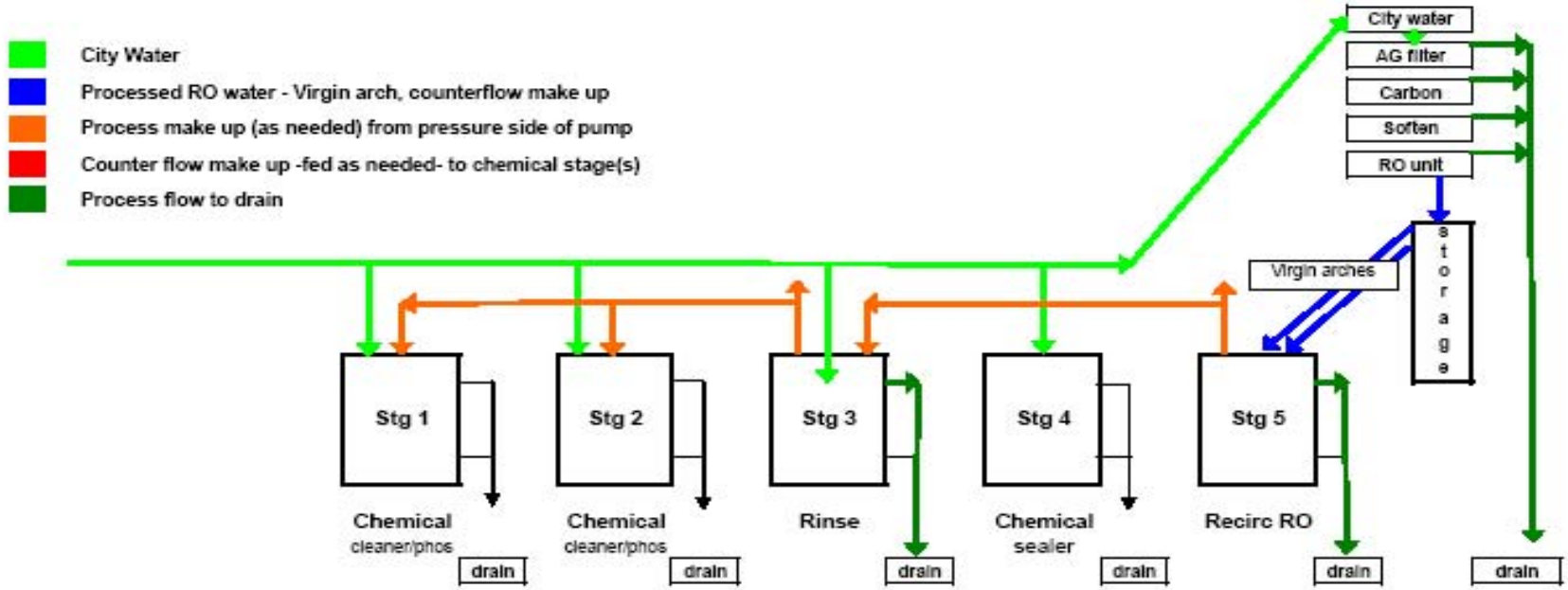
Projected Annualized "TCO" Assessment - Line 1/2 Washer - updated December 15, 2007

Metric	KPI	Time Frame	Basis for Reduction	Percent Reduction	$'s per Unit		Financial Impact
ENERGY	BTU's	annual	Stg 1 Temp red 110° F to 100° F***** Stg 2Temp red 110° F to 100° F*****	-33% -33%	$3.06 / 1000 lbs *	$	(27,369.65)
LABOR	menu items (cost & frequency)	annual	Impact of RO water on process eliminating "hard" scale & sludge	-45%	per "event" **	$	(20,990.00)
WATER / SEWAGE	Gallons, US	annual	100% use & reuse of "purified" water (via RO)	-80%	$3.00 / CCF ***	$	(48,128.00)
PROCESS CHEMICALS	Gallons, US	annual	fewer chemical charge-ups lower chemical concentrations only one chemical stage	-12%	Daily usage and charge up info.	$	(10,850.00)
Production yield/rework	Cost/event	annual	re-work and scrap costs	TBD	under review	$	
"TCO" (Total Cost of Ownership) impact on Steelcase						*$*	*(107,337.65)*
"TCO" (Total Cost of Ownership) impact on a Steelcase "production hour"						*$*	*(26.83)*

** 09/28/07 Steelcase's cost of coal only to produce steam update from Mary Ellen Mika*
*** Cost figures provided by Mike Warners for baseline & comparative benchmarking against the "DuBois concept"*
**** 02/26/07 Steelcase's water & sewer costing update from K. Bolinger*
***** Chemical product cost figures assigned by DuBois vs. the Marketplace*
****** Temp. Reduction so far, additional changes in process to turn stage 1 heat off completely and further lower or run Stage 2 only part time.*
Note: Annualized time period includes 2 - 8 hour shift per day, 5 days per week, 50 weeks per year (4,000 production hours)

Steelcase - KWW Plant - Line 3-4 washer

Pretreatment Washer - Current State - Prior to May 2007



Conc			3 to 4 %		3 to 4 %				1/2 to 1 %				
pH			4.0 to 4.5		4.0 to 4.5				4.5 to 5.0				
Temp			110-130		110-130				amb		amb.		
Cond			5-10,000		5-10,000		2-4,000		1500-3000		<20		
Make up source			City&stg3		City&stg3		city&stg5		city water		RO		
Flow, GPM											36 - 45 GPM		
Discharge								12-15 GPM				20-30 GPM	12-15 GPM

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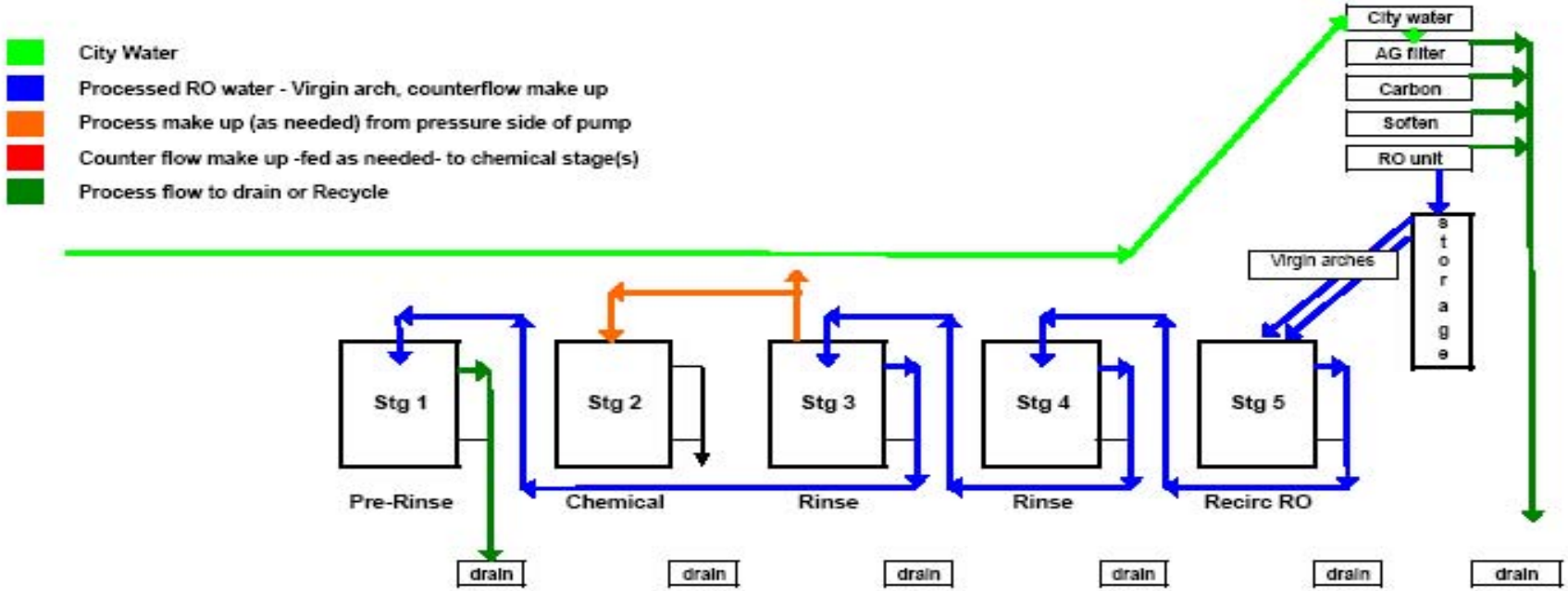
FLOWDI KWW 3-4 .XLS
KWW 3-4 as surveyed

Steelcase - KWW Plant - Line 3-4 washer

Pretreatment Washer - Future State - Start up plan May 2007



Conc					3 to 4 %								
pH					5.9 to 6.0								
Temp			90		100		carry over		carry over		amb.		
Cond			<2000		1500-6000		200-600		<50		<20		
Flow, GPM			c-flow from3		make up fr/3		c-flow from4		c-flow from5		3.5 per 7 ftl		
Discharge				2 to 6 GPM									1to4 GPM

kel / 10-05-06

FLOWDI KWW 3-4 .XLS
KWW 3-4 future state

Water "Footprinting" Results

- ✓ **Water usage reduction** – *80% less water required*

  - Steelcase currently at over ***45 Million gallons annualized savings!***

- ✓ **Waste stream reduction**– *85% to 95% less discharge*

  - utilization of 'counter flow' loop to supply heated stages reduces waste stream even further than original usage reduction.

Other TCO Gains at Steelcase

✓**Energy reduction** – 30% to *60% reduction in BTU's required.*

✓**Innovative chemistry** – *20% to 30% less volume. Only two systems left to change and all USA systems on Non-phosphated chemistry.*

✓**Labor to maintain washer** – *>50% reduction*

“Less” is greener and more profitable.

Less water, less energy, less chemicals, less labor … all add up to a more sustainable process.

This is all about buying less, buying better, and considering total impact along with total cost.

It’s also about asking our supplier partners to be creative and expecting ourselves to be open to new ideas.

thank you.