Ben & Jerry's is founded on & dedicated to a sustainable corporate concept of linked prosperity.

Our mission consists of 3 interrelated parts:

Our Economic Mission

To operate the Company on a sustainable financial basis of profitable growth, increasing value for our stakeholders & expanding opportunities for development & career growth for our employees.

Our Product Mission

To make, distribute & sell the finest quality ice cream & euphoric concoctions with a continued commitment to incorporating wholesome, natural ingredients & promoting business practices that respect the Earth & the Environment.

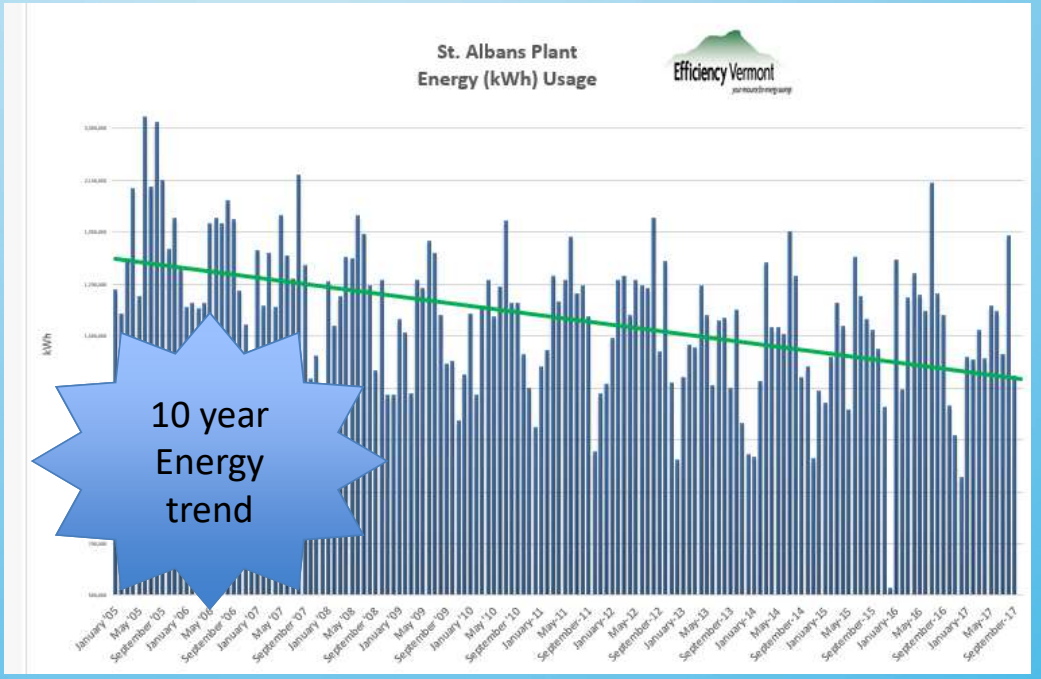
Our Social Mission

To operate the company in a way that actively recognizes the central role that business plays in society by initiating innovative ways to improve the quality of life locally, nationally and internationally.

Vermont Manufacturing

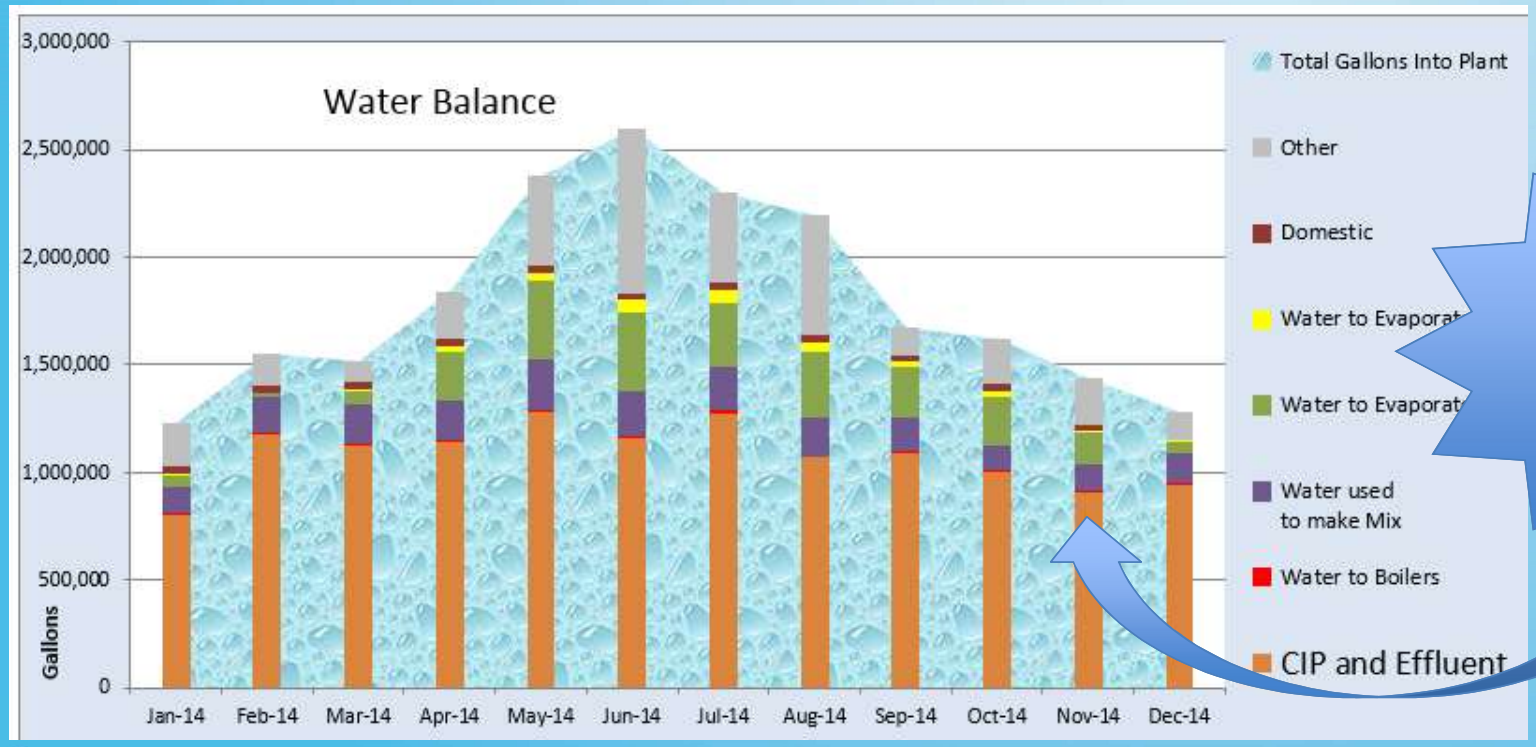
We evaluate, score and prioritize every environmental impact is evaluated, weighted and prioritized

annual reduction targets are set for our most significant impacts such as water, energy and waste



Ice Cream Pride Inside
Vermont Manufacturing

A basic **water balance indicates CIP/effluent is our biggest user of water**



CIP becomes # 1 focus for water reduction opportunity

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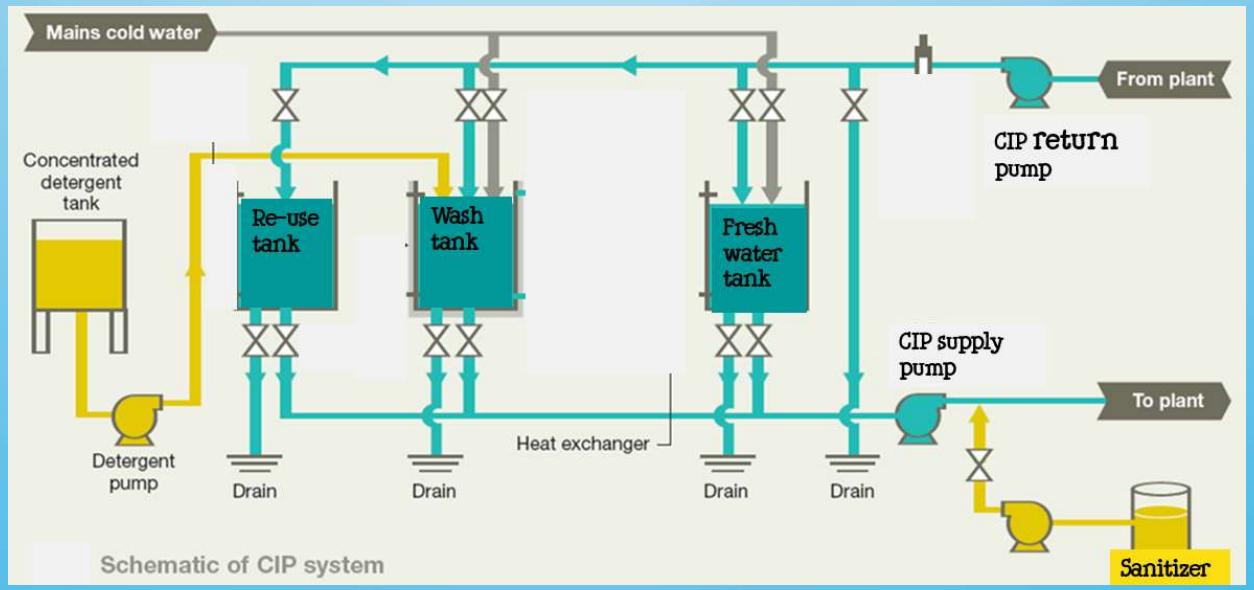
Starting Questions …….

How does the system operate currently?

When are we using water when it is not needed?

How can we quantify water use and water that is wasted?

What are the requirements of quality and PMO (Pasteurized milk ordinance) that must be maintained?



Schematic of CIP system

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Step 1. Understand how many washes per CIP Circuit

Washes per Month (2012)

	January			February			March			April			May			June			July			August			September			October			November			December			Average
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	
Past Tank	48	109	20	49	89	11	40	86	49	66	94	11	74	97	13	54	100	14	63	102	11	73	110	3	64	82	5	84	104	2	66	54	6	29	32	4	160
Cluster 1-6		17	12		21	7		13	18		21	3		18	7		20	10		22	4		23	6		16	8		26	4		13	8		10	1	26
Cluster 7-12	16	9		22	3		11	19		21	5		24	3		19	12		21	4		21	9		16	6		27	3		18	6		9	3		26
Fill Line 1	10	3		6	6		4	9		13			13			11	3		8	4		11	3		8	4		10	2		13			4	5		13
Fill Line 2	7	5		7	3		3	9		4	7		7	6		7	7		6	5		8	5		5	8		5	8		5	8		4	3		12
Fill Line 3			12	1		14			10		6	5		1	12	1		13			6			9			6			12			7			5	10
Fill Line 4	10	3		8	3		11	6		11	3		8	3		11	4		6	5		9	5		8	4		8	8		2	5		2	1		12
Reclaim Line	11			9			10			10			10			9			9			10			11			10			10			6			10
Yogurt Tank			6			1			2			7			2						2			4						2								2
Yogurt Line			2			2			2			6			7			12			8			11			9			7			7			3	6

Step 2. Determine total water usage of each CIP Circuit based on timed CIP steps

(step time seconds) x (GPM) x (washes per month)

Circuit Type	Total Wash Time (s)	Total Time Supply Pump Runs (s)	Flush Caustic Time (s)	Final Rinse Time (s)	Sanitize Time (s)	Flow Rate (GPM)	Average # Washes / Month A	B	C		Average Water Use / Year (G) (Flush, Final, Sanitize) A	B	C
Cluster 1-6	2840	2420	240	120	300	110	0	18.3	7.33		0	265716	106432
Cluster 7-12	2840	2420	240	120	300	110	18.75	6.83	0		272250	99172	0
Past Tank	1975	1765	180	240	120	110	59	88	12.5		700920	1045440	148500
Fill Line 1	4752	4410	600	485	600	125	9.25	3.25	0		389656	136906	0
Fill Line 2	3475	3175	300	250	420	125	5.66	6.2	0		137255	150350	0
Fill Line 3	4580	4370	650	395	600	125	0.2	0.6	9.25		8225	24675	380406
Fill Line 4	5362	5239	830	513	638	125	7.83	4.2	0		387781	208005	0
Reclaim Line	3088	2788	300	250	420	115	9.6	0	0		214176	0	0
Yogurt Tank	1790	1600	0	180	120	100	0	0	2.2		0	0	13200
Yogurt Line	4580	4370	650	395	600	115	0	0	6.33		0	0	239496
					Average GPM	116				**Total**	2110263	1930264	888033
										Grand Total	4928560		

Step 3. Calculate how many seconds of overuse of water for each circuit

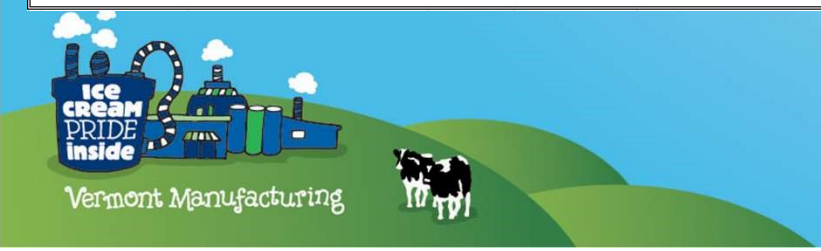
Data shows a potential savings of 1.9 million gallons of water per year for Flush caustic/final rinse

Time based flush caustic/final rinse

	Gallons of Water/Year (Flush,Final) Pasteurized		Gallons of Water/Year (Flush, Final) Raw
Cluster 1-6	202,990	Egg Tank	29,872
Cluster 7-12	202,594	Egg Receive	20,129
Past Tank	1,473,780	Egg Transfer	18,240
Fill Line 1	339,063	Raw Tank	244,860
Fill Line 2	163,075	Tanker Bay	602,580
Fill Line 3	262,556	Mix Tank	57,090
Fill Line 4	403,907	Reclaim Tank	22,680
Reclaim Line	121,440	Raw Receive	122,577
Yogurt Tank	7,920	Raw Line	106,722
Yogurt Line	152,142		
Total	3,329,466	**Total**	1,224,750
Grand Total	4,554,216		

Conductivity based flush caustic/final rinse

	Gallons of Water/Year (Flush, Final) Pasteurized	Gallons Difference		Gallons of Water/Year (Flush, Final) Raw	Gallons Difference
Cluster 1-6	144,912	58,078	Egg Tank	29,872	-
Cluster 7-12	155,697	46,897	Egg Receive		
Past Tank	643,463	830,317	Egg Transfer		
Fill Line 1			Raw Tank	167,904	76,956
Fill Line 2	163,075	-	Tanker Bay	301,290	301,290
Fill Line 3	99,998	162,559	Mix Tank	41,289	15,801
Fill Line 4	161,052	242,856	Reclaim Tank	22,680	-
Reclaim Line	46,368	75,072	Raw Receive		
Yogurt Tank			Raw Line	70,119	36,603
Yogurt Line	50,957	101,185			
Total	1,465,520	1,516,963	**Total**	633,154	430,650
Grand Total Water	2,098,675		**Total Gallons Difference**	1,947,612	



Step 4. Use time /water reduction to calculate Sanitizer recirculation usage and cost

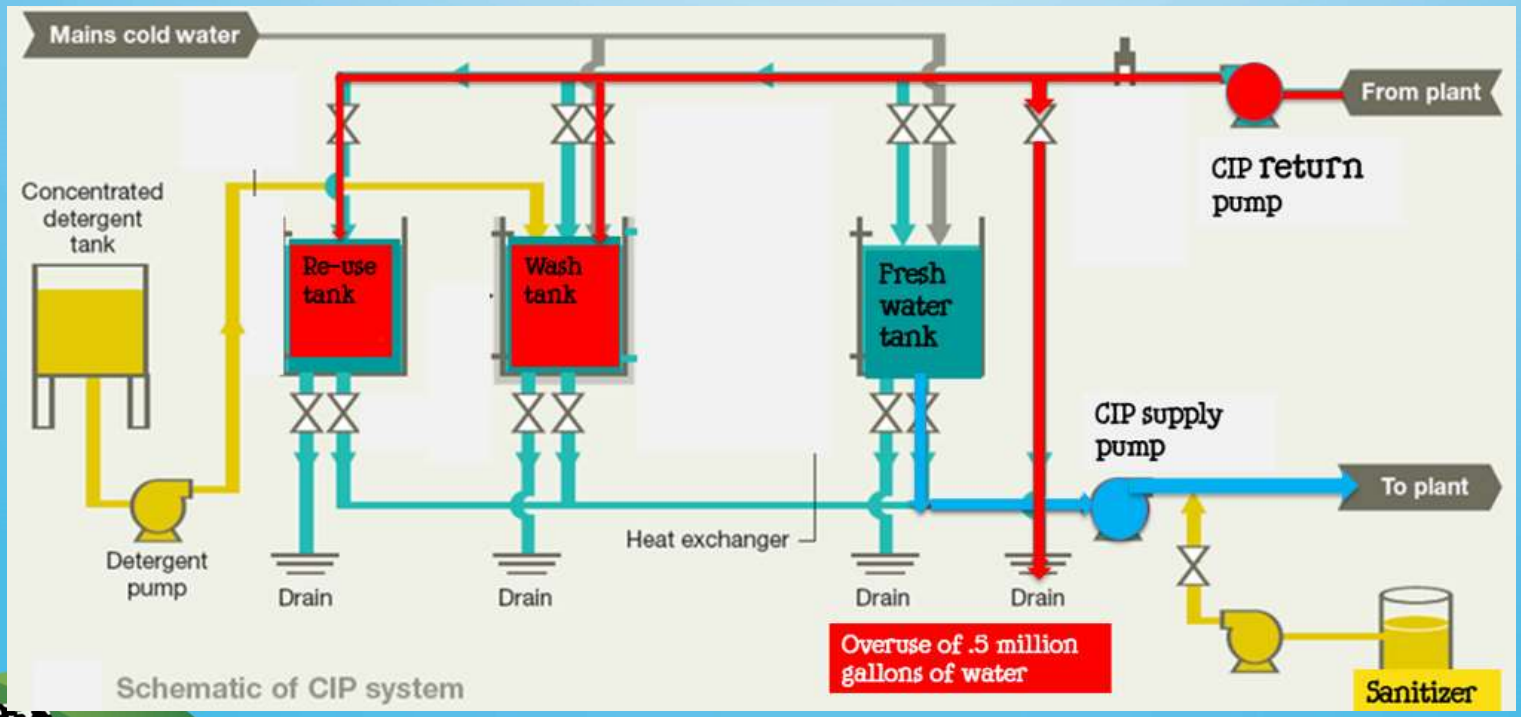
Current				
	Gallons of Sanitizer Per Year Pasteurized			Gallons of Sanitizer Per Year Raw
Cluster 1-6	169158		Egg Tank	11730
Cluster 7-12	168828		Egg Receive	13419
Past Tank	421080		Egg Transfer	5760
Fill Line 1	187500		Raw Tank	87450
Fill Line 2	124530		Tanker Bay	164340
Fill Line 3	150750		Mix Tank	31140
Fill Line 4	191879		Reclaim Tank	22680
Reclaim Line	92736		Raw Receive	49140
Yogurt Tank	5280		Raw Line	40131
Yogurt Line	87354			
Total	1599095		**Total**	425790
Grand Total	2024885			

Previous CIP system operation – <u>Time based Flush caustic</u> CIP step
Each CIP step is controlled by a set time

Fresh water Caustic flush – CIP washwater returns to …….
1. wash tank 2. then reuse tank 3. remaining flow goes to drain

A portion of the flush is reused, but is the timing of the flush too long?

Problem



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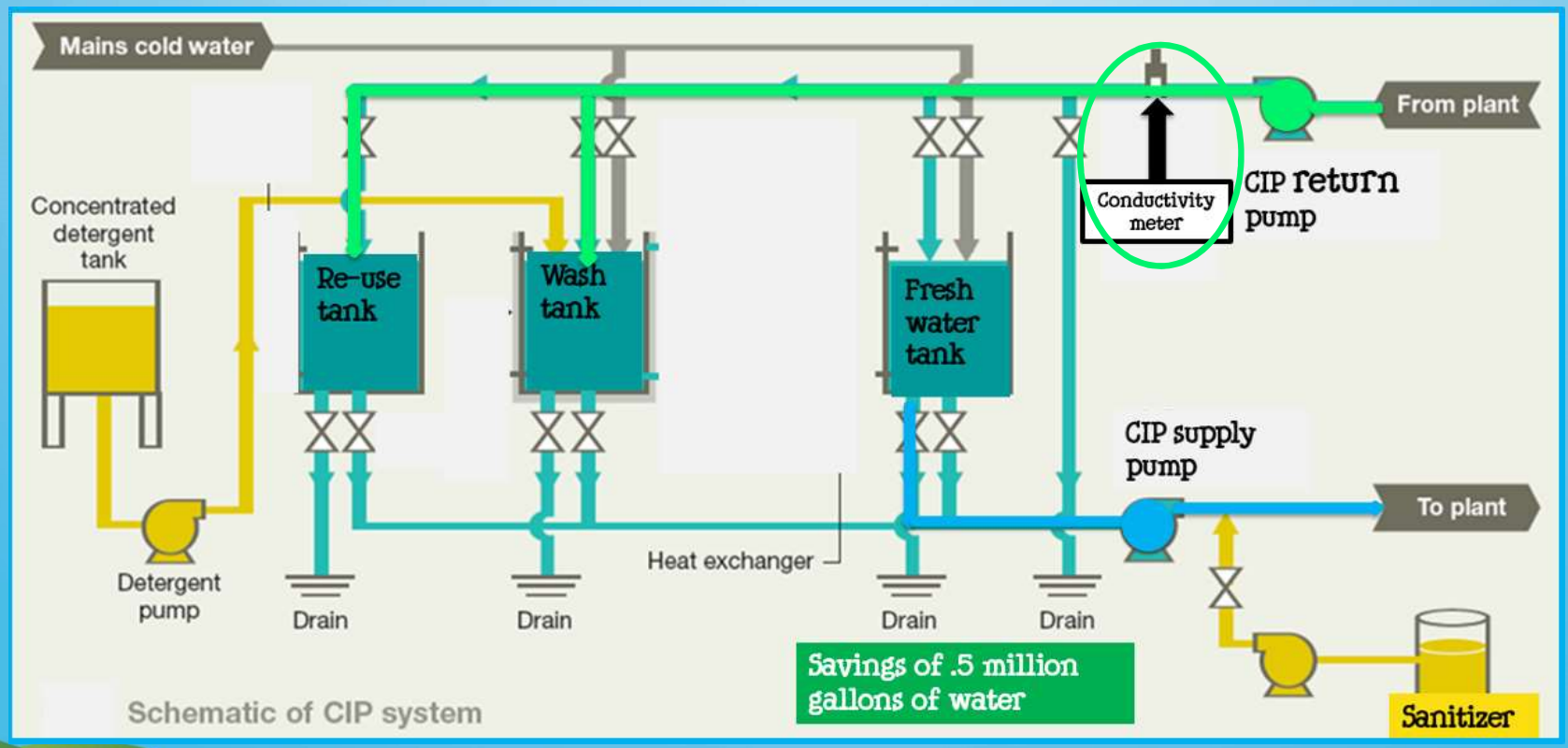
<u>Change</u> –conductivity based Flush caustic cip step
-water is used only as needed

Water diverts to drain only if CIP circuit requires more flush time.

Solution



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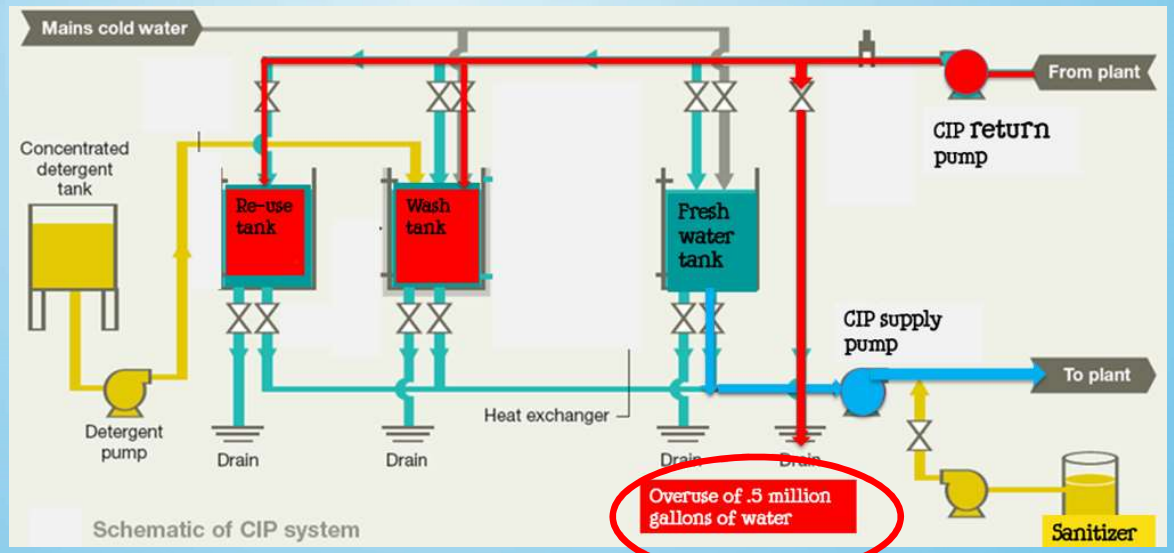
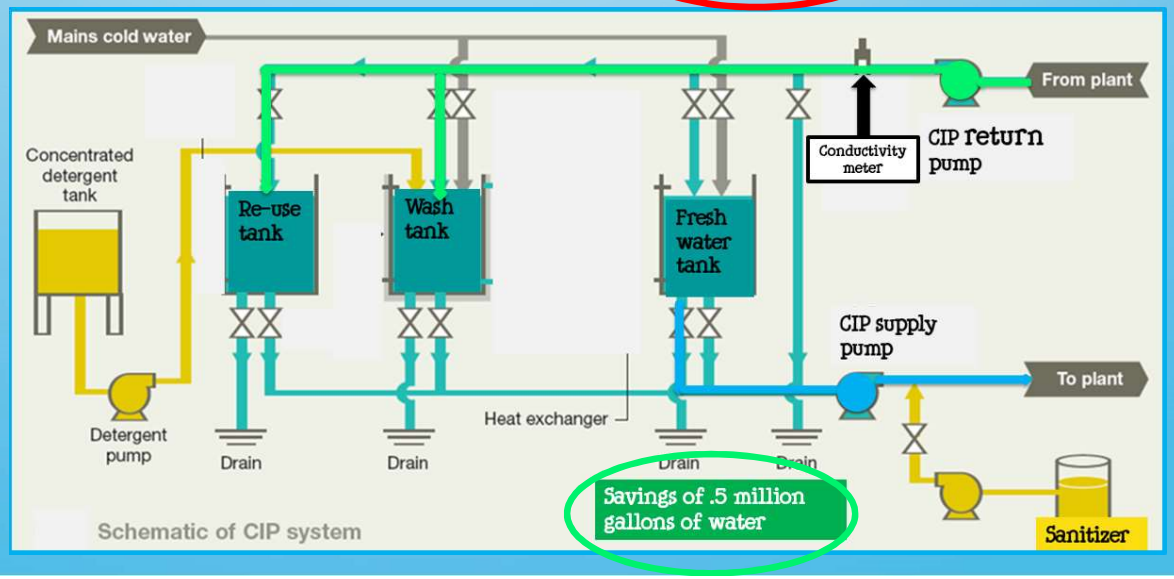
Summary

Time Based CIP step updated to conductivity based CIP step control

Fresh water is used ONLY as needed based on return conductivity

Results !
Water saved = .5 million gallons/year





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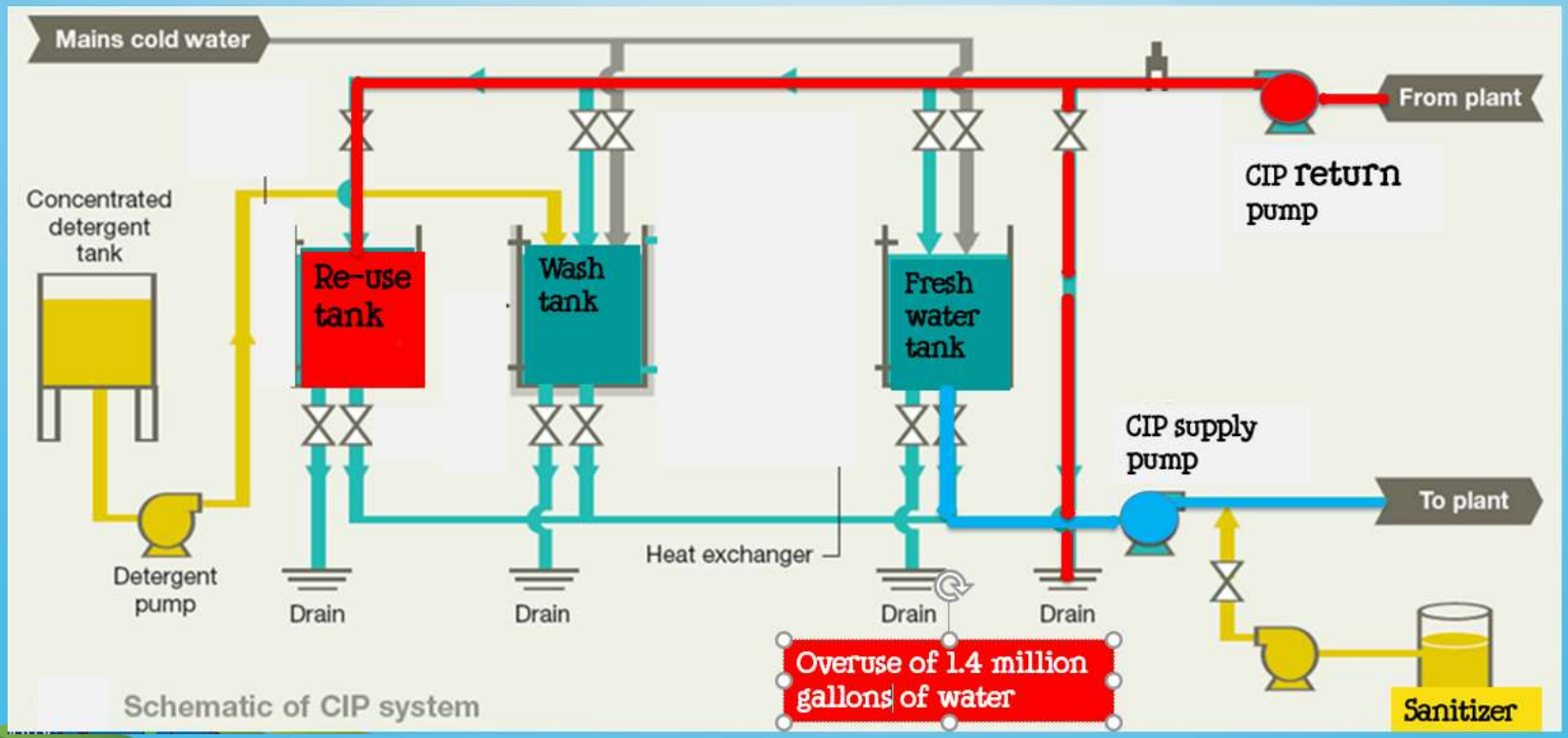
Previous CIP system operation – <u>Time based - Final rinse</u>

Fresh water final rinse - pushes washwater back to reuse tank ,then to drain

A small portion of the final rinse is reused but the timing of the rinse was too long

Problem



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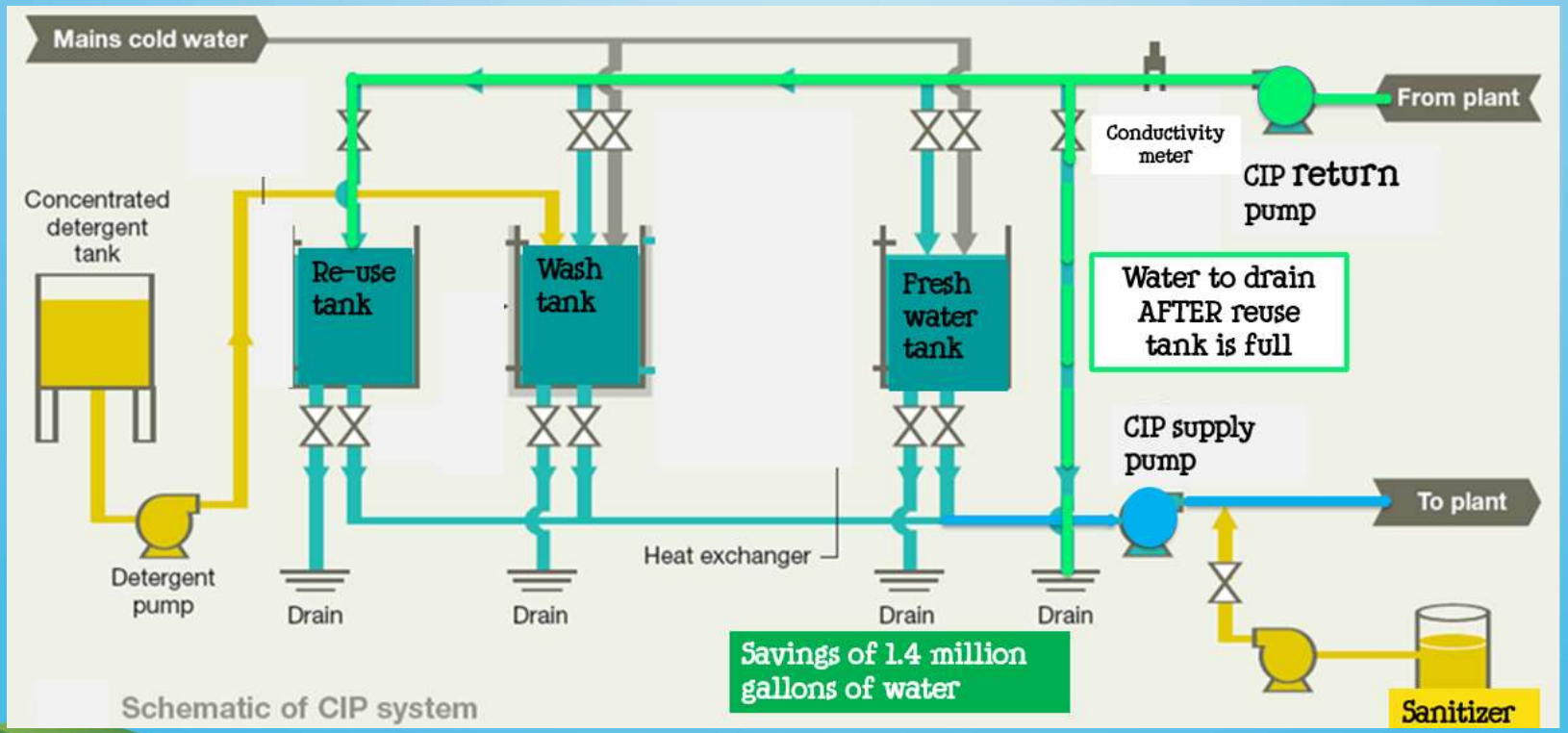
Updated Final rinse CIP step is based on conductivity not time

-water is used only as needed to reach specified conductivity level

-Once chemical is clear from lines, fresh water supply is turned off

Solution



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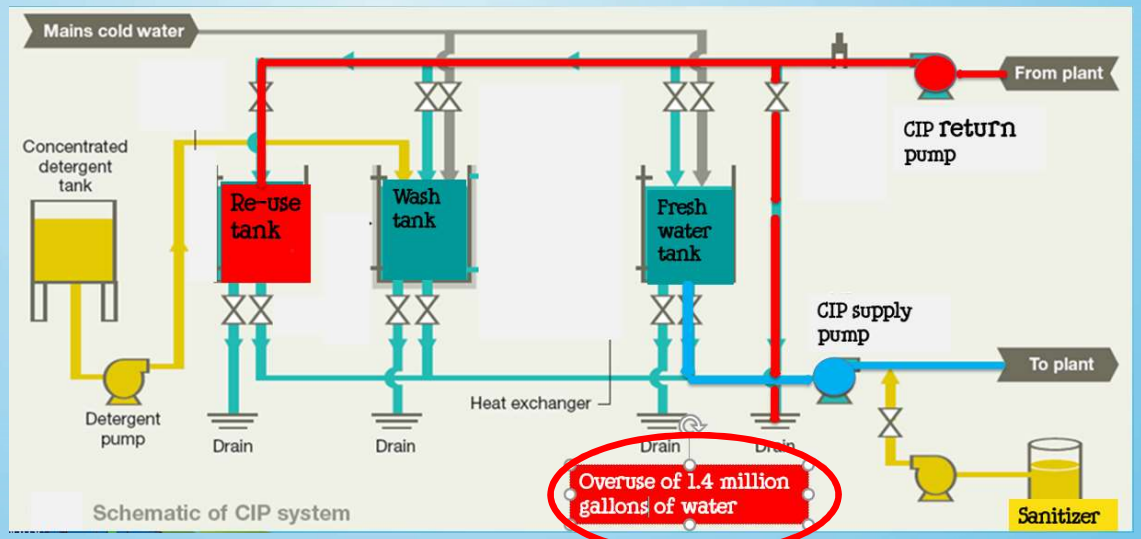
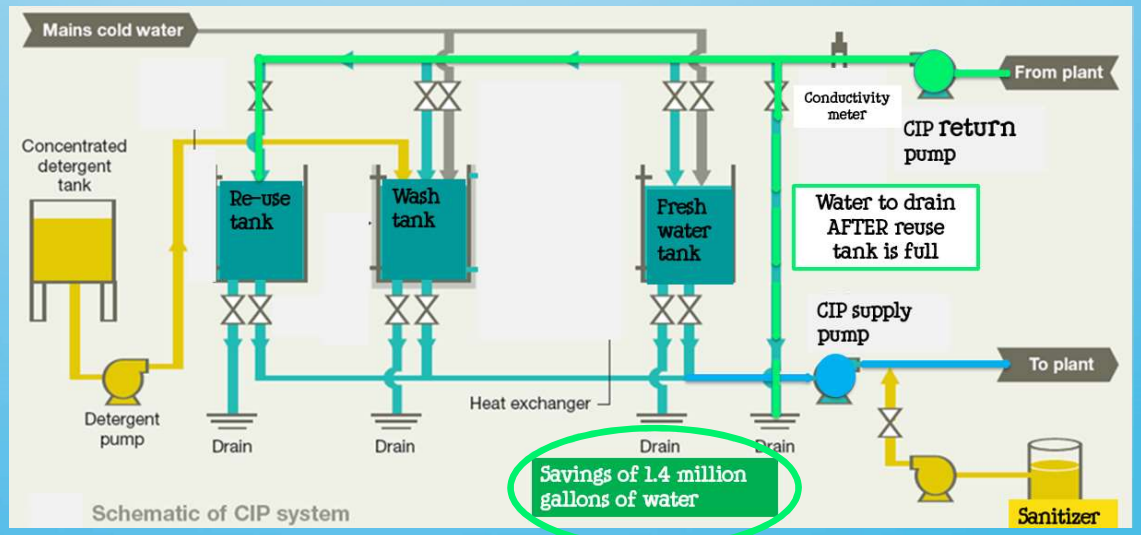
Summary

conductivity meters control CIP steps

Results:
The amount of water needed for final rinse is determined by conductivity, eliminating overuse entirely.

Annual water savings of 1.4 million gallons/year!





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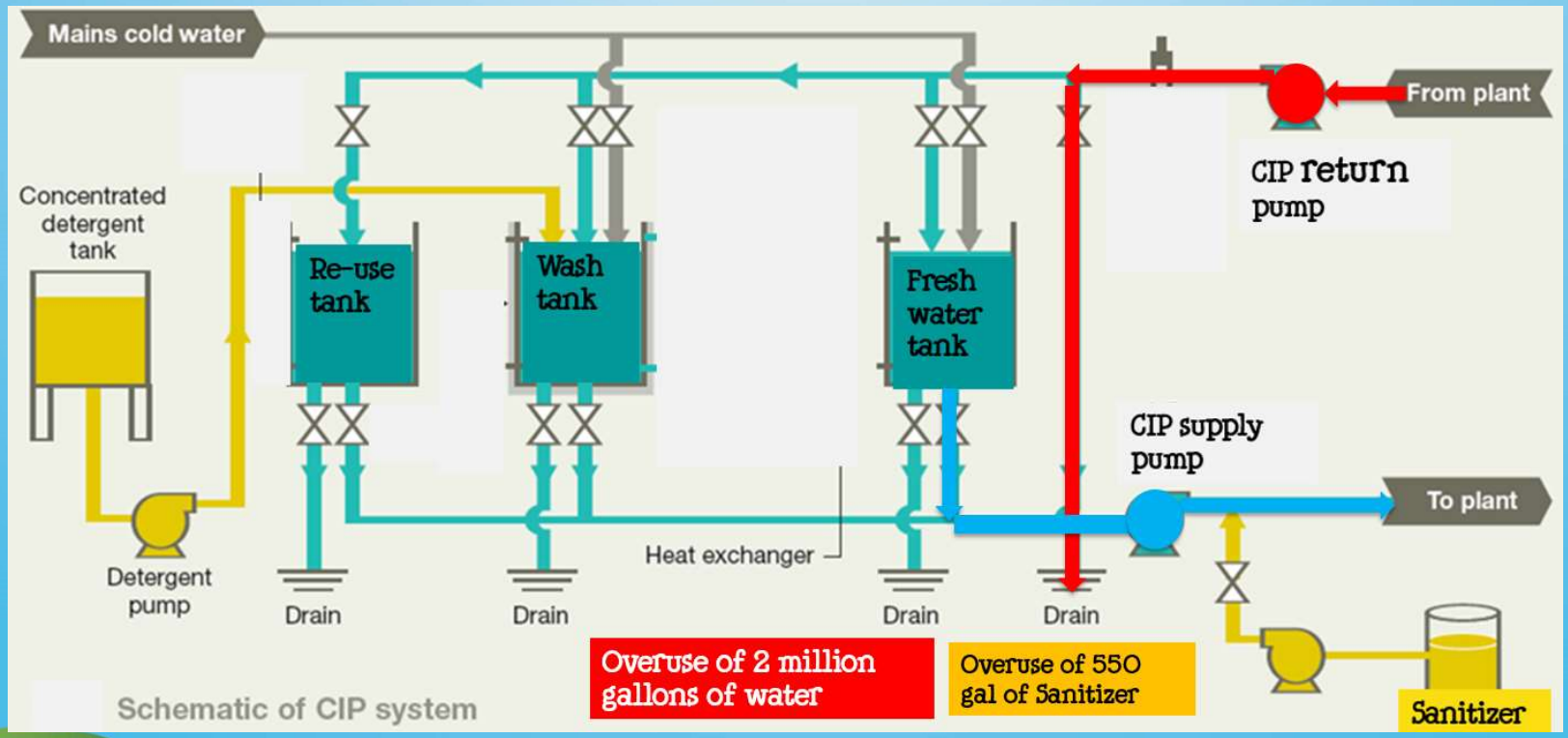
Previous CIP system operation – <u>Sanitize CIP</u> step

Fresh water is pumped through system while sanitizer is added

All water and chemicals for this cip step were sent directly to drain (standard practice in the industry)

Problem



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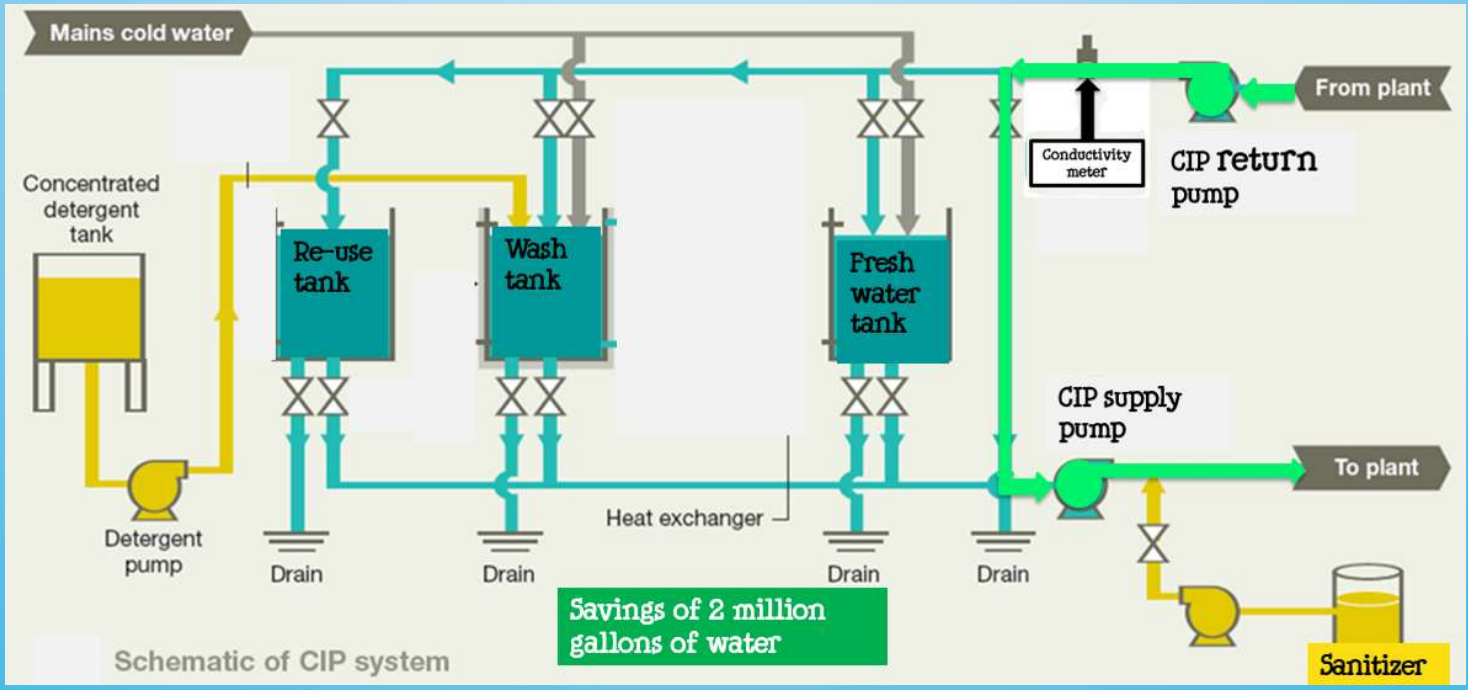
Updated Sanitizer recirculation

-by passes the drain and recirculates while sanitizer is dosing

-Conductivity meter controls dosing (slow and steady to prevent slugs)

Fresh water is not needed as line is already charged with freshwater from previous final rinse

Solution

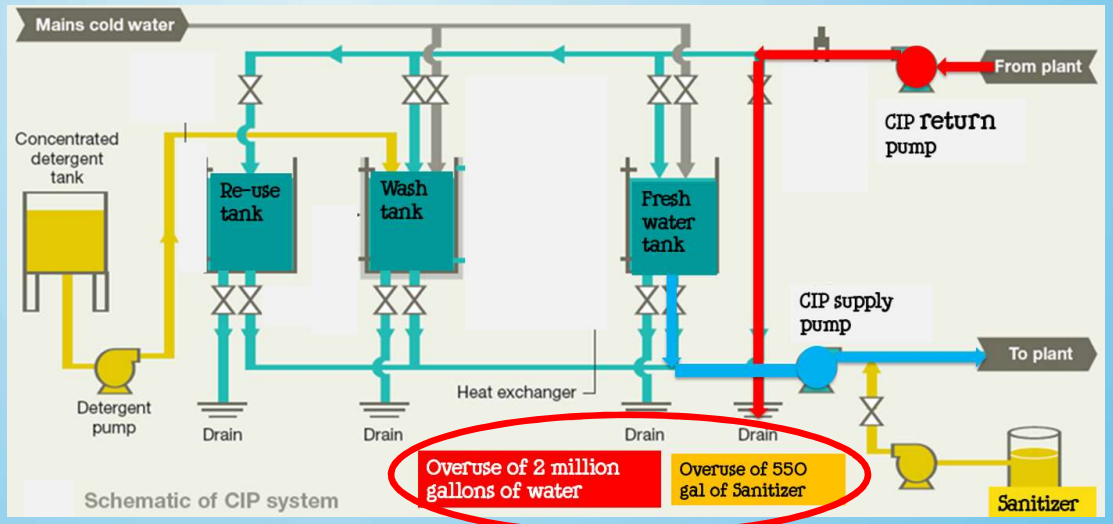


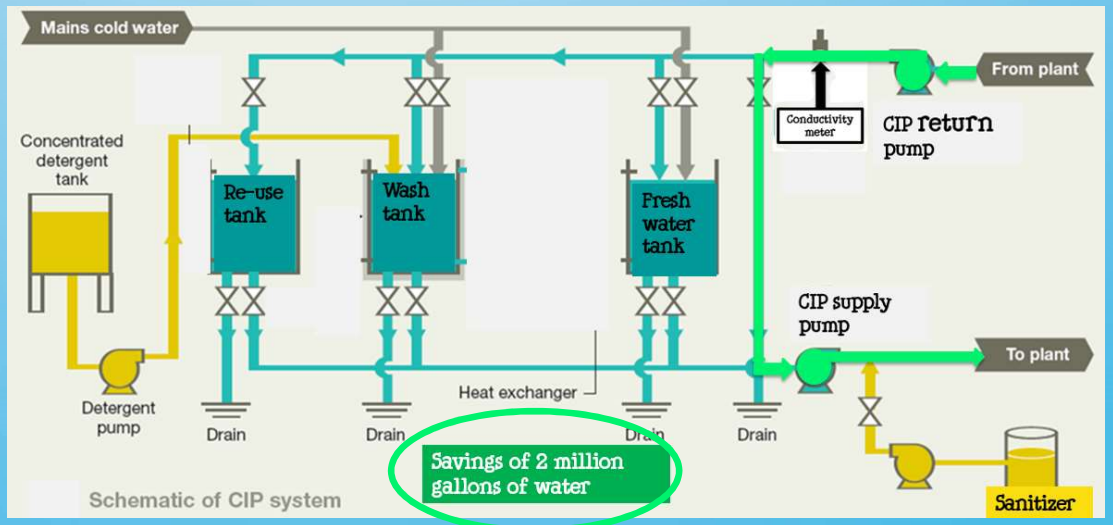
Summary

Program fresh water to recirculate while adding sanitizer

Quality can be improved by increasing your contact time with sanitizer without using more sanitizer and water

An annual saving of 2 million gallons of water and 550 gallons of sanitizer chemicals





Problem

The entire contents of the wash tank (2000 gal) is heated for each CIP wash.

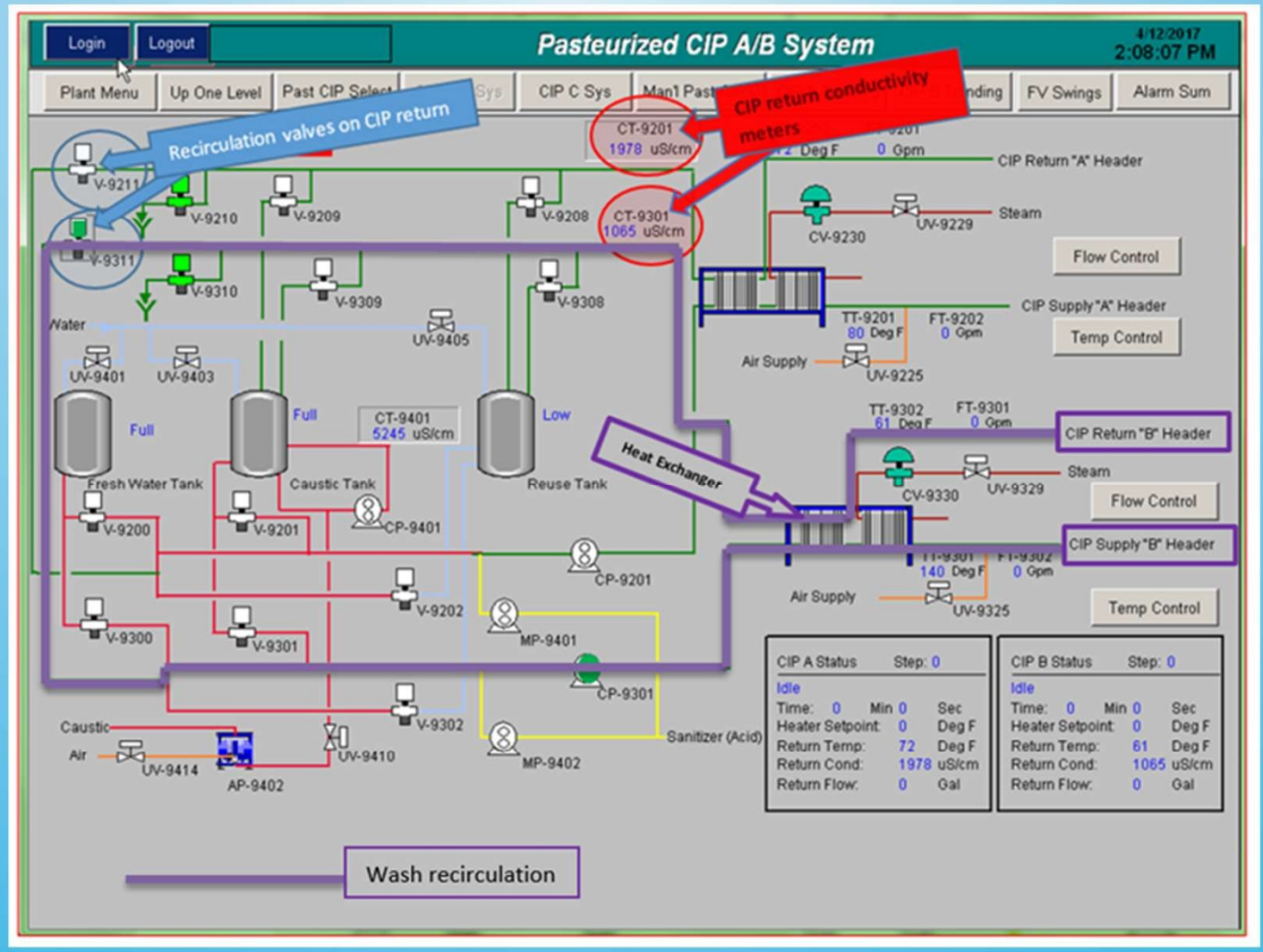
Solution

Install valves to bypass the wash tank (return) once the CIP circuit is filled with washwater.

Recirculate wash flow without using wash tank as a return vessel

the heat exchanger heats only the amount of water needed to wash the CIP circuit

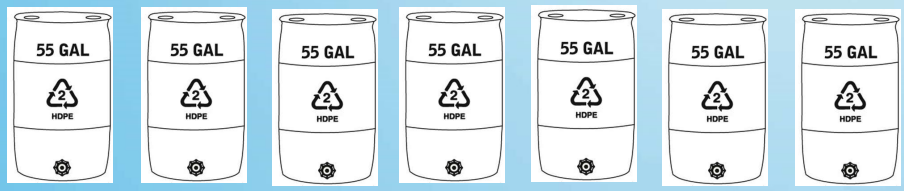
Energy Savings	
Natural Gas for Water Heating	$6,337
Compressed Air Savings	$420.00
Electrical Savings from VFD	
Total	$6,757

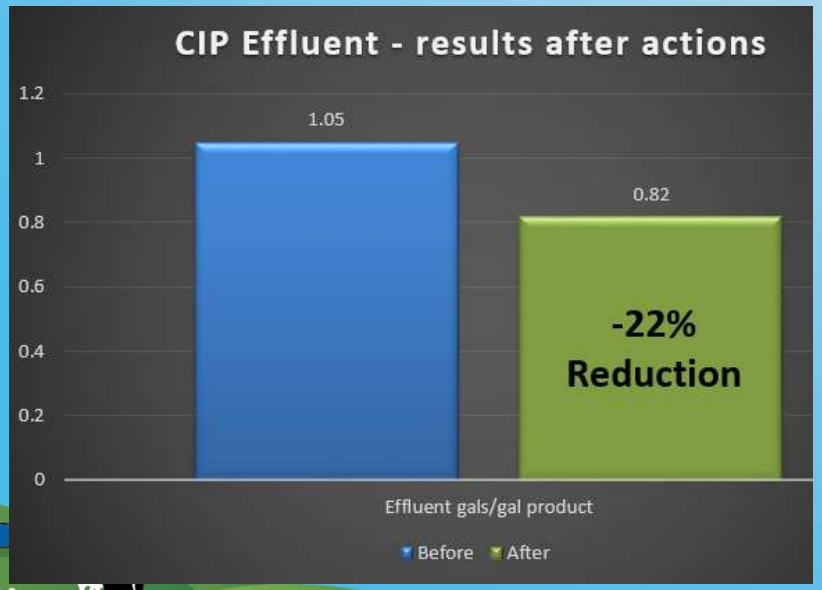


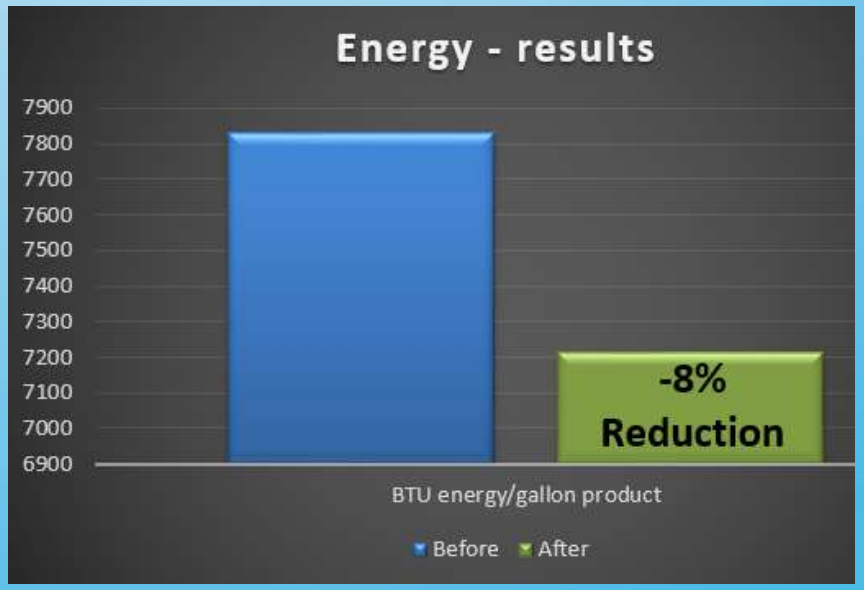
annual results

Actual water reduction was 2.7 million gallons

Reduced chemical usage by 7 barrels per year







Vermont Manufacturing

Partners

Bruns brothers completed the process changes

Ecolab assisted with conductivity meters and CIP changes

Hallam completed programming changes

Efficiency VT provided incentives for VFD's on pumps

Received funds from Unilever under sustainability incentive program called Small Actions Big Difference (SABD)