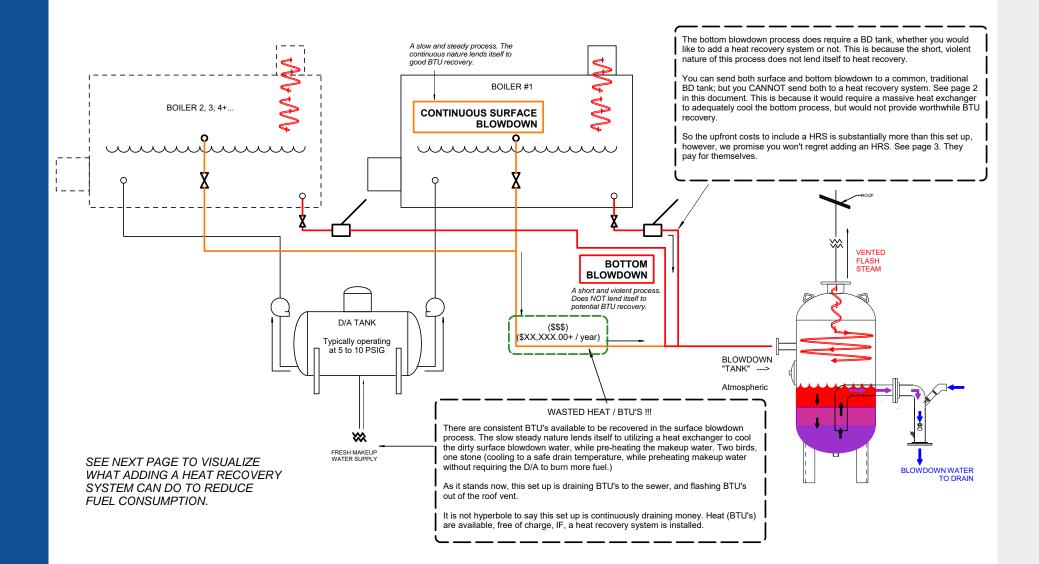
It is not uncommon to see boiler rooms that send surface blowdown, bottom blowdown, D/A overflow, and other process to a single traditional overflow style blowoff vessel.

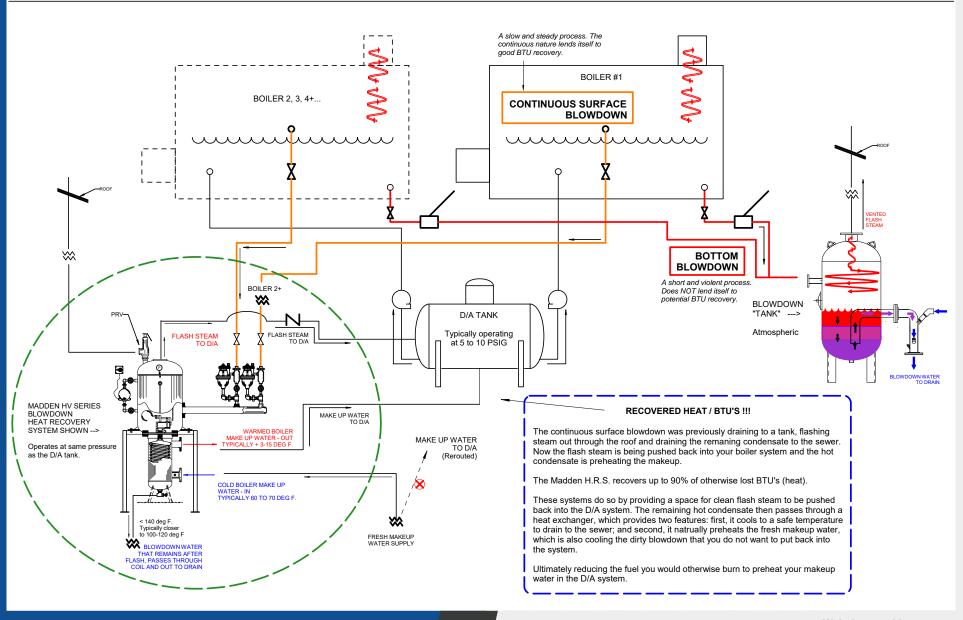
With this 3 page document, Madden wants to help end users visualize where a significant fuel cost savings would occur if a heat recovery system was implemented...



NOW INCLUDING A HEAT RECOVERY SYSTEM

There are additional up front costs to buy and install a heat recovery system, but it's worth it.

These systems reduce the amount of fuel required to produce "X" PPH of steam. If it would take "Y" amount of fuel to produce "X" PPH of steam without an H.R.S. It would now take "Y - HRS recovered BTU's" to produce "X" PPH of steam. (See Page 3 for an example of a Madden performace and savings estimate - Ie., an R.O.I.)



MADDEN ENGINEERED PRODUCTS, LLC.

MADDEN'S CONTINUOUS BLOWDOWN HEAT RECVOVERY SYSTEM

PERFORMANCE & SAVINGS ESTIMATE (EXAMPLE)

BOIL	ER ROOM PARAMETERS:			PRODUCT	Model no:	HV50	
Boiler Operating Pressure:	150 PSIG			RECOMMENDATION:	Blowdown capacity:	5,000	PPH
D/A Pressure:	5 PSIG				Heat exchanger type:	SS	
Flash Steam Percentage:	14.90%						
Max Boiler Steam Production	(3) 41,400 PPH boilers, (2) operating, max			GENERAL	1.) The HV50 offers ~10% continuous steam conditions. This should provide		
Average Boiler Steam Production	~ 50,000		COMMENTS		2.)		
Makeup Water Temperature	Assuming 70 deg F						
Nominal Continuous Blowdown Flow Rate	Assuming ~ 3% of average steam production.						
		CALCUL	ATIONS				
BOILERS:	Number of boilers:	3	BOILERS		Boiler Room	Inputs	
	Total steam generation capacity:	82,800	PPH				
	Operating pressure:	150	PSIG		BOILER PRESSURE	150	
	Average steam generation: estimate	50,000	PPH		STEAM RATE-MAX	82,800	
	Average steam	50,000	PPH		STEAM RATE-AVG	50,000	
	Blowdown rate - pct	3.00%	PCT		BLOWDOWN-PPH	1500	
	Blowdown rate, average	1500	PPH		HX TUBE-COPPER	370	
					HX TUBE-304 SS	244.9	
	Flashed steam vessel pressure	5	PSI		HX TUBE SURFACE-SQ FT	21	
	Flash steam rate:	14.90%	RATE		BLOWDOWN TEMP (DEG. F.):	225	
	Flash steam volume	223.5	PPH		FEEDWATER TEMP (DEG. F.):	70	
	Heat in flash steam:	1,155	BTU/LB		RECOVERABLE BTU'S	124	
	Heat recovery, flash steam:	258,143	BTU/hr		HEAT EXCHANGE CAPACITY		
	Hot water temperature after flash:	225	Deg. F.		STAINLESS-BTU/HR	318,860	
	Hot water rate:	85.10%	RATE		NOTE: Madden assumes an 80% efficiency	ate of heat	
	Hot water volume:	1,277	PPH		transfer through 3/4" O.D. X 0.049" 304SS (Coil	
	BTU recovery rate:	124	BTU/LB				
	Heat exchanger recovery:	158,286	BTU/hr	-	GAS - COST/THERM \$.	0.75	
	TOTAL BTU RECOVERY PER HOUR (A + B)	416,429	BTU	J			
					FEED WATER RATE - PPH	35000	
OPERATING COST		j1			FEEDWATER RATE - GPM	70	
SAVINGS:	Fuel saved: @ 80% eff	5.21	Therms		FLASH STEAM PRESSURE	5	
	Cost per Therm	0.75	per Therm		BTU IN FLASH STEAM	1155	
	Savings per hour:	\$3.90	per hour		FLASH STEAM PCT	0.149	
			·			01210	
	Savings per day (24 hrs):	\$93.70	per day	1			
	Savings per year (365 days):	\$34,199.19	per year	<u>_</u>			
FEEDWATER							
HEAT RISE:	Makeup water rate: estimate	70	GPM				
		35,000	PPH				
	Temperature IN, makeup water	70	deg. F.				
	Temperature OUT, makeup water	75	deg. F.				
	Temperature COT, makeup water	5	deg. F.				