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EFFLUENT DECONTAMINATION SYSTEMS (EDS); CONSIDERING ENERGY EFFICIENT ALTERNATIVES TO CONVENTIONAL BATCH KILL TANK SYSTEMS

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Abstract:
Thermal batch EDS technology is by far the most commonly specified equipment for biocontainment facilities. This technology is the most expensive to acquire, most expensive to maintain, and requires dramatically more energy and cooling resources to operate. Options are available that are less expensive to acquire and operate including **Chemical, Thermo-Chemical, and Thermal Continuous Flow** EDS equipment yielding better than 95% reduction in energy consumption and much lower cost of operation.

Introduction: This presentation is prepared to inform facility designers, engineers, and owners responsible for EDS technology selection, that other options are available that use substantially less energy (heating and cooling), some of which are less costly to acquire. This poster outlines some of the options that are available, and gives some comparison numbers for acquisition and operation of these systems.

Thermal Batch EDS Steam and Cooling Water Equivalent Consumption (2 hour cycle)

Cooker Size (gallons)	Steam flow to reach 250 degrees in 1 hour (pounds)	70 degree F Cooling water used (gallons)
100	306	160
250	766	400
500	1600	800
750	2400	1200
1000	3000	1600
2000	5000	3200
4000	10000	6400

Below, a typical non-redundant thermal batch EDS; 2,000 g collection / 500 g cook tank

System above, 4 gpm continuous equivalent, capital cost $600,000, uses >20x more energy than the system at the right

Thermal Continuous EDS Steam and Cooling Water Equivalent Consumption

Batch Cooker Size equivalent Continuous Flow EDS	280 degree F Continuous flow EDS in gallons per minute	Steam required (pounds) with 90 percent energy recovery	Cooling water equivalent required
100	0.8	10	0
250	2.1	25	0
500	4.2	50	0
750	6.3	75	0
1000	8.3	100	0
2000	16.7	200	0
4000	33.3	400	0

Below, a typical non-redundant continuous flow EDS; 10 gallon per minute at 280 degrees F

System above, 10 gpm continuous equivalent, capital cost $600,000, uses <5% of the energy of the system at the left

Some Other Options:

Continuous flow chemical EDS with neutralization, 120 gallons per hour, $60,000 capital cost, $2 per hour ops cost

Batch Chemical EDS, 300 gallons per hour, $190,000 capital cost, $5 per hour ops cost

Conclusion:

In comparison to batch thermal EDS technology, the data are beyond compelling to consider continuous flow thermal technology for a number of reasons. We all have a responsibility to find alternatives to high energy consumption options, and there are many other pleasant upsides too numerous to mention in this poster.

Any system shown here is suitable for any BSL level including level 3, level 3-ag, and level 4 operations.