



Update on Proposed Solid Waste Rule for Incinerators

Jim Welp
Black & Veatch

NBP-WEF Holds Future of Biosolids Management Forum

- Purpose: Identify trends in technology, operations, and management; regulatory and public policy drivers; research needs; and professional and training needs over the next three, five, and ten years for biosolids.

POTWs are Resource Recovery Centers

- Nutrients – N, P, and soil conditioner
- Energy – heat, power, fuel
- Water – clean water
- Other

All Biosolids Management Options have Issues

- Thermal Oxidation - solid waste and MACT standards, public acceptance
- Land Application (and EQ products) - P, odors, trace organics, public education, public acceptance
- Landfilling - Organics, stabilization requirements, public acceptance

The Broader View

- More stringent requirements are coming that will effect your program
- All options need to be on the table – not one solution
- Competing program investments with CSO's, stromwater, nutrients,…

Outline

- Combustion principals and benefits
- Proposed ruling
- Impact on thermal oxidation facilities
- Energy recovery
- Conclusions
- Mill Creek and Southerly WWTPs pictures

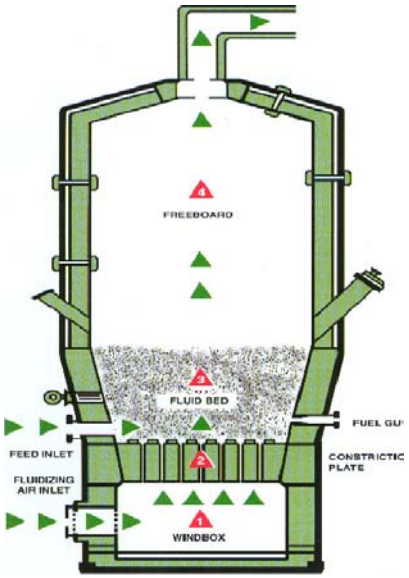
Combustion Principals and Benefits

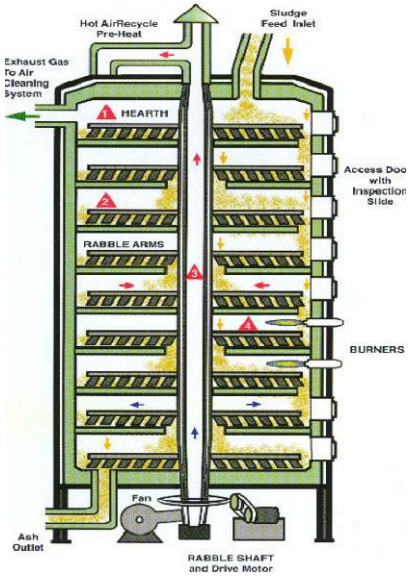
Combustion Principles

- Combustion - produces same end products (CO_2, H_2O, and SO_2) as other solids management processes but at different rates
  - Incineration: ~0.1 to 60 minutes
  - Digestion: ~15 to 30 days
  - Composting: ~1 to 2 months
  - Land Application: ~1+ years

Incineration Technologies

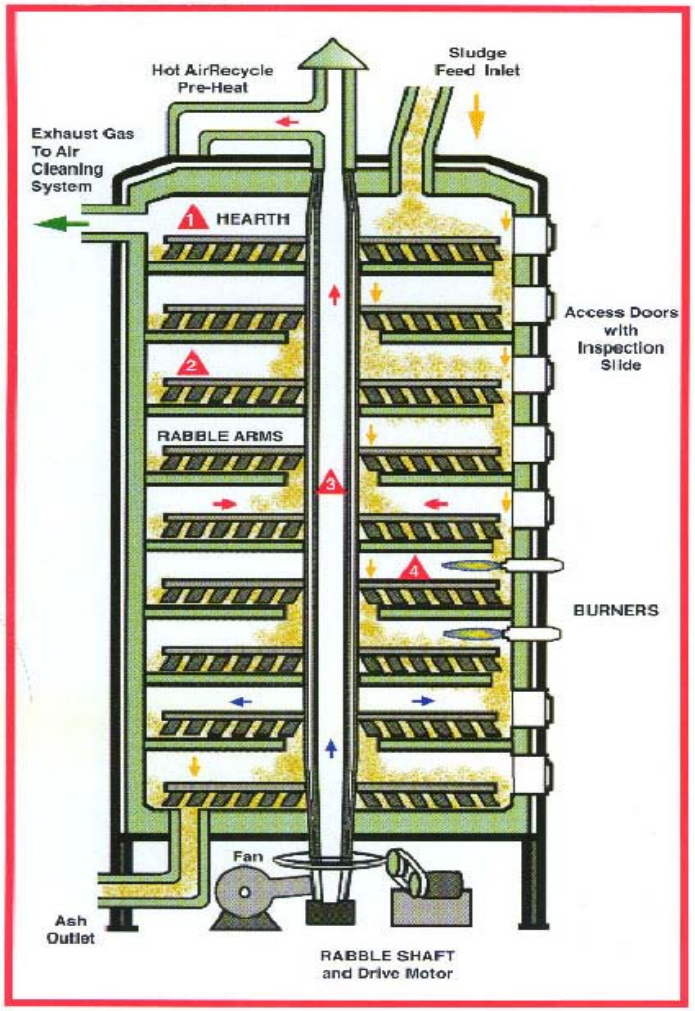
- Fluid Bed Incineration
  - Newer technology
  - All new units in last ~12 years

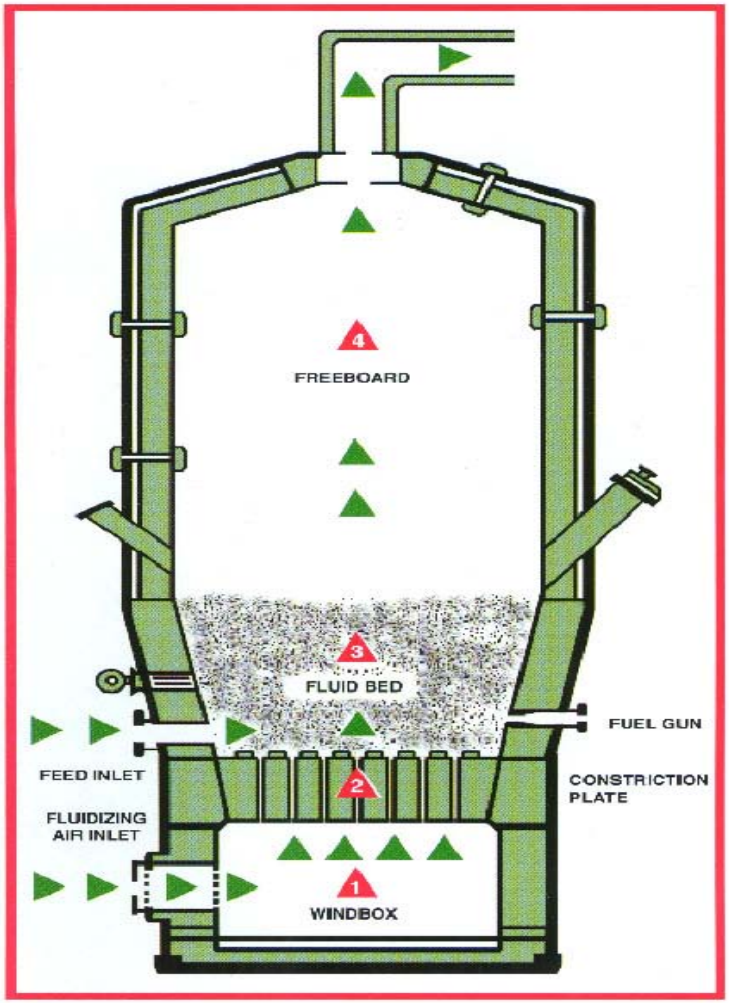




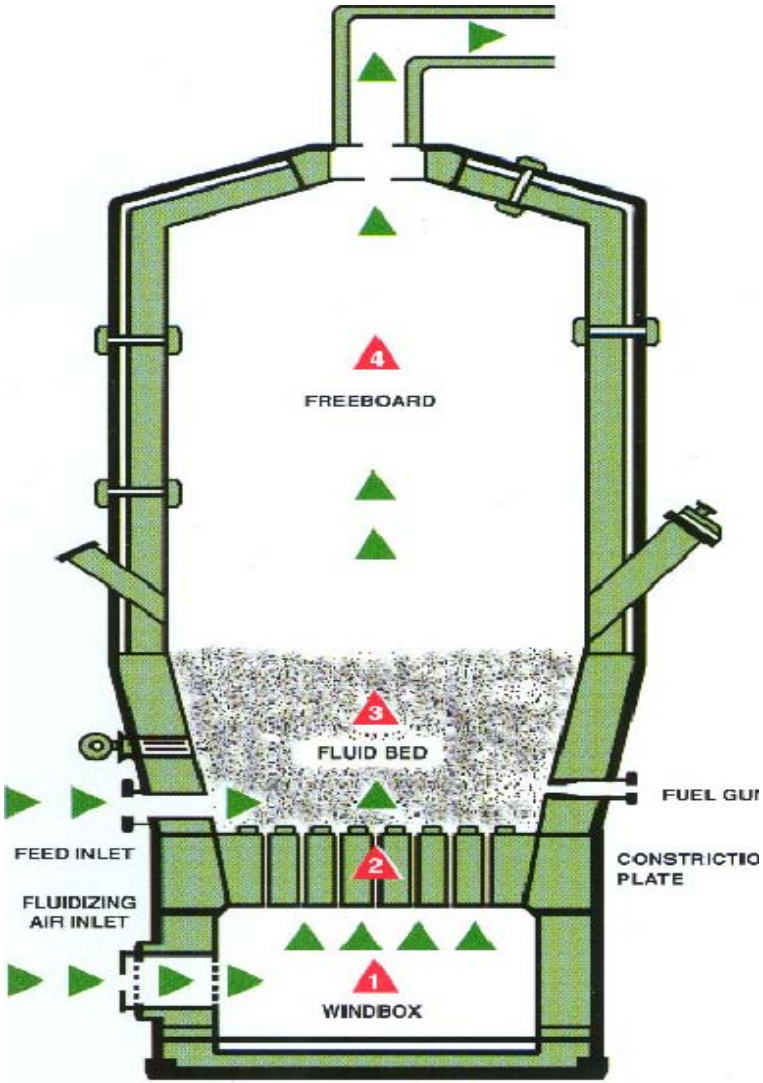
- Multiple Hearth Incineration
  - More units in service but units are older
  - Upgrades needed for energy efficiency and cleaner emissions

MHI and FBI – How do they work?

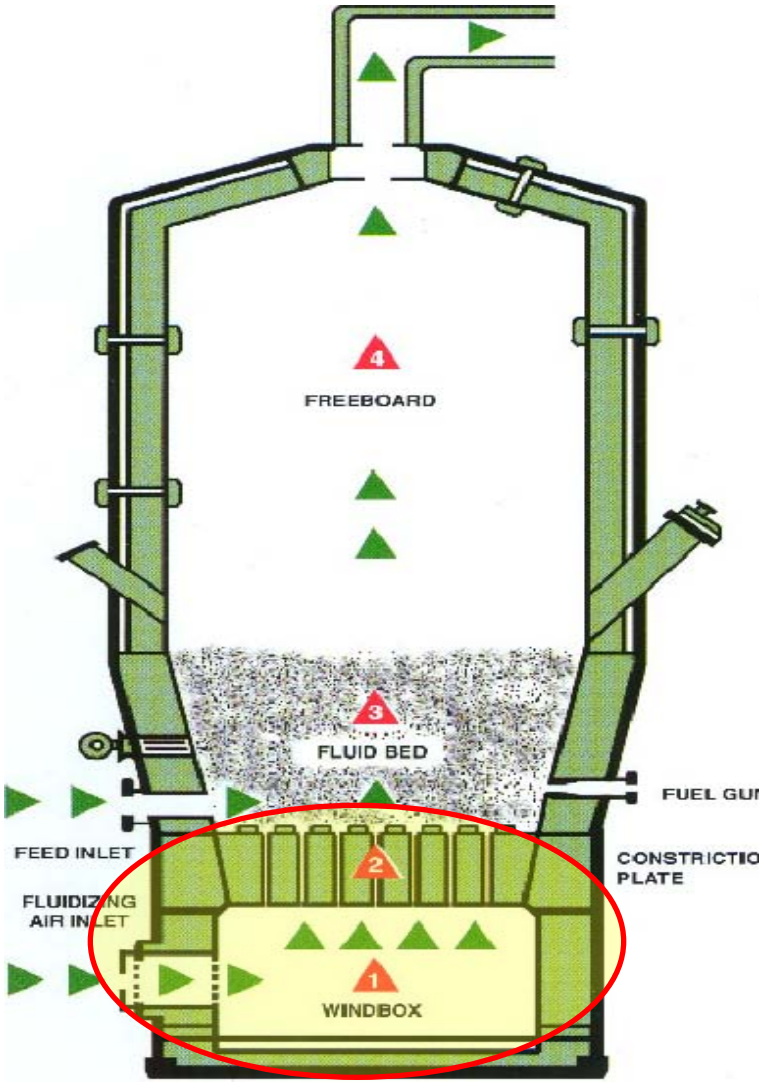




Fluid Bed Reactor



Windbox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FUEL GUI
FEED INLET
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CONSTRICTIO
PLATE
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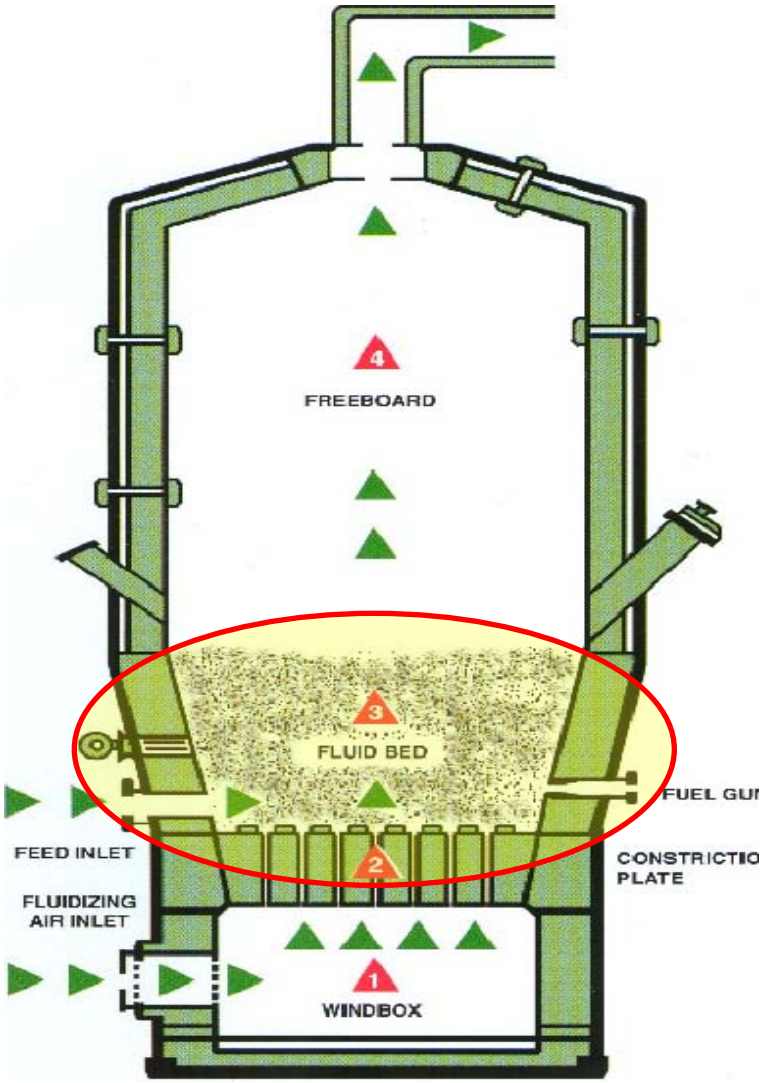
AIR INLET
1
WINDBOX

Fluid Bed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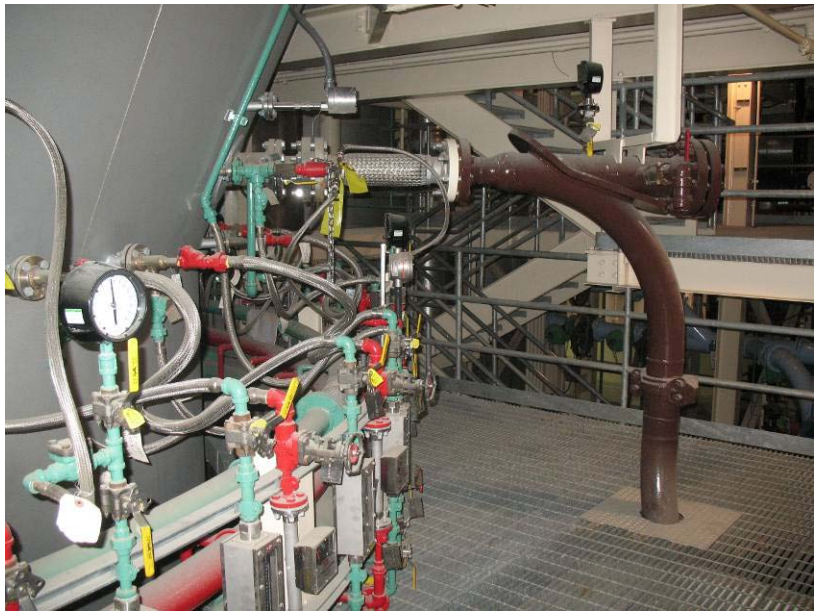
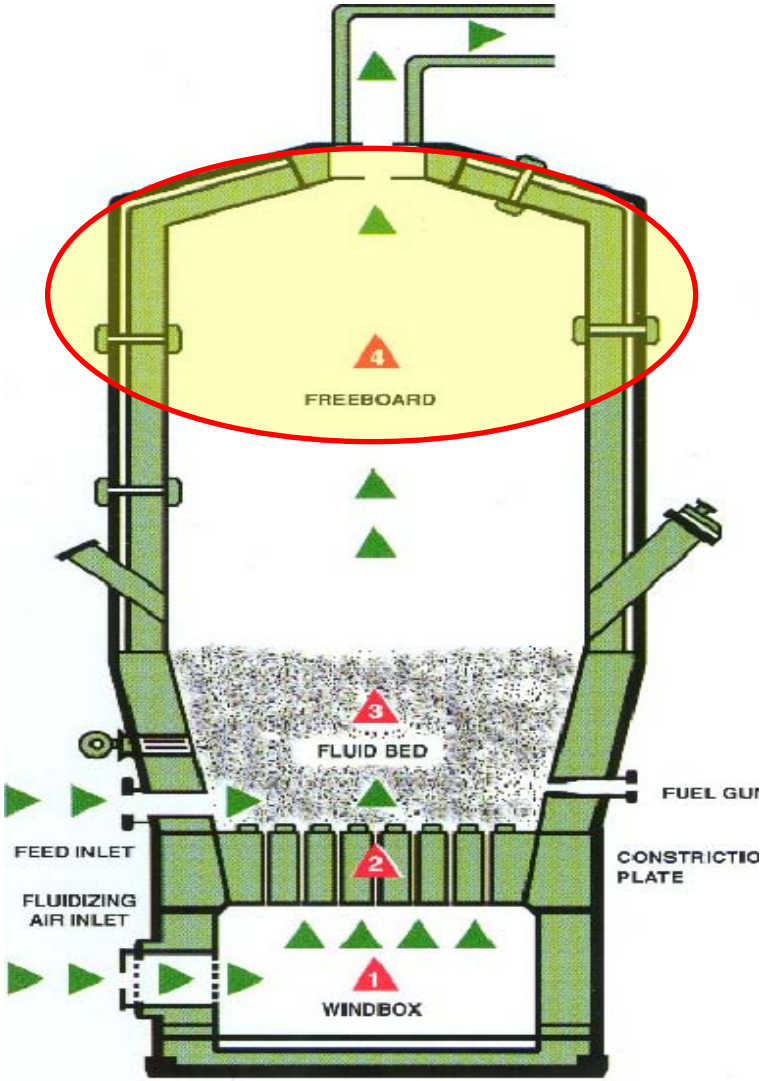


Freeboard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Thermal Oxidation Benefits

- Complete Stabilization
  - Large volume and mass reduction
  - Pre-stabilization not required
- Energy Efficient
  - Low auxiliary fuel requirements
  - Sustainable operation with clean emissions
- Neighbor Friendly
  - Operates continuously without visible emissions
  - Lowest truck traffic
  - Lowest odor potential
- Cost Effective

Proposed Ruling

EPA Offices…Who makes the rules?

- Water – NPDES, 503
- Air – CAA Section 112 and 129
  - Local “non-attainment areas”
- Resource Recovery (Solid Waste) – RCRA, landfills
  - Definition redefined due to activist lawsuit

Regulatory Impacts from EPA Solid Waste Proposed Regulation

- All sewage sludge is a solid waste
  - Intended to cover SSIs - not other biosolids management practices
- Solid waste definition requires Section 129 of CAA
  - MACT (maximum achievable control standards) to replace GACT in Section 112 of CAA
  - Top 12% of operating facilities (or top 5 if less than 30)
- EPA accepts that this may increase landfilling
- Law of unintended consequences…

SSI MACT – pollutants / surrogate list and data requested as part of ICR testing

- **Mercury** – no surrogate
- **Filterable PM** – for non-mercury metallic HAP
- **SO2** or **HCl** – for acid gas HAP
- **CO** – for non-dioxin / furan organic HAP
- **Dioxin / furan** organic HAP
- Others: **Cadmium, lead, NO_x, and opacity**

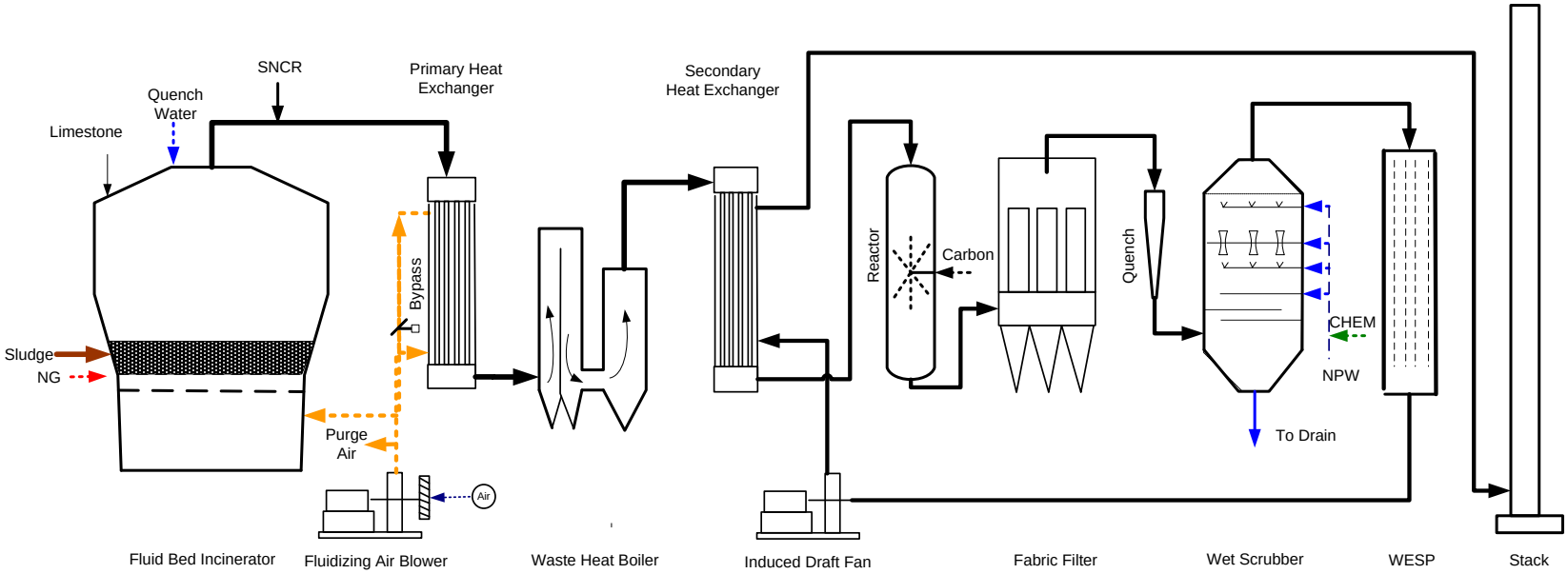
Proposed MACT Standards

Parameter @ 7% O2	Existing MHI	Existing FBI	New SSI
Cadmium (mg/dscm)	0.095	0.0019	0.00051
Dioxin/Furan, TMB (ng/dscm)	5.0	0.061	0.024
Dioxin/Furan, TEQ (ng/dscm)	0.32	0.056	0.0022
CO(ppmv)	3900	56	7.4
HCl (ppmv)	1.0	0.49	0.12
Mercury (mg/dscm)	0.02	0.0033	0.001
NOx (ppmv)	210	63	26
Opacity, %	10	0	0
Lead (mg/dscm)	0.30	0.0098	0.0053
PM, filterable (mg/dscm)	80	12	4.1
SO2 (ppmv)	26	22	2.0

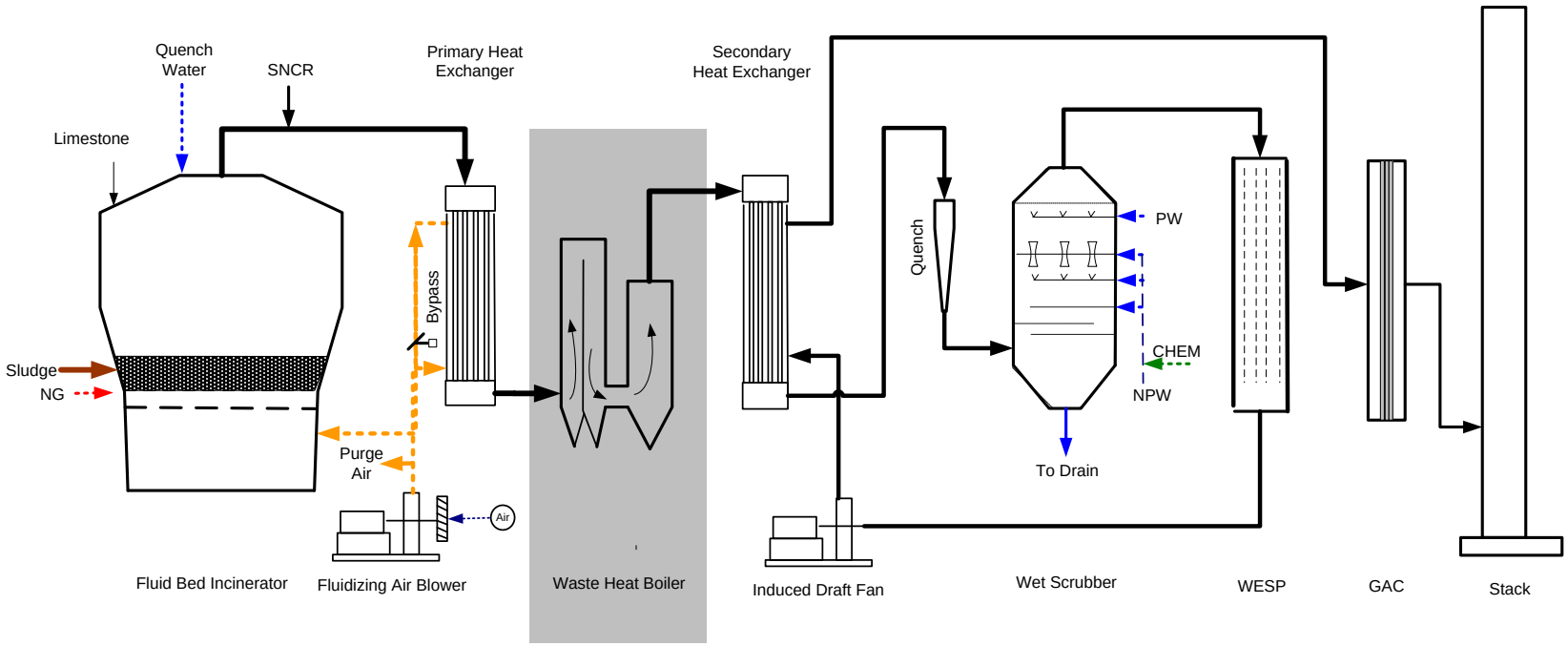
EPA "Cherry Picked" Emission Limits

Parameter @ 7% O2	New SSI	Location	Sample Size
Cadmium (mg/dscm)	0.00051	NCTZOsborne	3
Dioxins/Furans, TMB (ng/dscm)	0.024	MIYpsilanti	3
Dioxins/Furans, TEQ (ng/dscm)	0.0022	MIYpsilanti	3
CO (ppmv)	7.4	MIYpsilanti	6
HCl (ppmv)	0.12	NCTZOsborne	3
Mercury (mg/dscm)	0.001	MNStPaulMetro FBR3	36
NOx (ppmv)	26	NCTZOsborne	3
Opacity, %	0	all	
Lead (mg/dscm)	0.0053	NCTZOsborne	3
PM, filterable (mg/dscm)	4.1	MNStPaulMetro FBR2	12
SO2 (ppmv)	2.0	MNStPaulMetro FBR1	3

Dry ash fluid bed system (St. Paul, MN)

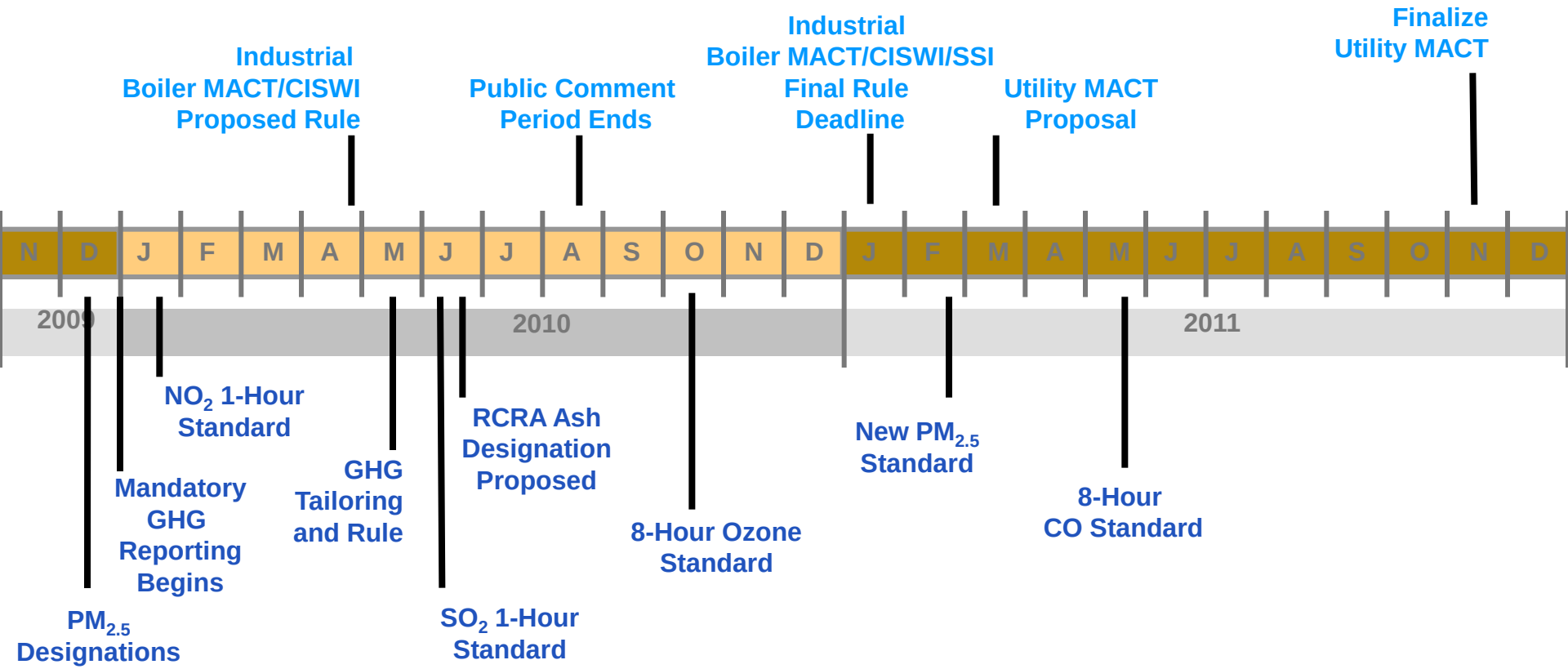


Wet ash system (Ypsilanti, MI)



Timing with Other Regulatory Considerations

- Existing sources to comply by ~ January 2014
- New sources to comply upon startup



Regulatory Update!

- 80 comments received
- EPA does not intend to re-pose the rule
- July 15, 2011 requested to fully consider responses

FOR IMMEDIATE RELEASE

December 7, 2010

EPA Seeks New Timetable for Reducing Pollution from Boilers and Incinerators

Agency committed to developing rules that are protective, cost effective and based on sound science

WASHINGTON – In a motion filed today in the federal District Court for the District of Columbia, the U.S. Environmental Protection Agency (EPA) is seeking an extension in the current court-ordered schedule …

Impact on Thermal Oxidation Facilities

Operational Impacts

- Better understanding of operational changes and impact on emissions
  - No exemption for startup, shutdown, and malfunction
  - Need “steady state” conditions – small changes
- All units likely to need emission equipment upgrades

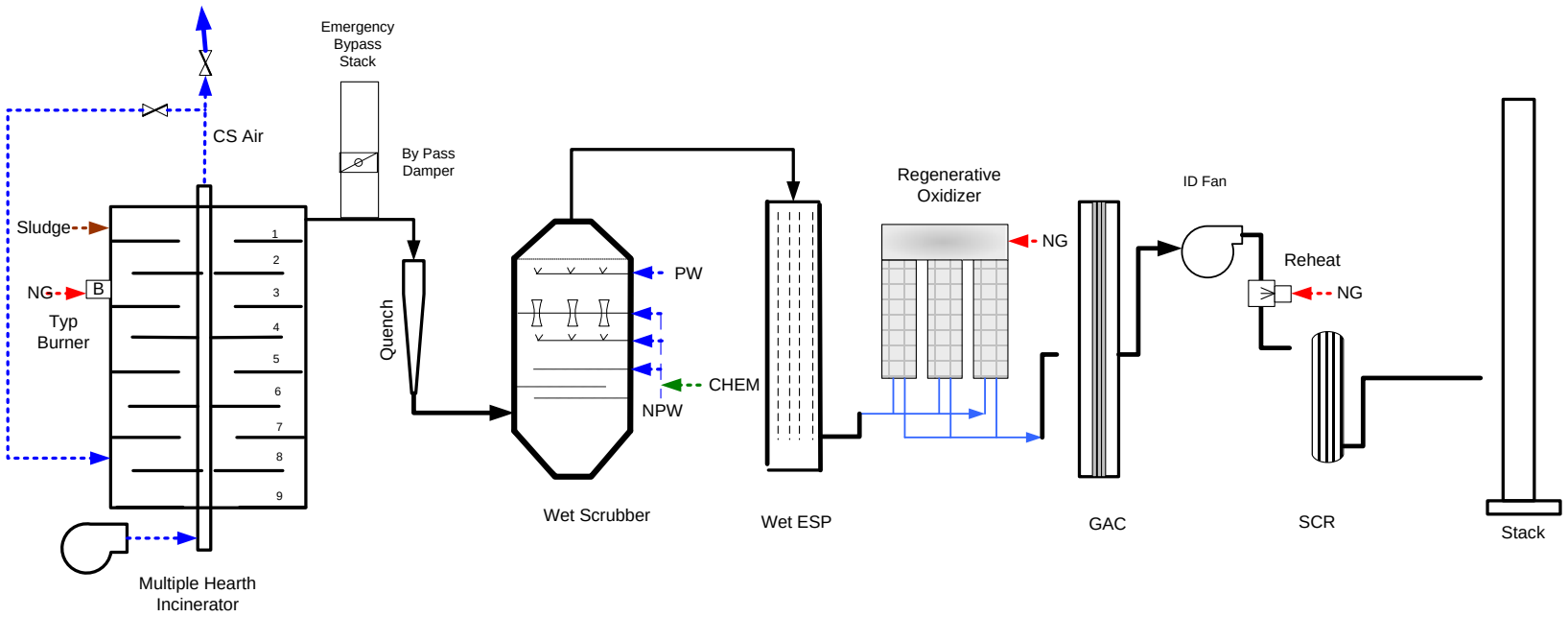
Real Life Example of Agency with Five MH Facilities

		Plant				
Parameter @ 7% O2	**129 limit**	**A**	**B**	**C**	**D**	**E**
Cadmium (mg/dscm)	0.095	**0.11**	**0.06**	0.04	**0.07**	0.03
Dioxin/Furan, TMB (ng/dscm)	0.32					
Dioxin/Furan, TEQ (ng/dscm)	5.0	**11**			**9.5**	
CO(ppmv)	3,900	**3012**	2111	**2804**	1337	**3441**
HCl (ppmv)	1.0		0.10			
Mercury (mg/dscm)	0.02	**0.13**	**0.14**	**0.101**	**0.068**	**0.090**
NOx (ppmv)	210	**194**	128	**177**	**185**	**346**
Opacity, %	10					
Lead (mg/dscm)	0.3	**0.41**	0.07	**0.35**	**0.46**	0.09
PM, filterable (mg/dscm)	80	**83**	**78**	**65**	41	52
SO2 (ppmv)	26					

Initial Observations of Needs

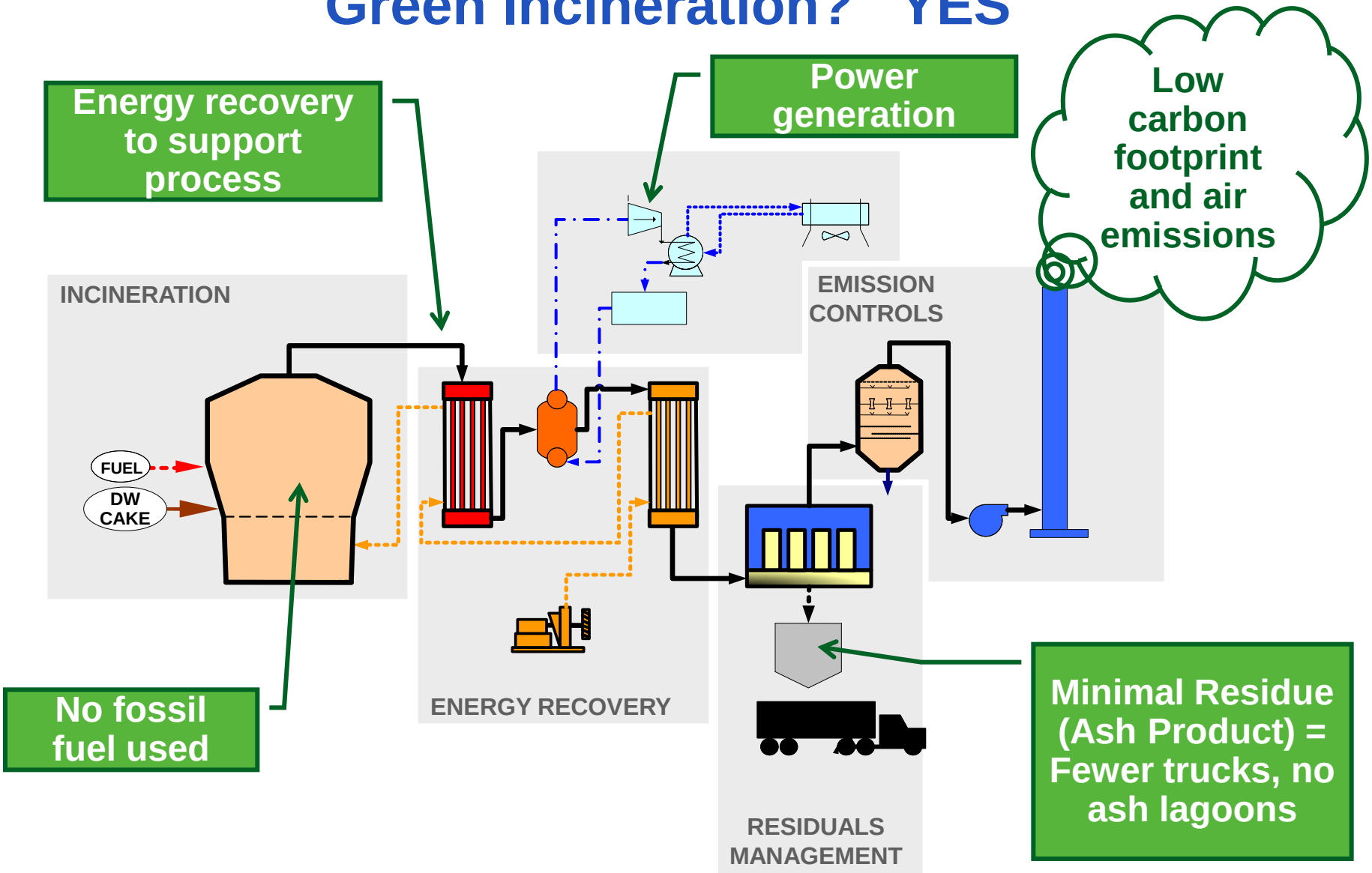
Plant	A	B	C	E	F
Combustion Efficiency – may need afterburner and or NOx control					
CO	**Borderline**	OK	OK	OK	**Borderline**
NOx	**Borderline**	OK	**Borderline**	**Borderline**	**Control Reqd**
Opacity	No data	No data	No data	No data	No data
Particulate Control - may need better scrubber and/or WESP					
Cd	**Control Reqd**	OK	OK	**Borderline**	OK
Pb	**Control Reqd**	OK	**Control Reqd**	**Control Reqd**	OK
PM	**Control Reqd**	**Borderline**	OK	OK	OK
Wet Scubber – may need to add caustic					
HCL	No data	OK	No data	No data	No data
SO2	No data	No data	No data	No data	No data
Carbon Adsorption - needed for control					
D/F	**Control Reqd**	No data	No data	**Control Reqd**	No data
Hg	**Control Reqd**	**Control Reqd**	**Control Reqd**	**Control Reqd**	**Control Reqd**

Multiple Hearth Incinerator on steroids…



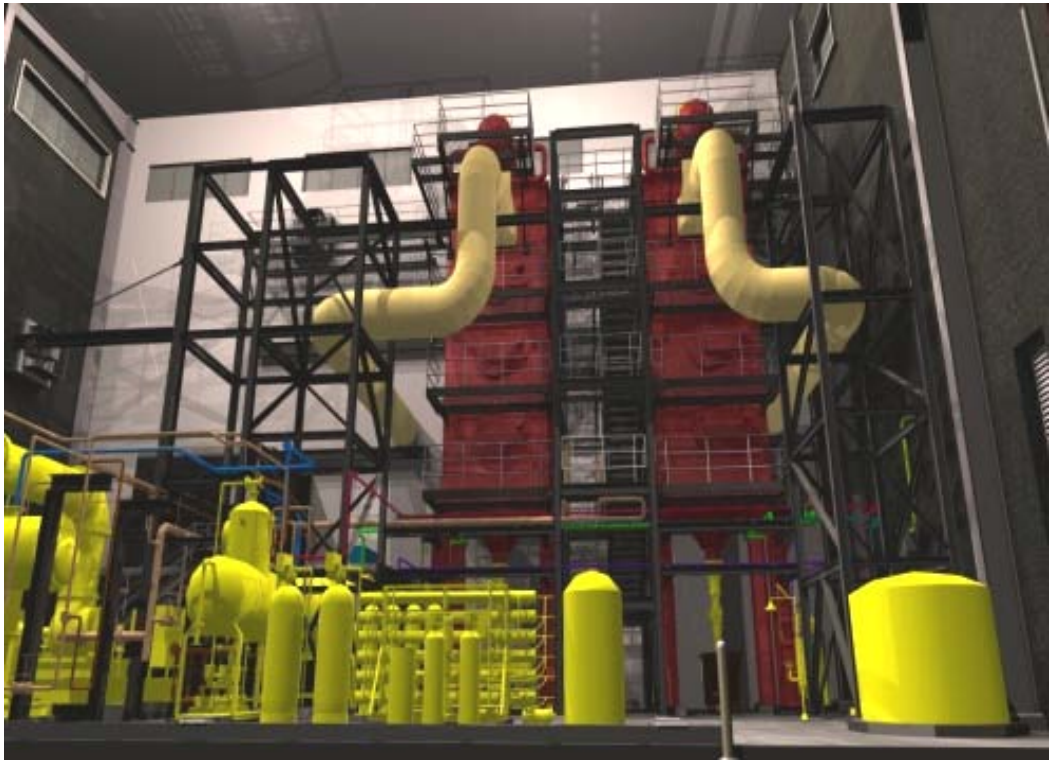
Energy Production

Green Incineration? YES



Hartford, CT Decision – Add Energy Production to MHI Upgrade

- B&V designed MHI upgrade and power generation facility
- Waste heat boilers produce superheated steam at 600F which drives a steam turbine generator to produce electrical power
- Steam turbine generating output capacity will be 2 MW providing 45% of the current 3.5 MW plant demand



NEORSD – Renewable energy production @ Southerly WWTP as part of upgrade to fluid bed

- Fluid bed incineration project was the most cost-effective biosolids management option
  - "Green power" system produces 27% of 13 MW plant load
  - Ability to use energy from grease/skimmings
  - Reduced natural gas consumption by $1M/yr
  - Provided energy enhancement to offset purchased power
  - Minimize uncontrollable costs
  - Generate $1.4 M/yr in electrical power to offset purchased power

Facility Operations at Average Conditions

Parameter	Hartford	Southerly
No of Units Operating	2	2
Sludge Feed, dtpd	96	163
Total Solids, %	28	28
Volatile Solids	70	68
Auxiliary Fuel, Btu/h	6,200,00	0
Turbine Steam Flow, lb/h	24,100	26,000
Gross Electricity Production, MW	**1.6**	**2.6**
Net Energy, kWh/dry ton	**362**	**355**

Paradigm Shift

Recovering Energy as Resource

- Proposed regulations are driving us to consider energy as a resource for recovery
- Sustainability and public accountability are driving us to consider energy as a resource for recovery

CHEERS... to the Northeast Ohio Regional Sewer District for installing generators at its Southerly Treatment Plant in Cuyahoga Heights that work more efficiently and will turn solid human waste into electrical power to help run the plant.

THE PLAIN DEALER
August 22, 2008

Conclusions

- Incineration is a viable biosolids management option
- MACT standards will impact all facilities
- EPA is at least listening to our concerns
- Facilities should consider recovering energy as a resource

Mill Creek Facilities

May 2008

July 2008

September 2008

November 2008

March 2009

September 2009

NEORSD Facilities

September 2010

November 2010





QUESTIONS

For more information…

Jim Welp
513-505-1982
WelpJE@bv.com

OWEA presents:

2010 Biosolids Specialty Workshop

December 9, 2010

University Plaza Hotel

Conveniently located in central Columbus
West of I-71 and along 315
North of OSU campus.

University Plaza Hotel & Conference Center
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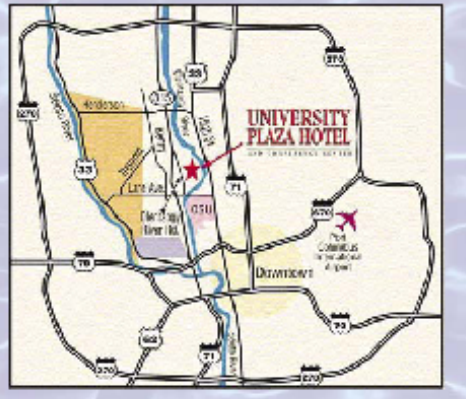

Workshop Schedule

7:45-8:15	**Registration, Coffee, and Pastries**
8:15-8:30	Opening Remarks *- Jamie Gellner, Residuals Vice-Chair*
8:30-9:15	Sludge Minimization – a Paradigm Shift in Sludge Management *- Dr. Sam Jeyanayagam, CH2M Hill*
9:15-10:00	Grit Collection and Classification Case Studies *- Brian McNamara, Hampton Roads Sanitation District*
10:00-10:15	**Break**
10:15-11:00	LMI Mixing of Digester Tanks *- Brian Schultz, City of Sidney*
11:00-11:45	Microconstituents in Biosolids - What Does It Mean for the Future of Land Application of Biosolids? *- Dr. Lakwinder Hundal, MWRD of Greater Chicago*
11:45-12:45	**Lunch (provided)**
12:45-1:30	Dewatering Improvements - Clarksville Case Study *- Dan Miklos, Hazen and Sawyer*
1:30-2:15	Update on Solid Waste Rule for Incinerators *- Jim Welp, Black &Veatch*
2:15-2:30	**Break**
2:30-3:15	Energy Conservation and Recovery in Wastewater Treatment Facilities *- Jim Smith, Malcolm Pirnie, Inc.*
3:15-4:00	Basics of Aerobic Stabilization *- Bryan Woo, Ovivo*
4:00	**Adjourn**

2010 Biosolids Specialty Workshop

Thursday, December 9, 2010

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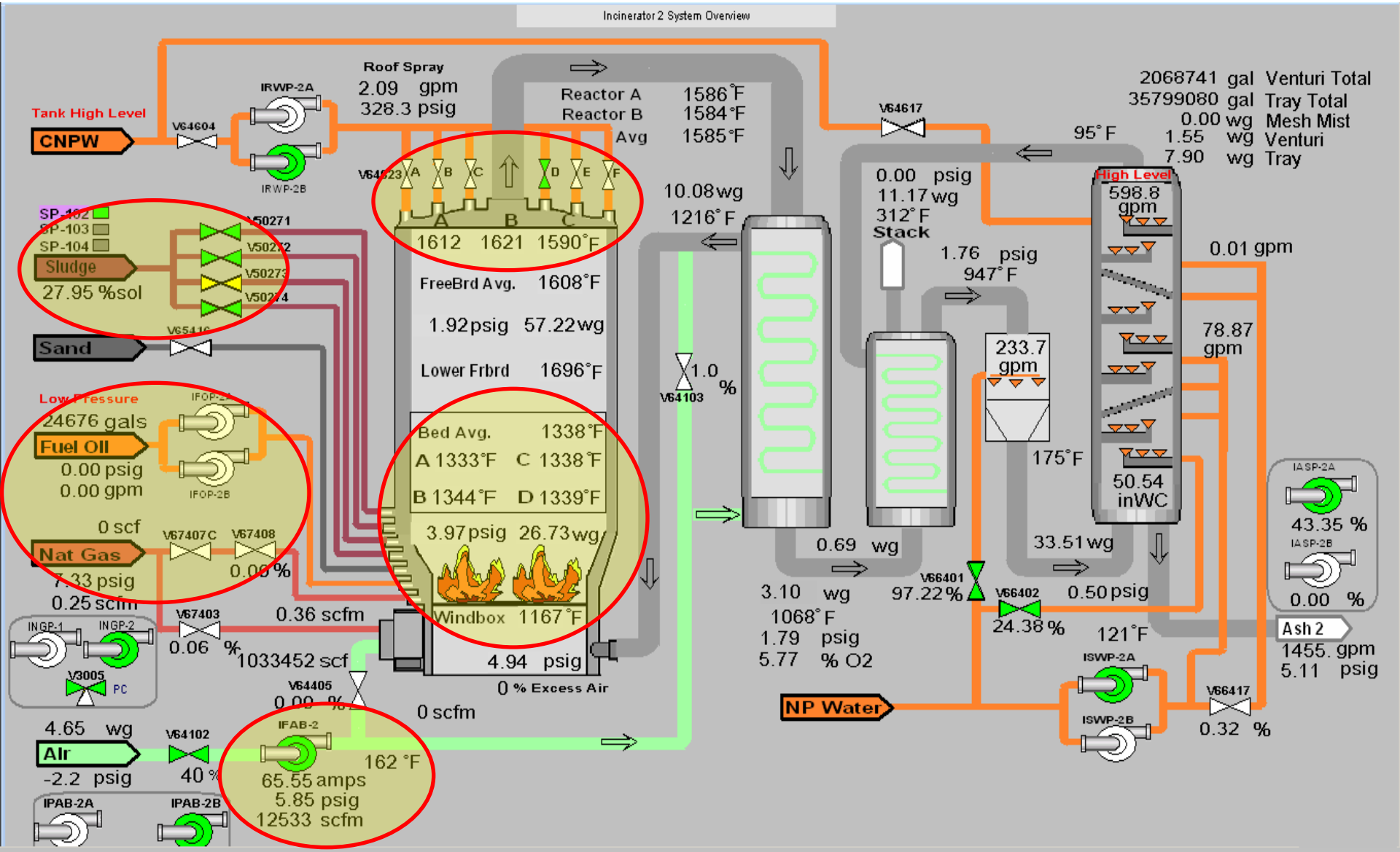
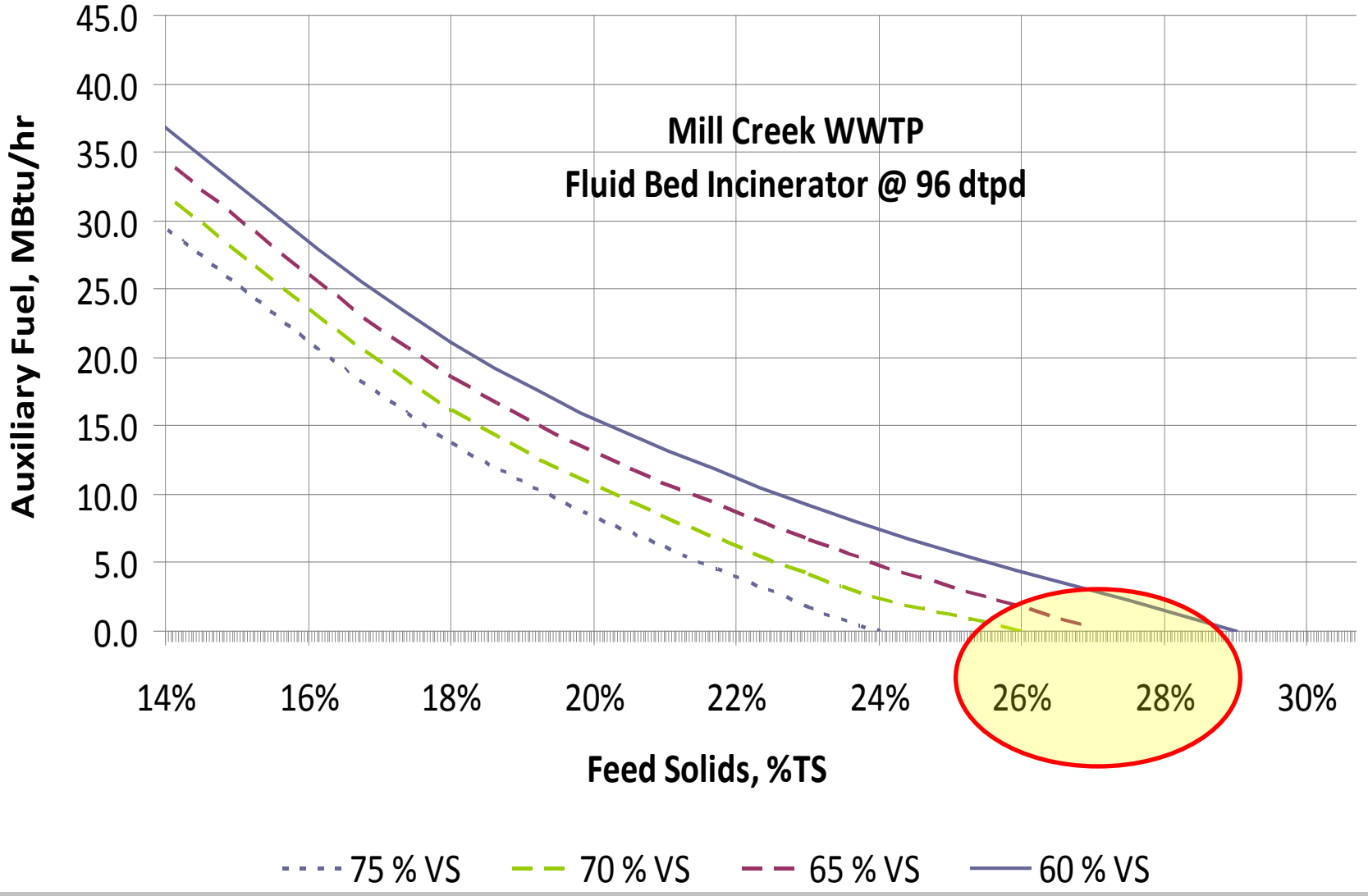
Registration will be confirmed by E-mail.

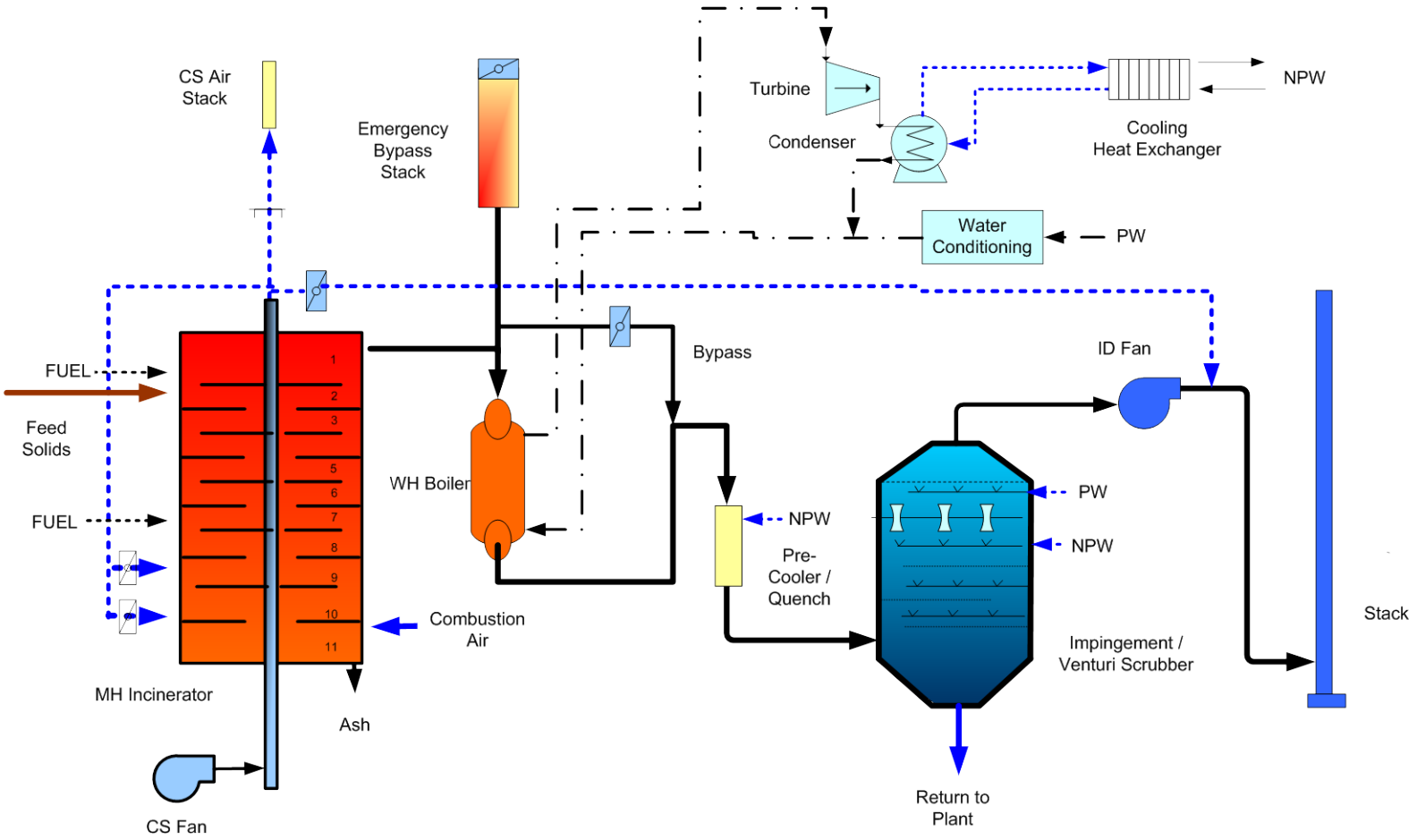
Mill Creek WWTP Incineration Process



Auxiliary Fuel Requirements with Hot Windbox



Hartford WPCF Power Generation Schematic



Southerly WWTP Power Generation Schematic