NJWEA

Addressing the Emission Requirements for Fluid Bed Sludge Incinerators

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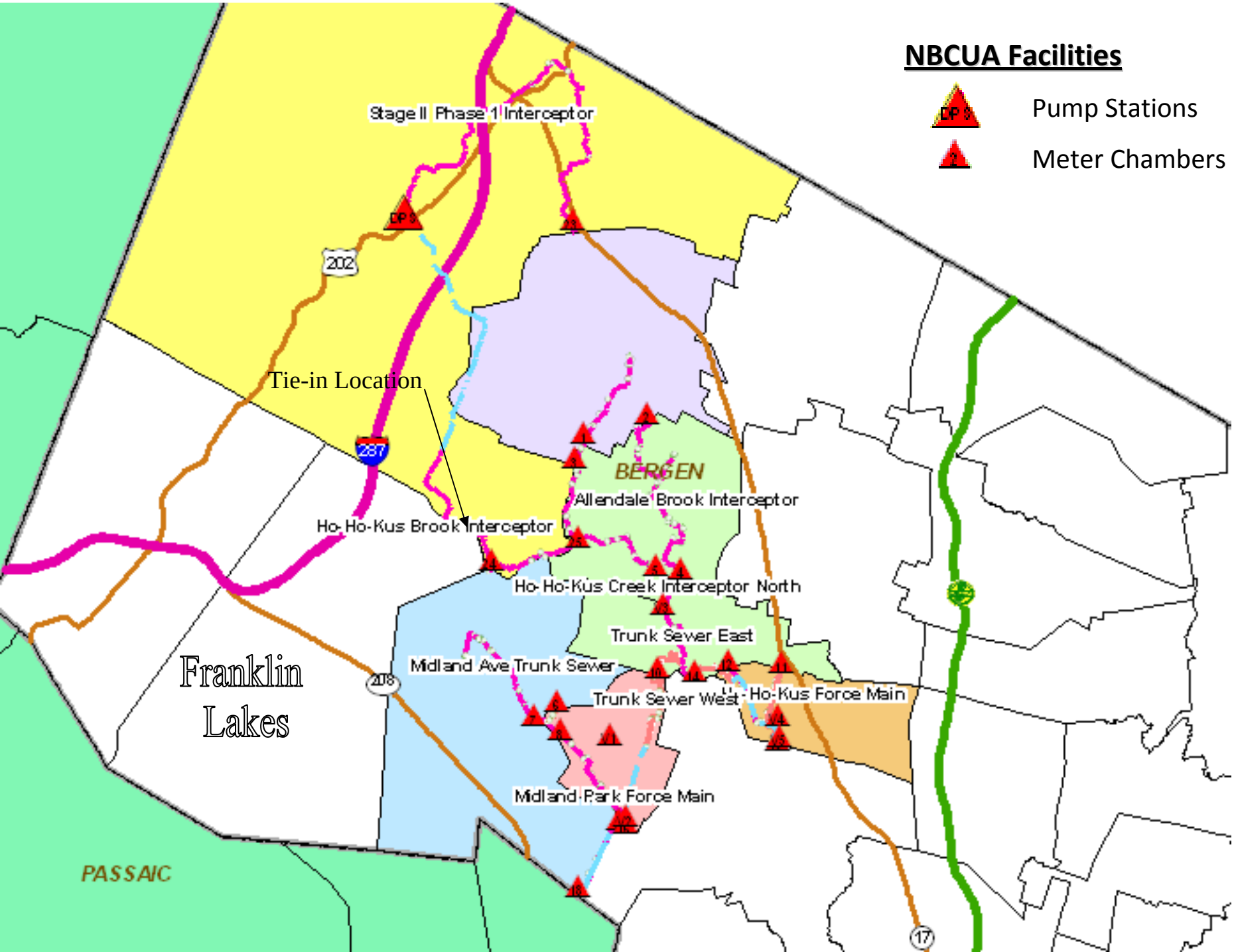
NORTHWEST BERGEN COUNTY UTILITIES AUTHORITY

- **NBCUA Owns and Operates**
  - **31 Miles of Interceptors**
  - **18 Metering Chambers**
  - **4 Pumping stations**
  - **Wastewater Treatment Plant in Waldwick**
  - **Rated at 16.8 MGD**


NBCUA Facilities
Pump Stations
Meter Chambers
Stage II Phase 1 Interceptor
Tie-in Location
Ho-Ho-Kus Brook Interceptor
Allendale Brook Interceptor
BERGEN
Ho-Ho-Kus Creek Interceptor North
Trunk Sewer East
Midland Ave Trunk Sewer
Trunk Sewer West
Ho-Kus Force Main
Midland Park Force Main
Franklin Lakes
PASSAIC
202
287
208
17

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- Waste Water Treatment Plant Constructed in 1969
- Treatment Steps Include:
  - Primary Settling
  - Activated Sludge Processing
  - Final Clarification
  - UV Disinfection
- All Recovered Solids Dewatered
  - Thickener
  - Belt Filter
- Solids Combusted in Fluid Bed Incinerator
- Ash to Off Site Disposal

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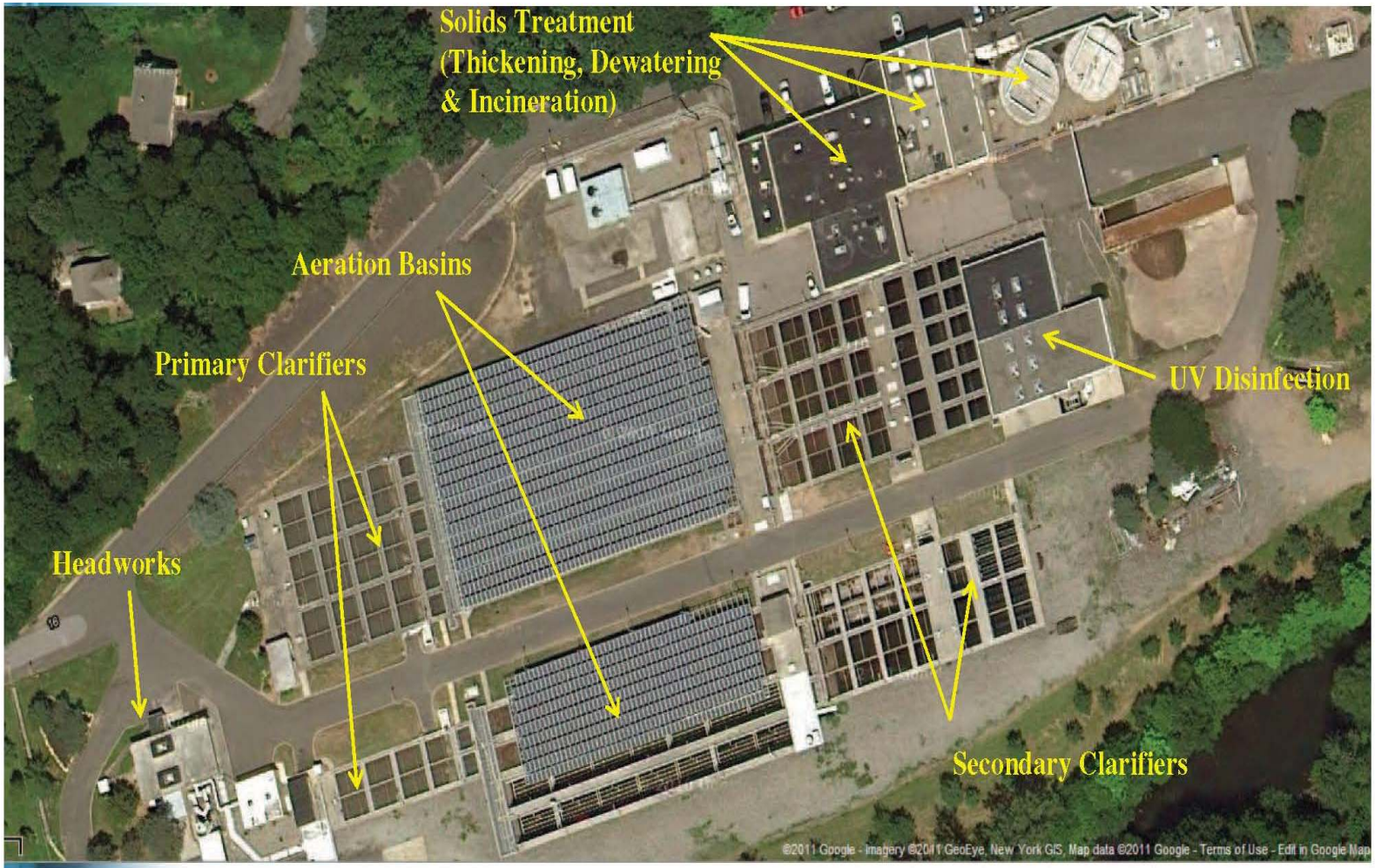
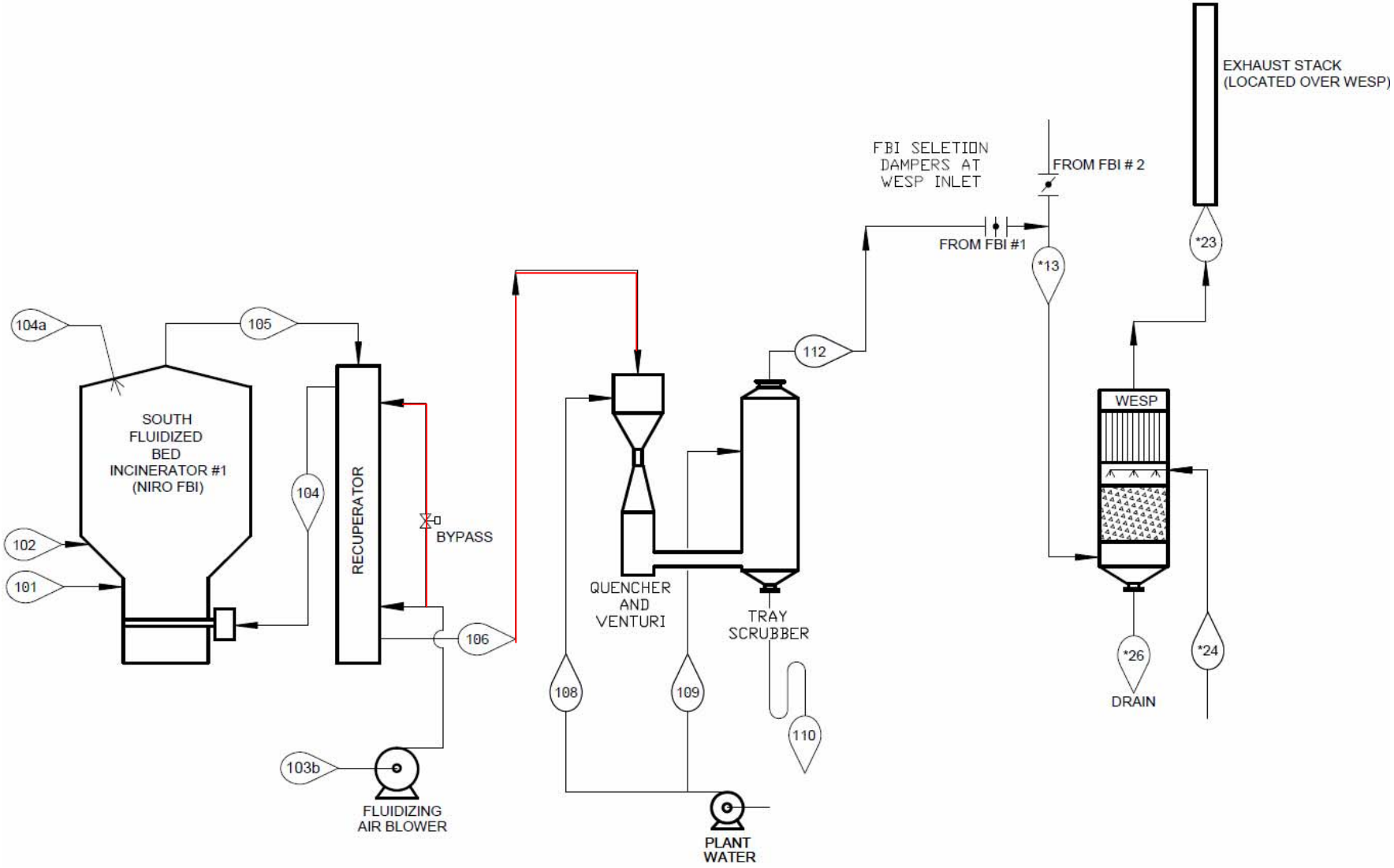


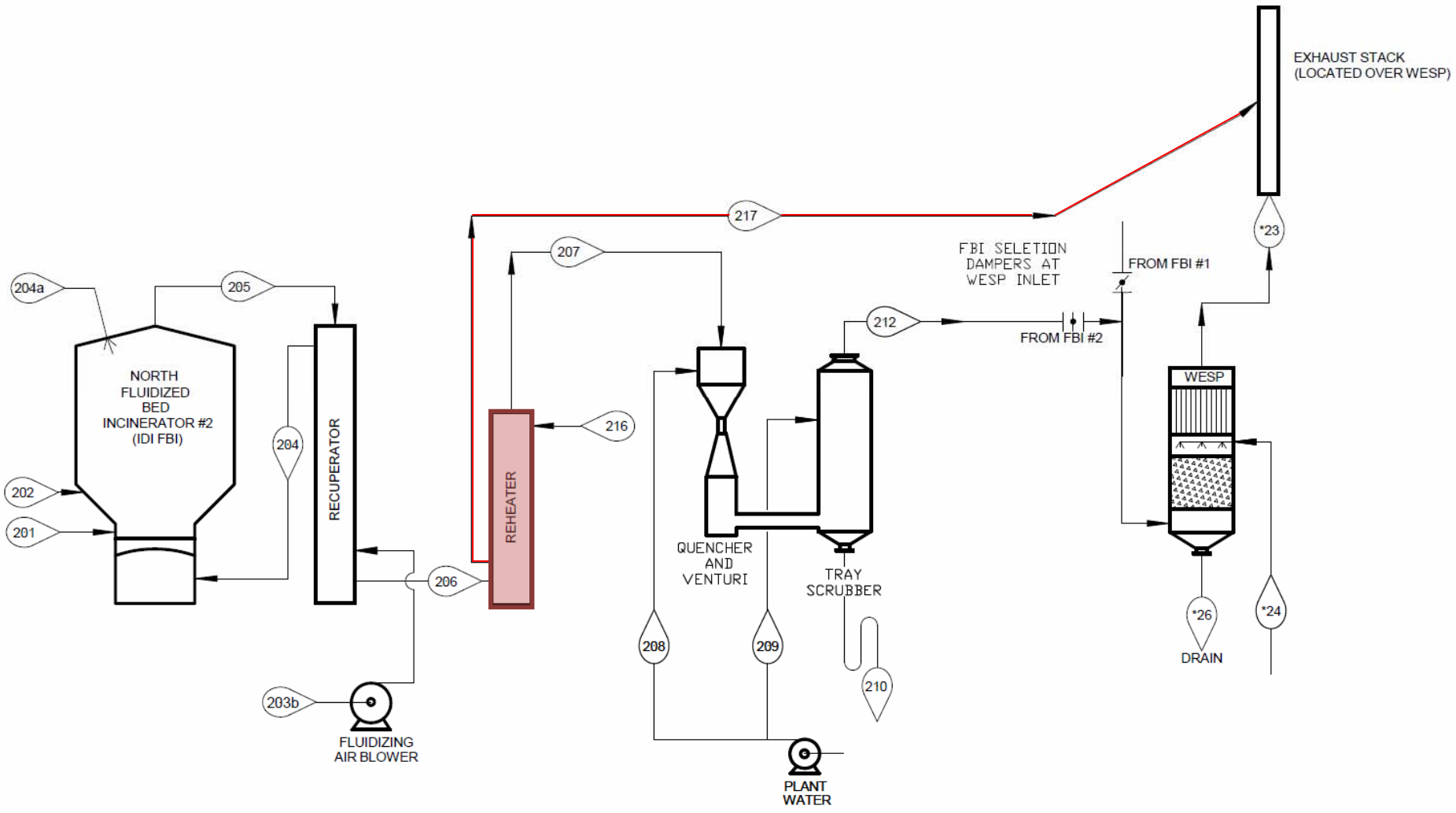
Two Incinerators

- Original Facility Included Fluid Bed Incinerator
- Circa 1990, a Niro incinerator was installed.
- Circa 1995, a more modern IDI incinerator was installed.
- Feed rates:
  - IDI: 2250 dry lbs/hr
  - Niro: 2000 dry lbs/hr
- Combined Exhaust: single WESP and stack installed with IDI incinerator

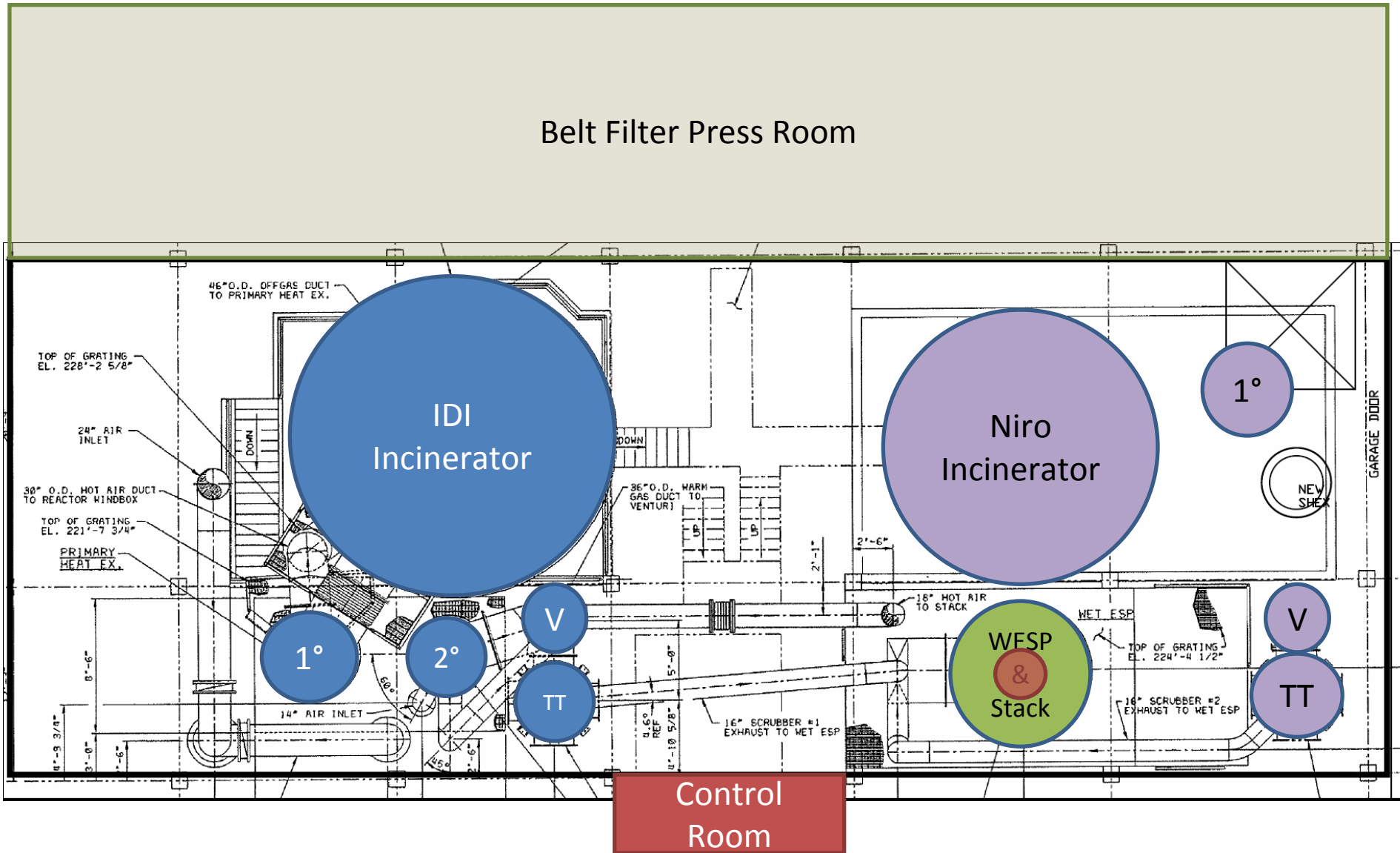
Niro Incinerator



IDI Incinerator



Incinerator Room: Existing Equipment



Regulated Emissions

Current Permit: PASS by Considerable Margin

Gaseous: NOx, SO_2, CO, O_2, VOC, H_2S

Metals: As, Be, Cd, Cr, Pb, Hg, Ni

TCDD, B(a)P, Benzene

HCl

Particulate: TSP, PM-10

40 CFR 60 Subpart-MMMM (2016)

Cd, CO, HCl, Hg, NOx, Pb, CCD/CDF, PM, SO_2

SSI Emissions Limits

TABLE 1—EMISSION LIMITS FOR EXISTING SSI UNITS

Pollutant	Units	Emission limit for MH incinerators	Emission limit for FB incinerators
Cd	mg/dscm @ 7% O_2	0.095	0.0016
CO	ppmvd @ 7% O_2	3,800	64
HCl	ppmvd @ 7% O_2	1.2	0.51
Hg	mg/dscm @ 7% O_2	0.28	0.037
NO_X	ppmvd @ 7% O_2	220	150
Pb	mg/dscm @ 7% O_2	0.30	0.0074
PCDD/PCDF, TEQ	ng/dscm @ 7% O_2	0.32	0.10
PCDD/PCDF, TMB	ng/dscm @ 7% O_2	5.0	1.2
PM	mg/dscm @ 7% O_2	80	18
SO_2	ppmvd @ 7% O_2	26	15

TABLE 2—EMISSION LIMITS FOR NEW SSI UNITS

Pollutant	Units	Emission limit for MH incinerators	Emission limit for FB incinerators
Cd	mg/dscm @ 7% O_2	0.0024	0.0011
CO	ppmvd @ 7% O_2	52	27
HCl	ppmvd @ 7% O_2	1.2	0.24
Hg	mg/dscm @ 7% O_2	0.15	0.0010
NO_X	ppmvd @ 7% O_2	210	30
Pb	mg/dscm @ 7% O_2	0.0035	0.00062
PCDD/PCDF, TMB	ng/dscm @ 7% O_2	0.045	0.013
PCDD/PCDF, TEQ	ng/dscm @ 7% O_2	0.0022	0.0044
PM	mg/dscm @ 7% O_2	60	9.6
SO_2	ppmvd @ 7% O_2	26	5.3

IDI unit @ 85% load

IDI Unit					
Pollutant	MMMM Limit		NBCUA Result		% of limit
Cd	0.0016	mg/dscm@7%O2	9.20E-04	PASS*	58%
CO	64	ppmvd/dscm@7%O2	1.991	PASS	3%
HCl	0.51	ppmvd/dscm@7%O2	0.100	PASS	20%
Hg	0.037	mg/dscm@7%O2	7.44E-02	FAIL	201%
NOx	150	ppmvd/dscm@7%O2	43.765	PASS	29%
Pb	0.0074	mg/dscm@7%O2	2.02E-03	PASS	27%
CDD/CDF TEQ	0.1	ng/dscm@7%O2	6.42E-03	PASS	6%
CCD/CDF TMB	1.2	ng/dscm@7%O2	1.20E-01	PASS	10%
PM	18	mg/dscm@7%O2	1.477	PASS	8%
SO2	15	ppmvd/dscm@7%O2	1.327	Pass	9%

Niro Unit @110% load

NIRO Unit					
Pollutant	MMMM Limit		NBCUA Result		% of limit
Cd	0.0016	mg/dscm@7%O2	3.44E-04	PASS	22%
CO	64	ppmvd/dscm@7%O2	4.52	PASS	7%
HCl	0.51	ppmvd/dscm@7%O2	0.061	PASS	12%
Hg	0.037	mg/dscm@7%O2	9.52E-02	FAIL	257%
NOx	150	ppmvd/dscm@7%O2	16.69	PASS	11%
Pb	0.0074	mg/dscm@7%O2	5.40E-03	PASS	73%
CDD/CDF TEQ	0.1	ng/dscm@7%O2	3.17E-03	PASS	3%
CDD/CDF TEQ	0.1	ng/dscm@7%O2	2.64E-03	PASS	3%
CCD/CDF TMB	1.2	ng/dscm@7%O2	9.46E-02	PASS	8%
PM	18	mg/dscm@7%O2	12.03	PASS	67%
SO2	15	ppmvd/dscm@7%O2	28.97	FAIL	193%

Mercury (Hg) Concentration in Sludge

- Limit: 5.00 mg/dry-Kg of sludge (ppm)

- Average during 2010 (IDI) stack test: 0.791 ppm
- Average during 2012 (Niro) stack test: 0.460 ppm

- 2012 monthly composites:

  Minimum: 0.27 ppm (March)

  Average: 0.47 ppm

  Maximum: 1.06 ppm (January)

SLUDGE DISPOSAL OPTIONS

- Dewater (20% - 25% Solids) and Truck Off-Site
  - 20 Tons/Day Dry Solids
  - 25,000 Tons/Year Dewatered Cake
  - Estimated Disposal Cost - $2.5 million per year

- Retrofit Carbon Absorption System
  - Estimated Capital Cost - $5 to $6 million
  - Estimated Debt Service - $300,000 per year

Activated Carbon

- Extremely porous with very large surface area available for adsorption and/or chemical reactions.

- Sulfur Impregnated

- Mercury Sulfide (HgS)

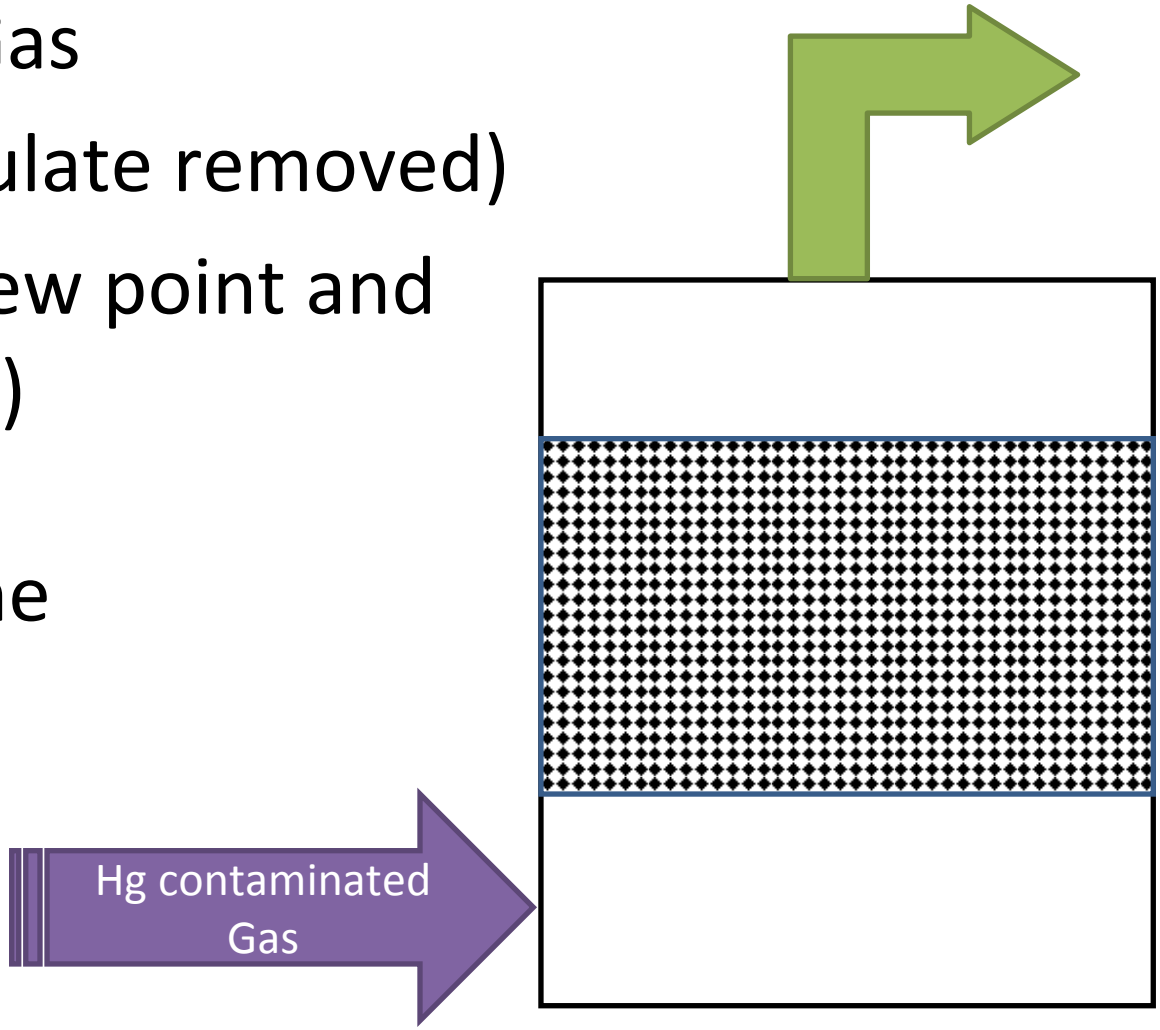
Adsorption of Hg onto Carbon

Conditioned Gas

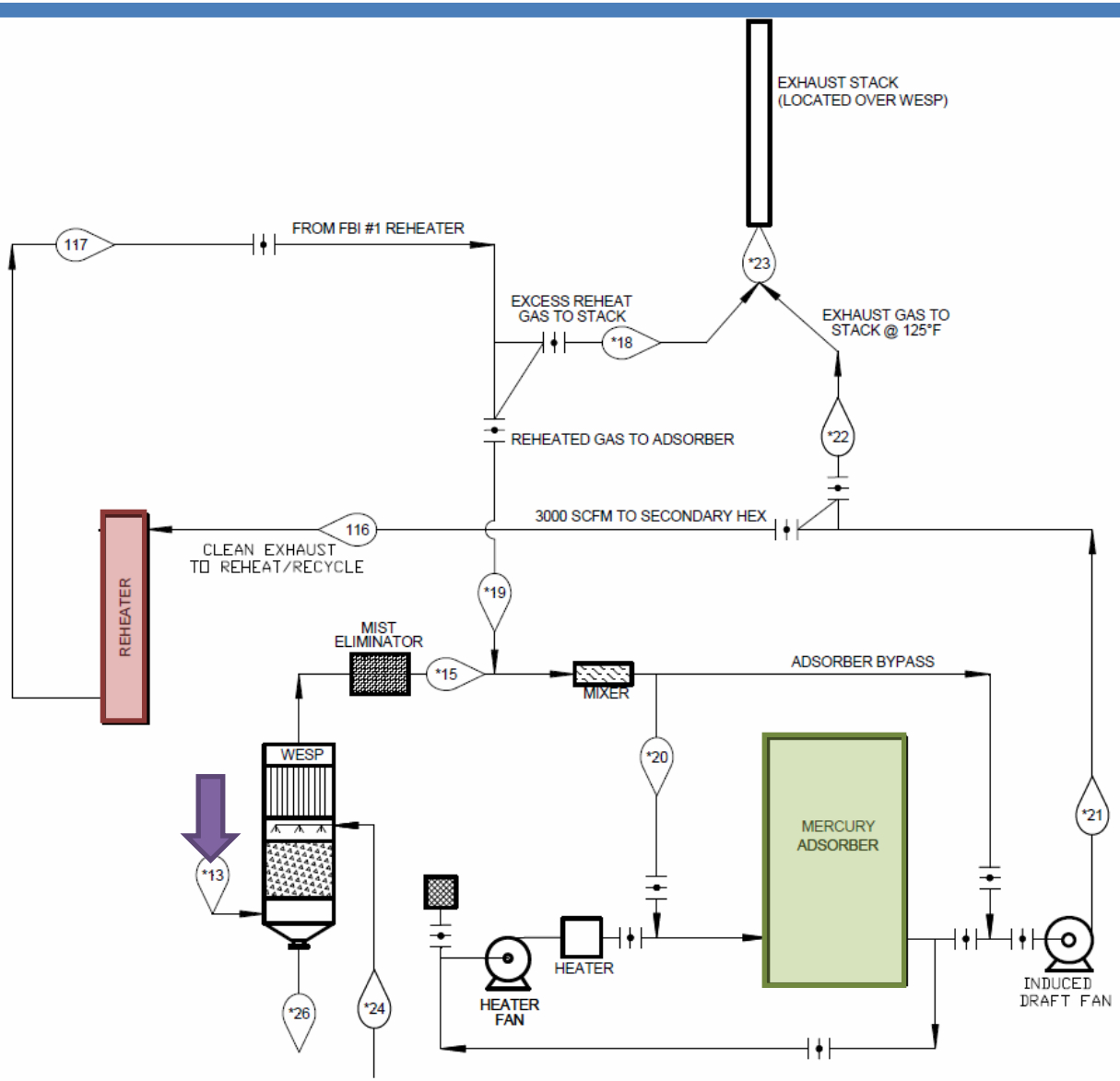
- Clean (particulate removed)
- Dry (above dew point and droplet free)

Residence Time

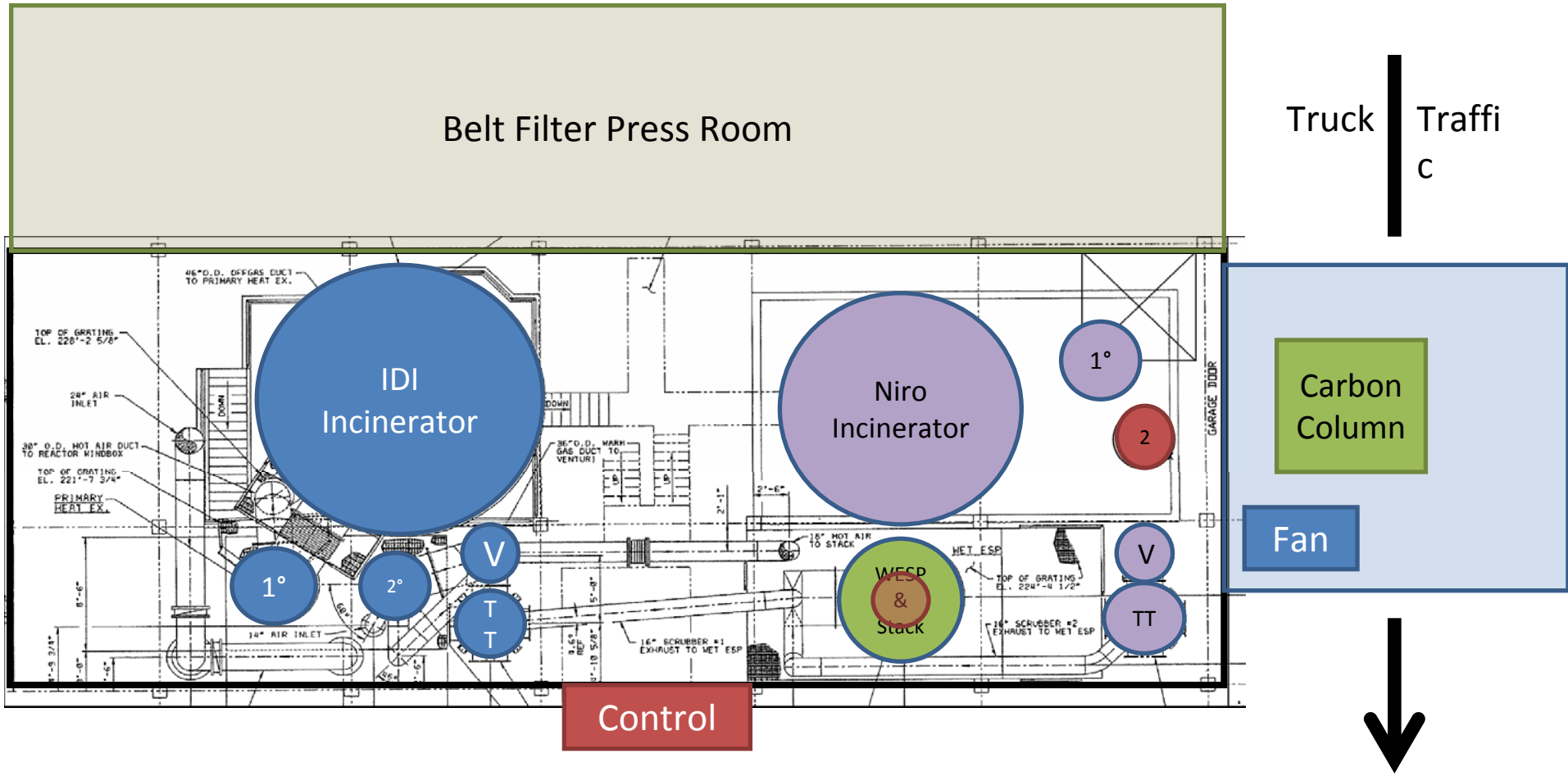
- 2-5 seconds



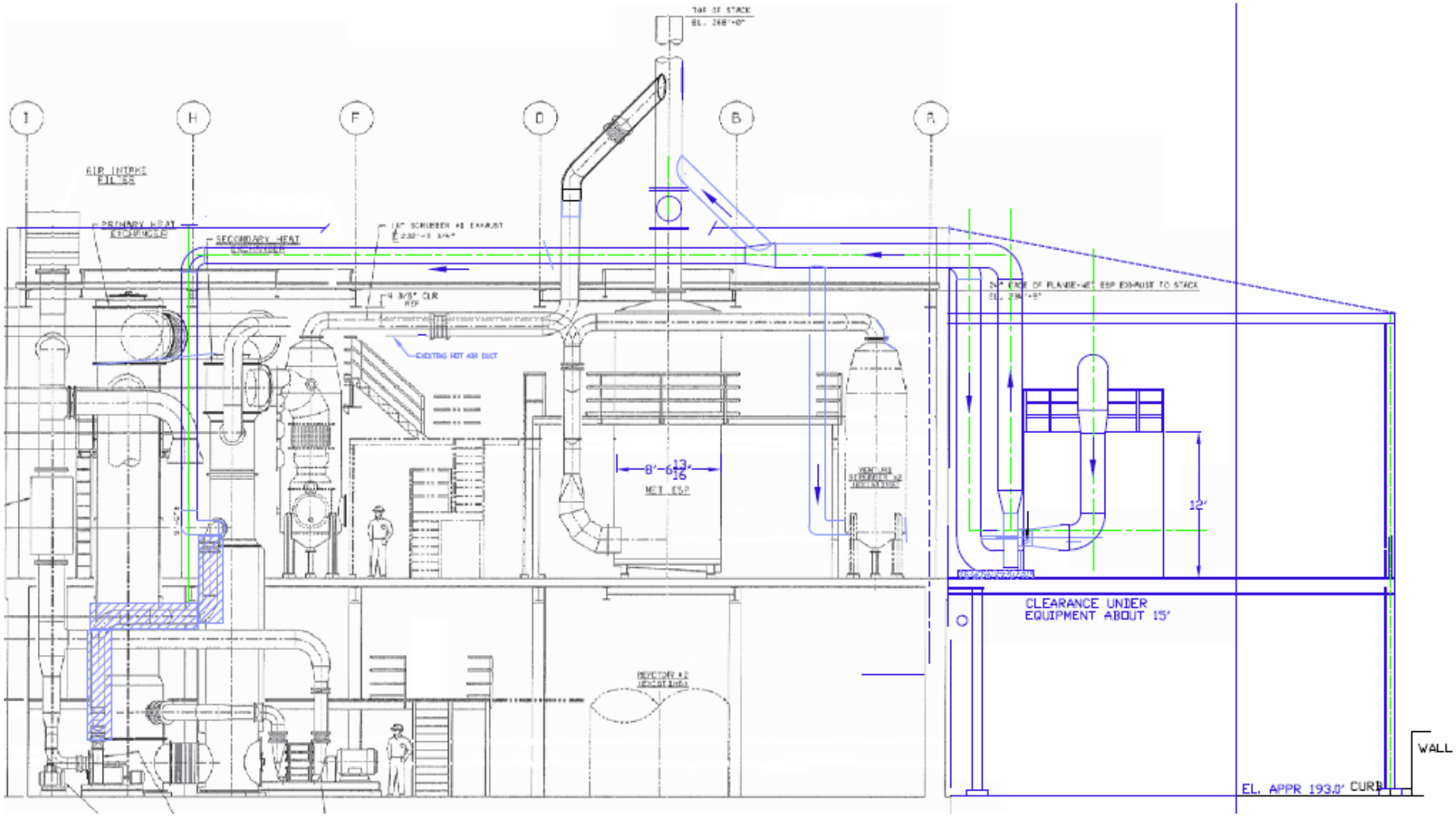
Hg Control: Carbon Column



Incinerator Room: Added Column



Carbon Column: Elevation View



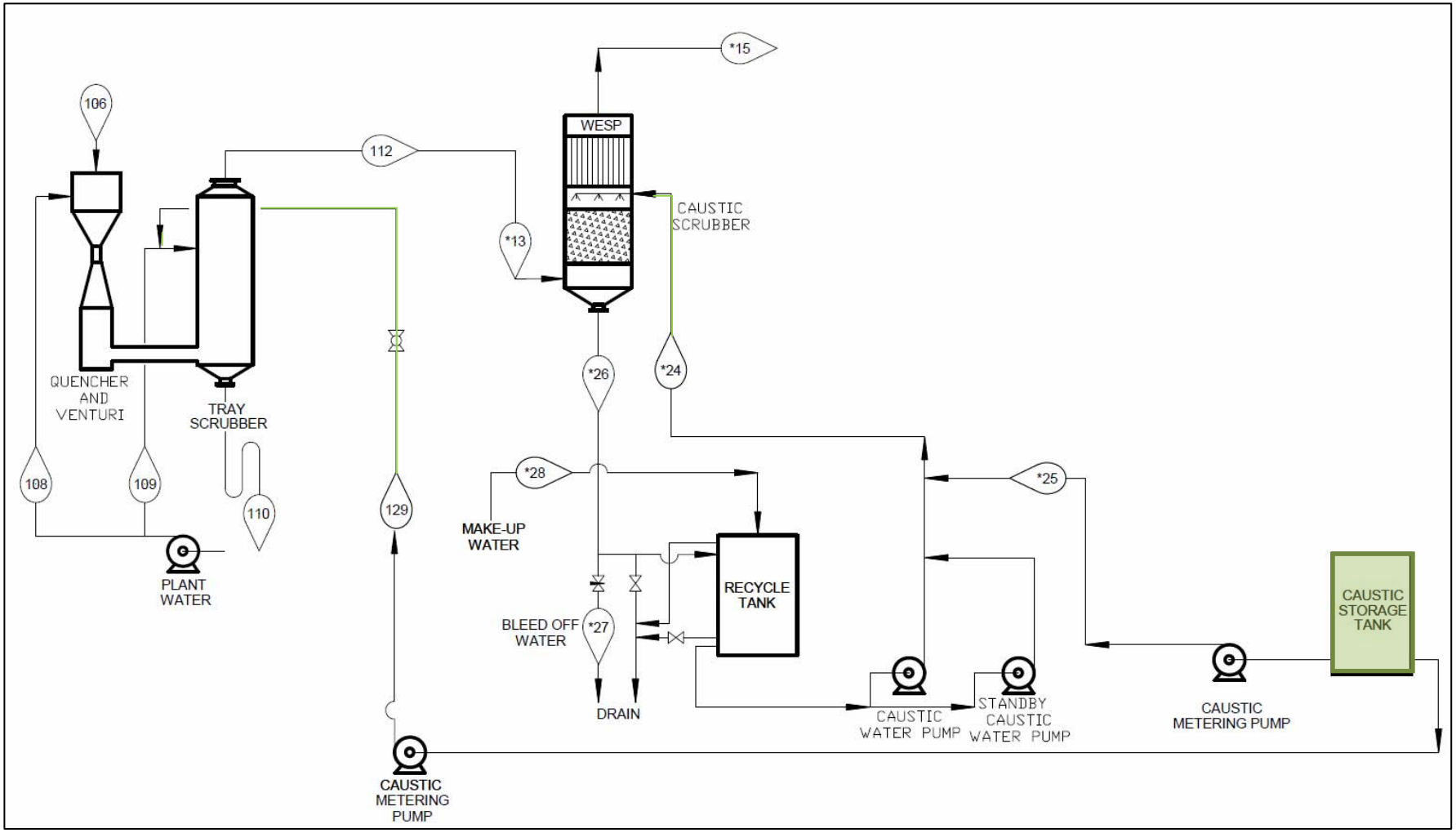
Column Location: Lower Road

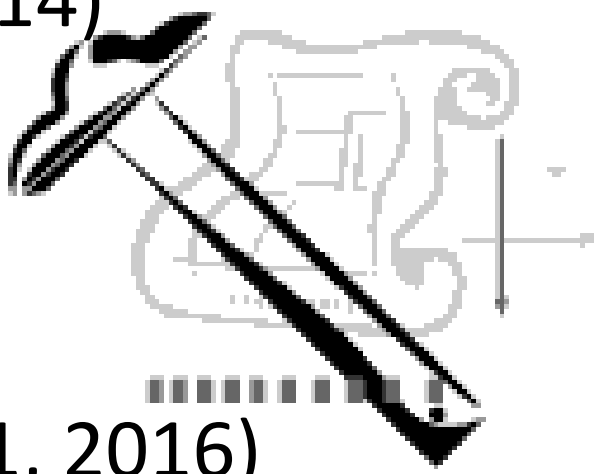
Increased SO_2 & HCl Control

- Currently have wet scrubbers
  - Venturi
  - Tray Tower
  - Packed Column

- Adding Caustic to neutralize acid gas and increase scrubber absorption efficiency
- Recycle stream to conserve caustic

SO2 Control: Caustic System



What's Next

- NJEIFP Loan (SFY2015)
  - Letter of Intent (October 7, 2013)
  - Plans and Specs (March 5, 2014)
- Title V application (March 21, 2014)
  - Permit shield (December, 2013)
- Construction (2015)
- Compliance Testing (by March 21, 2016)