Tampa Electric Company - Big Bend Station
Temporary Request to Transload Limestone
Title V Permit Number 0570039-067-AV
Facility ID No. 0570039

Professional Engineer Certification

1. Professional Engineer Name: Robert A. Velasco, P.E.
   Registration Number: 57190
2. Professional Engineer Address...
   Organization/Firm: Tampa Electric Company
   Street Address: P.O. Box 111
   City: Tampa State: FL Zip Code: 33601
3. Professional Engineer Telephone Numbers...
   Telephone: (813) 228 - 4232 Fax: (813) 228 - 1308
4. Professional Engineer E-mail Address: ravelasco@tecoenergy.com
5. Professional Engineer Statement:

   (1) Engineering information included herein is believed to be correct to the best of the Engineer's knowledge;

   (2) Engineering information is based on acceptable engineering techniques and professional standards;

   (3) Engineering opinions and information included herein provides reasonable assurance of meeting the requirements of Rule 62-4 F.A.C.;

   (4) Engineer is not responsible for subsequent deviations made by others without the written consent of the Engineer; and

   (5) This certification does not imply any guarantee or warranty.

Robert A. Velasco 2/9/2015
Signature/Date

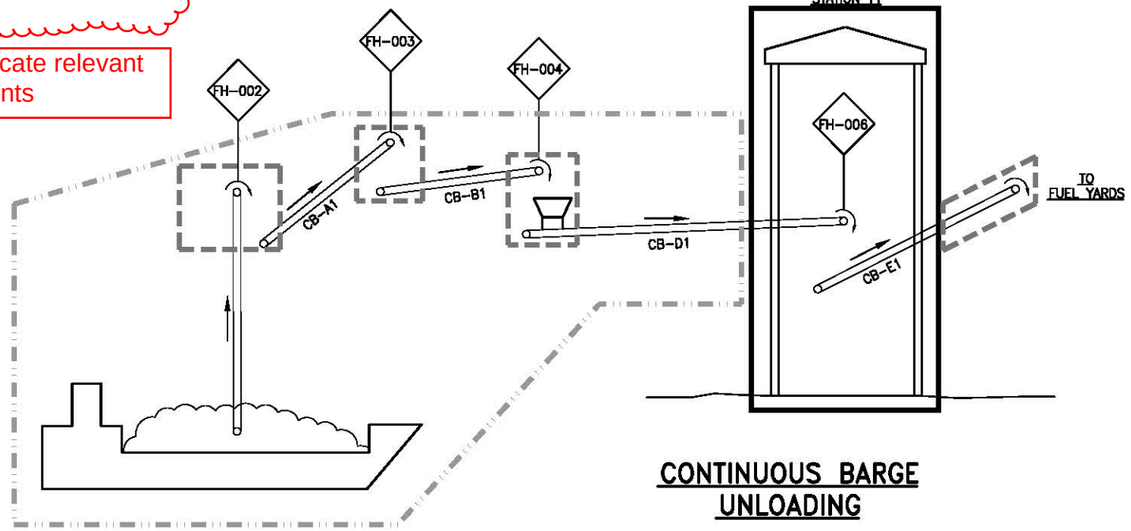
(seal)

Attachment A

Limestone Handling Process Flow Diagrams

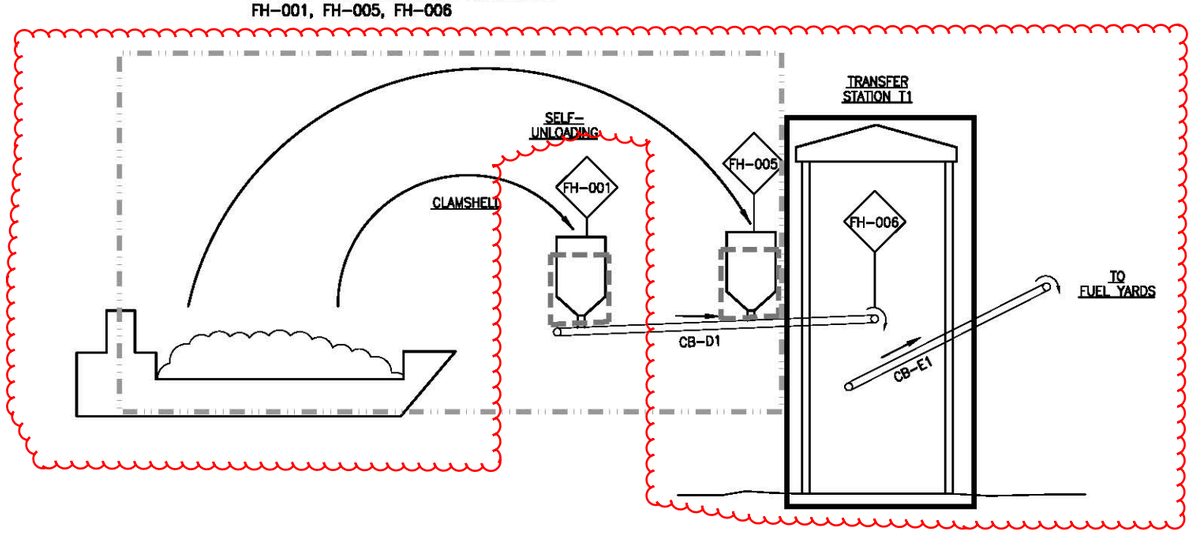
Bubble indicate relevant transfer points

EU-010: BARGE UNLOADING OPERATIONS
FH-002, FH-003, FH-004, FH-006



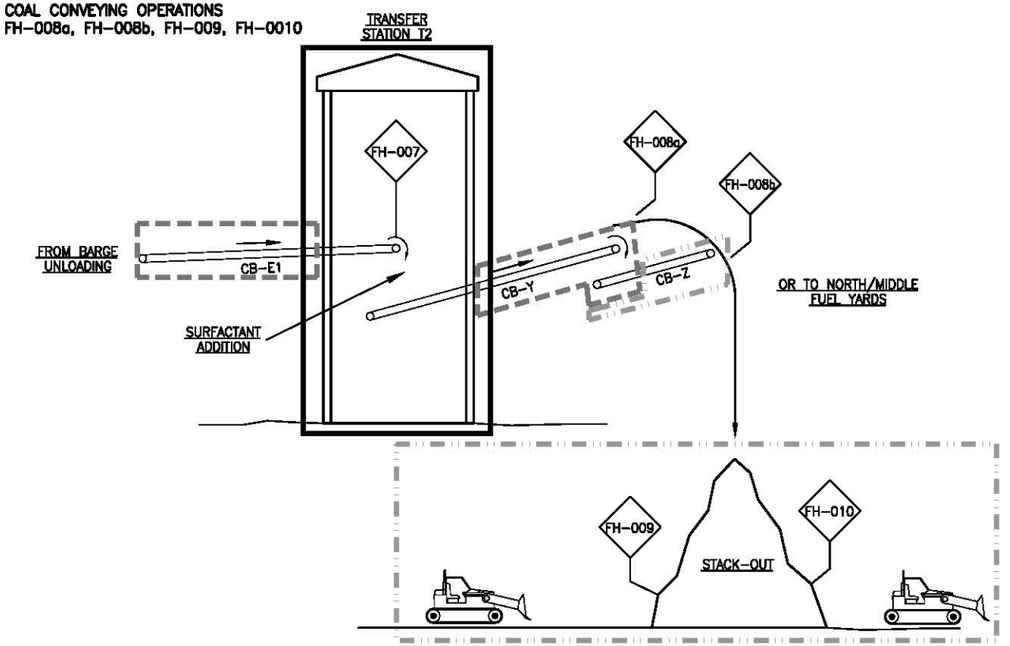
CONTINUOUS BARGE UNLOADING

EU-010: BARGE UNLOADING OPERATIONS
FH-001, FH-005, FH-006

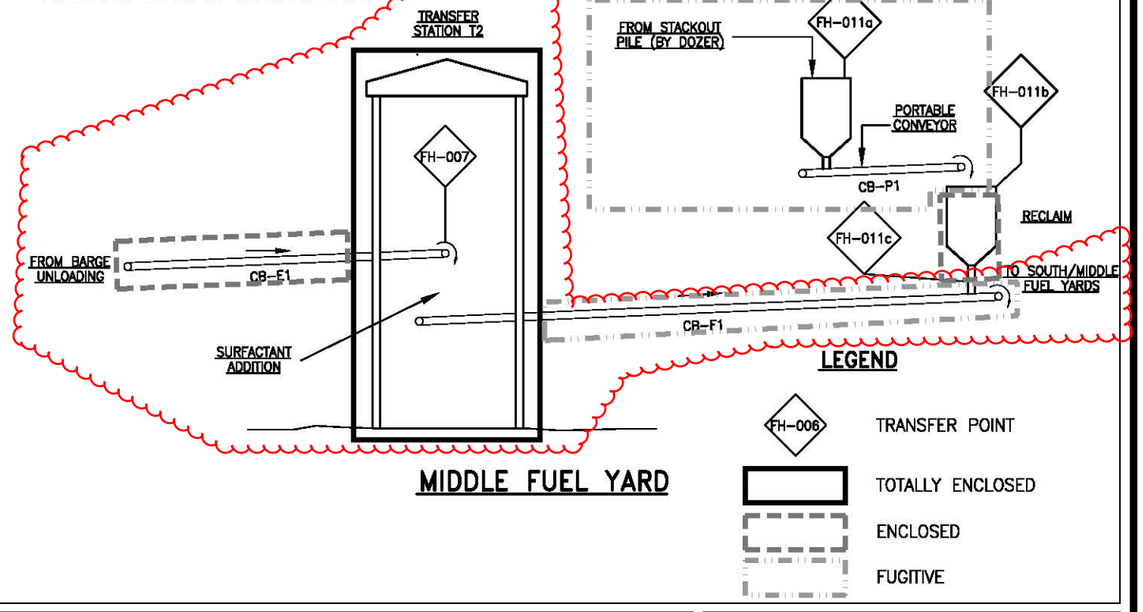


CLAMSHELL AND SELF-BARGE UNLOADING

EU-010: COAL CONVEYING OPERATIONS
FH-007, FH-008a, FH-008b, FH-009, FH-0010



EU-010: COAL CONVEYING OPERATIONS
FH-007, FH-0011a, FH-0011b, FH-0011c,



MIDDLE FUEL YARD

LEGEND

FH-006 TRANSFER POINT

TOTALLY ENCLOSED

ENCLOSED

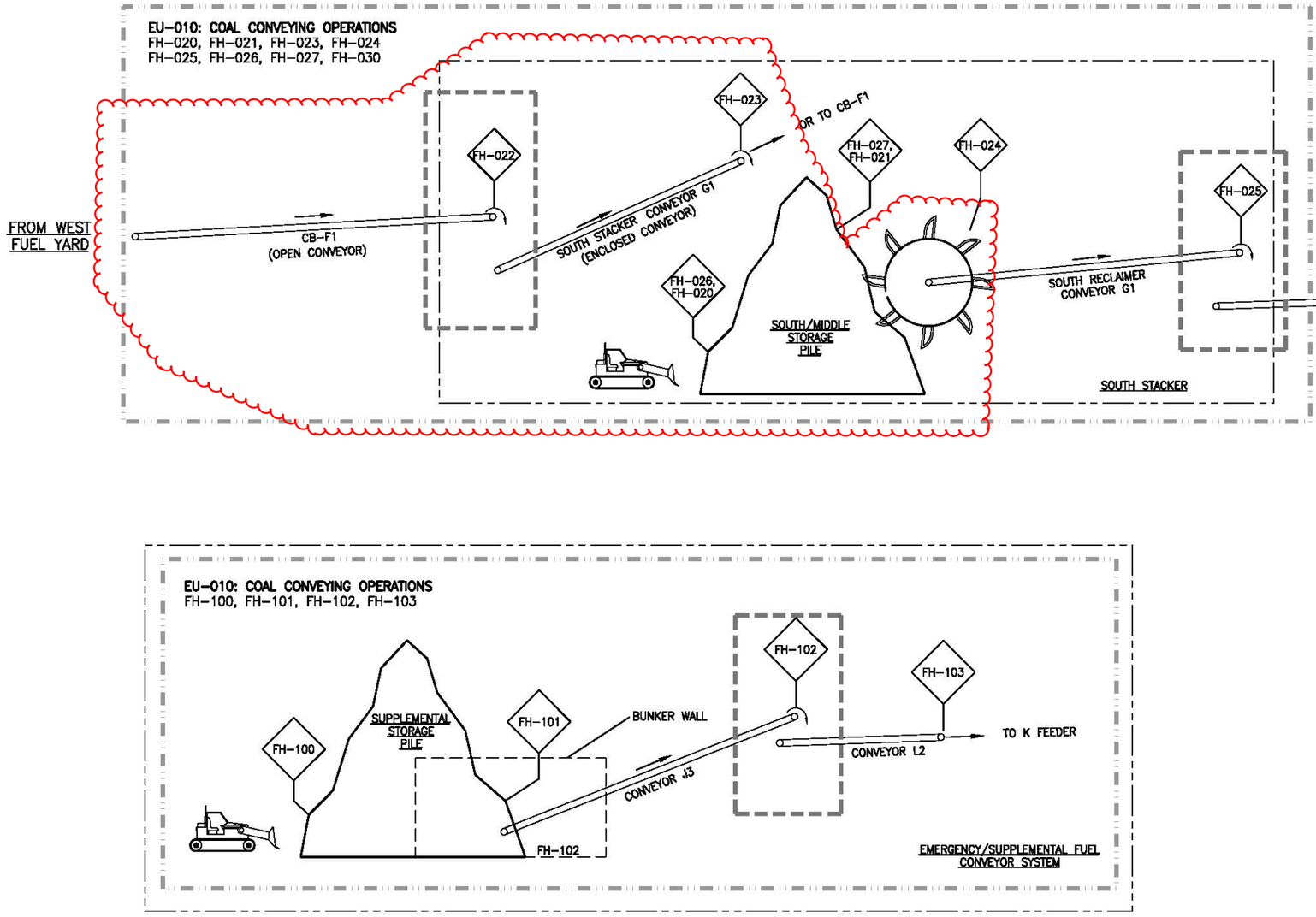
FUGITIVE

ATTACHMENT B1.

FUEL HANDLING PROCESS FLOW SCHEMATIC, BARGE UNLOADING AND MIDDLE FUEL YARD

Sources: TEC, 2014; ECT, 2014.

TECO. TAMPA ELECTRIC



LEGEND

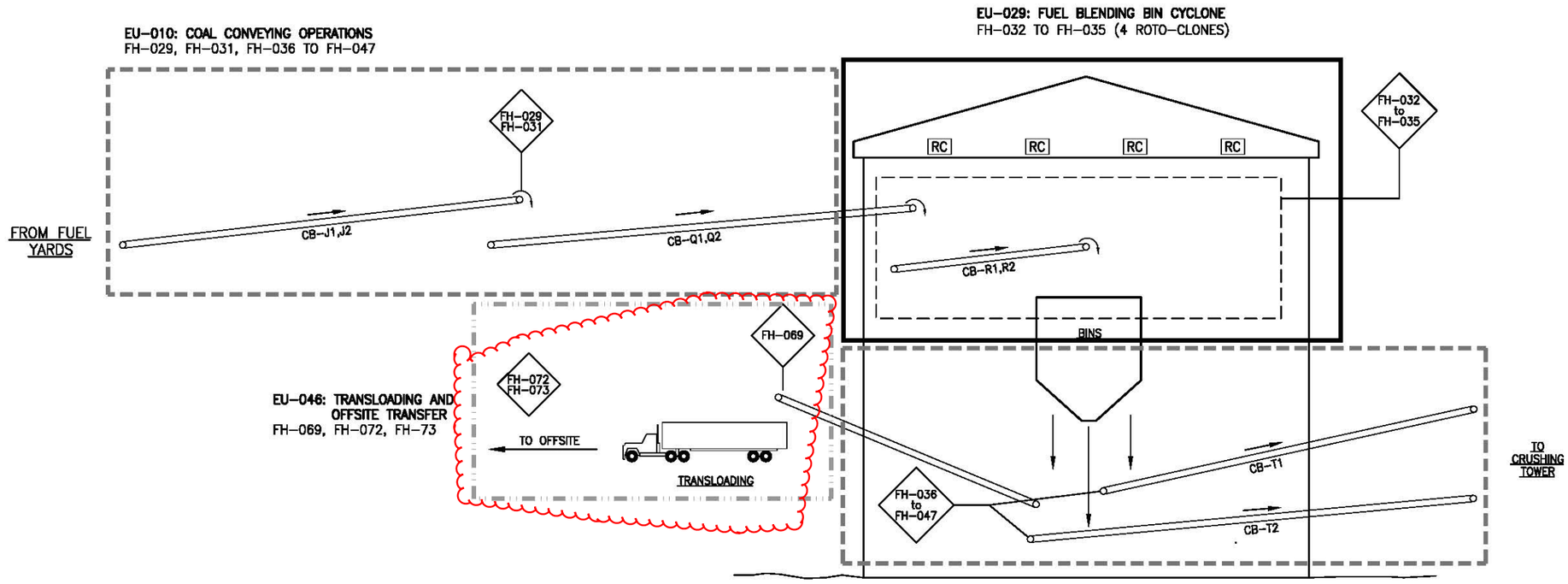
- FH-022 — TRANSFER POINT
- TOTALLY ENCLOSED
- ENCLOSED
- FUGITIVE

ATTACHMENT B3.

FUEL HANDLING PROCESS FLOW DIAGRAM, SOUTH/MIDDLE FUEL YARD

Sources: TEC, 2014; ECT, 2014.

TECO. TAMPA ELECTRIC



BLENDING BINS

LEGEND

- FH-069 — TRANSFER POINT
- TOTALLY ENCLOSED
- ENCLOSED
- FUGITIVE

ATTACHMENT B4.

FUEL HANDLING PROCESS FLOW DIAGRAM, BLENDING BINS

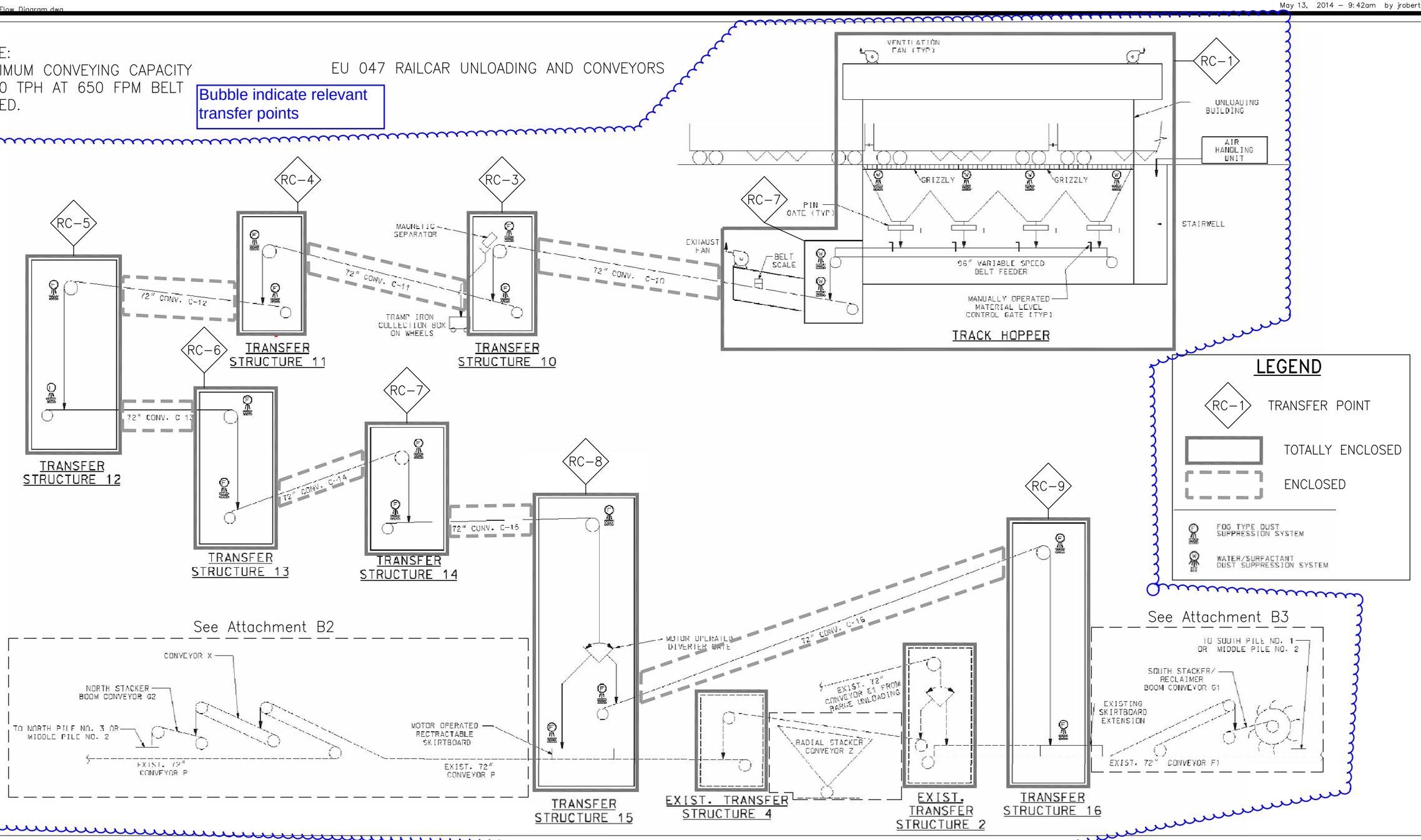
Sources: TEC, 2014; ECT, 2014.

TECO. TAMPA ELECTRIC

NOTE:
MAXIMUM CONVEYING CAPACITY 4400 TPH AT 650 FPM BELT SPEED.

Bubble indicate relevant transfer points

EU 047 RAILCAR UNLOADING AND CONVEYORS



ATTACHMENT B11.

FLOW DIAGRAM

BOTTOM DUMP RAIL CAR UNLOADING AND COAL CONVEYING SYSTEM

Sources: TEC, 2014; ECT, 2014.

TECO
TAMPA ELECTRIC

Attachment B

Limestone Handling Emission Calculations

Tampa Electric Company
Big Bend Station - PTE Calculations
Limestone Handling PM/PM_{10} Emission Estimates

Emission Source	Emission Source	PTE	
		PM (tpy)	PM_{10} (tpy)
Transfer Points	AP-42 (Table 13.2.4; 1/95)	3.0	1.4
Storage Pile Wind Erosion	AP-42 (Table 13.2.5; 1/95)	0.086	0.043
Loader Operations	AP-42 (Table 13.2.2; 9/98)	0.15	0.032
Truck Traffic	AP-42 (Table 13.2.2; 9/98)	1.1	0.24
Totals		**4.4**	**1.7**

* The emission increases represented in this table are from the increased use of the fuel yard/railcar conveyors to transfer and store limestone. The limestone will be unloaded from the barge/railcar and conveyed to the storage pile by the existing fuel yard/rail car conveyors. Once the limestone is in the storage pile, it will then be loaded into trucks and transported to the limestone unloading area. Once the limestone arrives by truck to the unloading area, the limestone handling process will resume as currently permitted.

Emission Estimation Algorithm

$$E = k \times 0.0032 \times [(U / 5)^{1.3} / (M / 2)^{1.4}] \times TR \times [(1 - (CE / 100)] \times (1 \text{ ton} / 2{,}000 \text{ lb})$$

E = PM/PM_{10} emission rate; tons per year (tpy)
k = particle size multiplier; dimensionless
U = mean wind speed, miles per hour (mph)
M = moisture content; weight percent (%)
TR = transfer rate; tons per year (tpy)
CE = control efficiency; percent (%)

Source: Section 13.2.4.3, Eqn. (1), AP-42, November 2006.

Estimation Variable Constants		
k (PM)	**0.74**	
k (PM_{10})	**0.35**	
U	**10.00**	**mph**
M	**1.00**	**%**
TR (Limestone Handling)	**105,000**	**tpy**

Transfer Point	Emission Point ID	Control Efficiency (%)	Annual Throughput (tpy)	PTE PM (tpy)	PTE PM_{10} (tpy)
Barge Clamshell to Conveyor D1[¥]	FH-001	25	105,000	0.606	0.287
Self-Unloading Barge to Conveyor D1	FH-005	100	105,000	0.000	0.000
Conveyor D1 to Conveyor E1	FH-006	100	105,000	0.000	0.000
Conveyor E1 to Conveyor F1	FH-007	100	105,000	0.000	0.000
Conveyor F1 to South Stacker Conveyor (G1)	FH-022	0	105,000	0.808	0.382
Conveyor G1 to South Storage Pile	FH-023	0	105,000	0.808	0.382
Train Car Drop Unloading to Belt Feeder BF-1	RC-1	100	105,000	0.000	0.000
Transfer from BF-1 to Conveyor C-10	RC-2	100	105,000	0.000	0.000
Conveyor C-10 to Conveyor C-11	RC-3	100	105,000	0.000	0.000
Conveyor C-11 to Conveyor C-12	RC-4	100	105,000	0.000	0.000
Conveyor C-12 to Conveyor C-13	RC-5	100	105,000	0.000	0.000
Conveyor C-13 to Conveyor C-14	RC-6	100	105,000	0.000	0.000
Conveyor C-14 to Conveyor C-15	RC-7	100	105,000	0.000	0.000
Conveyor C-15 to Conveyor C-16	RC-8	100	105,000	0.000	0.000
Conveyor C-16 Drop to Conveyor F1[+]	RC-9	0	105,000	0.808	0.382
			Totals	**3.029**	**1.433**

* The existing fuel yard/railcar conveyors will be used to transfer the limestone from the barge to the South Storage pile where it will be loaded into trucks and transported to the existing limestone unlaoding area.
[¥] Control efficieny of 25% used for hopper with four sides.
[+] The transfer points following RC-9 will continue with FH-022 to FH-023. The emissions were calculated once to avoid double counting.

Emission Estimation Algorithm

$E = k \times (\text{Summation of } P_i, \text{ for } i = 1 \text{ to } N) \times S \times [(1 - (CE / 100)] \times (1 \text{ ton} / 907{,}184.7 \text{ gram})$

$P = [58 \times (u^* - u_t^*)^2] + [25 \times (u^* - u_t^*)]$

E = PM/PM_{10} emission rate; tons per year (tpy)
k = particle size multiplier; dimensionless
P = erosion potential, grams per square meter (g/m^2)
N = number of disturbances per year
S = exposed surface area, square meters (m^2)
CE = control efficiency; percent
u* = friction velocity, meters per second (m/s)
u_t* = threshold friction velocity, meters per second (m/s)

Source: Section 13.2.5.3, Eqn. (3), AP-42, November 2006.

Estimation Variable Constants		
k (PM)	**1.00**	
k (PM_{10})	**0.50**	
u_t*	**1.12**	**m/s**
CE	**90.0**	**%**

Storage Pile	Emission Point ID	Met. Period	Friction Velocity- u* (m/s)	Erosion Potential - P (g/m^2)	Affected Area - S (m^2)	PTE PM (ton/yr)	PTE PM_{10} (ton/yr)
South Storage Pile (Limestone Storage)	FH-027	14	1.30	6.38	0.0	0.00000	0.00000
		30	1.13	0.26	0.0	0.00000	0.00000
		37	1.33	7.81	0.0	0.00000	0.00000
		65	1.48	16.52	0.0	0.00000	0.00000
		65	1.80	43.82	17,800.0	0.08598	0.04299
		77	1.30	6.38	0.0	0.00000	0.00000
		90	1.33	7.81	0.0	0.00000	0.00000
					Totals	**0.086**	**0.043**

* Surface area of pile calculated based on a crushed limestone density of 90 lb/ft3. The total limestone storage was assumed to be stored during the worst case time of the year when the erosion potential was the greatest. This is representative of a worst case scenario.

Emission Estimation Algorithm

$$E = k \times (s / 12)^a \times (W / 3)^b \times [(365-P)/365] \text{ VMT} \times [(1 - (CE / 100)] \times (1 \text{ ton} / 2{,}000 \text{ lb})$$

E = PM/PM_{10} emission rate; tons per year (tpy)
k = empirical constant; dimensionless
s = surface material silt content; percent (%)
a = empirical constant; dimensionless
W = mean vehicle weight; tons
b = empirical constant; dimensionless
P = days of rain >0.01 in. during year
VMT = vehicle miles traveled; miles/year (mi/yr)
CE = control efficiency; percent

Source: Section 13.2.2.2, Eqn. (1a), AP-42, November 2006.

Estimation Variable Constants		
k (PM)	**4.9**	
k (PM_{10})	**1.5**	
s	**1.6**	**%**
a (PM)	**0.7**	
a (PM_{10})	**0.9**	
W	**48.0**	**tons**
b (PM)	**0.45**	
b (PM_{10})	**0.45**	
P	**107.0**	
CE	**90.0**	**%**

	Emission Point ID	VMT (mi/yr)	PTE PM (ton/yr)	PTE PM_{10} (ton/yr)
Loader Reclaim from Storage Pile to Loadout	FH-064	1,050	0.15	0.03
		Totals	**0.155**	**0.032**

*Assumed the loader could move 5 tons per move and the greatest travel length for shaping the pile would be 0.05 miles. This represents worst case scenario.

Emission Estimation Algorithm

$$E = k \times (s / 12)^a \times (W / 3)^b \times [(365-P)/365] \text{ VMT} \times [(1 - (CE / 100)] \times (1 \text{ ton} / 2{,}000 \text{ lb})$$

E = PM/PM_{10} emission rate; tons per year (tpy)
k = empirical constant; dimensionless
s = surface material silt content; percent (%)
a = empirical constant; dimensionless
W = mean vehicle weight; tons
b = empirical constant; dimensionless
M = surface material moisture content; weight percent (%)
c = empirical constant; dimensionless
P = days of rain >0.01 in. during year
VMT = vehicle miles traveled; miles/year (mi/yr)
CE = control efficiency; percent

Source: Section 13.2.2.2, Eqn. (1a), AP-42, November 2006.

Estimation Variable Constants		
k (PM)	**10.0**	
k (PM_{10})	**2.6**	
s	**1.6**	**%**
a (PM)	**0.8**	
a (PM_{10})	**0.8**	
W (full)	**45.0**	**tons**
W (empty)	**20.0**	**tons**
b (PM)	**0.5**	
b (PM_{10})	**0.4**	
P	**107.0**	
CE	**90.0**	**%**

	Emission Point ID	VMT (mi/yr)	PYE PM (ton/yr)	PYE PM_{10} (ton/yr)
Truck Traffic (Limestone), Full	FH-072	2,520	0.69	0.14
Truck Traffic (Limestone), Empty	FH-073	2,520	0.46	0.10
		Totals	**1.147**	**0.235**

* From the South Storage pile to the limestone unloading area is approximately 0.6 miles.