ATTACHMENT 1

So, the particulate emissions (E_T) from the transfer points of the process are calculated using the equation $E_T = P \times EF_T \times TP$:

$$E_{T\text{-ave}} = 1800 \text{ ton/hr} \times 0.003 \text{ lb/ton} \times 8 \text{ transfer points}$$
$$= 43.2 \text{ lb/hr}$$

$$E_{T\text{-max}} = 2000 \text{ ton/hr} \times 0.003 \text{ lb/ton} \times 8 \text{ transfer points}$$
$$= 48 \text{ lb/hr}$$

= 6 lb/hr from each transfer point

Further, particulate emissions will be generated from wind erosion of the storage piles. These emissions are calculated using a calculated emission factor (EF_S) from AP-42 13.2.4. Therefore the EFs is calculated using the following equation:

$$EF_S = k(0.0032)x \frac{(U/5)^{1.3}}{(M/2)^{1.4}}$$
$$= 0.0074 \text{ lb/ton}$$

where:

EF_S	= emission factor (lb/ton)		
k	= particle size multiplier (dimensionless)	= 0.35	(AP-42 for particle size < 10 micrometer)
U	= mean wind speed, miles per hour [mph]	= 6.9	annual average from NOAA for Knoxville, TN
M	= material moisture content (%)	= 0.7	Average based on AP-42 Table 13.2.4-1 Typical Silt and Moisture Content Values of Materials At Various Industries for Limestone at stone quarrying and processing

Therefore, the particulate emissions (E_S) from wind erosion of the storage piles are calculated using the equation $E_S = P \times EF_S$:

$$E_{S\text{-ave}} = 1800 \text{ ton/hr} \times 0.00740228109303794 \text{ lb/ton}$$
$$= 13.324106 \text{ lb/hr}$$

$$E_{S\text{-max}} = 2000 \text{ ton/hr} \times 0.00740228109303794 \text{ lb/ton}$$
$$= 14.804562 \text{ lb/hr}$$

So, the total particulate emissions (E) for the whole process are $E_L + E_T + E_S$:

$$E_{ave} = 0.54 \text{ lb/hr} + 43.2 \text{ lb/hr} + 13.3241059674683 \text{ lb/hr}$$
$$= 57.064106 \text{ lb/hr}$$

$$E_{max} = 0.6 \text{ lb/hr} + 48 \text{ lb/hr} + 14.8045621860759 \text{ lb/hr}$$
$$= 63.404562 \text{ lb/hr}$$

Rail Loadout Structure Particulate Matter Calculations
O&N Minerals
Luttrell, TN

A rail loadout structure will be constructed for crushed limestone. The total emissions for the loadout structure are determined from the hourly throughput of crushed limestone, the number of transfer points, emission factors based on pollutant emissions mass per throughput (lb/ton), and the number of hours of operation.

The annual throughput of the loadout structure is limited by the number of rail cars which can be emptied and the amount of crushed limestone produced. This process will be intermittent, as this is an ancillary product. This system does not allow for the main processing plant to operate and produce our primary product simultaneous with the rail loadout process. Therefore, throughput will be restricted to the following tonnage: the average hourly throughput (P_{ave}) is approximately 1,800 tons per hour, operating for 4 hours per day, 1.25 days per week, for 52 weeks. The maximum hourly throughput (P_{max}) is 2,000 tons/hr.

P_{ave} = 1,800 ton/hr
P_{max} = 2,000 ton/hr

According to Air and Waste Assosiation, Air Pollution Engineering Manual, p. 784, the emission factor (EF_L) for unloading crushed limestone into the rail car is:

EF_L = 0.0003 lb/ton

So, the particulate emissions (E_L) from the unloading portion of the process are calculated using the equation $E_L = P \times EF_L$:

$E_{L\text{-}ave}$ = 1800 ton/hr × 0.0003 lb/ton
= 0.54 lb/hr

$E_{L\text{-}max}$ = 2000 ton/hr × 0.0003 lb/ton
= 0.6 lb/hr

The operation will be limited by the number of transfer points in the process (TP) (please refer to the flow diagram):

TP = 8 transfer points

According to AP-42 11.19.2, the emission factor (EF_T) for crushed limestone transfer points is:

EF_T = 0.0030 lb/ton

The normal operating schedule of the rail loadout facility will be 4 hours per day for 1.25 days per week for 52 weeks/year. Therefore, the annual operation hours (H) will be:

H = 260 hr/yr

Therefore, the annual emissions (E_{annual}) will be:

$E_{annual\ -ave}$ = 57.0641059674683 lb/hr × 260 hr/yr ✓
= 14836.67 lb/yr
= 7.42 tons/yr

$E_{annual\ -max}$ = 63.4045621860759 lb/hr × 260 hr/yr ✓
= 16485.19 lb/yr
= 8.24 tons/yr

A/L dated June 26, 2008

Op Hours: 300 hrs/yr for conveyors V107RCL, 002RCL } 3 Transfer Points

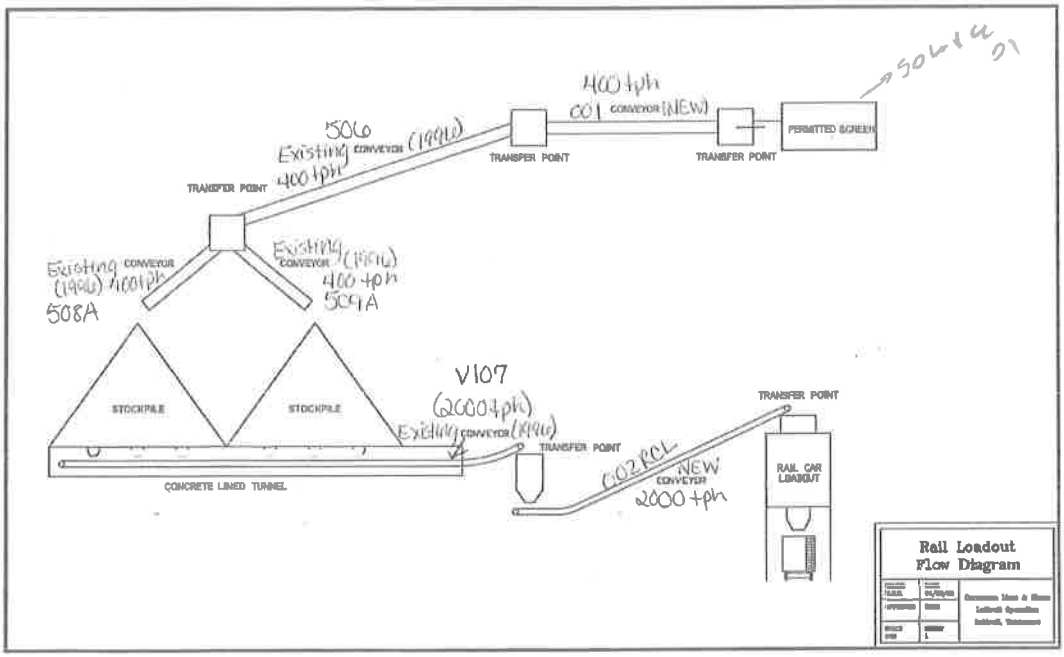
" " 4500 hrs/yr " " 5 Transfer Points { 001RCL, 506RCL, 508ARCL, 509ARCL

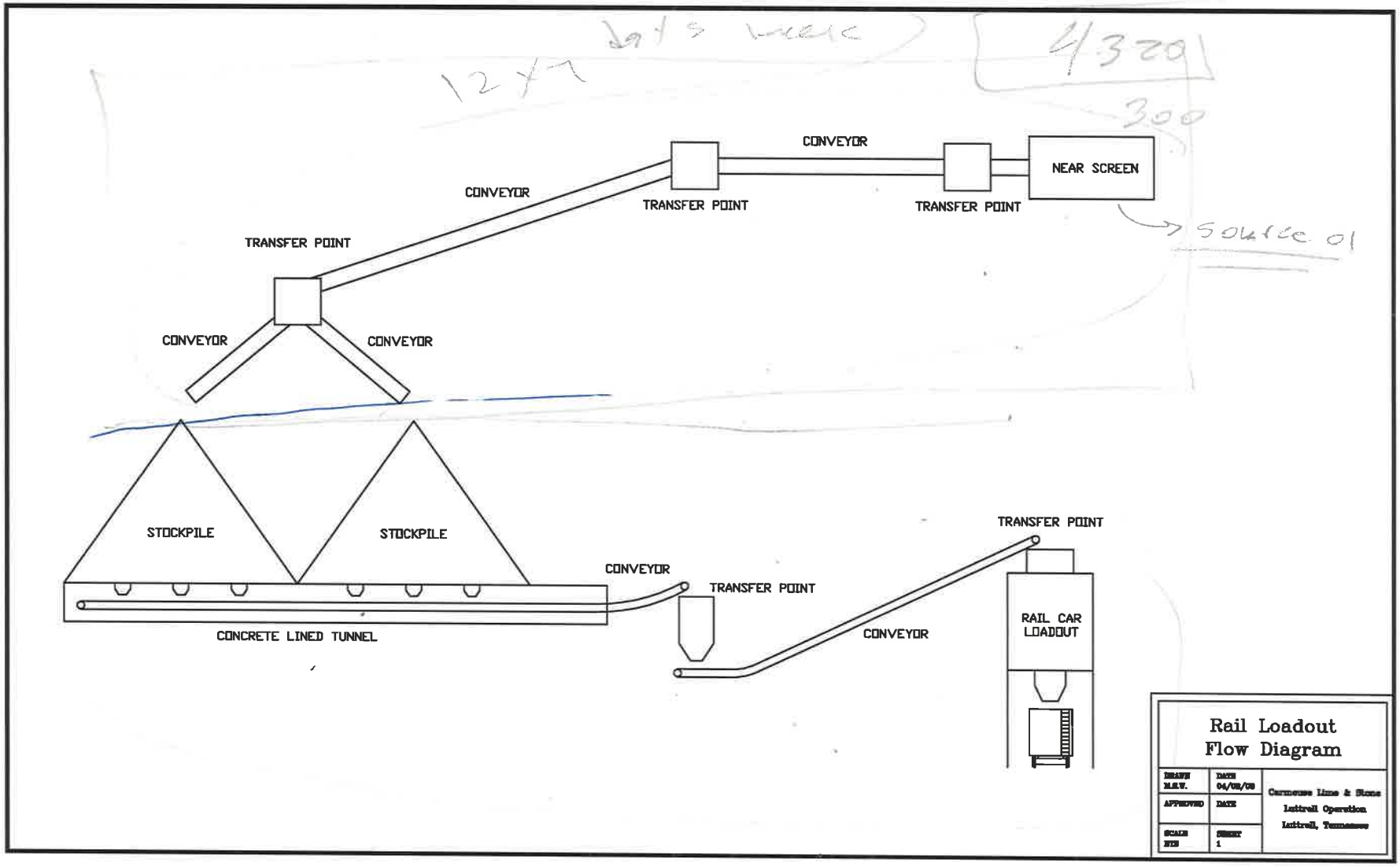
$E_L + E_T + E_S$: emissions from Transfer Points

Fugitive TSP max = (0.6 lb/hr + 6 × 3 lbs/hr + 14.81 lbs/hr) × 300/2000

+ (0.6 + 6 × 5 × 14.81) × 4500/2000 = 5.0 TPY + 10.9 TPY

= 114 TPY


400 tph
C01 CONVEYOR (NEW)
PERMITTED SCREEN
506
Existing CONVEYOR (1994)
400 tph
TRANSFER POINT
TRANSFER POINT
TRANSFER POINT
Existing CONVEYOR (1994) 400 tph
508A
Existing CONVEYOR (1994)
400 tph
509A
V107
(2000 tph)
STOCKPILE
STOCKPILE
Existing CONVEYOR (1994)
TRANSFER POINT
TRANSFER POINT
C02 RCL
NEW CONVEYOR
2000 tph
RAIL CAR LOADOUT
CONCRETE LINED TUNNEL
Rail Loadout Flow Diagram


CONVEYOR
CONVEYOR
TRANSFER POINT
TRANSFER POINT
NEAR SCREEN
TRANSFER POINT
CONVEYOR
CONVEYOR
STOCKPILE
STOCKPILE
CONVEYOR
TRANSFER POINT
TRANSFER POINT
CONVEYOR
RAIL CAR LOADOUT
CONCRETE LINED TUNNEL
Rail Loadout Flow Diagram
DRAWN M.E.V.
DATE 04/08/08
APPROVED
DATE
SCALE NTS
SHEET 1
Carmeuse Lime & Stone
Luttrell Operation
Luttrell, Tennessee