AIR SCIENCES INC. DENVER • PORTLAND	ENGINEERING CALCULATIONS	PROJECT TITLE: Solvay Minerals Inc.	BY: E. Memon		
		PROJECT NO: 170-4	PAGE: 1	OF: 4	SHEET: 1
		SUBJECT: Calciners A and B Emissions	DATE: September 5, 2002		

CALCINERS A & B (SOURCE # 17)

SOURCE CHARACTERISTICS

	Units	Existing	Modified
Control Device		ESP	ESP
Exhaust Flow Rate	ACFM	312,000	650,000
Trona Feed Capacity	TPH	400	320
Thermal Capacity	MMBtu/hr	500	400
Operation Schedule	hrs/yr	8,760	8,760
Fuel Type		Natural Gas	Sub-bituminous Coal

POTENTIAL EMISSION DIFFERENCE (tpy)

Pollutant	Existing	Modified	Difference
PM_{10}	97.7	180.2	82.5
NOx	131.4	876.0	744.6
CO	6,675.1	5,532.7	-1,142.4
VOC	3,398.9	2,709.7	-689.2

EMISSION DIFFERENCE FOR COMPARISON TO MAJOR SOURCE TRIGGER THRESHOLDS (tpy)

Pollutant	Existing Actual [a]	Modified PTE	Difference
PM_{10}	32.4	180.2	147.8
NOx	49.2	876.0	826.8
CO	1,077.4	5,532.7	4,455.3
VOC	1,199.2	2,709.7	1,510.4

[a] *Average of years 2,000 and 2,001 actual emissions, as reported to WYDEQ*

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MODIFIED CONDITIONS
CALCINERS A & B (SOURCE # 17)

SOURCE CHARACTERISTICS

Furnace Type	Detroit Stoker Underthrow Fuel (Pneumatically Assisted) Spreader		
Control Device	ESP		
Exhaust Flow Rate	650,000	ACFM	Solvay
	240,000	DSCFM	Solvay
Trona Feed Capacity	320	TPH	Solvay
Thermal Capacity	400	MMBtu/hr	Solvay
Operation Schedule	8,760	hrs/yr	Solvay

FUEL DATA

Fuel Type	Sub-Bituminous Coal		Solvay
Heating Value	10,150	Btu/lb	Solvay
	20.3	MMBtu/ton	
Fuel Consumption	19.7	ton/hr	

$$\frac{400\ \text{MMBtu}}{\text{hr}} \cdot \frac{\text{ton}}{20.3\ \text{MMBtu}}$$

EMISSION FACTORS

Pollutant	Emission Factor		
PM_{10}	0.02	grain/DSCF	Manufacturer Guarantee for ESP

$$41.1\ \text{lb/hr} \quad \frac{0.02\ \text{grain}}{\text{DSCF}} \cdot \frac{240{,}000\ \text{DSCF}}{\text{min}} \cdot \frac{1\ \text{lb}}{7000\ \text{grain}} \cdot \frac{60\ \text{min}}{\text{hr}}$$

NOx	0.5	lb/MMBtu	Solvay/Manufacturer Guarantee
CO	5	lb/ton-coal	AP-42, Table 1.1-3 (Spreader Stoker)
	0.19	lb/MMBtu	AP-42, Table 1.1-3 (Based on 26 MMBtu/ton)
CO (process)	3.7	lb/ton-trona	See Calculations on Sheet 4
VOC (process)	1.9	lb/ton-trona	See Calculations on Sheet 4

POTENTIAL EMISSIONS

Pollutant	lb/hr	tpy
PM_{10}	41.1	180.2
NOx	200.0	876.0
CO	1,263.2	5,532.7
VOC	618.6	2,709.7

STACK PARAMETERS

Location	603,686	m East
	4,594,808	m North
Stack Height	55.02	m
Stack Diameter	3.66	m
Exhaust Temperature	463.7	^{o} K
Exhaust Velocity	29.2	m/s

Numbers in blue are entries, and black are calculations

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EXISTING CONDITIONS

CALCINERS A & B (SOURCE # 17)

SOURCE CHARACTERISTICS

Control Device	ESP		Permit 30-126
Exhaust Flow Rate	312,000	ACFM	Permit 30-126
Trona Feed Capacity	400	TPH	Permit 30-126
Thermal Capacity	500	MMBtu/hr	Permit 30-126
Operation Schedule	8,760	hrs/yr	

POTENTIAL EMISSIONS

Pollutant	lb/hr	tpy	
PM_{10}	22.3	97.7	Permit 30-126
SO_2	0.0	0.0	Permit 30-126
NOx	30.0	131.4	Permit 30-126
CO	1,524.0	6,675.1	Permit CT-1347
VOC	776.0	3,398.9	Permit CT-1347

ACTUAL EMISSIONS [a]

Pollutant	2000 tpy	2001 tpy	Average tpy
PM_{10}	40.2	24.5	32.4
NOx	64.5	33.9	49.2
CO	1,322.0	832.8	1,077.4
VOC	1,446.1	952.3	1,199.2

[a] *Provided by Solvay Minerals Inc. as reported to WYDEQ as per requirement of permit 30-126*

STACK PARAMETERS

Location	603,686	m East
	4,594,808	m North
Stack Height	55.02	m
Stack Diameter	3.66	m
Exhaust Temperature	463.7	^{o} K
Exhaust Velocity	13.41	m/s

Numbers in blue are entries, and black are calculations

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CALCULATIONS TO ESTIMATE CO AND VOC EMISSIONS FROM PROCESS ONLY

EXISTING CONDITIONS

Thermal Capacity	500	MMBtu/hr	Permit 30-126
Trona Feed Capacity	400	TPH	Permit 30-126
Total CO (Process + Combustion) Emissions	1524	lb/hr	Permit CT-1347
CO (Natural Gas Combustion) Emissions	84	lb/MMScf	AP-42 Table 1.4-1
	0.08	lb/MMBtu	(Based on 1,020 Btu/Scf)
	41.2	lb/hr	
CO (Process) Emissions	1482.8	lb/hr	
	3.7	lb/ton-ore	
Total VOC (Process + Combustion) Emissions	776.0	lb/hr	Permit CT-1347
VOC (Natural Gas Combustion) Emissions	5.5	lb/MMScf	AP-42 Table 1.4-2
	0.005	lb/MMBtu	(Based on 1,020 Btu/Scf)
	2.7	lb/hr	
VOC (Process) Emissions	773.3	lb/hr	
	1.9	lb/ton-ore	

Numbers in blue are entries, and black are calculations