

December 6, 1999

**MEMORANDUM**

**TO:** Mike Simon, Permit Manager  
Air Quality Permit Program

**FROM:** Dan Pitman, P.E., Staff Engineer  
Technical Services Office

**SUBJECT:** ***PERMIT TO CONSTRUCT TECHNICAL ANALYSIS***  
P-990146, Central Paving Co., Portable  
(Standard Rock Crusher Permit to Construct No. 777-00243; Including Aggregate,  
Asphalt, and Concrete Production when Collocated in Attainment Areas)

**PURPOSE**

The purpose of this memorandum is to satisfy the requirements of IDAPA 16.01.01.200 (*Rules for the Control of Air Pollution in Idaho*) for issuing Permits to Construct (PTC).

**PROJECT DESCRIPTION**

Central Paving Co. is proposing to commence construction of a portable rock crushing facility. Central Paving Co. is requesting a PTC be issued to cover the operations of the rock crushing facility in both attainment and nonattainment areas throughout the State of Idaho. Note that the Standard PTC for a portable rock crusher also includes provisions for collocated operations in attainment areas with one (1) other portable source (i.e., rock crusher, hot-mix asphalt, or concrete batch plant). The rock crushing facility's maximum hourly production rate is 1,348,111 tons per hour. The facility includes a 725-kilowatt, diesel-fired electrical generator.

**SUMMARY OF EVENTS**

On November 7, 1999, the Idaho Department of Health and Welfare, Division of Environmental Quality (DEQ) received a PTC application.

**DISCUSSION**

1. Process Description

The majority of rock crushing facilities in Idaho mine rock deposits from pits using front-end loaders. However, rock may also be mined from quarries by drilling and blasting, or dredged from stream beds. Rock crushing facilities generally produce three to four sizes of aggregate by employing a series of crushers and screens.

The rock is transferred to a vibrating grizzly to segregate large from small material. The large material is conveyed to the primary crusher (usually a jaw or gyratory crusher) where it is reduced to 3 to 12 inches in diameter. The crushed material is transferred to the primary screen where it is separated into two or three size ranges. The oversized material is conveyed to a secondary crusher, and the smaller material is transferred to a tertiary crusher or is stockpiled. The secondary crusher (usually a gyratory or cone crusher) reduces the material to roughly 1 to 4 inches in diameter. The material is rescreened. The oversized material is crushed in a tertiary crusher and rescreened, and the small aggregate is stockpiled.

Particulate matter (PM) emissions are generated at all points of crushing, screening, and material transfer. The use of water spray is the most common method used to control particulate emissions. If an electrical generation unit is used, the combustion of fuel also results in PM emissions as well as oxides of nitrogen (NO<sub>x</sub>), oxides of sulfur (SO<sub>x</sub>), carbon monoxide (CO), and volatile organic compounds (VOCs). Fugitive PM emissions are generated by the mining activities, the aggregate storage piles, and front-end loader and truck traffic.

The Standard PTC requested will allow this rock crushing facility to collocate and simultaneously operate with one (1) other portable plant (i.e., rock crusher, hot-mix asphalt, or concrete batch plant) in attainment areas. It is important to note that during collocated operations, this crusher is then part of a single, larger source engaged in the production of either hot-mix asphalt, concrete, and/or aggregate; depending upon which type of portable plant the crusher is collocated with. While collocated, the two portable plants are now considered to be one source, and the emissions of this single source is the sum of the emissions from the two portable plants. This single, larger source must comply with all applicable federal, state, and local requirements. To maintain compliance, specific requirements and limitations have been included in the Standard PTC for this rock crusher for collocated operations. As described in the following sections of this technical memorandum, specific conservative assumptions and calculations were made to determine these Standard PTC collocation requirements. For this reason, the permit for the other portable plant with which this rock crusher will collocate must also contain specific collocation requirements based on the same conservative assumptions and calculations used in this Standard PTC.

## 2. Equipment Listing

The analysis upon which this permit was based assumed that the following equipment would be used:

### 2.1 Primary Crusher

Manufacturer/Type:	Horizontal Impactor
Date of Manufacture:	After 8/31/83
Maximum Capacity:	600 ton/hr

### 2.2 Secondary Crusher

Manufacturer/Type:	54" Cone
Date of Manufacture:	After 8/31/83
Maximum Capacity:	350 ton/hr

### 2.3 Tertiary Crusher

Manufacturer/Type:	Vertical Impactor
Date of Manufacture:	After 8/31/83
Maximum Capacity:	200 ton/hr

#### 2.4 Additional Crushers

Manufacturer/Type:	Jaw Crusher
Date of Manufacture:	After 8/31/83
Maximum Capacity:	500 ton/hr

#### 2.5 Generator

Manufacturer:	Caterpillar 3412
Rated Power Output(kW):	725
Fuel Type ( gasoline/diesel):	Diesel
Fuel Usage (gal/hr):	41
Stack Diameter(ft):	0.67
Stack Height(ft):	7.03
Exhaust Flared(acfm):	4457

When collocated, this crusher is then part of a single, larger source that produces either hot-mix asphalt, concrete, and/or aggregate; depending upon which type of portable plant the crusher is collocated with. The equipment used by this single, larger source would include the crusher equipment listed above plus the equipment of the other portable plant. To see an equipment description for the other portable plant, see the corresponding permitting files for that plant.

#### 3. Area Classification

The rock crushing facility is a portable source and may operate in both attainment and nonattainment areas throughout Idaho.

#### 4. Emission Estimates

Emission estimates to determine the potential to emit (PTE) for aggregate processing and handling are conservatively determined using a spreadsheet specifically developed for rock crushing facilities. The spreadsheet has been developed using emission factors from AP-42, Table 11.19.2-2, 1/95 Edition, to estimate the facility's emissions from crushers, screens, and transfer points. Fugitive emissions from sources that are not affected facilities, pursuant to 40 CFR 60.670, are not included in determining PTE. Likewise for collocated operations; fugitive emissions from hot-mix asphalt plant sources that are not affected facilities, pursuant to 40 CFR 60.90, are not included in determining PTE. PTE is used to determine if prevention of significant deterioration (PSD) or Title V Operating Permit requirements apply to the facility. Emissions from generators are also determined by the spreadsheet using emission factors from AP-42, Tables 3.3-2 and 3.4-2, 1/95 Edition. These emissions are included in the determination of PTE. Crusher, screen, and transfer point emissions are not limited to specific pound-per-hour or ton-per-year emission rates because of the margin of error inherent in the emission estimates, which are not source-specific, but rather are applicable to the broader source category of crushed stone processing. Generator emissions are not limited to specific emission rates either.

For collocated operations, a conservative approach is taken by limiting the emissions of each of the collocated units to half of the levels allowed when operating alone. Then the combined emissions of the two collocated sources will be within the allowable levels. See

the information below for a more detailed description. This approach is designed to result in acceptable throughput limits for most collocation situations. In cases where the throughput limits are too restrictive, a site-specific analysis and permit amendment may be completed.

This facility's uncontrolled and controlled PTE is 326 tons per any consecutive 12-month period (T/yr) and 99 T/yr, respectively. The emission estimates are included as Appendix A. The following narrative briefly explains the methods and assumptions used in the development of the source-specific spreadsheet.

### **ATTAINMENT AREA OPERATIONS**

The spreadsheet inherently limits emissions below certain triggering levels (i.e., PSD and Title V thresholds) by limiting maximum throughput. If a generator is not used, throughput is solely limited to limit a facility's PTE to 99 T/yr of PM emissions. If a generator is used, throughput is limited based on the most limiting pollutant or pollutants (i.e., the pollutant whose emission rate is closest to 99 T/yr). The spreadsheet calculations incorporate the following to determine the throughput limit: the maximum hourly throughput of the primary crusher, the total number of crushers, the capacity of the generator (if used), the ambient impact from the generator, and the generator's fuel type and fuel consumption rate.

In the standard permit, two throughput limit options are available for attainment area operations. One is for an annual limit (annual is any consecutive 12-month period), and the other is for a daily and annual limit. The annual limit option is chosen only to limit emissions to 99 T/yr or less. The daily and annual limit option is chosen to protect a 24-hour ambient standard, an annual ambient standard, and to limit emissions to 99 T/yr. Depending on the circumstances, one or both options may be required.

### **NONATTAINMENT AREA OPERATIONS**

For facilities that operate in a nonattainment area, throughput is limited to protect the standard(s) for which the area is designated as nonattainment. For example, when these facilities operate in a particulate matter with an aerodynamic diameter of less than or equal to a nominal ten (10) microns (PM-10) nonattainment area, throughput is, or may have to be, limited on a daily basis to protect the 24-hour standard, or annually to protect the annual standard. In either case, the spreadsheet automatically calculates the allowable throughput that protects these standards. When a generator is used, the spreadsheet takes into account its ambient impact and limits throughput accordingly. If the impacts are not significant, the spreadsheet limits throughput to keep emissions at or below 99 T/yr.

In the standard permit, two throughput options are available to choose from for operations in a nonattainment area. The first option states the rock crushing facility cannot operate in any PM-10 nonattainment area or proposed PM-10 nonattainment area without DEQ approval. The choice of this option is obvious. The second option is a daily and annual throughput limit. Imposing this limit not only protects the 24-hour limit and annual limit, but also ensures facility emissions will not exceed 99 T/yr.

### **COLLOCATED OPERATIONS IN ATTAINMENT AREAS**

Standard PTCs will only allow collocation with one (1) other portable source (i.e., rock crusher, hot-mix asphalt, or concrete batch plant) which has also received a Standard PTC

that specifically allows collocation. When a combination of one portable crusher unit and one other portable unit are operated at a single location, the emissions of both units must be added together when determining PTE. Consistent with the approach taken for attainment area operations, the spreadsheet inherently limits the combined emissions of the two portable units to below certain triggering levels (i.e., PSD and Title V thresholds) by limiting the maximum throughput of each. For collocated operations, half of the attainment area triggering levels are used as limits for calculating throughput for each source. The crusher throughput is then established based on the most limiting pollutant or pollutants (i.e., the pollutant whose emission rate is closest to 49.5 T/yr). The spreadsheet calculations incorporate the following to determine the throughput limit: the maximum hourly throughput of the primary crusher, the total number of crushers, the capacity of the generator (if used), the ambient impact from the generator, and the generator's fuel type and fuel consumption rate.

In the standard permit, two throughput limit options are available for collocated attainment area operations. One is for an annual limit (annual is any consecutive 12-month period), and the other is for a daily and annual limit. The annual limit option is chosen only to limit the combined emissions to 99 T/yr or less. The daily and annual limit option is chosen to protect a 24-hour ambient standard, an annual ambient standard, and to limit emissions to 99 T/yr. Depending on the circumstances, one or both options may be required.

#### **FUGITIVE EMISSIONS AT THE PROPERTY BOUNDARY**

In order to ensure the air quality at and beyond the facility boundary is not further degraded, the standard permit requires that no visible emissions cross the facility boundary. It is assumed if no emissions visibly cross the boundary, the air quality is protected and not further degraded. The permit requirement is offered in lieu of fugitive dust modeling.

#### **5. Modeling**

Estimated emissions due to aggregate crushing and handling are expected to vary considerably from the facility's actual emissions. Modeling results would reflect the emission estimates with an added level of conservatism built into the modeling. Because of the degree of uncertainty involved in the emissions estimate, modeling of fugitive dust emissions was not conducted. However, to ensure no ambient air quality standard will be violated due to emissions generated by crushing, screening, aggregate handling, and fugitive sources; the permit requires that emissions from these sources not be seen leaving the property boundary for more than three (3) minutes in any sixty (60) minute period. If visible emissions are not seen crossing the property boundary, no significant impact on ambient air quality nor a violation of National Ambient Air Quality Standards (NAAQS) will occur.

If a generator is used to provide power to the facility, an ambient impact analysis must be performed to ensure its emissions do not cause or contribute to a violation of any applicable ambient air quality standard. Normally, the EPA-approved SCREEN3 modeling program is used to predict the ambient impact from the generator. The spreadsheet then uses the modeling result and calculates a throughput limit based on the proposed operating area (attainment, nonattainment, or collocated attainment). For collocated operations, the crusher generator operation is limited as needed so that the modeled impacts will be half of the available allowable ambient impact. Likewise for collocated operations; the modeled impacts of the other portable facility will also be limited to half of the available allowable, ambient impact so that the combined emissions of the two collocated sources will remain within the

NAAQS. Using the 24-hour NAAQS standard for PM-10 (attainment area) as an example, one-half of the allowable available impact would be equal to  $32 \mu\text{g}/\text{m}^3$ , as follows:

$$32 \mu\text{g}/\text{m}^3 = 0.5 \times [150 \mu\text{g}/\text{m}^3 - 86 \mu\text{g}/\text{m}^3],$$

where  $150 \mu\text{g}/\text{m}^3$  is the 24-hour average standard and  $86 \mu\text{g}/\text{m}^3$  is the conservative statewide 24-hour average background value. Then the generator operations would be limited as needed, based on the specific ambient impact modeling for this generator, so that its modeled 24-hour concentration does not exceed  $32 \mu\text{g}/\text{m}^3$  at or beyond the facility's property boundary. This approach is designed to result in acceptable operational limits for most collocation situations. In cases where these limits are too restrictive, a site-specific analysis and permit amendment may be completed. If a generator is used, the modeling estimates are included as Appendix B.

6. Facility Classification

Rock crushing plants (including collocated operations producing asphalt, concrete, and aggregate) are not designated facilities, as defined in IDAPA 16.01.01.006.27. This facility is not a major facility as defined in IDAPA 16.01.01.006.55 and IDAPA 16.01.01.008.10. The SIC code for this rock crushing facility is 1442, "Construction Sand and Gravel." The AIRS facility classification for this facility is "A2" because the uncontrolled PTE is greater than 100 T/yr.

7. Regulatory Review

The following rules and/or regulations have been reviewed in this permit analysis:

<u>IDAPA 16.01.01.201</u>	Permit to Construct;
<u>IDAPA 16.01.01.202</u>	Application Procedures;
<u>IDAPA 16.01.01.203</u>	Permit Requirements for New and Modified Stationary Sources;
<u>IDAPA 16.01.01.209</u>	Procedures for Issuing Permits;
<u>IDAPA 16.01.01.211</u>	Conditions for Permits to Construct;
<u>IDAPA 16.01.01.212</u>	Obligation to Comply;
<u>IDAPA 16.01.01.577</u>	Ambient PM-10 Air Quality Standard;
<u>IDAPA 16.01.01.625</u>	Visible Emissions;
<u>IDAPA 16.01.01.650</u>	Rules for Control of Fugitive Dust; and
<u>IDAPA 16.01.01.728.02</u>	Distillate Fuel Oil.

With regard to 40 CFR 60, Subpart OOO, Standards of Performance for Nonmetallic Mineral Processing Plants, this is an affected facility per the applicant's permit application.

8. Permit Coordination

This facility is not a major facility as defined by IDAPA 16.01.01.006.55 and IDAPA 16.01.01.008.10, and it is not an NSPS-affected facility. Therefore, coordination with the Operating Permit Section is not necessary.

9. AIRS Information

Since each of these facilities is considered a new facility for AIRS purposes, an update to the AIRS data base is required. The information necessary to update the data base is included as Appendix X of this technical analysis.

FEES

The facility is not a major facility as defined in IDAPA 16.01.01.008.10. Therefore, registration and registration fees, according to IDAPA 16.01.01.526, are not applicable.

RECOMMENDATION

Based on review of application materials and all applicable state and federal rules and regulations, staff recommend that Central Paving Co., Inc. be issued a PTC for a portable rock crushing facility. No public comment period is recommended, no entity has requested a comment period, and the project does not involve PSD PTC requirements.

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cc:	P. Rayne, AFS	Twin Falls RO
	T. Trumbull, AQP	Pocatello RO
	R. Wilkosz, AQP	Idaho Falls RO
	Coeur d'Alene RO	Database/Source File (777-00243)
	Lewiston RO	RO COF
	Boise RO	RO Source File

# **Appendix A**

*Emission Estimate Calculations*

*P-990146*

*Central Paving Co., Portable*

DATA ENTRY

<b>Company Name:</b>	Central Paving Co.	<b>Engineer:</b>	Dan P. Pitman
<b>Project:</b>	Portable Crusher	<b>Date:</b>	15-Nov-99
<b>FTC #:</b>	777-xxxxx	<b>Filename:</b>	

**Crusher Facility Information**

<b>Facility Production Capacity</b>	600 [=] tons/hr
<b>Applicant's Requested Hours of Operatio</b>	24 [=] hrs/day
	8,760 [=] hrs/yr
<b>Estimated Throughput:</b>	5,256,000 [=] tons/yr
<b>Maximum Hours of Operatio</b>	8,760 [=] hrs/yr
<b>Maximum Throughput:</b>	5,256,000 [=] tons/yr
<b>Number of Crushers:</b>	4
<b>Limitations</b>	
<b>Annual Threshold Emission A</b>	(A = <100 Tons/yr; Below Title V Threshold)
	(B = <250 Tons/yr; PSD Threshold)
<b>Selected Emission Limitation</b>	100 Tons/yr

**Generator Information**

<b>Generator? (Y/N)</b>	Y
<b>Generator Size:</b>	725 [=] kW      972.0075 Conversion Factor
<b>Units:</b>	B (A = Horsepower) (B = Kilowatts)
<b>Fuel Type:</b>	A (A = Diesel-Fired Generator) (B = Gasoline-Fired/Dual-Fired Generator)
<b>Fuel Usage:</b>	41 [=] gal/hr
<b>Fuel Heating Value:</b>	5.578665 [=] MMBtu/hr
<b>Modeled 1-hr Concentration:</b>	32.33 [=] µg/m3, at emission rate of 1 lb/hr

INPUTS TO PERMIT TO CONSTRUCT (PTC)		Value	Units
<b>Section A.2 "Operating Requirements"</b>			
Section A.2.1 Number of Crushers:	Number of Crushers	4	
Section A.2.1 Number of Generators:	Number of Generators	1	
Section A.2.1 Number of Generators:	Size of Generators	725	[=] kW
<b>Section B "Attainment Area When Not Collocated"</b>			
Section B.1.1 Facility Throughput Limits:	Annual Throughput Limit	1,348,111	T/yr
Section B.1.3 Generator Hours of Operation:	Annual Hours of Operation	8,760	hrs/yr
	<<AND/OR>>		
	Daily Hours of Operation	NA	
<b>Section C "Attainment Area When Collocated"</b>			
Section C.1.3 Facility Throughput Limits:	Annual Throughput Limit	674,056	T/yr
Section C.1.4 Generator Hours of Operation:	Annual Hours of Operation	4,380	hrs/yr
	<<AND/OR>>		
	Daily Hours of Operation	NA	
<b>Section D "Nonattainment Area"</b>			
Section D.1.1 Facility Throughput Limits:	Annual Throughput Limits	1,348,111	T/yr
Section D.1.3 Generator Hours of Operation:	Annual Hours of Operation	8,760	hrs/yr
	<<AND/OR>>		
	Daily Hours of Operation	NA	

**Drop Point Emission Factors**

Mean Wind Speed (U)	10 [=] mph
Material Moisture Content (M)	2.5 [=] %
Particle Size Multiplier (k)	
PM-10 (<10 µm)	0.35 [=] dimensionless
PM (<30 µm)	0.74 [=] dimensionless
Emission Factor:	
PM-10 (<10 µm)	0.0020 [=] lb/ton
PM:	0.0053 [=] lb/ton
	0.0067 [=] lb/ton

Notes: 1 PM = (k\*0.0032\*(U/5)^1.3/(M/2)^1.4)/0.8

	Background Concentrations -- Attainment/Non-Classifiable Areas (ug/m3)				
	1-hr	3-hr	8-hr	24-hr	Annual
PM					
PM-10				86.0	32.7
CO	11,400		5,130		
NOx					40.0
SO2		543		144	23.5
TOC					

**PERMIT LIMITS TABLE**

	PERMIT LIMITS									
	Attainment Area		Non-Attainment Area		Collocated Attainment Areas					
Crusher	T/day	MMT/yr	T/day	MMT/yr	T/day	MMT/yr				
Operating Requirements	14,400	1.35	14,400	1.35	14,400	0.67				
Generator	hrs/day	hrs/yr	hrs/day	hrs/yr	hrs/day	hrs/yr	CO 1-hr Standard	SO2 3-hr standard	CO 8-hr Standard	
Operating Requirements	24.0	8,760	24.0	8,760	24.0	4,380	minutes/1-hr	hr/3-hr	hr/8-hr	8.0
Generator	Contaminant	T/yr	Contaminant	T/yr	Contaminant	T/yr				
Emission Limits	None	None	None	None	NO <sub>x</sub>	49.5				
AIRS Facility Classification	A2									

**OUTPUT**

**Potential to Emit – Based on Applicant's Data**

Crusher, Screens & Transfer Points	Uncontrolled Emissions	Controlled Emissions
PM	1,264 tons/yr	379 tons/yr
PM-10	481 tons/yr	144 tons/yr
Generator		
PM	1.7 tons/yr	1.7 tons/yr
PM-10	1.4 tons/yr	1.4 tons/yr
CO	19.8 tons/yr	19.8 tons/yr
NO <sub>x</sub>	75.7 tons/yr	75.7 tons/yr
SO <sub>2</sub>	12.3 tons/yr	12.3 tons/yr
TOC	2.4 tons/yr	2.4 tons/yr
Total Crusher + Generator		
PM	1266 tons/yr	381 tons/yr
PM-10	482 tons/yr	146 tons/yr
PTE Summary	1266.2 [=] T/yr of PM	381.0 [=] T/yr of PM
<b>Enforceable Limits – Based on Requested Operations</b>		
Generator -- Operation	24.0 hrs/day	8,760 hr/yr
Crusher -- Production	14,400 T/day	5.26 MMT/yr
AIRS Facility Classification:	A2	

**Potential to Emit – Emissions Analysis Using Ambient Air Quality Standards**

Emissions limited to less than:

100 Tons/yr

Assumptions: Plant operations limited by NAAQS from generator emissions, and, Crusher emissions back-calculated to yield 99 Tons/yr of emissions.

**Attainment/Non-Classifiable Area**

Uncontrolled Emissions			Controlled Emissions		Non-Attainment Area	
	324 tons/yr		97 tons/yr	Crusher	Uncontrolled Emissions	Controlled Emissions
	123 tons/yr		37 tons/yr	PM	324 tons/yr	97 tons/yr
				PM-10	123 tons/yr	37 tons/yr
				Generator		
	1.7 tons/yr		1.7 tons/yr	PM	1.7 tons/yr	1.7 tons/yr
	1.4 tons/yr		1.4 tons/yr	PM-10	1.4 tons/yr	1.4 tons/yr
	19.8 tons/yr		19.8 tons/yr	CO	19.8 tons/yr	19.8 tons/yr
	75.7 tons/yr		75.7 tons/yr	NO <sub>x</sub>	75.7 tons/yr	75.7 tons/yr
	12.3 tons/yr		12.3 tons/yr	SO <sub>2</sub>	12.3 tons/yr	12.3 tons/yr
	2.4 tons/yr		2.4 tons/yr	TOC	2.4 tons/yr	2.4 tons/yr
				Totals:		
	326 tons/yr		99 tons/yr	PM	326 tons/yr	99 tons/yr
	125 tons/yr		38 tons/yr	PM-10	125 tons/yr	38 tons/yr
	326.0 [=] T/yr of PM		99.0 [=] T/yr of PM	PTE Summary	326.0 [=] T/yr of PM	99.0 [=] T/yr of PM
<b>Enforceable Limits – Attainment Areas</b>					<b>Enforceable Limits – Non-Attainment Areas</b>	
	24.0 hrs/day		8,760 hr/yr	Generator	24.0 hrs/day	8,760 hr/yr
	14,400 T/day		1.35 MMT/yr	Crusher	14,400 T/day	1.35 MMT/yr

Crusher Plant Emission Calculations and Impact Estimates

EMISSION ANALYSIS BASED ON APPLICANT'S DATA

Generator Emissions	Applicant's Data				Generator Emissions		Modeled Air Concentrations		
	Generator Emission Factor [=] lb/MMBtu	Generator Emission Rate [=] lb/hr	Hours of Operation [=] hr/day	[=] hr/year	lbs/day	Hours of Operation T/yr	Calculated 24-hr Impact [=] ug/m3	Calculated Annual Impact [=] ug/m3	Calculated Annual Impact [=] Other
PM	0.0697	0.39	24.0	8,760	9.33	1.70	N/S	N/S	
PM-10	0.0573	0.32	24.0	8,760	7.67	1.40	4.1	0.8	
CO	0.8100	4.52	24.0	8,760	108.45	19.79	58.4	11.7	146 ? 102 ?
NO <sub>x</sub>	3.1000	17.29	24.0	8,760	415.05	75.75		44.7	
SO <sub>2</sub>	0.5050	2.82	24.0	8,760	67.61	12.34	36.4	7.3	82 *
TOC	0.1000	0.56	24.0	8,760	13.39	2.44			

Generator Emissions	BRC Evaluation	Generator Emissions Regulatory Analysis			Ambient Air Concentrations w/ Background Values (ug/m3)				
		Significant Contribution Emission Rates	Non-Attainment Area Significant Contribution Ambient Air Concentration		1-hr	3-hr	8-hr	24-hr	Annual
PM	BRC	(2.5 T/yr)	No	(25 T/yr)					
PM-10	BRC	(1.5 T/yr)	No	(15 T/yr)	No	5 ug/m3		1 ug/m3	
CO	Above BRC	(10 T/yr)	No	(100 T/yr)	No	2000 ug/m3 (1-hour)		500 ug/m3 (8-hour)	
NO <sub>x</sub>	Above BRC	(4 T/yr)	Significant	(40 T/yr)					
SO <sub>2</sub>	Above BRC	(4 T/yr)	No	(40 T/yr)					
TOC									

Rock Crusher Emissions	Crushers		Screens		Transfer Points		Total Emissions
	Nos. 1 & 2	Nos. 3 - 4	Nos. 1 & 2	Nos. 3 - 4	Nos. 1 - 14	Nos. 15 - 25	
No. Units	2	2	2	2	14	14	
Throughput ([=] T/hr/unit)	600	450	600	450	600	300	
Operation Schedule ([=] hrs/day)	24						
Throughput ([=] MM T/yr/unit)	5.26	3.94	5.26	3.94	5.26	2.63	
Operation Schedule ([=] hrs/yr)	8,760						
Control Efficiency	70%	70%	70%	70%	70%	70%	
PM-10							
Emission Factor	0.0003	0.0024	0.0150	0.0710	0.0020	0.0020	
Uncontrolled Emissions ([=] lb/hr)	0.32	2.16	18.00	63.90	16.95	8.47	109.8
Controlled Emissions ([=] lb/hr)	0.10	0.65	5.40	19.17	5.08	2.54	32.9
Uncontrolled Emissions ([=] T/yr)	1.4	9.5	78.8	279.9	74.2	37.1	480.9
Controlled Emissions ([=] T/yr)	0.4	2.8	23.7	84.0	22.3	11.1	144.3
PM							
Emission Factor	0.0007	0.0063	0.0394	0.1864	0.0053	0.0053	
Uncontrolled Emissions ([=] lb/hr)	0.84	5.67	47.25	167.74	44.80	22.40	288.7
Controlled Emissions ([=] lb/hr)	0.25	1.70	14.18	50.32	13.44	6.72	86.6
Uncontrolled Emissions ([=] T/yr)	3.7	24.8	207.0	734.7	196.2	98.1	1264.5
Controlled Emissions ([=] T/yr)	1.1	7.5	62.1	220.4	58.9	29.4	379.3

For information purposes:

Crusher Hours of Operation to Yield 99.0 T/yr Emissions	
w/o Generator	w/ Generator
	8760
	6011
	5926
	2286
	2247

- Notes:
- Number of Screens = Number of Crushers
  - Number of Transfer Points = 7\*(Number of Crushers)
  - Emission Factors from AP-42, Table 11.19.2-2. Where factors were given for one pollutant, the following conversion factors were used:  
TSP = PM<sub>10</sub>\*2.1; TSP = PM\*0.8
- Hourly values are based on maximum daily production rates given above. Annual values are based on throughput values given above.

Pollutant	Generator Emissions		Crusher Emissions (Controlled)		Total Emissions	
	lb/day	T/yr	lb/day	T/yr	lb/day	T/yr
PM	9.33	1.70	2078.6	379.3	2087.9	381.0
PM-10	7.67	1.40	790.6	144.3	798.3	145.7
CO	108.45	19.79			108.4	19.8
NO <sub>x</sub>	415.05	75.75			415.1	75.7
SO <sub>2</sub>	67.61	12.34			67.6	12.3
TOC	13.39	2.44			13.4	2.4

Enforceable Limits			
Generator -- Operation	24.0	hrs/day	8,760
Crusher -- Production	14,400	T/hr	5.26
			MMT/yr

Crusher Plant Emission Calculations and Impact Estimates

EMISSION ANALYSIS – BASED ON AMBIENT AIR QUALITY STANDARDS  
Emissions limited to less than: 100 Tons/yr

Attainment Area

Pollutant	Generator Emission Factor [=] lb/MMBtu	Generator Emission Rate [=] lb/hr	Calculated Impacts				Allowable Impacts					Maximum Throughput [=] MMT/year		
			Hours of Operation [=] hr/day	Hours of Operation [=] hr/year	AAQS		< 100 TYP1 Hours of Operation [=] hr/year	Generator Hours of Operation [=] hr/day	Generator Hours of Operation [=] hr/year	Crusher Hours of Operation [=] hr/year	< 100 TYP1 [=] ton/year		Calculated Emissions	
					Hours of Operation [=] Other	Hours of Operation [=] Other								
PM	0.0697	0.39	N/S	N/S										
PM-10	0.0573	0.32	24.0	8,760			24.0	8,760	2,247		99.00	1.35		
CO	0.8100	4.52	N/S	N/S	1.0 2						38.41	3.56		
					8.0 3						19.79			
NOx	3.1000	17.29	N/S	8,760										
SO2	0.5050	2.82	24.0	8,760	3.0 4						75.75			
TOC	0.1000	0.56	N/S	N/S							12.34			
											2.44			

Pollutant	Generator Emissions			Ambient Air Concentrations w/ Background Values (ug/m3)				
	Calculated 24-hr Impact [=] ug/m3	Calculated Annual Impact [=] ug/m3	Calculated Impact [=] Other	Based On Entered SCREEN3 Data				
				1-hr	3-hr	8-hr	24-hr	Annual
PM	N/S	N/S						
PM-10	4.1	0.8						
CO	58.4	11.7	146 2			5,232		
			102 3					
NOx	223.6	44.7						85
SO2	36.4	7.3	82 4		625		180	30.8
TOC	7.2	1.4						

	Crushers		Screens		Transfer Points		Total Emissions	Allowable Hours of Operation w/ Emissions <100 T/yr	
	Nos. 1 & 2	Nos. 3 - 4	Nos. 1 & 2	Nos. 3 - 4	Nos. 1 - 14	Nos. 15 - 28		w/o Generator	w/ Generator
No. Units	2	2	2	2	14				
Throughput ([=] T/hr/unit)	600	450	600	450	600				
Throughput ([=] MM T/yr/unit)	1.35	1.01	1.35	1.01	1.35				
Operation Schedule ([=] hrs/yr)	2,247								
Control Efficiency	70%	70%	70%	70%	70%				
PM-10									
Emission Factor	0.0003	0.0024	0.0150	0.0710	0.0020				
Uncontrolled Emissions ([=] lb/hr)	0.32	2.16	18.00	63.90	16.95		109.8		
Controlled Emissions ([=] lb/hr)	0.10	0.65	5.40	19.17	5.08		32.9	6011	5926
Uncontrolled Emissions ([=] T/yr)	0.4	2.4	20.2	71.8	19.0		123.4		
Controlled Emissions ([=] T/yr)	0.1	0.7	6.1	21.5	5.7		37.0		
PM									
Emission Factor	0.0007	0.0063	0.0394	0.1864	0.0053				
Uncontrolled Emissions ([=] lb/hr)	0.84	5.67	47.25	167.74	44.80		288.7		
Controlled Emissions ([=] lb/hr)	0.25	1.70	14.18	50.32	13.44		86.6	2286	2247
Uncontrolled Emissions ([=] T/yr)	0.9	6.4	53.1	188.4	50.3		324.3		
Controlled Emissions ([=] T/yr)	0.3	1.9	15.9	56.5	15.1		97.3		

Notes:

1TPY calculations include crusher, screen and transfer point emissions.

2 CO 1-hr Averaging Period

3 CO 8-hr Averaging Period

4 SO2 3-hr Averaging Period

– Daily and annual operation values are based on background data less the modeled generator emissions (i.e., ambient air concentrations).

That is, the generator hours of operation have been back-calculated from AAQS values. The crusher particulate emissions (controlled)

are then used to back-calculate crusher operational times, assuming 99 Tons/yr less generator emissions.

– Maximum throughput values are based on the minimum number of hours (crusher) that will yield a total of 99 Tons/yr, multiplied by the

maximum daily production rates.

– Hourly emission values are based on maximum daily production rates, given above.

– Annual emission values are based on the maximum throughput values given above.

EMISSION ANALYSIS – BASED ON AMBIENT AIR QUALITY STANDARDS  
Emissions limited to less than: 100 Tons/yr

Non-Attainment Area

Pollutant	Generator Emission Factor [=] lb/hp-hr	Generator Emission Rate [=] lb/hr	Calculated Impacts				Allowable Impacts				Maximum Throughput [=] MMT/year	
			Hours of Operation [=] hr/day	Hours of Operation [=] hr/year	AAQS		< 100 TPY: Hours of Operation [=] hr/year	Generator Hours of Operation [=] hr/day	Generator Hours of Operation [=] hr/year	Crusher Hours of Operation [=] hr/year		< 100 TPY: Calculated Emissions [=] ton/year
					Other	Other						
PM	0.0697	0.39	N/S	N/S			8,760	24.0	8,760	2,247	99.00	1.35
PM-10	0.0573	0.32	24.0	8,760			8,760				38.41	3.56
CO	0.8100	4.52	N/S	N/S	1.0	8.0	8,760				19.79	
NO <sub>x</sub>	3.1000	17.29	N/S	8,760			8,760				75.75	
SO <sub>2</sub>	0.5050	2.82	24.0	8,760	3.0		8,760				12.34	
TOC	0.1000	0.56	N/S	N/S			8,760				2.44	

Pollutant	Generator Emissions			Ambient Air Concentrations w/ Background Values (ug/m <sup>3</sup> )				
	Calculated 24-hr Impact [=] ug/m <sup>3</sup>	Calculated Annual Impact [=] ug/m <sup>3</sup>	Calculated Impact [=] Other	Based On Entered SCREEN3 Data				
				1-hr	3-hr	8-hr	24-hr	Annual
PM	N/S	N/S						
PM-10	4.1	0.8						
CO	58.4	11.7	146	11,546		5,232		
NO <sub>x</sub>	223.6	44.7	102					85
SO <sub>2</sub>	36.4	7.3	82		625		180	30.8
TOC	7.2	1.4						

	Crushers		Screens		Transfer Points		Total Emissions	Allowable Hours of Operation w/ Emissions <100 T/yr	
	Nos. 1 & 2	Nos. 3 - 4	Nos. 1 & 2	Nos. 3 - 4	Nos. 1 - 14	Nos. 15 - 28		w/o Generator	w/ Generator
No. Units	2	2	2	2	14	14			
Throughput (T/hr/unit)	600	450	600	450	600	300			
Throughput (MM T/yr/unit)	1.35	1.01	1.35	1.01	1.35	0.67			
Operation Schedule (hrs/yr)	2,247								
Control Efficiency	70%	70%	70%	70%	70%	70%			
PM-10									
Emission Factor	0.0003	0.0024	0.0150	0.0710	0.0020	0.0020			
Uncontrolled Emissions (lb/hr)	0.32	2.16	18.00	63.90	16.95	8.47	109.8		
Controlled Emissions (lb/hr)	0.10	0.65	5.40	19.17	5.08	2.54	32.9	8250	5926
Uncontrolled Emissions (T/yr)	0.4	2.4	20.2	71.8	19.0	9.5	123.4		
Controlled Emissions (T/yr)	0.1	0.7	6.1	21.5	5.7	2.9	37.0		
PM									
Emission Factor	0.0007	0.0063	0.0394	0.1864	0.0053	0.0053			
Uncontrolled Emissions (lb/hr)	0.84	5.67	47.25	167.74	44.80	22.40	288.7		
Controlled Emissions (lb/hr)	0.25	1.70	14.18	50.32	13.44	6.72	86.6	2286	2247
Uncontrolled Emissions (T/yr)	0.9	6.4	53.1	188.4	50.3	25.2	324.3		
Controlled Emissions (T/yr)	0.3	1.9	15.9	56.5	15.1	7.5	97.3		

- Notes:
- TPY calculations include crusher, screen and transfer point emissions.
  - CO 1-hr Averaging Period
  - CO 8-hr Averaging Period
  - SO<sub>2</sub> 3-hr Averaging Period
  - Daily and annual operation values are based on background data less the modeled generator emissions (i.e., ambient air concentrations). That is, the generator hours of operation have been back-calculated from AAQS values. The crusher particulate emissions (controlled) are then used to back-calculate crusher operational times, assuming 99 Tons/yr less generator emissions.
  - Maximum throughput values are based on the minimum number of hours (crusher) that will yield a total of 99 Tons/yr, multiplied by the maximum daily production rates.
  - Hourly emission values are based on maximum daily production rates, given above.
  - Annual emission values are based on the maximum throughput values given above.
  - Non-Attainment Area hour of operation calculations assume TSP emissions are non-attainment in PM-10 non-attainment areas. Therefore, operation is limited by significant impact limits.

Attainment Area - Collocated Units - Calculations

Collocated Ambient Air Concentrations - Attainment Area Calculations (1-hr, 3-hr, 8-hr, & 24-hr standards are cut in half for collocation)					
Pollutant	1-hr	3-hr	8-hr	24-hr	Annual (Max. Hours to Achieve 49.5 T/yr)
PM					
PM-10				27.9	8.0
CO	14,154		2,333		
NO <sub>x</sub>					2.9
SO <sub>x</sub>		297		74	51.1
TOC					

Background Concentrations -- Attainment/Non-Classifiable Areas (ug/m3)					
Pollutant	1-hr	3-hr	8-hr	24-hr	Annual
PM					
PM-10				86.0	32.7
CO	11,400		5,130		
NO <sub>x</sub>					40.0
SO <sub>x</sub>		543		144	23.5
TOC					

# **Appendix B**

## ***Modeling Results***

***P-990146***

***Central Paving Co., Portable***

1/12/99

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\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 96043 \*\*\*

Central Paving

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = POINT  
EMISSION RATE (G/S) = .126000  
STACK HEIGHT (M) = 2.1427  
STK INSIDE DIAM (M) = .2042  
STK EXIT VELOCITY (M/S) = 64.2183  
STK GAS EXIT TEMP (K) = 807.0389  
AMBIENT AIR TEMP (K) = 293.1500  
RECEPTOR HEIGHT (M) = 1.0000  
URBAN/RURAL OPTION = RURAL  
BUILDING HEIGHT (M) = .0000  
MIN HORIZ BLDG DIM (M) = .0000  
MAX HORIZ BLDG DIM (M) = .0000

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

BUOY. FLUX = 4.180 M\*\*4/S\*\*3; MOM. FLUX = 15.616 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN AUTOMATED DISTANCES \*\*\*  
\*\*\*\*\*

\*\*\* TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES \*\*\*

A	DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	SIGMA Y (M)	SIGM Z (M)
1	1.	.0000	1	1.0	1.0	320.0	64.78	2.27	2.2
3	NO								
7	100.	28.65	4	15.0	15.0	4800.0	6.32	8.27	4.7
9	NO								
9	200.	19.09	4	8.0	8.0	2560.0	9.97	15.72	8.7
	NO								

Central.out

1	300.	14.14	4	5.0	5.0	1600.0	14.67	22.89	12.6
	NO								
8	400.	11.32	4	4.5	4.5	1440.0	16.06	29.72	15.7
	NO								
0	500.	9.475	4	3.5	3.5	1120.0	20.04	36.51	19.0
	NO								
3	600.	8.151	4	3.0	3.0	960.0	23.02	43.13	22.0
	NO								
8	700.	7.149	4	2.5	2.5	800.0	27.20	49.71	25.0
	NO								
2	800.	6.383	4	2.5	2.5	800.0	27.20	56.03	27.7
	NO								
9	900.	5.772	4	2.0	2.0	640.0	33.46	62.53	30.7
	NO								
2	1000.	5.290	4	2.0	2.0	640.0	33.46	68.71	33.3
	NO								
8	1100.	4.843	4	2.0	2.0	640.0	33.46	74.85	35.2
	NO								
3	1200.	4.866	6	1.5	1.5	10000.0	36.86	41.23	18.5
	NO								
0	1300.	5.054	6	1.0	1.0	10000.0	41.88	44.51	20.0
	NO								
6	1400.	5.264	6	1.0	1.0	10000.0	41.88	47.43	20.6
	NO								
1	1500.	5.436	6	1.0	1.0	10000.0	41.88	50.33	21.3
	NO								
5	1600.	5.574	6	1.0	1.0	10000.0	41.88	53.22	21.9
	NO								
8	1700.	5.681	6	1.0	1.0	10000.0	41.88	56.10	22.5
	NO								
0	1800.	5.760	6	1.0	1.0	10000.0	41.88	58.97	23.2
	NO								
2	1900.	5.814	6	1.0	1.0	10000.0	41.88	61.83	23.8
	NO								
3	2000.	5.847	6	1.0	1.0	10000.0	41.88	64.68	24.4
	NO								

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 1. M:

69.	32.33	4	20.0	20.0	6400.0	5.27	5.93	3.4
7	NO							

DWASH= MEANS NO CALC MADE (CONC = 0.0)  
 DWASH=NO MEANS NO BUILDING DOWNWASH USED  
 DWASH=HS MEANS HUBER-SNYDER DOWNWASH USED  
 DWASH=SS MEANS SCHULMAN-SCIRE DOWNWASH USED  
 DWASH=NA MEANS DOWNWASH NOT APPLICABLE, X<3\*LB

\*\*\*\*\*  
 \*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
 \*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	32.33	69.	0.

# **Appendix C**

## ***AIRS Information***

***P-990146***

***Central Paving Co., Portable***

