BLACK & VEATCH

8400 Ward Parkway, P.O. Box No. 8405, Kansas City, Missouri 64114, (913) 339-2000

DOCKET
93-AFC-2
DATE: MAY 2 7 1994
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Sacramento Cogeneration Authority
Procter & Gamble Cogeneration Project

B&V Project 23933
B&V File 32.0406
May 27, 1994

Mr. B. B. Blevins
California Energy Commission
1516 Ninth Street
Sacramento, California 95814
Attn: Docket Unit

Subject: Determination of Fugitive Dust Impacts - Air Quality

Attention: Mr. B. B. Blevins

Gentlemen:

Enclosed are twelve copies of the fugitive dust impact analysis which is a response to Item 1 of the Conclusions and Recommendations for the Air Quality section of the Preliminary Staff Assessment (PSA) for the Procter & Gamble Cogeneration Project. We anticipate that the California Energy Commission (CEC) will incorporate the results of this analysis into the Final Staff Assessment. This fugitive dust impact analysis is the second of three submittals to the CEC which discusses the air quality section of the PSA. The final submittal being provided to the CEC will be the revised air quality impact analysis and revised emissions offsets determinations which is currently being prepared and will be submitted on June 6, 1994. This final submittal will address Items 2 and 3 of the PSA Conclusions and Recommendations.

Please contact me at (913) 339-2164 or Douglas Timpe at (913) 339-7214 if you have any questions on this material.

Very truly yours,

BLACK & VEATCH

David M Lefebvre

David M. Lefebvre

Enclosures

cc: Darrell Woo, CEC
Aleta Kennard, SMAQMD
Diana Parker, SCA
Ron Simms, Walsh Construction Company

STATE OF CALIFORNIA

State Resources Conservation
and Development Commission

In the Matter of:	)	
	)	
Application for Certification of the Sacramento Cogeneration Authority's Procter & Gamble Cogeneration Project	))))	Docket No. 93-AFC-2 PROOF OF SERVICE (REV. 12/03/93)
______________________________	))	

PROOF OF SERVICE

I, Douglas C. Timpe ____________, declare that on ____________, 1994, I deposited copies of the attached ______________________________ ______________________________ in the United States mail at Overland Park, KS, with first class postage thereon fully prepaid and addressed to the following:

APPLICANT

Ms. Susan Strachan, Manager
Projects Permitting & Licensing
SMUD
P. O. Box 15830
Sacramento, CA 95852-1830

Steve Cohn
General Counsel's Office
SMUD
P. O. Box 15830
Sacramento, CA 95852-1830

INTERESTED PARTY

(NONE LISTED)

INTERESTED AGENCIES

Richard Johnson
Division Chief
Sacramento Metro AQMD
8411 Jackson Road
Sacramento, CA 95826

Ray Menebroker, Chief Project
Assessment Branch
Stationary Source Division
California Air Resources Board
P. O. Box 2815
Sacramento, CA 95814

Ed Schnabel
Sacramento Metropolitan Water District
5331 Walnut Avenue
Sacramento, CA 95814

CALIFORNIA ENERGY COMMISSION
(Docket Unit - 12 copies required)

Docket Unit, MS-4
1516 Ninth Street
Sacramento, CA 95814

I am and was at the time of the service of the attached paper over the age of 18 years and not a party to the proceeding involved.

I declare under penalty of perjury that the foregoing is true and correct.

Attachment

INTERNAL DISTRIBUTION LIST

Parties do not mail to the following individuals. The Energy Commission Docket Unit will internally distribute documents filed in this case to the following:

Barbara Crowley
Vice Chair and Presiding Member
1516 Ninth St., MS-33
Sacramento, CA 95814

Darrel "H" Woo
Project Manager
1516 Ninth St., MS-15
Sacramento, CA 95814

Art Kevorkian
Commissioner and Committee Member
1516 Ninth St., MS-35
Sacramento, CA 95814

Grace Bos
Associate Public Adviser
1516 Ninth St., MS-12
Sacramento, CA 95814

Susan Gefter
Hearing Officer
1516 Ninth St., MS-9
Sacramento, CA 95814

Jeff Ogata
Office of General Counsel
1516 Ninth St., MS-14
Sacramento, CA 95814

REPORTER (Commission Notices Only)

CourtScribes
5207 Cold Springs Dr.
Foresthill, CA 95631

Sacramento Cogeneration Authority
Procter & Gamble Cogeneration Project
Response to April 15, 1994 Preliminary Staff Assessment (PSA)
for the Air Quality Section

ITEM 1

Conclusions and Recommendations

There are a number of issues that need resolution before staff can make a finding in the technical area of air quality. These issues include the following:

Item

1. *analysis of construction emissions (fugitive dust) and the mitigation measures to further reduce fugitive dust emissions from the project. This could include:*

- *a refinement in the actual amount of land under construction at one time;*
- *analysis of the actual silt content of the site;*
- *specific fugitive dust modeling; and*
- *mitigation such as additional watering and application of chemical binders over disturbed areas that are not being worked.*

Response

To respond to the recommendation made by the CEC in their preliminary staff assessment (PSA), a fugitive dust modeling analysis was performed to determine the construction fugitive dust impacts. The modeling was performed using the Fugitive Dust Model (FDM), Version 93070, to predict the 24 hour ground-level particulate concentrations resulting from project site construction. The modeling was performed for two scenarios in which anticipated construction activities generating maximum fugitive dust emissions occur during two different phases of construction. The modeling results show that the maximum predicted PM_{10} impacts due to construction are less than ambient air quality standards. In addition, the modeling results clearly show a significant decrease in predicted impacts with increasing distance from the site, confirming the CEC's opinion that construction impacts are localized.

General Approach

As is typical of fugitive dust analyses, numerous assumptions of varying conservatism were made based on the data currently available. Because of the wide range of possible input parameters for specific variables, two peak construction scenarios were examined using realistic assumptions regarding construction activities expected to occur. In addition, modeling receptors were placed at the site boundary and at increasing distances from the site in order to assess the decrease in impacts with distance.

For Scenario 1, the entire project construction area was divided into two separate sources: a 10 acre excavation/grading area where the project will be located, and a 4 acre graveled parking/unloading area used for worker vehicle parking and unloading of delivery trucks. The 10 acre area includes a graveled east-west (E-W) site access road used for vehicle traffic. In addition, the parking/unloading area is an area located on the west side of the excavation/grading area which will only be utilized during construction of the project. This scenario was modeled to determine the maximum construction fugitive dust impacts during the anticipated four month excavation/grading period of construction.

For Scenario 2, the area was also divided into the 10 acre construction area and the 4 acre parking/unloading area, but the 10 acre area only included emissions from the E-W vehicle access road utilized for vehicle traffic. This scenario was modeled to determine the maximum construction fugitive dust impacts occurring during the period of peak vehicle traffic into and out of the site.

The particulate emissions from these sources result from fugitive dust due to vehicle traffic and excavation and grading of the construction area. All emission factors used to generate pollutant emission rates from fugitive dust sources were obtained from the U.S. EPA document, AP-42, Compilation of Air Pollution Emission Factors, Volume I, 1985.

The following sections present the fugitive dust modeling inputs, assumptions, and results for the two cases considered in the modeling analysis.

General Modeling Inputs and Assumptions

The following FDM inputs and assumptions were used as input to the modeling analysis for the two scenarios.

- All FDM modeling was conducted using sequential hourly surface meteorological data from the Sacramento Executive Airport National Weather Service (NWS) station and concurrent mixing height data from the Oakland International Airport NWS station for the period 1985 through 1989. This is the same data base used for the air quality impact analysis performed for the AFC.
- Receptors analyzed for this study were placed 50 meters apart along the fenceline surrounding the excavation/grading and parking/unloading areas and at 10, 20, 30, 40, and 50 meter increments outside of the fenceline. In addition, five receptors spaced 50 meters apart were placed 800 meters west of the site, which are representative of the nearest residential area.
- The FDM default options were utilized for this analysis.
- The particle size class evaluated in this analysis was only for the PM_{10} size fraction which has National and California Ambient Air Quality Standards (NAAQS and CAAQS).

Scenario 1 Modeling Approach and Results

Scenario 1 was performed based on the assumptions and modeling parameters discussed below. The emission levels used in Scenario 1 are based on more realistic assumptions for the determination of fugitive dust emission estimates than those presented in the October 1993 AFC Section 6.1.3.1, Fugitive Dust Sources.

Table 1 summarizes the source parameters used in Scenario 1. It should be noted that it was conservatively assumed that the entire construction area (excavation/grading and parking/unloading) will be disturbed simultaneously.

- The fugitive dust emissions due to excavation/grading of the 10 acre site is based on Section 11.2.4 of AP-42, Volume I, which furnishes an emission factor of 1.2 tons of total suspended particulate (TSP) per month of activity per acre for construction activities. This factor was only applied to the excavation/grading of the 10 acres and not to determine the emissions from the E-W vehicle access road which is discussed below. Although the site is actually 10 acres in size, construction office trailers will occupy approximately 0.55 acres in the southwest corner. Therefore, it was assumed for emission estimation purposes that only 9.45 acres will be disturbed during the excavation/grading.
- For excavation/grading, 21 percent of the TSP generated was conservatively assumed to be in the PM_{10} size range. The 21 percent PM_{10} fraction is based on Section 11.2.2 of AP-42, Agricultural Tilling which represents a PM_{10} fraction for activities similar to excavation/grading of the site. It should be noted that smaller PM_{10} fractions (e.g., 16 percent) have been reported for use in excavation and grading. Thus, the 21 percent fraction is considered conservative.
- Watering of the excavation/grading area was assumed to provide 79.54 percent control of the PM_{10} generated. This was determined using the EPA's PM_{10} Controlled Emissions Calculator provided as Appendix A to this attachment. It should be noted that watering of the excavation/grading area will be in accordance with normal construction practices and local requirements.
- The parking/unloading area and E-W vehicle access road will be graveled to control fugitive dust emissions because watering mitigation was not considered feasible. Watering of the parking/unloading area and the E-W vehicle access road was not considered feasible because worker vehicles remain parked during the workday and because of the continuous vehicle traffic on the access road which prevents an appropriate watering mitigation to be maintained. Emissions resulting from both worker vehicles and delivery truck traffic were evaluated for the parking/unloading area and E-W vehicle access road.
- Eighteen worker vehicles and five deliveries per day were assumed to travel along the parking/unloading area and the E-W vehicle access road. The worker vehicles were assumed to weigh 3 tons and will be driven at an

Table 1 Scenario 1 Source Parameters and Emissions		
Description	Excavation/ Grading Area[a]	Parking/ Unloading Area
Source Type	Area	Area
X-Coord. (m)[b]	97.5	-58.0
Y-Coord. (m)[b]	97.5	119.0
Emission rate	4.67×10^{-6} g/s·m^2	6.62×10^{-7} g/s·m^2
Area[c]	40,480 m^2	16,258 m^2
Release Height (m)	4.0	2.0

[a]The excavation/grading area includes the E-W vehicle access road.

[b]All coordinates are based on an origin located at the southwest corner of the construction area. The coordinates indicate the center of the area sources.

[c]Although the excavation and grading emission calculation is based on 9.45 acres of actual activity, it is assumed for ease of modeling purposes that the excavation/grading and E-W access road emissions are distributed evenly over the entire 10 acre area.

average speed of 13 miles per hour (mph) while the five delivery vehicles were assumed to weigh 10 tons unloaded and 20 tons loaded having 10 wheels each with an average speed of 13 mph. The total length of travel (i.e., entering and exiting) for the parking/unloading area was assumed to be 800 feet while the total length of travel (i.e., entering and exiting) along the E-W access road was assumed to be 1,376 feet.

- For the parking/unloading area and E-W vehicle access road, a 36 percent PM_{10} fraction was assumed based on Section 11.2.1 of AP-42, Volume I, Unpaved Roads. This fraction was used because the fugitive dust emissions calculated were based on vehicle traffic on the parking/unloading area and E-W vehicle access road which are both unpaved.
- A surface roughness length of 50 cm was assumed over the construction area based on Figure 1 of the FDM User's Guide (K.D. Winges, September, 1992).
- A particle density of 1.0 g/cm^3 was assumed. This value is based on the diameter of a unit density sphere that has the same settling velocity as the particulate evaluated.

Table 2 presents the results of the Scenario 1 fugitive dust modeling for the 24 hour averaging period using the meteorological data base for 1985 to 1989. The table lists the overall maximum 24 hour impacts along with maximum 24 hour impacts occurring at the nearest residence (approximately 800 meters west of the site). It should be noted that the five year maximum 24 hour impact occurred along the fenceline while the impacts dramatically decreased with increasing distance from the site as shown by the maximum impacts at the nearest residence. Therefore, it is demonstrated in Table 2 that fugitive dust impacts due to construction activities generate very localized effects. In addition, construction fugitive dust will only be temporary in nature with the most significant portion (i.e., excavation/grading) only occurring for approximately a four month period during the beginning of construction.

Scenario 2 Modeling Approach and Results

This scenario was modeled to determine the maximum 24 hour impacts that occur during the period of peak vehicle traffic at the construction site based on realistic assumptions about the vehicle traffic expected at the construction site. Because this period occurs after the four month excavation/grading period, the fugitive dust emissions due to excavation/grading were not included in the 10 acre construction area emissions. For this scenario, the E-W vehicle access road emissions comprised the total fugitive dust emissions for the 10 acre area.

Table 2
Comparison of Maximum 24 Hour PM_{10} Impacts at the Fenceline and at the Nearest Residences for Scenario 1

Receptor	Maximum 24 Hour Impact ($\mu g/m^3$)				
	1985	1986	1987	1988	1989
Fenceline	36.0	31.9	33.6*	32.1	31.1
Residence**	2.9	3.1	3.1	2.3	2.1

*Maximum impact occurred 10 meters outside the fenceline with a maximum fenceline impact of 33.2 $\mu g/m^3$ which was the third highest impact for 1987.

**Nearest residence receptor with the highest impact.

The source parameters and emissions for Scenario 2 are listed in Table 3. All assumptions and modeling parameters used in Scenario 2 are the same as those used in Scenario 1, with the following exceptions.

- The E-W vehicle access road and parking/unloading area will have vehicle traffic of 91 worker vehicles and 15 delivery trucks per day. These are the maximum vehicle amounts based on the anticipated project construction schedule.
- The 15 delivery trucks will be comprised of 14 trucks weighing 10 tons unloaded and 20 tons loaded with 10 wheels each and 1 truck weighing 20 tons unloaded and 55 tons loaded with 18 wheels.

Table 4 presents the results of the Scenario 2 fugitive dust modeling for the 24 hour averaging period for 1985 to 1989. The table lists the overall maximum 24 hour impacts along with maximum 24 hour impacts occurring at the nearest residence (approximately 800 meters west of the site). It should be noted that the overall maximum 24 hour impacts occurred along the fenceline while the impacts dramatically decreased with increasing distance from the site. Therefore, it is demonstrated in Table 4 that fugitive dust impacts during the peak vehicle traffic period generate very localized effects.

It should be noted that the maximum impacts for Scenario 2 are slightly less than the maximum impacts for Scenario 1. Thus, the highest construction fugitive dust impacts should only occur during the first four months of construction which compises the period of excavation/grading of the site.

Conclusion

Table 5 presents a summary of the maximum 24 hour PM_{10} impacts for each scenario. As shown in the table, the maximum 24 hour impacts for both scenarios are below their respective 24 hour NAAQS and CAAQS of 150 and 50 $\mu g/m^3$, respectively. A comparison of these maximum fenceline impacts to the nearest residential area impacts show the dramatic decrease in impacts with distance along with the insignificant predicted impacts at the nearest residential area. It should be noted that fugitive emissions are currently generated at the project site as a result of tilling conducted by Procter & Gamble as part of their fire hazard control program. Thus, construction emissions will be offset to a certain extent by the elimination of the tilling.

The results of this analysis confirm the CEC's statement that the fugitive dust impacts are considered to be of a very localized nature (PSA, 4/15/94). Thus, project construction will have nearly an insignificant effect upon areas located outside of the construction area. Therefore, the mitigation measures of graveling the parking/unloading area and watering the construction area in accordance with normal construction practices is sufficient fugitive dust emission control, considering the short-term nature of the construction to be performed and the localized nature of any impacts.

Table 3
Scenario 2 Source Parameters and Emissions

Description	Excavation/ Grading Area[a]	Parking/ Unloading Area
Source Type	Area	Area
X-Coord. (m)[b]	97.5	-58.0
Y-Coord. (m)[b]	97.5	119.0
Emission rate[b]	1.80×10^{-6} g/s·m^2	2.68×10^{-6} g/s·m^2
Area[c]	40,480 m^2	16,258 m^2
Release Height (m)	4.0	2.0

[a]The excavation/grading area only includes the E-W vehicle access road.

[b]All coordinates are based on an origin located at the southwest corner of the construction area. The coordinates indicate the center of the area sources.

[c]The emissions are assumed to be distributed evenly throughout this area.

Table 4
Comparison of Maximum 24 hour PM_{10} Impacts at the Fenceline and at the Nearest Residences for Scenario 2

Receptor Distance	Maximum 24 Hour Impact ($\mu g/m^3$)				
	1985	1986	1987	1988	1989
Fenceline	33.5	28.0	27.4	26.2	27.6
Residence*	2.0	2.2	2.2	1.6	1.4

*Nearest residence with the highest impact.

Table 5 Summary of Maximum Results for PM_{10}			
Scenario	Maximum 24 hour Impact[a] $\mu g/m^3$	24 hour NAAQS[b] $\mu g/m^3$	24 hour CAAQS[b] $\mu g/m^3$
1	36.0	150	50
2	33.5	150	50

[a]The maximum 24 hour impact which was predicted for the five years modeled.

[b]The annual NAAQS is an arithmetic mean while the annual CAAQS is a geometric mean.

Appendix A
PM_{10} Controlled Emissions Calculator

PM-10 Calculator

During the Spring of 1992 the Office of Air Quality Planning and tandards (OAQPS) placed two computer files containing PM-10 data on the CHIEF Bulletin Board. CE4PM10 contains PM-10 control efficiencies listed by Source Classification Code (SCC) and control device pair, and PSD4PM10 contains PM-10 size distributions by SCC. These two files, along with information in AP-42 Table C.2-3 "Typical Control Efficiencies of Various Particulate Control Devices," can be used to obtain PM-10 control efficiencies specific to any combination of SCC, primary particulate control device, and secondary particulate control device.

The PM-10 Controlled Emission Calculator, which incorporates these two files and data from AP-42 Table C.2-3, was created to facilitate the development and retrieval of PM-10 control efficiencies from these sources and to apply the control efficiency to a controlled emission amount to calculate PM-10 controlled emissions. It will be particularly useful to States that need to prepare PM-10 State Implementation Plans. It calculates PM-10 control efficiency and controlled emissions for PM-10 point sources with up to two control devices. The program can be run in batch or interactive mode. In interactive mode the user specifies the source, the control devices, and uncontrolled emissions, and the Calculator generates the PM-10 efficiency and the controlled emissions. If necessary, the user can access pop-up lists of Source Classification Codes and AIRS/FS control device and emission unit codes, all with accompanying text escriptions. On-screen help can also be accessed. In batch mode multiple records can be submitted and processed at one time. Output can be viewed on screen, sent to an ASCII text file, and/or sent to a printer. The program permits the user to specify a name, drive, and directory for each input and output file.

The Calculator is in the file PM10CALC.ZIP. After downloading, it must be unzipped using the DOS utility program PKUNZIP.EXE. The unzipped Calculator consists of 27 files which occupy 2,569,203 bytes of disk space. User's are advised to put the program in its own directory. Before running the Calculator, "files" should be set to at least 30 in the DOS CONFIG.SYS file. After changing to the correct directory, the Calculator can be started by typing "runtime pm10calc" and pressing Enter. The User's Manual for the Calculator describes how to activate and deactivate the Calculator's disk caching. CALCMAN.WP is the User's Manual in WordPerfect 5.1/5.2 format. The manual explains how to use the Calculator.

SCC	Process Name	PART Lbs/Unit	PM10 Lbs/Unit	SOx Lbs/Unit	NOx Lbs/Unit	VOC Lbs/Unit	CO Lbs/Unit	LEAD Lbs/Unit	UNITS	NOTES
Fugitive Emissions - 1300										
	Field									
3-10-888-03 -	Specify In Comments Field	---	---	---	---	---	---	---	Process-Unit/Yr	
3-10-888-04 -	Specify In Comments Field	---	---	---	---	---	---	---	Process-Unit/Yr	
3-10-888-05 -	Specify In Comments Field	---	---	---	---	---	---	---	100 Barrel Feed Produced	
BUILDING CONSTRUCTION - MAJOR GROUP 15										
Construction: Building Contractors - 1521, 1522										
3-11-001-01 -	Site Preparation: Topsoil Removal	74.3	20.0	---	---	---	---	---	Vehicle-Miles Travelled	
3-11-001-02 -	Site Preparation: Earth Moving (Cut & Fill)	19.6	4.3	---	---	---	---	---	Vehicle-Miles Travelled	
3-11-001-03 -	Site Preparation: Aggregate Hauling (on dirt)	43.1	10.0	---	---	---	---	---	Vehicle-Miles Travelled	
3-11-001-99 -	Other Not Classified	XXX	XXX	XXX	XXX	XXX	XXX	XXX	Acres of Construction Activity	
Construction: Demolition of Structures - 1521, 1522										
3-11-002-01 -	Mechanical or Explosive Dismemberment	---	0.000051	---	---	---	---	---	Sq. Ft. Demolished Floor Area	
3-11-002-02 -	Mechanical or Explosive Dismemberment	---	0.0011	---	---	---	---	---	Tons of Waste Material	
3-11-002-03 -	Debris Loading	---	0.000093	---	---	---	---	---	Sq. Ft. Demolished Floor Area	
3-11-002-04 -	Debris Loading	---	0.058	---	---	---	---	---	Tons of Waste Material	
3-11-002-05 -	On-Site Truck Traffic	---	0.01	---	---	---	---	---	Sq. Ft. Demolished Floor Area	

C.2.3 How To Use The Generalized Particle Size Distributions For Controlled Processes

To calculate the size distribution and the size specific emissions for a source with a particulate control device, the user first calculates the uncontrolled size specific emissions. Next, the fractional control efficiency for the control device is estimated, using Table C.2-3. The Calculation Sheet provided (Figure C.2-2) allows the user to record the type of control device and the collection efficiencies from Table C.2-3, the mass in the size range before and after control, and the cumulative mass. the user will note that the uncontrolled size data are expressed in cumulative fraction less than the stated size. The control efficiency data apply only to the size range indicated and are not cumulative. These data do not include results for the greater than 10 μm particle size range. In order to account for the total controlled emissions, particles greater than 10 μm in size must be included.

C.2.4 Example Calculation

An example calculation of uncontrolled total particulate emissions, uncontrolled size specific emissions, and controlled size specific emission is shown on Figure C.2-1. A blank Calculation Sheet is provided in Figure C.2-2.

TABLE C.2-3 TYPICAL COLLECTION EFFICIENCIES OF VARIOUS PARTICULATE CONTROL DEVICES[a]
(%)

AIRS Code[b]	Type of collector	Particle size (μm)		
		0 - 2.5	2.5 - 6	6 - 10
001	Wet scrubber - hi-efficiency	90	95	99
002	Wet scrubber - med-efficiency	25	85	95
003	Wet scrubber - low-efficiency	20	80	90
004	Gravity collector - hi-efficiency	3.6	5	6
005	Gravity collector - med-efficiency	2.9	4	4.8
006	Gravity collector - low-efficiency	1.5	3.2	3.7
007	Centrifugal collector - hi-efficiency	80	95	95
008	Centrifugal collector - med-efficiency	50	75	85
009	Centrifugal collector - low-efficiency	10	35	50
010	Electrostatic precipitator - hi-efficiency	95	99	99.5
011	Electrostatic precipitator - med-efficiency boilers	50	80	94
	other	80	90	97
012	Electrostatic precipitator - low-efficiency boilers	40	70	90
	other	70	80	90
014	Mist eliminator - high velocity >250 FPM	10	75	90
015	Mist eliminator - low velocity ≤250 FPM	5	40	75
016	Fabric filter - high temperature	99	99.5	99.5
017	Fabric filter - med temperature	99	99.5	99.5
018	Fabric filter - low temperature	99	99.5	99.5

046	Process change	--	--	--
049	Liquid filtration system	50	75	85
050	Packed-gas absorption column	90	95	99
051	Tray-type gas absorption column	25	85	95
052	Spray tower	20	80	90
053	Venturi scrubber	90	95	99
054	Process enclosed	1.5	3.2	3.7
055	Impingement plate scrubber	25	95	99
056	Dynamic separator (dry)	90	95	99
057	Dynamic separator (wet)	50	75	85
058	Mat or panel filter - mist collector	92	94	97
059	Metal fabric filter screen	10	15	20
061	Dust suppression by water sprays	40	65	90
062	Dust suppression by chemical stabilizer or wetting agents	40	65	90
063	Gravel bed filter	0	5	80
064	Annular ring filter	80	90	97
071	Fluid bed dry scrubber	10	20	90
075	Single cyclone	10	35	50
076	Multiple cyclone w/o fly ash reinjection	80	95	95
077	Multiple cyclone w/fly ash reinjection	50	75	85
085	Wet cyclonic separator	50	75	85
086	Water curtain	10	45	90

[a]Data represent an average of actual efficiencies. Efficiencies are representative of well designed and well operated control equipment. Site-specific factors (e. g., type of particulate being collected, varying pressure drops across scrubbers, maintenance of equipment, etc.) will affect collection efficiencies. Efficiencies shown are intended to provide guidance for estimating control equipment performance when source-specific data are not available. Dash - Not applicable.
[b]Control codes in Aerometric Information Retrieval System (AIRS), formerly National Emissions Data Systems.

Comment	SCC	1ST CTL DVC	2ND CTL DVC	EMISSIONS UNCONTROLLED	EMISSIONS CONTROLLED	EXPONENT	UNITS	EFFNCY (%)	METHOD CODE	ERROR CODE
CONSTR. TPSOIL REM	31100101	062		100	20	0	PH	79.54	g	
CONSTR. CUT & FILL	31100102	062		100	18	0	PH	81.55	g	
CONSTR. AGGR HAUL	31100103	062		100	10	0	PH	90.00	g	
CONSTR. TPSOIL REM	31100101	061		100	20	0	PH	79.54	g	
CONSTR. CUT & FILL	31100102	061		100	18	0	PH	81.55	g	
CONSTR. AGGR HAUL	31100103	061		100	10	0	PH	90.00	g	