SMAQMD BACT CLEARINGHOUSE

ACTIVE

CATEGORY Type: **MISCELLANEOUS**

BACT Category: Minor Source BACT

BACT Determination Number: 360	**BACT Determination Date:** 8/22/2024

Equipment Information

Permit Number: 27736

Equipment Description: OPTICAL WASTE SORTING SYSTEM

Unit Size/Rating/Capacity: 34,000 CFM

Equipment Location: SACRAMENTO RECYCLING & TRANSFER STATION
8491 FRUITRIDGE RD SACRAMENTO, CA

BACT Determination Information

District Contact: Joe Carle Phone No.: (279) 207-1121 email: jcarle@airquality.org

ROCs	**Standard:**	None
	Technology Description:	
	Basis:	
NOx	**Standard:**	None
	Technology Description:	
	Basis:	
SOx	**Standard:**	None
	Technology Description:	
	Basis:	
PM10	**Standard:**	99% Control Efficiency
	Technology Description:	Baghouse
	Basis:	Cost Effective
PM2.5	**Standard:**	99% Control Efficiency
	Technology Description:	Baghouse
	Basis:	Cost Effective
CO	**Standard:**	None
	Technology Description:	
	Basis:	
LEAD	**Standard:**	None
	Technology Description:	
	Basis:	

Comments:

Printed: 8/22/2024

777 12th Street, Suite 300

SACRAMENTO METROPOLITAN AIR QUALITY MANAGEMENT DISTRICT

Sacramento, CA 95814

BEST AVAILABLE CONTROL TECHNOLOGY DETERMINATION

DETERMINATION NOS.: 360
DATE: 08/22/24
ENGINEER: Joe Carle

Category/General Equip Description: Miscellaneous

Equipment Specific Description: Optical Waste Sorting Operation

Equipment Size/Rating: Minor Source

Previous BACT Det. No.: None

This Best Available Control Technology (BACT) determination was performed for an optical waste sorting operation. The process consists of optical sorters and sorting robots to segregate a single stream of recyclables into separate commodities. After the sorter has classified the waste, air compressor jets blow material off the belt into a series of chutes. Each optical sorter has a hood over the air jet area that collects any dust that may be on the material. This BACT was determined under a project for Authority to Construct No. 27736 (USA Waste of California, Inc.). In this project the air is flowing through the exhaust system at a rate of 34,000 cubic feet per minute.

BACT/T-BACT ANALYSIS

A. ACHIEVED IN PRACTICE (Rule 202, §205.1a):

The following control technologies are currently employed as BACT/T-BACT for optical waste sorting operations by the following agencies and air pollution control districts:

US EPA

BACT
Source: EPA RACT/BACT/LAER Clearinghouse

The only determination found in the EPA Clearinghouse that could be compared to this equipment category is as follows:

RBCL ID: KY-0116
Description: The process notes describe this as an aluminum scrap sorting line that uses x-ray transmission imaging. No crushing, grinding, granulating, shearing, or breaking of the aluminum scrap occurs in this unit. The permit was issued on July 25, 2022.

Control Standard: Vented to a baghouse with an assumed minimum capture efficiency of 98% and a minimum particulate matter control efficiency of 90% at a flow rate of 115,440 dscfm.

T-BACT
There are no T-BACT standards published in the clearinghouse for this category.

RULE REQUIREMENTS:
None

California Air Resource Board (CARB)

BACT

BACT Guidelines
Source: CARB BACT Guideline List

There are no BACT standards published in the BACT Guidelines List for this category.

BACT Determinations
Source: CARB BACT Determination List

There are no BACT standards published in the BACT Determination List for this category.

T-BACT
There are no T-BACT standards published in the BACT Guidelines or Determination list for this category.

RULE REQUIREMENTS:
None

Sacramento Metropolitan AQMD

BACT
Source: SMAQMD BACT Clearinghouse (02/14/2024)

There are no BACT standards published in the BACT Clearinghouse for this category.

T-BACT
There are no T-BACT standards published in the BACT Clearinghouse for this category.

RULE REQUIREMENTS:
Rule 404 - Particulate Matter (11/20/1984)

Shall not discharge particulate matter in excess of 0.23 g/dscm (0.1 gr/dscf).

South Coast AQMD

BACT
Source: SCAQMD BACT Guidelines for Non-Major Polluting Facilities (2/2/24)

There are no BACT standards published in the BACT Guidelines for this category.

T-BACT
There are no T-BACT standards published in the BACT Guidelines for this category.

RULE REQUIREMENTS:
Rule 404 – Particulate Matter – Concentration (2/7/1986)

The maximum PM concentration that is allowable is based on the flow rate of the exhaust and is shown in a table in the body of the rule. For a flow rate of 34,000 cfm the maximum PM concentration would be 0.115 g/dscm or 0.05 gr/dscf.

San Joaquin Valley APCD

BACT
Source: SJVAPCD BACT Clearinghouse (Searched 3/1/24)

There are no BACT standards published in the BACT clearinghouse for this category.

T-BACT
There are no T-BACT standards published in the BACT clearinghouse for this category.

RULE REQUIREMENTS:
Rule 4201 – Particulate Matter Concentration (12/17/1992)

Shall not discharge particulate matter in excess of 0.1 gr/dscf.

San Diego County APCD

BACT
Source: NSR Requirements for BACT Guidance Document (November 2023)

There are no BACT standards published in the guidance document for this category.

T-BACT
There are no T-BACT standards published in the guidance document for this category.

RULE REQUIREMENTS:
Rule 52 – Particulate Matter (1/22/1997)

Shall not discharge particulate matter in excess of 0.10 gr/dscf (0.23 g/dscm).

Bay Area AQMD

BACT
Source: BAAQMD BACT/TBACT Workbook (Searched 3/1/24)

There are no BACT standards published in the workbook for this category.

T-BACT
There are no T-BACT standards published in the workbook for this category.

RULE REQUIREMENTS:
Regulation 6 Particulate Matter – Rule 1 General Requirements (8/1/2018)

Shall not emit total suspended particulates (TSP) from any source in excess of 343 mg/dscm (0.15 gr/dscf).

If the potential to emit TSP is greater than 1,000 kg per year the maximum concentration that is allowable is based on the flow rate of the exhaust and is shown in a table in the body of the rule. For a flow rate of 34,000 cfm the maximum PM concentration would be 0.0285 g/dscm or 0.0124 gr/dscf.

Summary of Achieved in Practice Control Technologies

The following control technologies have been identified and are ranked based on stringency:

PM10 & PM2.5

Achieved in Practice Standards for PM for Optical Waste Sorting Systems			
Rank	**Standard/Control Method**	**Source**	**Comments**
1	Vented to a baghouse with a 98% capture and 90% control efficiency	EPA RBLC 7/25/2022	Permit limits exit grain loading to 0.002 gr/dscf (A)
2	Maximum PM concentration determined by table in rule based on exhaust flow rate A flow rate of 34,000 cfm has a maximum PM concentration limit of 0.0124 gr/dscf	BAAQMD Rule 8/1/2018	Ranking based off a flow rate of 34,000 cfm
3	Maximum PM concentration determined by table in rule based on exhaust flow rate A flow rate of 34,000 cfm has a maximum PM concentration limit of 0.05 gr/dscf	SCAQMD Rule 2/7/1986	Ranking based off a flow rate of 34,000 cfm

Achieved in Practice Standards for PM for Optical Waste Sorting Systems			
Rank	**Standard/Control Method**	**Source**	**Comments**
4	Maximum PM concentration limit of 0.1 gr/dscf	SMAQMD, SJVAPCD, & SDCAPCD Rules	
5	No standard	CARB and District BACTs	

(A) Commonwealth of Kentucky Department for Environmental Protection Permit Number: V-22-011; Issued: 7/25/2022; Emission Unit 028 – Scrap Sorting Line #1.

<u>All Other Criteria Pollutants</u>

There are no achieved in practice standards for NOx, VOC, SOx, and CO.

<u>Toxics</u>

There are no achieved in practice toxic standards for this source.

<u>Summary Table</u>

The following control technologies have been identified as the most stringent, achieved in practice control technologies:

Best Control Technologies Achieved in Practice for Optical Waste Sorting Systems		
Pollutant	**Standard**	**Source**
VOC	No standard	N/A
NOx	No standard	N/A
SOx	No standard	N/A
PM10	Vent to baghouse with a capture efficiency of 98% and a control efficiency of 90%	EPA RBLC
PM2.5	Vent to baghouse with a capture efficiency of 98% and a control efficiency of 90%	EPA RBLC
CO	No standard	N/A
Toxics	No standard	N/A

B. TECHNOLOGICALLY FEASIBLE AND COST EFFECTIVE (Rule 202, §205.1.b.):

Technologically Feasible Alternatives:
Any alternative basic equipment, fuel, process, emission control device or technique, singly or in combination, determined to be technologically feasible by the Air Pollution Control Officer.

The table below shows the technologically feasible alternatives identified as capable of reducing emissions beyond the levels determined to be "Achieved in Practice" as per Rule 202, §205.1.a.

Technologically Feasible Alternatives	
Pollutant	**Standard**
VOC	No other technologically feasible option identified
NOx	No other technologically feasible option identified
SOx	No other technologically feasible option identified
PM10	99% control efficiency baghouse
PM2.5	99% control efficiency baghouse
CO	No other technologically feasible option identified
Toxics	No other technologically feasible option identified

Cost Effective Determination:
After identifying the technologically feasible control options, a cost analysis is performed to take into consideration economic impacts for all technologically feasible controls identified.

1. Maximum Cost per Ton of Air Pollutants Controlled

   A control technology is considered to be cost-effective if the cost of controlling one ton of that air pollutant is less than the limits specified below:

Pollutant	Maximum Cost ($/ton)
VOC	26,300
NO_X	36,700
PM10	11,400
SO_X	18,300
CO	300

2. Cost Effectiveness Analysis Summary

This BACT determination will perform a cost effectiveness analysis in accordance with the EPA Air Pollution Control Cost Manual, Sixth Edition, January 2002. The electricity (11.24 cents/kWh) rate is based on an industrial application as approved by the District. The EPA cost manual quotes that the PM control efficiency of baghouses can range from 99% to 99.9%. The cost numbers in the manual do not differentiate between control efficiencies. Therefore, the minimum control efficiency of 99% will be used for this analysis. The life of the equipment was based on the EPA cost manual recommendation. The interest rate was based on the previous 6-month average interest rate on United States Treasury Securities (based on the life of the equipment) and addition of two percentage points and rounding up to the next higher integer rate. The labor (Occupation Code 51-8099: Plant and System Operators - Other) and maintenance (Occupation Code 49-2094: electrical and electronics commercial and industrial equipment repairers) rates were based on data from the Bureau of Labor Statistics. The 1998 costs used in the EPA Cost Manual were adjusted using an inflation rate based on the CPI for an average US city, for all urban consumers, not seasonally adjusted, comparing the first half of 1998 to the second half of 2023. Other equipment specifications such as flow rate and total filter area were taken from what is being proposed in Authority to Construct No. 27736 (USA Waste of California, Inc.).

Baghouse with 99% PM10 Control Efficiency:

As shown in Attachment A, the cost effectiveness for the baghouse to control PM was calculated to be **$1,642/ton** (see attached Baghouse Cost Effectiveness Calculation). The following basic parameters were used in the analysis.

Equipment Life = 20 years for system (2 years for filters)

Control Efficiency = 99%

Total Capital Investment = $461,491

Direct Annual Cost = $121,279 per year

Indirect Annual Cost = $86,247 per year

Total Annual Cost = $207,526 per year

PM Removed = 126.4 tons per year

Cost of PM10/PM2.5 Removal = $1,642 per ton reduced

A detailed calculation of the cost effectiveness for PM removal with a baghouse with 99% control efficiency is shown in Attachment A.

3. Conclusion

In this analysis, the cost of a baghouse with a minimum PM control efficiency of 99% is examined using the specification numbers from what is being proposed in Authority to Construct No. 27736 (USA Waste of California, Inc.). The analysis shows that a baghouse with a minimum PM control efficiency of 99% would be cost effective with a cost of $1,642 per ton, which is less than the $11,400 per ton cost effective threshold for PM10.

C. SELECTION OF BACT:

Based on the above analysis, BACT for PM10 & PM2.5 will be based on what is technologically feasible, which is a baghouse with a minimum PM control efficiency of 99%. There are no/negligible emissions of VOC, NOx, SOx, CO, or HAPs from this type of operation:

BACT FOR AN OPTICAL WASTE STORTING OPERATION		
Pollutant	**Standard**	**Source**
VOC	None	N/A
NOx	None	N/A
SOx	None	N/A
PM10	Baghouse with 99% control efficiency	Technologically feasible
PM2.5	Baghouse with 99% control efficiency	Technologically feasible
CO	None	N/A
HAPs	None	N/A

APPROVED BY: Brian F Krebs **DATE:** 08-22-2024

Attachment A
Baghouse Cost Effective Analysis

BAGHOUSE COST EFFECTIVENESS CALCULATION

EPA AIR POLLUTION CONTROL COST MANUAL, Sixth Edition, EPA/452/B-02-001, January 2002

Cost Effectiveness = $ 1,642.22 $/ton

Equipment

Max allowable grain loading (District Rule 404)	0.1	gr/dscf
Flow Rate	34,000	cfm (A)
Min/hr	60	
Operating hours	24	hours
Operating Days	365	days
gr/lb	7000	
Baghouse control	0.990	
Uncontrolled PM (lb/year)	255291.4	
Controlled Baghouse PM (lbs/year)	2552.9	
PM10 Reduction (tons/year)	126.4	

Cost Estimation

Direct Costs (DC)

Purchased equipment costs (PEC)

Fabric Filter (no insulation)	$	29,168.25	(B)
Bags	$	1,987.50	(C)
Cages	$	3,364.23	(D)
Auxiliary Equipment	$	31,481.57	(E)
Total (A)	$	66,001.55	
Instrumentation=0.1*A	$	6,600.15	
Sales Tax=0.0875*A	$	5,775.14	
Freight=0.05*A	$	33,000.77	
Total=B	$	111,377.61	

Direct Installation costs

Foundation and support=0.04*B	$	4,455.10
Handling & Erection=0.5*B	$	55,688.80
Electrical=0.08*B	$	8,910.21
Piping=0.01*B	$	1,113.78
Insulation for ductwork=0.07*B	$	7,796.43
Painting=0.04*B	$	4,455.10
Total	$	82,419.43
Total Direct Costs (DC)	$	193,797.04

Indirect Costs (IC)

Engineering=0.1*B	$	11,137.76
Construction and field expense=0.2*B	$	22,275.52
Contractor fees=0.1*B	$	11,137.76
Start-up=0.01*B	$	1,113.78
Performance Test=0.01*B	$	1,113.78
Contingencies=0.03*B	$	3,341.33
Total Indirect Cost (IC)	$	50,119.92

Total Capital Investment (DC+IC) in 1998	$	243,916.97	
Total Capital Investment (DC+IC) in Today	$	461,490.90	(F)

Direct Annual Costs

Operating labor			
Operator	$	15,768.00	(G)
Supervisor (15% operator)	$	2,365.20	
Maintenance			
Labor	$	18,374.10	(H)
Material (same as labor)	$	18,374.10	
Replacement parts, bags	$	1,099.27	
Intrest Rate		7%	
Life of bag		2	years
Caplital Recovery Factor		0.55	
Utilities			
Electricity	$	42,415.63	(I)
Compressed air	$	16,905.40	(J)
Waste Disposal	$	5,977.27	(K)
Total Direct Annual Costs	$	121,278.97	

Indirect Annual Costs

Overhead (0.6*(Operating+Supv+Maint labor+Maint Materials)	$	32,928.84	
Admin Charges=0.02(Total Capital Investment)	$	4,878.34	
Property Tax=0.01(Total Capital Investment)	$	2,439.17	
Insurance=0.01(Total Capital Investment)	$	2,439.17	
Interest Rate		7%	
Equipment life (years)		20	
Capital Recovery Factor (CRF)		0.094392926	
Capital Recovery	$	43,561.48	
Total Indirect Annual Costs	$	86,246.99	
Total Annual Cost	$	207,525.96	per year
PM10 Removed		**126.4**	**Tons/year**
Cost of PM10 Removal	**$**	**1,642.22**	**per Ton PM10**

(A) From application for Authority to Construct No. 27736 (USA Waste of California, Inc.)
(B) Figure 1.8; Assumed Comon Housing for Pulse-Jet Filters; Total filter area 3750 sqft (from application)
(C) Table 1.8; Assumed 5-1/8 diameter polyester bags; Bottom bag removal; total filter area 3750 sqft
(D) Table 1.8; Assumed 5-5/8 x 10 ft cages in 100 cage lots; 13.42 sqft filter per cage; total filter area 3750 sqft
(E) Used auxiliary cost on page 1-52 proportional to the gross filter area
(F) 189.2% inflation using CPI for all Urban Consumers, US City Average, not seasonally adjusted from 1998 Half1 to 2023 Half2
(G) Assume $28.80/hr (Bureau of Labor Statistics Mean Hourly Wage for May 2023 for Occupation 51-8099 - Plant and System Operators); 1.0 hrs/shift; 3 shifts/day; 365 days/year
(H) Assume $33.56/hr (Bureau of Labor Statistics Mean Hourly Wage for May 2023 for Occupation 49-2094 - Electrical and Electronic Commercial and Industrial Equipment Repairs); 0.5 hrs/shift; 3 shifts/day; 365 days/year
(I) Using equation 1.17 on pg 1-47; Assume: 10 in H20 (using maximum from first paragraph pg 1-30) and 11.24 cents/kWhr (https://www.electricitylocal.com/states/california/sacramento/ accessed 5/22/24)
(J) Assume: 189.2% inflation (see above) on cost of compressed air in 1998 dollars
(K) Assume: 189.2% inflation (see above) on cost of waste disposal in 1998 dollars