

**San Joaquin Valley  
Unified Air Pollution Control District  
Best Available Control Technology (BACT) Guideline 5.5.2\***

**Emissions Unit:** Snack Chip Ambient Air Cooler    **Industry Type:** Food Manufacturing

**Equipment Rating:**        All

**Last Update:** October 6, 2022

<b>Pollutant</b>	<b>Achieved-in-Practice or contained in SIP</b>	<b>Technologically Feasible</b>	<b>Alternate Basic Equipment</b>
PM <sub>10</sub>	Use properly engineered high velocity air filtration system with oil baffle type filters, or equivalent filter system (70% control)		

\*BACT is the most stringent control technique for the emissions unit and class of source. Control techniques that are not achieved in practice or contained in a state implementation plan must be cost effective as well as feasible. Economic analysis to demonstrate cost effectiveness is required for all determinations that are not achieved in practice or contained in an EPA approved State Implementation Plan.

**\*This is a Summary Page for this Class of Source - Permit Specific BACT Determinations on Next Page(s)**

# Best Available Control Technology Analysis

## Snack Chip Ambient Air Cooler

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## I. Introduction

The objective of this project is review and update the existing Best Available Control Technology (BACT) guideline 5.5.2 for a snack chip ambient air cooler at a commercial snack manufacturing operation (refer to **Appendix B**). These ambient air coolers are used for rapid cooling of snack chips that will immediately stop cooking in a matter of seconds in most cases. In general, during cooling process, external cool low-humidity air is vigorously circulated through the product, which make some water-grease (oily particles) entrain in the exhaust air. The entrained particles are either captured in a oil baffle type filtration system or other similar control devices, before discharging the laden air into the atmosphere.

## II. BACT Categories

BACT guideline, which is the focus of this project, is:

- BACT guideline 5.5.2 – Snack Chip Ambient Air Cooler

As stated in section I above, this BACT guideline can be applied to any commercial snack chip manufacturing operation that produces snack chips (e.g., potato chips, corn chips, etc.) and use snack chip ambient air coolers. The ambient air coolers generates particulate matter emissions. Therefore, discussion is limited to particulate matter emissions control only.

## III. Top-Down BACT Analysis

### A. BACT analysis for PM<sub>10</sub> Emissions

PM<sub>10</sub> is generated from ambient air coolers used in snack chip manufacturing operation.

#### **Step 1 - Identify All Possible Control Technologies**

##### ***BACT Clearinghouse Survey:***

The following BACT clearinghouses were consulted to determine whether any snack chip ambient air cooler at commercial snack making operation have been required to employ emission controls to reduce PM10 emissions:

- EPA RACT/BACT/LAER clearinghouse
- CARB BACT clearinghouse
- South Coast AQMD BACT clearinghouse

- Bay Area AQMD BACT clearinghouse
- Sacramento Metro AQMD BACT clearinghouse
- San Joaquin Valley APCD BACT clearinghouse

EPA RACT/BACT/LAER clearinghouse

The database was searched using the following criteria:

Permit Date: 1/1/2012 to 8/28/2022

Process Type: All Process Types

Process Name Contains: Snack chip, snack, chip

Pollutant Name: All pollutants

No results were found.

CARB BACT clearinghouse

The database (<https://ww3.arb.ca.gov/bact/bactnew/rptpara.htm>) was searched using the following criteria:

Search: Snack

**BACT Guideline List** Data Last Updated 5/19/2022

Agency: San Joaquin Date Filter: 6/27/1991 to 2/3/2022

(All)  
 San Joaquin

snack

Agency	District ID	Date	Title	
San	1.6.3	2/21/2020	Snack Chip Fryer with Indirect-Fired Heat Transfer System	●
Joaquin	1.6.4	6/16/1999	Oven - Snack Food	●
	5.5.1	1/15/2003	Snack Chip Steam-heated Conditioning Units - Fryer and De-oiler	●

None of the guidelines identified above is for a snack chip ambient air cooler system.

South Coast AQMD BACT clearinghouse

The existing determinations under “Part B: Section I – SCAQMD LAER/BACT” were reviewed (<http://www.aqmd.gov/home/permits/bact/guidelines/i---scaqmd-laer-bact>). No relevant BACT determination was found.

The existing determinations under “Part B: Section II – Other LAER/BACT” were reviewed (<http://www.aqmd.gov/home/permits/bact/guidelines/ii---other-laer-bact>). No relevant BACT determination was found.

The existing determinations under “Part B: Section III – Other Technologies” were reviewed (<http://www.aqmd.gov/home/permits/bact/guidelines/iii---other-technologies>). No relevant BACT determination was found.

The draft LAER Part B, Section I and III Draft Proposals were also reviewed ([http://www.aqmd.gov/docs/default-source/bact/proposed\\_updates\\_bact\\_partb\\_draft\\_2-2-18.pdf?sfvrsn=6](http://www.aqmd.gov/docs/default-source/bact/proposed_updates_bact_partb_draft_2-2-18.pdf?sfvrsn=6)). No relevant BACT determination was found.

Further, the draft Major Source, Part D Draft Proposals were also reviewed ([http://www.aqmd.gov/docs/default-source/bact/proposed\\_updates\\_bact\\_guidelines\\_partd\\_draft\\_2-2-18.pdf?sfvrsn=6](http://www.aqmd.gov/docs/default-source/bact/proposed_updates_bact_guidelines_partd_draft_2-2-18.pdf?sfvrsn=6)). No relevant BACT guideline was found.

Bay Area AQMD BACT clearinghouse

The BACT guidelines available on BAAQMD website were reviewed (<http://www.baaqmd.gov/permits/permitting-manuals/bact-tbact-workbook>).

No relevant BACT guideline was found.

Sacramento Metro AQMD BACT Clearinghouse

The BACT guidelines available on the AQMD website were reviewed ([http://www.airquality.org/businesses/permits-registration-programs/best-available-control-technology-\(bact\)](http://www.airquality.org/businesses/permits-registration-programs/best-available-control-technology-(bact)))

SJVAPCD BACT clearinghouse

The current requirements in District BACT guideline 5.5.2 for tortilla chip line ambient air cooler are summarized in the following table:

Pollutant	Achieved in Practice	Technologically feasible	Alternate Basic Equipment
PM <sub>10</sub>	Use of high velocity dust filter (70% control) 0.16 lb/hr		

***Survey of Federal, State and Local Rules and Regulations***

The following rules and regulations were consulted to determine whether any limits apply to seasoner at commercial snack making operation to reduce PM10 emissions:

- New Source Performance Standard
- CARB (no applicable rules)
- South Coast AQMD Regulation XI Rules
- Bay Area AQMD Rules
- Sacramento Metro AQMD Rules
- San Joaquin Valley APCD Regulation IV Rules

Title 40, Chapter I, Subchapter C, Part 60 – Standards of Performance for New Stationary Sources

There is no subpart that is applicable to snack chip production facilities. Therefore, no further discussion is required. Subparts are available at: <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-60?toc=1>

CARB (no applicable rules)

CARB’s website includes rules from local air district related to stationary sources.

South Coast AQMD Regulation XI Rules

Rules in Regulation VII (<http://www.aqmd.gov/home/rules-compliance/rules/scaqmd-rule-book/regulation-xi>) are reviewed. No relevant rule applicable to this were found, except for Rule 1155 applicable to particulate matter control devices. Table 1 (below) in the rule includes summary of the requirements. Visible emissions are required to be monitored at least once for the units vented to a fabric filtration devices with up to 7,500 square feet of filter area. There are no emissions standard or other limitation listed in this rule.

Table 1  
Summary of Requirements

Fabric Filtration PM Air Pollution Control Equipment (baghouses)*			Other Fabric and Non-Fabric Filtration PM Air Pollution Control Equipment (dust collectors, cyclones, ESPs, wet scrubbers)*
Tier 1	Tier 2	Tier 3	n/a
≤ 500 square feet	> 500 – 7,500 square feet	> 7,500 square feet	n/a
Once-a-week visible emissions monitoring and recordkeeping (new, existing)	Once-a-week visible emissions monitoring and recordkeeping (new, existing)	Until BLDS is installed, once-a-week visible emissions monitoring and recordkeeping	Once-a-week visible emissions monitoring and recordkeeping (new, existing)
--	--	BLDS installation (new, existing)	--
--	--	Emission limit (0.01 gr/dscf)	--
--	--	Title V facilities conduct initial source test and test every five years relative to compliance with the emission limit.	--

\* Except as provided in subdivision (g) Exemptions.

Bay Area AQMD Rules

BAAQMD rules (<https://www.baaqmd.gov/rules-and-compliance/current-rules>) were reviewed. Regulation 6 Rule 2 – Commercial Cooking Equipment (12/5/07) was reviewed (<https://www.baaqmd.gov/~media/dotgov/files/rules/reg-6-rule-2-commercial-cooking-equipment/documents/rg0602.pdf?la=en&rev=42fc0966398c43f9b585572708a5ea70>). No requirement were found for snack chip ambient air coolers.

Sacramento Metro AQMD Rules

The AQMD regulation 4 was reviewed (<https://www.airquality.org/Businesses/Rules-Regulations>). Rule 404 –

Particulate matter (11/20/1984), <http://www.airquality.org/ProgramCoordination/Documents/rule404.pdf>, limits particulate matter from a facility engaged in the preparation of canned and preserved fruits and vegetables (SIC group 203). Since the operations at Frito-Lay does not involve canning to preserve fruits and vegetables, the requirements in this rule are not applicable to this facility.

San Joaquin Valley APCD Regulation IV Rules  
Regulation IV (<https://www.valleyair.org/rules/1ruleslist.htm#reg4>) was reviewed. There is no rule that applies to snack chip manufacturing operations.

***Survey of source tests for snack chip food manufacturing operation permits in the SJVAPCD:***

Permits database was queried to identify snack chip ambient air coolers with active permits at snack chip manufacturing operations. The following units were identified. Source tests reports from 2019 to 2021 in permits database are also reviewed.

Facility Name	Permit #	Equipment Description	Source test data/other relevant information
LA TAPATIA TORTILLERIA INC	C-3252-10-0	3.1 MMBTU/HR CASA HERRERA MODEL TCO-150 NATURAL GAS-FIRED OVEN IN SERIES WITH A <b>CHIP COOLER</b> AND A CONVEYORIZED OIL FRYER WITH VENTILATION HOOD AND OIL MIST ELIMINATOR, HEAT EXCHANGER, FEEDING SEASONING AND PACKAGING EQUIPMENT	No test data
FRITO-LAY INC	N-1919-1-10	UTC 1 (TORTILLA CHIP) CONSISTING OF TWO PERMIT EXEMPT PRE-COOKERS (STEAM-HEATED), TWO 3.2 MMBTU/HR (EACH) OVENS (DIRECT-FIRED), ONE COOKER (STEAM-HEATED), ONE MECHANICAL SEASONER AND A HEAT & CONTROL <b>AMBIENT AIR COOLER SERVED BY A HIGH VELOCITY AIR FILTER</b> . THE WET SCRUBBER SERVES THE SEASONER AND IS SHARED WITH PERMIT UNIT N-1919-2.	No data, permit limits were established based on info in project S-950709
FRITO-LAY INC	S-2076-3-9	CORN CHIP PRODUCTION LINE #1 INCLUDING FRYING VAT WITH VENTILATION HOOD AND MIST ENTRAINMENT SEPARATOR, EXHAUST FAN, FRYER HOOD LIFT, SEASONER, FRYER FINES REMOVAL SCREEN WITH AIR CLEANING SYSTEM, AND <b>AMBIENT AIR COOLER SERVED BY HIGH VELOCITY AIR FILTER</b>	<u>Source test 7/28/20</u> 0.025 lb-PM/hr (avg) 0.021 lb-PM10/hr (avg)  Process rate = 2,132 lb/hr  0.020 lb-PM10/ton of process rate*

Facility Name	Permit #	Equipment Description	Source test data/other relevant information
FRITO-LAY INC	S-2076-4-9	TORTILLA CHIP LINE #1 WITH CONVEYORIZED OIL FRYER, HEAT EXCHANGER, SEASONER, 6.83 MMBTU/HR NATURAL GAS FIRED CASA HERRERA OVEN, AND <b>ONE AMBIENT AIR COOLER SERVED BY HIGH VELOCITY DUCT FILTER</b> AND HEAT RECOVERY AND HOT WATER STORAGE SYSTEM SHARED WITH S-2076-5	<u>Source Test 6/12/19</u> 0.039 lb-PM/hr (avg) 0.036 lb-PM10/hr (avg)  Process rate = 2,887 lb/hr  0.025 lb-PM10/ton of process rate*
FRITO-LAY INC	S-2076-5-9	TORTILLA CHIP LINE #2 WITH CONVEYORIZED OIL FRYER, HEAT EXCHANGER, SEASONER, 6.83 MMBTU/HR NATURAL GAS FIRED CASA HERRERA OVEN, AND <b>ONE AMBIENT AIR COOLER SERVED BY HIGH VELOCITY DUCT FILTER</b> AND HEAT RECOVERY AND HOT WATER STORAGE SYSTEM SHARED WITH S-2076-4	<u>Source test 7/27/20</u> 0.021 lb-PM10/hr (avg) 0.026 lb-PM/hr (avg)  Process rate = 1,961 lb/hr  0.021 lb-PM10/ton of process rate*
FRITO-LAY INC	S-2076-8-11	CORN CHIP PRODUCTION LINE #2 INCLUDING FRYING VAT WITH VENTILATION HOOD AND MIST ENTRAINMENT SEPARATOR, EXHAUST FAN, HEAT EXCHANGER, CIRCULATING PUMP, TRANSFER PUMP, FRYER HOOD LIFT, SEASONER, FRYER FINES REMOVAL SCREEN WITH AIR CLEANING SYSTEM, AND <b>AMBIENT AIR COOLER SERVED BY HIGH VELOCITY AIR FILTER</b>	<u>Source test 7/11/19</u> 0.045 lb-PM/hr 0.042 lb-PM10/hr  Process rate = 2,021 lb/hr  0.042 lb-PM10/ton of process rate*
FRITO-LAY INC	S-2076-17-8	BAKED LINE #1 INCLUDING A 9.76 MMBTU/HR NATURAL GAS-FIRED BAKING OVEN, 10 MMBTU/HR NATURAL GAS-FIRED PRIMARY DRYER, STEAM HEATED FRYER WITH OIL MIST ELIMINATOR AND <b>AMBIENT AIR COOLER</b>	No test data
FRITO-LAY INC	S-2076-19-15	PRETZEL LINE #2 INCLUDING 7.3 MMBTU/HR NATURAL GAS-FIRED BAKING OVEN, 4.0 MMBTU/HR NATURAL GAS-FIRED COATER/DRYING OVEN VENTED TO CYCLONE AND BAGHOUSE, 1.25 MMBTU/HR NATURAL GAS-FIRED FINISHING OVEN, <b>5370 CFM AMBIENT AIR COOLER</b> , AND DUST COLLECTION SYSTEM	<u>Source Test 3/4/21</u> 0.012 lb-PM/hr (avg); No PM10 test results reported.  Process rate = 1,262 lb/hr  0.019 lb-PM/ton of process rate*

\*Value is calculated using average PM10 emission rate and process rate

### List of Control Options:

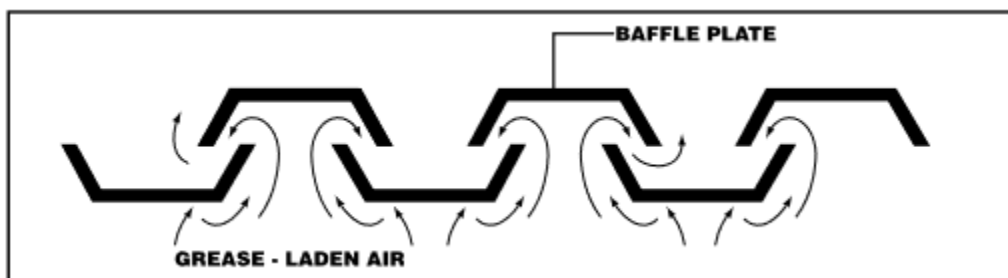
Based on the search of *BACT Clearinghouse Survey, Survey of Federal, State and Local Rules and Regulations and Survey of source test for snack chip food manufacturing operation permits*, shown above, the following emission control options were developed:



- High velocity air filters

Information in the project file for permit S-2076-19 revealed that the high velocity air filters serving the ambient cooler are 20" x 20" x 2" oil baffle style filters. It is assumed the other Frito-Lay installations also use similar oil baffle style filters. These filters are believed to reduce at least 70% of particulate matter emissions generated by a snack chip ambient air cooler.

Literature search of an oil baffle filter revealed that baffle filters are very efficient in extracting grease (oil particles) from the exhaust stream<sup>1</sup>. The following schematic shows arrangement of oil baffle filter.



As high velocity laden exhaust air containing moisture and oil particles is discharged through the baffles, heavier particles carried in the air are forced to pass through a narrow channel created using baffle plates. Due to the inertial force of heavier particles greater than air surrounding them, most heavier particles strike the baffle plate with considerable force causing them to splatter on the baffle surface. The lighter particles that are still entrained in the air are subjected to change their direction slightly perpendicular along the baffle plate causing them to impinge onto the inner surfaces of the baffles in the same manner in which the heavier particles impinged on the entering surface. The design of a several baffle surfaces provides impingement surface and rapid direction changes causing most of the oil particles to fall from the laden exhaust air stream. The collected particles (oil grease) flows through the trough which is generally coated with TEFLON coating. The grease slides down to the trough and typically flows into a collecting channel around the filter. The collected grease is periodically emptied from the collecting channels.

Beside the high velocity baffle filters discussed above, other technologies such as water scrubber may also be used.

<sup>1</sup> [https://www.filtersales.com/pdf/flame\\_gard\\_grease\\_filters.pdf](https://www.filtersales.com/pdf/flame_gard_grease_filters.pdf)

Therefore, the following technologies can be used to reduce PM10 emissions from snack chip ambient air cooler:

- High velocity air filters
- Wet scrubber

## Step 2 - Eliminate Technologically Infeasible Options

### Wet scrubber:

Scrubbers are used to remove air pollutants by inertial or diffusional impaction, reaction with a sorbent or reagent slurry, or by absorption of pollutant(s) into liquid solvent. These devices are commonly employed for controlling inorganic gases<sup>2</sup>. These devices are not used for reducing fine particulate matter because of high liquid to gas ratios (22.4 gallons per 1,000 cubic feet of air) are required<sup>3</sup>. These devices generate additional waste streams that in some cases needs to be hauled to a waste treatment facility creating additional indirect emissions. These devices also require additional electricity, additional space, etc. The lower bound of scrubber's control efficiency is about 70%<sup>3</sup>, which is similar to other more prominent technologies such as high velocity filtration system, which do not create such additional waste stream and require additional utilities (waste water, electricity, space etc.). Also, high particulate matter exhaust streams tend to clog these devices<sup>1</sup>, which require more frequent maintenance and downtime. Moreover, as noted in *survey of source tests for snack chip food manufacturing operation permits in the SJVAPCD* above, none of snack chip ambient air coolers use wet scrubber to reduce particulate matter emissions. Therefore, use of wet scrubber technology is deemed infeasible for the snack chip ambient air cooler systems.

## Step 3 - Rank Remaining Control Technologies by Control Effectiveness

Pollutant	Achieved in Practice	Technologically feasible	Alternate Basic Equipment
PM10	Use properly engineered high velocity air filtration system with oil baffle type filters, or equivalent filter system (70% control)	None	None

A note on the control effectiveness, Frito-Lay, Inc. will be required to conduct a source test to determine the effectiveness of a high velocity air filtration system.

<sup>2</sup> <https://www3.epa.gov/ttnca1/dir1/fpack.pdf>

<sup>3</sup> <https://www3.epa.gov/ttnca1/dir1/fsprytwr.pdf>

Source test result may be used to administratively amend/increase the current achieved-in-practice control of 70% listed above.

#### **Step 4 - Cost Effectiveness Analysis**

There is no technologically feasible or alternate basic equipment listed in Step 3 above. Therefore, cost-effectiveness analysis is not required.

#### **Step 5 - Select BACT**

The BACT for the proposed snack chip ambient air cooler is to use properly engineered high velocity air filtration system capable of reducing at least 70% of PM<sub>10</sub> emissions.

## **IV. Recommendation**

Upon approval, the attached guideline is recommended to be adopted into District's BACT Clearinghouse.

### **Appendices**

- A: Draft BACT Guideline
- B: Existing BACT Guideline 5.5.2

**Appendix A**  
**Draft BACT Guideline**

**San Joaquin Valley  
Unified Air Pollution Control District  
Best Available Control Technology (BACT) Guideline 5.5.2\***

**Emissions Unit:** Snack Chip Ambient Air Cooler    **Industry Type:** Food Manufacturing

**Equipment Rating:** All

**Last Update:** October 6, 2022

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PM <sub>10</sub>	Use properly engineered high velocity air filtration system with oil baffle type filters, or equivalent filter system (70% control)		

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**Appendix B**  
**Existing BACT Guideline 5.5.2**

**Best Available Control Technology (BACT) Guideline 5.5.2 A**

**Emissions Unit:** Tortilla Chip Line,  
Ambient Air Cooler      **Equipment Rating:** 3300 lb/hr

**Facility:** Recot, Inc      **References:** ATC #: S-2076-21-0  
Project #: 950709

**Location:** Bakersfield      **Date of Determination:** 10/1/1995

**Pollutant**      **BACT**

CO      BACT NOT TRIGGERED

NOx      BACT NOT TRIGGERED

PM10      High velocity dust filter (70% control) 0.16 lb/hr

SOx      BACT NOT TRIGGERED

VOC      BACT NOT TRIGGERED

**BACT Status**

**Comment**

Achieved in Practice