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From: Barbara Cenalmor
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Technical Support Document
Proposed Title V Permit
Frito-Lay, Inc.
Permit # V20638.000

1. BACKGROUND

1.1 Applicant/Application History

This Title V permit revision pertains to an existing snack food processing and packaging operation, owned and operated by Frito-Lay, Inc. a Delaware corporation. The SIC Code is 2096. The facility is located at 1450 W. Maricopa Highway, Casa Grande, Pinal County, Arizona, upon a parcel also identified by Pinal County Assessor's Parcel # 503-35-001-A6.

This facility has historically been a Class II source until now. The applicant proposes to add a steam-producing biomass boiler, which will increase allowable emissions of Nitrogen Oxides (NOx) to above the Class I Title V threshold of 100 tons per year.

This analysis reflects consideration of (at least) the following:

- Permit application received on September 29, 2009, signed by Jaime Chon, VP of Operations Mountain Region on 9/28/09.
- Facility-wide PM2.5 emissions, e-mailed by Ron Martin on 10/7/09.
- Uncontrolled facility-wide emissions, e-mailed by Cedric Robinson on 10/14/09.
- Clarification on NOx potential emissions from existing boiler, e-mailed by Cedric Robinson on 11/3/09.
- Information about the biomass SCR system e-mailed by Cedric Robinson on 12/7/09.
- New biomass boiler HAPs calculations including a maximum 1% contamination of wood supply e-mailed by Cedric Robinson on 2/18/10.
- Responses to questions including information on the biomass boiler electrostatic precipitator and the design of the flyash removal system, e-mailed by Cedric Robinson on 3/17/10 and 3/31/10.
- Emissions calculations for the On-Machine Seasoning system at the Sun Chips line, e-mailed by Cedric Robinson on 4/13/10.
- HAP impact analysis for the biomass boiler, e-mailed by Cedric Robinson on 4/13/10.
- Revised HAP impact analysis for biomass boiler, e-mailed by Scott Weaver (SAIC) using more conservative estimates for TDF pollutants.
- Details of PM2.5 Emission Factors, e-mailed by Scott Weaver (SAIC) on 7/1/2010.

1.2 Attainment Classification

This facility is located in an area currently designated as attainment for all pollutants.

1.3 Permitting History

This facility's food processing and packaging operation has historically been permitted with a Class II permit. The most current permit B30826.R01 was issued on 5/2/08 and it was a revision to add the Sun Chips Line. The facility has been permitted since before 1993.

1.4 Compliance/Enforcement History

This facility was last inspected in 2008 and found to be in compliance. There have been no enforcement actions taken in the past.

2. PROCESS DESCRIPTION

2.1 General Process

The facility includes 5 processing lines for the different types of products that Frito-Lay manufactures: Sun Chips, corn chips, tortilla chips, potato chips and fried cheese puffs. Besides the grain receiving and handling and grain milling , the different lines require steam for kettles, fryers and dryers. The existing fuel burning equipment (boiler, ovens, flare) have historically only been allowed to burn natural gas or propane.

This permit authorizes the unlimited use of a 78.3 MMBtu/hr biomass-fueled boiler to generate steam, equipped with a multiclone and electrostatic precipitator stack control systems, as well as a fuel handling system and fly ash handling system. The existing 79.2 MMBtu/hr natural gas boiler, which is limited to 2160 hours of propane burning, will be kept to supplement or as backup for the biomass boiler.

The boiler is also equipped by a Selective Catalytic Reduction control system which will be used in the future to control emissions of Nitrogen Oxides (NOx).

2.2 Biomass Boiler

The biomass boiler will include a fuel handling system consisting of the following process:

1. "Wood waste" will be the primary source of fuel and will be delivered via covered tractor trailer into a concrete bunker. The wood waste will arrive on site pre-screened and pre-chipped so there will be no wood processing at the facility.
2. Tire Derived Fuel ("TDF") will be delivered to the facility via dump truck into a TDF bin. "Wood waste" will be delivered via dump truck into a concrete bunker.
3. The wood fuel will be transported by a drag chain through a sifter screen to remove any large debris.
4. The wood fuel will be conveyed by an incline belt where it will be combined with the TDF as needed.
5. The biomass fuel (wood + TDF) will pass through a magnet conveyor near the end of the incline belt which is designed to remove any residual metals (mostly copper, iron, and nickel) which could still be present in the fuel source and which could generate toxics.
6. The fuel will drop into a hopper before it enters the boiler.

Frito-Lay is proposing to use "wood waste" and TDF as biomass fuel. "Wood waste" can include wood from demolished buildings, green wood waste: tree clippings, limbs and cuttings, forest product waste and bark, wood pallets, sawdust and sanderdust, and pelletized grass and leaves. Wood waste will contain less than 1% total by weight of any or any combination of the following contaminants: plastics, rubber, glass, painted wood (including leaded paint), chemically treated wood (e.g., chromium, copper, arsenic, creosote, or pentachlorophenol), metals and salts. The TDF will be limited to 7% of the total fuel source heat input annually. These limitations are addressed in section 3 of this document.

Fly ash will be generated by the biomass boiler. In order to minimize fugitive emissions from the handling of fly ash, Frito-Lay will collect the ash at 4 collection points each with a control valve to prevent system overload and malfunction. The flyash will be conveyed via an enclosed drag chain conveyor to a drop chute which directs it to a tarped collection bin. PM10 and PM2.5 emissions are expected at the transfer point between the drop chute and the collection bin. The ash bins will be properly discarded by a vendor.

Frito-Lay will be installing a multi-clone/electrostatic precipitator (ESP) system to control particulate matter (PM10 and PM2.5) emissions from the biomass boiler. The multi-clone consists of several smaller cyclones arranged in series to remove larger particles from the gas stream. The electrostatic precipitator will be arranged in series with the multi-clone, and will be removing finer particles from the gas stream using the force of an induced electrostatic charge.

Frito-Lay will also be installing a Selective Catalytic Reduction (SCR) system which employs ammonia injection to reduce emissions of nitrogen oxides (NOx). Since SCR testing or manufacturing data is not available for biomass boilers of this size, Frito-Lay is not claiming any NOx reduction efficiency until they conduct a series of tests and trials. It is estimated that this tests and trials will prolong for approximately 2 years. Once data is obtained, Frito-Lay will submit a revision application to have the expected emission reduction included in their permit.

2.3 Product Lines

2.3.1 Corn Transfer and Cleaning (Existing Operation)

Frito-Lay receives whole corn via hopper truck and rail car. The raw materials are unloaded to two corn silos for storage. From the silos, the corn is mixed with a natural conditioning agent and water and is metered into steam-jacketed kettles where the raw materials is pre-cooked. From the kettles, the material is emptied into a multi-tank system for soaking, prior to being rinsed, drained, and reconstituted. The reconstituted material is used in the fried corn chip line and the fried tortilla chip line. A description of the emission and calculations is included in section 3 of this document.

2.3.2 Fried Potato Chip Line (Existing Operation)

Raw materials are delivered by truck or railcar and conveyed to in-plant storage facilities. From storage, these materials are metered through the manufacturing process where the are prepped, inspected, cooked in vegetable oil, seasoned and conveyed to packaging.

Particulate matter emissions from these process originate from the fryer (cooker) and the primary seasoner. Raw materials are cooked in vegetable oil, which is steam-heated in a heat exchanger and circulated through the cooker. During the cooking process, the raw materials release water vapor and absorb vegetable oil. Emissions directly off the cooker consist of water vapor with entrained vegetable oil particles, which are drawn up through the cooker hood exhaust stacks into a water-based scrubber. After cooking, a pneumatic seasoning system is used to apply seasoning to the product. The design of this system includes enclosures, vacuum capture plenums and an evacuation and control system, which is vented to the atmosphere. Additional seasoning is then applied by means of a mechanical seasoner, located within the processing area. The chips are seasoned via dispersion of flavoring in powder form into a mixing tumbler. The seasoning dispersion system consists of a bag dump station feeding a helix conveyor that in turn transfers the powder to a hopper for the actual feed into the tumbler. The seasoning tumbler is cylindrical in shape with reduced openings on both ends to allow for feed/discharge of product during continuous operation.

A description of the emission and calculations is included in section 3 of this document.

2.3.3 Fried Corn Chip Line (Existing Operation)

The reconstituted material from the corn cleaning system is shaped, cut, and cooked in vegetable oil. The vegetable oil is steam-heated in a heat exchanger and continuously circulated through the fryer (cooker). The finished product is then seasoned, cooled and conveyed to packaging.

This line is equipped with a high efficiency oil mist eliminator (OME) and an ambient cooler, downstream from the fryer, which is used to cool the product and is also a source of particulate matter. The application is seasoning is done in a mechanical seasoner and therefore no emissions are generated. The mechanical seasoner operates in the same manner as the one described for the Potato Chip Line. A description of the emission and calculations is included in section 3 of this document.

2.3.4 Fried Tortilla Chip Line (Existing Operation)

The reconstituted material from the corn cleaning system is shaped and then baked/toasted in 2 ovens, cooled, preconditioned and cooked in vegetable oil. The oil is steam-heated in a heat exchanger. This line is equipped with an ambient air cooler. The finished product is seasoned, cooled and conveyed to packaging. The seasoning is done in a mechanical seasoner. The mechanical seasoner operates in the same manner as the one described for the Potato Chip Line.

Emissions are generated at 3 different places on this line: the ovens, the fryer and the ambient air cooler. A description of the emission and calculations is included in section 3 of this document.

2.3.5 Fried Cheese Puff Line (Existing Operation)

Corn meal is received in pre-ground form and stored in a silo. From the silo, it is fed into a mixer where it is blended with water before entering the 4 steam-heated extruders. After the extruders, the product is fed into the oil cooker. The cooker is also seam-heated. The cooker is equipped with an oil mist eliminator. The cooked product is conveyed to a seasoning applicator, cooled and sent for packaging. A scrubber is used to control emissions from seasoning the product.

Emissions are generated at the silo, extruders (which are vented through a rotoclone for fine particle removal), fryer, ambient air cooler and slurry skid fume scrubber. A description of the emission and calculations is included in section 3 of this document.

2.3.6 Sun Chips Line (Existing Operation)

Sun Chips are manufactured from both whole wheat and corn. Whole wheat berries are vacuum unloaded from a railcar into bulk silos. Then they are vacuum transferred to a wheat cleaner. The berries are then transferred from the cleaner to a received above a cooking kettle. The berries are finally discharged from the receiver into the cook kettle and from there to the extruder. Whole corn is received by railcar and transferred to a hammermill which exhausts into a Roto-clone, and then to a sifter and a mixer. Seasonings are also transferred from the “Super Sack” silo to the mixer with the corn. The seasoned corn product is then transferred to a weigh belt and then to the extruder. In the extruder, both wheat and corn product are used together to manufacture the desired product. After the extruder, the product is fried in a steam-heated deep fryer equipped with a high efficiency oil mist eliminator to recover process oil. After the fryer, an ambient cooler cools the product for packaging. Particulate matter emissions are generated from the corn and wheat handling, at the hammermill and during the frying process.

As part of this Title V permit application, permittee is disclosing the installation of an On-Machine Seasoning system, which had not been permitted before. This seasoning system is made up of several small tumblers, and it will service 8 packaging tubes to produce bags of chips. Maximum capacity of the OMS system is limited by the capacity of the packaging tubes (2,300 lb/hr for each of the 7 small-bag tubes and 1,400 lb/hr for one large-bag tube). A dust collector will be installed to control the seasoning dust in the packaging area. The dust collector has been installed for employee comfort, and not necessarily to reduce emissions for compliance purposes. During a site visit on 6/3/2010, PCAQCD confirmed that the OMS dust collector exhausts back into the building, therefore it is not considered an emissions unit.

2.4 Fuel Burning Equipment

In addition to the product lines and the new biomass boiler, the facility includes the following fuel burning equipment:

1. (2) - 5.383 MMBut/hr ovens for the Tortilla Chip line. The permit allows these ovens to burn natural gas as main fuel and up to 2160 hours of propane[1]per year each as backup.

2. 79.2 MMBtu/hr boiler to generate steam. It burns natural gas mainly but it is also allowed 2160 hours per year of propane use.

3. 0.415 MMBtu/hr starch dryer. It burns natural gas mainly but it is also allowed 2160 hours per year of propane use.

4. 1.5 MMBtu/hr propane flare used to test the propane delivery system or for gas blowdown.

3. EMISSIONS

3.1 Biomass Boiler, Fly Ash Collection System and Fuel Handling System (NEW)

3.1.1 Combustion Pollutants (CO, NOx, PM10/PM2.5, SO2, VOCs)

The stoker design boiler has an input rating of 78.3 MMBtu/hr, and according to manufacturer data, can produce 60,000 pounds of steam per hour. Initial emission estimates for the boiler have been calculated using manufacturer emission factors (in lb/MMBtu) for NOx, CO and VOCs. Emission factors from AP-42, Table 1.6-1 were used for PM10 (uncontrolled), PM2.5 (uncontrolled) and SO2 emissions (in lb/MMBtu). Combustion emissions were calculated based on a the total heat input, 78.3 MMBtu/hr. In addition, SO2 emissions were also calculated using an emission factor from "Air Emissions from Scrap Tire Combustion", October 1997 (EPA-600/R-97-115), http://www.epa.gov/ttn/catc/dir1/tire_eng.pdf, in lb/MMBtu , which reflects burning of 90% woodwaste and 10% TDF.

For controlled emissions for PM10 and PM2.5, the applicant used manufacturer guaranteed emission factors from the ESP's manufacturer. Uncontrolled emissions calculations with the corresponding emission factors are included in Attachment 3 of this document.

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[1] This limitation was taken by Frito-Lay during previous revisions in order to maintain their emissions below 50 tpy and therefore avoiding higher "synthetic minor" fees.

No NOx emission reduction is being applied at this time from the use of an SCR.

3.1.2 Hazardous Air Pollutants (HAPs)

Since this boiler will be burning wood-type materials as well as TDF, the applicant calculated total HAP emissions for both.

The applicant looked at two sources of emission factors for HAP emissions from wood burning and for each HAP chose the most conservative factor of the two sources. These 2 sources are the National Council for Air and Stream Improvement (NCASI), www.ncasi.org , and AP-42, Table 1.6-3. In most cases, the NCASI factors were the most conservative of the two. These emission factors are in lb/MMBtu.

For the wood burning, HAPs analysis includes the impact of the <1% of contaminants allowed by the permit, based upon laboratory results provided by Frito-Lay's fuel supplier from a representative waste wood sample. This 1% can come from plastics, rubber, glass, painted wood (including lead), chemically treated wood, metals and salts. The emissions resulted from this analysis were added to the total HAPs emitted from the facility. The results do not show specific concentrations of lead, but assuming that at least a fraction of the 1% could be lead based painted wood, PCAQCD assumes some lead emissions could be generated, even if insignificant. More accurate results of such emissions will be demonstrated during the feedstock testing regimen imposed by the permit and during the first and subsequent rounds of mandatory performance tests, which require results of metal HAPs emitted, including lead.

For TDF burning, the applicant used factors from the EPA report for controlled burning of biomass, "Air Emissions from Scrap Tire Combustion", October 1997 (EPA-600/R-97-115), http://www.epa.gov/ttn/catc/dir1/tire_eng.pdf . These emission factors are in lb/MMBtu. AP-42 factors were dismissed since they are for open burning of biomass, and controlled burning factors seem more appropriate.

Total HAP emissions were calculated by adding the worst-case HAPs generated by burning wood (93% of the total Heat Input, or 72.82 MMBtu/hr), the HAPs generated by burning TDF (assumed total Heat Input instead of 7% to be conservative[2]), and the HAPs generated by allowing up to 1% contaminants in the fuel.

> *HAP PTE (tons/yr) = [Worst Case HAPs$_{wood}$(lb/MMBtu) x Wood Heat Input (MMBtu/hr)] + [HAPs$_{TDF}$ (lb/MMBtu) x Heat Input[3] (MMBtu/hr)] + [HAPS $_{1\%cont}$]*

3.1.3 PM10/PM2.5 from Fuel Handling System

The application included emissions calculations for the handling of the fuel (wood) at the following emission points: Transfer from dump trucks to storage pile, transfer from storage pile to conveyor, transfer from conveyor to boiler, and wood waste hauling[4]. Given the lack of specific emission factors for the handling of wood chips, wood waste and sawdust, the applicant used emission factors (in lb/ton) for aggregate handling from AP-42 Section 13.2.4. For such formula

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[2] 7% of the heat input corresponds to approximately 1549 tons per year of TDF or 4.24 tons per day.

[3] HAPs calculations from TDF use were done using total fuel input (78.3MMBtu/hr) because cited emission factors are for a 7% TDF in natural gas. Using the boiler's total fuel input ensures a more conservative estimate.

[4] The fuel handling area is paved.

Frito-Lay used a mean wind speed of 6.2 mph, based on 2008 National Weather Data for the area. Frito-Lay has indicated that the moisture of the fly ash will vary during operations and estimated an average moisture of 10% based on engineering estimates from exiting biomass boilers. PCAQCD conducted a review of other approved biomass boiler permits around the country, and specifically within EPA Region 9 and found that these factors are commonly used in lieu of specific factors for this type of operation. Calculations were conducted based on a fuel throughput of 17,294 pounds per hour, per boiler manufactured data.

While the use of aggregate handling emission factors could be appropriate for the handling of wood chips or wood pellets, PCAQCD is concerned about sawdust and sanderdust handling. But again, except for some factors on EPA's Factor Information Retrieval System database that were revoked several years ago, no EPA-approved emission factors were found that would characterize such emissions. Therefore, in order to protect the 24-hour PM10 and PM2.5 NAAQS, Permittee has voluntarily accepted a 10% opacity limitation as determined by EPA Method 9 and a 20% opacity limitation as determined by EPA 203C (more stringent than the generally applicable local or federally enforceable standards), which seems more appropriate than limiting the annual use of sawdust or sanderdust.

3.1.4 PM10/PM2.5 from Fly Ash Collection

In order to minimize fugitive emissions from the handling of fly ash, Frito-Lay will collect the ash at 4 collection points (one at the ESP, 2 at the multiclone, one at boiler). Each point will have a control valve to prevent system overload and malfunction. The ash will be conveyed (enclosed conveyors) to a drop chute which directs it to a tarped collection bin (hopper). Hoppers are replaced by plant personnel as they are filled. Only authorized vendors are allowed to remove full bins. Particulate matter emissions from the transfer of the ash from the conveyor system to the hopper have been estimated using the AP-42 emission factor calculated per the formula listed in 13.2.4 for Aggregate Handling and Storage. For such formula Frito-Lay used a mean wind speed of 6.2 mph, based on 2008 National Weather Data for the area. Frito-Lay has indicated that the moisture of the fly ash will vary during operations and estimated an average moisture of 10% based on engineering estimates from exiting biomass boilers. Also, Frito-Lay has calculated a maximum ash production of 2207.5 tons per year based on the boiler combustion efficiency.

In order to account for the variability of the ash moisture content, and given the lack of site-specific information, the applicant has voluntarily accepted a 10% opacity limitation as determined by EPA Method 9 and a 20% opacity limitation as determined by EPA 203C (more stringent than the generally applicable local or federally enforceable standards).

Even under the assumption that the moisture content of the ash is a lot lower than estimated by Frito-Lay, 0.1% for example, fly ash emissions would only increase to 217 pounds per year.

3.2 Product Lines

Attachment 2 of this technical support document summarizes emissions from the production lines. The following subsections summarize the calculation methodologies.

3.2.1 Corn Receiving and Transfer (Existing Operation)

PM10 and PM2.5 emissions from the corn receiving and transfer system are determined using EPA's AP-42, Section 9.9.1 Grain Elevators and Processes. Emissions from the corn silos (EPN 25A/25B) are accounted for in the emissions estimate from the corn receiving and transfer system.

3.2.2 Corn Cleaning (Existing Operation)

PM10 and PM2.5 emissions from corn cleaning were also determined using AP-42, Table 9.9.1-1 emission factors. Those emission factors are for internal vibrating cleaners with a cyclone used as a control device. The grain cleaning at Frito-Lay uses a baghouse which is expected to be more efficient and therefore the emission factor should be adequately conservative.

3.2.3 Potato Chip Fryer (Existing Operation)

PM10 and PM2.5 emissions from the fryer are vented through a scrubber (9C/11C). Emissions from the scrubber were calculated using stack test results from similar equipment at other Frito-Lay facilities. The emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Average material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.4 Corn Chip Fryer (Existing Operation)

Particulate matter (PM10 and PM2.5) emissions from the corn chip fryer (15A) are calculated based on stack testing results for similar equipment (and no control devices) at other Frito-Lay plants. A control efficiency of 90% was assumed for the high efficiency oil mist eliminator (OME). The emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Average material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.5 Ambient Air Cooler (Existing Operation)

Particulate matter (PM10 and PM2.5) emissions from the ambient air cooler were calculated based on stack testing results for similar equipment at other Frito-Lay plants for tortilla chip production lines. The emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Median material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.6 Tortilla Chip Fryer (Existing Operation)

Particulate matter emissions (PM10 and PM2.5) from the tortilla chip fryer are calculated based on stack testing results for similar equipment (and no control devices) at other Frito-Lay plants. A control efficiency of 90% was assumed for the high efficiency oil mist eliminator (OME). The emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.7 Ambient Air Cooler (Existing Operation)

Particulate matter emissions (PM10 and PM2.5) from the ambient air cooler were calculated based on stack testing results for similar equipment at other Frito-Lay plants for tortilla chip production lines. The emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.8 Corn Meal Silo (Existing Operation)

The unloading and transfer of corn meal to and from the corn silo occurs through an enclosed, pneumatic system. Displaced air is vented to a dust collector (EPN 19) for control of particulate matter (PM10 and PM2.5). Emissions were calculated assuming the exit grain loading of the fabric filter is 0.01 grains/dry standard cubic feet (gr/dscf) and an exhaust flow rate of 2,222 scf/hour.

3.2.9 Extruder Emissions (Existing Operation)

The annual emission rate for the 4 extruders was calculated based on the combined hourly throughput for the 4 extruders which is 2600 lb/hr, and annual operations of 8760 hours per year.

Stack testing results for similar equipment at other Frito-Lay plants was used. These stack tests were for extruders equipped with a Rotoclone. The extruders at this plant are all exhausted through a single Rotoclone (EPN 20). Since the stack tests were conducted downstream of the Rotoclone, no additional efficiency has been claimed for the use of the control device. The particulate matter emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.10 Cheese Puff Fryer (Existing Operation)

The annual emission rate for the fryer was calculated based on a maximum through put of 2600 lb/hr limited by the extruders, and annual operations of 8760 hours per year.

Stack testing results for similar equipment at other Frito-Lay plants was used. The particulate matter emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.11 Ambient Air Cooler (Existing Operation)

Particulate matter emissions from the ambient air cooler were calculated based on stack testing results for similar equipment at other Frito-Lay plants for tortilla chip production lines. The emission factor was calculated as follows:

$$\text{EF (lb/ton)} = \frac{50^{th}\text{ percentile emission rate (lb/hr)}}{\text{Median material throughput during testing (lb/hr)}} \times 2000\text{ lb/ton}$$

3.2.12 Slurry Skid Fume Scrubber (Existing Operation)

PM10 and PM2.5 emissions from the scrubber were calculated assuming an outlet grain loading of 0.01 grains/dry standard cubic feet (gr/dscf) and a flow rate of 500 scf/minute.

3.2.13 Sun Chips Fryer/High Efficiency OME (Existing Operation)

The annual emission rate for the fryer was calculated, based on a maximum throughput of 3600.40 lb/hr, and annual operations of 8760 hours per year.

Stack testing results for similar equipment at another Frito-Lay plants was used to estimate emissions. The facility will be conducting its own emissions test in 2010.

3.2.14 Grain handling - Corn and Wheat Berries (Existing Operation)

Particulate matter emissions from the grain handling of the Sun Chips line were calculated using emission factors from AP-42 Table 9.9.1-1. The grain handling involves the following operations: corn receiving from railcar, whole corn transfer to hammermill, transfer from hammermill to sifter, transfer from sifter to mixer, transfer from super sack to mixer, transfer from mixer to weighbelt, and transfer from weighbelt to extruder. Additionally, wheat berries are also received from railcar and vacuum unloaded into bulk silos. From the silos they go to the cleaner and vacuum transferred to a receiver above the cook kettle.

3.2.15 Hammermill (Existing Operation)

Particulate matter emissions were calculated using an emission factor from AP-42 Table 9.9.1-2. PM10 emissions were estimated to be 50% of the filterable PM. This emission factor is for controlled emissions, and this hammermill's emissions are controlled by a rotoclone.

3.2.16 On-Machine Seasoning System (New Operation)

Frito-Lay has estimated that approximately 0.5% of the weight of the seasoning is emitted into the air as particulate matter. By installing a 99% control efficient dust collector, the emission factor was reduced to 0.005 % by weight. Assuming maximum seasoning is specified at 7% of the total product weight, and based on 1400 lb/hr maximum production capacity for big bag chips and 2300 lb/hr for small bag chips, this operation generates 5.39 tons per year of uncontrolled PM10, or 0.05 tons per year controlled PM10. This piece of equipment was just recently determined by PCAQCD to not be an emissions unit since the dust collector exhausts inside the building and no emissions are vented to the atmosphere.

3.3 Other Fuel Burning Equipment

3.3.1 Tortilla Chip Ovens (Existing Operation)

Emissions from the tortilla chip ovens were calculated using emission factors from AP-42 Section 1.4 for natural gas combustion and Section 1.5 for propane combustion. Carbon Monoxide (CO) emissions were calculated using an emission factor from a similar oven at another Frito-Lay facility. The ovens are limited to burning propane only 2160 hours per year each. Worst case scenario emissions for natural gas/propane were used for purposes of calculating potential emissions.

3.3.2 Production boiler (Existing Operation)

The emissions from the 79.2 MMBtu/hr boiler were also calculated using emission factors from AP-42 Sections 1.4 and 1.5. This boiler is also limited to 2160 hours of propane combustion per year.

3.3.3 Starch Dryer (Existing Operation)

The emissions from the 0.415 MMBtu/hr dryer were also calculated using emission factors from AP-42 Sections 1.4 and 1.5. Process emissions from this dryer were calculated using emissions data obtained from similar equipment at other Frito-Lay facilities. This dryer is also limited to 2160 hours of propane combustion per year.

3.3.4 Propane Flare (Existing Operation)

Frito-Lay has a propane flare that is used to test the propane delivery system or for gas blowdown. The flare has an input rating of 1.5 MMBtu/hr and operates approximately 72 hours per year. For purposes of calculating emissions, emission factors from AP-42 Section 1.5 were used. Potential emissions were calculated based on operations 8760 hours per year, even if anticipated operations will be much less.

3.4 Potential/Allowable Emissions

Emissions allowed by this permit revision can be seen in the table below. More detailed emissions data, as well as calculations can be found in the attachments for this document.

ALLOWABLE EMISSIONS	
POLLUTANT	**EMISSIONS (TPY)**
NOx	153
CO	148
PM10	25
PM2.5	18
SOx	17
VOC	20
Total HAPs	13

The shown allowable emissions of PM10 and PM2.5 are after controls. Without the controls required by this permit, the facility would also be a “major source” of PM10 and PM2.5. Section 4.3.2 for a description of the controls required to maintain “synthetic minor” status with respect to PM10 and PM2.5.

4. REGULATORY REQUIREMENTS AND MONITORING

4.1 TITLE V/PSD Applicability

This facility constitutes a “major source” of Nitrogen Oxides (NOx) and Carbon Monoxide (CO) mostly due to the emissions from the biomass boiler, and therefore requires a permit pursuant to Title V of the CAA Amendments of 1990.

Even without the limitations of the permit, the source is not at risk of becoming a "major emitting source" within the meaning of 40 CFR §51.166, which would require the facility to go through a Prevention of Significant Deterioration (PSD) review.

4.2 NSPS Applicability

The biomass boiler is subject to the requirements of 40 CFR Part 60, Subpart Dc, Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units.

The standards of Subpart Dc are applicable to steam generating facilities with heat input capacities between 10 and 100 MMBtu/hour that commence construction, modification, or reconstruction after June 9, 1989.

This subpart defines limitations for particulate matter (0.03 lb/MMBtu heat input) and requires the facility to install a Continuous Opacity Monitor on the boiler stack to ensure that the 20% opacity standard[5] is not exceeded. These limitations do not apply during start ups, shut downs or malfunctions. While the subpart also addresses SO2 emissions, only fossil fuel-burning boilers are subject to the standards. While SO2 emissions are expected from the combustion of TDF, Subpart Dc does not contains standards for boilers using TDF as fuel.

Periodic performance tests will be required to demonstrate compliance with the mass emissions limitation.

4.3 Regulatory Emission Limitations and Compliance/Monitoring

4.3.1 HAP Emission Rates; "Synthetic Minor" Status

Particularly in view of the capacity to burn TDF, PCAQCD finds that uncontrolled potential emissions from this facility can exceed the 25 tpy "major source" threshold for hazardous air pollutants (or 10 tpy for an individual HAP). The facility has the potential to trigger additional regulatory requirements under 40 CFR Part 63. The applicant has agreed to accept limitations on the amount of TDF used and types of fuels accepted, as necessary to avoid those additional regulatory burdens. Accordingly, this permit imposes a cap on total and individual HAPs and defines limitations and recordkeeping for the facility operator to demonstrate with a reasonably degree of accuracy, and on an on-going basis, that the facility conforms to the cap limitation.

To keep this source a "synthetic minor" with respect to HAPs the permit contains the following limitations:

- Imposes a nominal cap of 10 tpy of any individual HAP and 25 tpy of any HAP combination by limiting emissions of total HAPs, including emissions during startups and shutdowns, to 0.038 lb/MMBtu and emissions of individual HAPs, including emissions during startups and shutdowns, to 0.019 lb/MMBtu;
- Limits the maximum heat input to the biomass boiler to 685,908 MMBtu (Higher Heating Value (HHV)-dry basis) per year[6].
- Limits the use of TDF based on an assumed heat input of 5.48 MMBtu (78.3 MMBtu x 7%) to 4.24 tons per day[7]. See §4.C.2 of the permit; A daily limit will ensure that there are no exceedances of the short-term Arizona Ambient Air Guidelines (See Section 5 of this document).
- Defines the accepted and prohibited fuel types. The permit only allows up to 1% of contaminants on woods including plastics, rubber, glass, painted wood (including leaded), chemically treated wood (e.g., chromium, copper, arsenic, creosote, or pentachlorophenol), metals and salts. Periodic testing for metals and organics is required by this permit.
- Requires that the applicant follows a fuel certification program with the

[5] 20% standard (6-minute average), except for one 6-minute period where the opacity can reach 27%.

[6] 78.3 MMBtu/hr x 8760 hr/yr = 685,908 MMBtu/yr

[7] 78.3 MMBtu/hr x 7% = 5.48 MMBtu/hr/15,500 Btu/lb x 1,000,000 = 353.6 lb/hr x 8760 hr/2000 lb = 1548.8 tpy/365 = 4.24 tons per day.

suppliers so that they provide fuel in accordance with a Fuel Specification. The certification program is described in subsection 4.3.1.1 of this document.

- Requires the installation of magnets on the fuel conveyor to the boiler to remove ferrous metals before they enter the boiler;
- Requires that the applicant determine daily amount of TDF burned (in tons). Since this is not measured on a continuous basis as feed varies with load, an estimated amount can be determined by the TDF density and the speed of the conveyor.

4.3.1.1. Fuel Supplier Certifications

Frito-Lay will be accepting biomass fuel from several suppliers. For each supplier, Frito-Lay will have a contract which will include a fuel specification. The suppliers will certify that each load will meet such specification. PCAQCD has requested that each specification contain the certification language of §4.C.2.d.iii to ensure that all suppliers are aware of the consequences of not complying with the fuel requirements of this permit.

4.3.2 PM10 and PM2.5 Emission Rates; "Synthetic Minor" Status

PCAQCD finds that uncontrolled potential emissions from this facility can exceed the 100 tpy "major source" threshold for PM10 and PM2.5. Accordingly, this permit imposes a cap on both PM10 and PM2.5 and defines controls, operational requirements and recordkeeping for the facility operator to demonstrate with a reasonably degree of accuracy, and on an on-going basis, that the facility conforms to the cap limitation.

To keep this source a "synthetic minor" with respect to PM10 and PM2.5 the permit contains the following requirements:

- Installation and operation of a particulate matter removal system which includes a multi-clone in series with an electrostatic precipitator. Such system shall be used to control particulate matter emissions from the biomass boiler. The system's operation will be monitored and maintained in accordance with manufacturer's specifications.

- Any fly ash collected from the biomass boiler shall be collected and transported via enclosed conveyor to a tarped bin for proper disposal.

4.3.3 Non-NSPS Opacity

The production facility is subject to a 20% opacity standard. Due to the uncertainty of the amount of emissions generated by the fuel handling and fly ash handling systems, and in order to protect the 24-hour PM10 and PM2.5 NAAQS, Permittee has voluntarily accepted a 10% opacity limitation as measured by EPA Method 9 as well as a 20% opacity limitation as measured by EPA Method 203C. Method 203C is more appropriate for non-continuous plumes, and has a shorter averaging period.

In addition to a semi-annual Method 9 opacity test to be conducted on all emission points, vents, exhausts and stacks which are subject to the 20% or 10% opacity standards, the permit requires regular compliance monitoring. This monitoring requires the applicant to conduct monthly visual screenings of all emission sources. If emissions are observed, the applicant will have to conduct an opacity test, done by a certified observer, and will have to repeat such test every 7 days until the problem is resolved. Results of the initial visual observation as well as any Method 9 tests have to be submitted to the District. Any instances when an opacity test reveals higher than the corresponding opacity standard have to be reported to the District as deviations.

4.3.4 Particulate Matter - Process Weight Rate Equation for Biomass Boiler Fuel Handling System

For process sources having a weight rate of 60,000 pounds per hour (30 tons per hour) or less, the maximum allowable emission shall not exceed:

$E = 4.10P^{0.67}$, where E = Maximum Allowable particulate matter emissions rate in lb/hr, and P = process weight in tons/hour.

$E = 4.10 \times (17294/2000)^{0.67} = 17.40$ lb/hr

Uncontrolled PM10 emissions for the fuel handling system are not expected to exceed 0.92 tpy which is below the maximum allowable rate of 17.40 lb/hr. No additional controls are required.

4.3.5 Particulate Matter - Process Weight Rate Equation for Production Facility

For process sources having a weight rate of 60,000 pounds per hour (30 tons per hour) or less, the maximum allowable emission shall not exceed:

$E = 4.10P^{0.67}$, where E = Maximum Allowable particulate matter emissions rate in lb/hr, and P = process weight in tons/hour.

The total process weight from all similar units employing a similar type process shall be used in determining the maximum allowable emission of particulate matter.

The total throughput of the production lines has been determined to be:
Corn Chip: 11388 tpy
Potato Chip: 30660 tpy
Tortilla Chip: 13140 tpy
Cheese Puff: 11388 tpy
Sun Chip: 15770 tpy
TOTAL = 82346 tpy = 9.40 tons per hour

$E = 4.10 \times (9.4)^{0.67} = 18.40$ lb/hr = 80.59 tpy

Uncontrolled PM10 emissions from the chip production lines are not expected to exceed 40.61 tons per year (see appendix A) which is below the maximum allowable rate of 80.59 lb/hr. While this permitting action does not require further controls, the permit does require the facility to continue with their current control efforts which are summarized in Section 2.3 of this document.

4.3.6 Other Limitations - SO2 and NOx

Code §5-24-1030 establishes the following limitations: 600 ppm SO_2 and 500 ppm NO_x (NO_2).

The permit application for the biomass boiler provides the following compliance demonstration with these limitations:

Flowrate (dscfm) = 78.3 MMBtu x 8,710 dscf/MMBtu x 20.9/5.9 x 1 hr/60min = 40,264.60 dscfm

SO2 Maximum Allowable Emissions (lb/hr) = ppmv x MW x $1.557e^{-07}$ x Flowrate = 600 ppmv x 64 lb/mole x $1.557e^{-07}$ x 40,264.6 dscfm = 240.74 lb/hr

NO2 Maximum Allowable Emissions (lb/hr) = 500 ppmv x 46 lb/mole x $1.557e^{-07}$ x 40,264.6 dscfm = 144.20 lb/hr

Uncontrolled SO2 and NO2 rates from the biomass boiler are 2.9 lb/hr and 23.5 lb/hr, respectively, below the maximum allowable of 240.74 lb/hr and 144.20 lb/hr. No further controls are required for these pollutants.

4.4 Testing Requirements

4.4.1 Biomass Boiler

NSPS TESTING

In accordance with 40 CFR §60.45c(a), the permit requires an initial test and annual subsequent tests for particulate matter.

NON-NSPS TESTING

The permit also requires an initial test and subsequent tests every 5 years to determine CO and NOx emission rates, PM10 and PM2.5 control efficiency by the multiclone/ESP, all metal HAPs, inorganic HAPs, some organic HAPs (acetaldehyde, acrolein, benzene, formaldehyde and toluene at least) and any other HAPs that could be detected through any of the previously listed tests.

Additionally, the applicant will have to obtain certifications from the fuel supplier indicating heating values.

4.4.2 Biomass Feedstock Testing

While Frito-Lay has provided results for a lab analysis of a representative sample of the feedstock, to determine a trend of lead and arsenic contamination, PCAQCD has included in the permit a requirement to conduct quarterly testing of monthly samples. Lead and arsenic have been determined to be the most problematic pollutants, given that construction debris is allowed in the fuel, and therefore it may contain lead-painted wood or pressure treated wood. Each quarter, an aggregate sample made of the last 3 months' samples will be submitted to a laboratory to determine lead concentration. It is assumed that the bottom ash will be representative of flyash emissions.

A testing schedule and frequency has been determined, and more frequent testing will be required if the initial 12-months of tests show that lead emissions are above 0.2 tons per year (20% of the monitoring threshold of 1tpy).

4.4.3 Opacity

In addition to the monitoring requirements pertaining visible emissions and opacity, the permit requires semiannual opacity testing, using Reference Methods 9 and 203C, of each transfer point at the biomass fuel handling system, the flyash handling system and all the vents, exhausts and stacks from the production facility.

4.4.4 Sun Chips Line Testing

A particulate matter test on the Sun Chips Line's hammermill and fryer was required during the last revision of this facility's non-title V permit. Since that test has not been conducted yet, it is still included as an applicable requirement.

4.5 40 CFR 68 - Risk Management Program and Plan

The requirements of 40 CFR 68 of submitting and maintaining a Risk Management Program and Plan (RMP) could apply to this facility if the SCR has been designed to use 20% or higher (by weight) ammonia, which is regulated by 40 CFR 68. In such case, the applicant will have to prepare and maintain a Risk Management Plan in accordance with the requirements of 40 CFR 68.

4.6 40 CFR Part 64 - Compliance Assurance Monitoring (CAM)

Pursuant 40 CFR 64.2, the CAM apply on a pollutant specific basis to an emissions unit at a major source that is required to obtain a part 70 or 71 permit if the unit satisfies all of the following criteria:

(1) The unit is subject to an emission limitation or standard for the applicable regulated air pollutant (or a surrogate thereof), other than an emission limitation or standard that is exempt under paragraph (b)(1) of this section; and

(2) The unit uses a control device to achieve compliance with any such emission limitation or standard; and

(3) The unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source. For purposes of this paragraph, "potential pre-control device emissions" shall have the same meaning as "potential to emit," as defined in §64.1, except that emission reductions achieved by the applicable control device shall not be taken into account.

The biomass boiler satisfies requirement (1) and (2) above since the emissions unit is subject to an emission limitation and the unit also uses a control device. However, it does not meet requirement (3) because the source, by itself, does not exceed the major source thresholds based on emissions. As such, this project is not subject to the CAM (40 CFR Part 64).

4.7 State HAPs Program

Neither Frito-Lay's main facility, nor the biomass boiler itself, fall under the Standard Industrial Category (SIC) Codes subject to the Arizona HAPs rule, incorporated into Pinal County's rule under Chapter 7.

5. AMBIENT IMPACT ASSESSMENT

PCAQCD has conducted a simple air quality impact screening analysis to demonstrate compliance with ambient air quality standards and guidelines. The screening analysis was conducted on the emissions from the biomass boilers, since they represent the bulk of the facility's emissions.

The purpose of this analysis is to determine whether air quality impacts from proposed criteria pollutant and hazardous air pollutant (HAP) emissions will cause or contribute to a violation of any air quality standard, or worsen an existing air quality problem. Applicable standards/guidelines include the National Ambient Air Quality Standards (NAAQS) and the Arizona Ambient Air Quality Guidelines (AAAQG).

The results of PCAQCD's screening review confirmed that the facility meets all required ambient air quality standards and guidelines.

The discussion presented in this section pertains to the results of ADEQ's modeling analysis.

5.1 Air Quality Screen

The EPA's SCREEN3 Model was used to complete the screening analysis. The following modeling options were used:

- Full meteorology with all stabilities and wind speeds;
- An automated distance array with a minimum distance of 1 meter and a maximum distance of 1000 meters;
- Zero for receptor height;
- No complex terrain above stack height;
- No simple terrain above stack base;
- Building Downwash
- Rural area

Since SCREEN3 only generates 1-hour maximum impacts, the EPA recommended conversion factors (persistence factors) were used to determine the concentrations of other averaging periods of concern.

5.2 Source Release Parameters

The boiler was modeled as a point source using the parameters included in the permit application[8].

MODELING SOURCE RELEASE PARAMETERS				
Equipment	**Stack Height (ft/m)**	**Dia. (in/m)**	**Exit Temp. (F/K)**	**Exit Flow Rate (acfm)**
Biomass Boiler (ESP exhaust)	50/15.24	42/1.07	350/450	31,528

5.3 Modeled Emissions

The following table indicates the controlled criteria pollutant and AAAQG emissions from the biomass boiler. Modeled emissions are based on 8760 hours per year firing woodwaste and TDF at 79.2 MMBtu/hr.

MODELING EMISSION RATES	
Pollutant	**Emissions (lb/hr)**
NO2[9]	11.75
CO	22.71
PM10	1.96
PM2.5	0.67

[8] Data from manufacturer's specification for the ESP (PPC Industries, 6/25/09).

[9] Assumes that only 50% of NO converts to NO2

SO2	2.90
Lead[10]	0.05
Acrolein	0.291
Benzene	0.306
Formaldehyde	0.320
HCl	1.38
Methanol	0.109
Styrene	0.0671

5.4 Building Downwash

When calculating pollutant impacts, the SCREEN3 tool has the capability of accounting for building downwash produced by airflow over and around structures. Building downwash effects were considered in this screening analysis. The main plant's dimensions were estimated to be:

Height = 40 feet = 12.2 m

Dimensions = 500 ft x 300 ft = 152.4 x 91.4 meters

These height and dimensions were estimated from facility maps provided by Frito-Lay during previous permitting transactions.

5.5 NAAQS Analysis Results

A screening analysis was performed for NO2, CO, PM10 and Lead to determine if the biomass boiler would exceed the NAAQS. The results are presented in the table below. Based on the results, Frito-Lay has demonstrated compliance with the NAAQS standards for its proposed facility.

NAAQS ANALYSIS RESULTS						
Pollutant	Averaging Period	Concentration (μg/m^3)			NAAQS (μg/m^3)	% of NAAQS
		Modeled	Background[11]	Total		
NO2	Annual	22.37	30	52.37	100	52%

[10] Lead emissions assume that 1/2 of the 1% allowed contaminated fuel (or 2 lb/hr PM10 output as indicated by Frito-Lay) is lead-treated wood with a 10% average lead concentration.

[11] Background concentrations are based on maximum and annual 2007 ambient air quality for the EPA-approved monitoring stations in the general project area. PM10/PM2.5 are from Pinal County stations and CO/NO2/S02 are from Maricopa County stations.

	1-hour	139.79	36.22	176.01	188.7[12]	93%[13]
CO	1-hour	270.25	3,078	3,348.25	40,000	8.3%
	8-hour	189.18	1,824	2,013.18	10,000	20%
PM10	24-hour	9.35	45	54.35	150	36%
PM2.5	Annual	0.64	9.47	10.11	15	67%
	24-hour	3.18	22.07	25.25	35	72%
SO2	1-hour	34.48	62.4	96.88	195	50%
	3-hour	31.03	45.33	76.36	1,300	5.8%
	24-hour	13.79	18.67	32.46	365	8.9%
	Annual	2.76	5.6	8.36	80	10.5%
Lead	3-mo	.00714	0	0.00714	0.15	4.8%

5.6 AAAQG Analysis Results

A screening analysis was performed for hazardous air pollutants (HAPs) of concern to determine if the proposed biomass boiler would exceed any of the AAAQG concentrations. The results of the analysis are presented in the table below.

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[12]Conversion from ppb established by the annual standard of 53 ppb or 100 ug/m^3.

[13]The applicant's proposed uncontrolled emission factor of 0.3 lb/MMbtu NOx was based on a manufacturer guarantee and is based on the boiler design criteria including the proposed fuel specification. That fuel specification included a maximum of 7% TDF (heat input basis). On this basis, the manufacturer provided data was determined to be appropriate for estimating maximum uncontrolled NOx emissions from the proposed boiler. In addition, Frito-Lay is proposing to include an SCR system which will further reduce NOx emissions from the biomass boiler. Because of the untested nature of an SCR in this type of application (such a small biomass boiler), controlled emissions were conservatively estimated without an SCR control efficiency. The boiler's actual emissions with the SCR control are expected to be less than the uncontrolled emissions estimate contained in this document.

AAAQG ANALYSIS RESULTS: SCREEN3				
Pollutant	Averaging Period	Max. Modeled Conc. (µg/m^3)	AAAQG (µg/m^3)	% of AAAQG
Acrolein	1-hr	3.467	6.3	55.03
	24-hr	1.387	2	69.35
	Annual	0.277	N/A	-
Benzene	1-hr	3.64	170	2.14
	24-hr	1.456	44	3.31
	Annual	0.291	0.12	**242.5**
Formaldehyde	1-hr	3.81	25	15.24
	24-hr	1.525	16	9.53
	Annual	0.305	0.076	**401.32**
HCl	1-hr	16.47	210	7.84
	24-hr	6.59	56	11.77
	Annual	1.32	N/A	-
Methanol	1-hr	1.3	2600	0.05
	24-hr	0.52	2100	0.02
	Annual	0.104	N/A	-
Naphthalene	1-hr	0.17	630	0.03
	24-hr	0.07	400	0.02
	Annual	0.01	N/A	-
Styrene	1-hr	1.65	3500	0.05
	24-hr	0.66	1700	0.04
	Annual	0.13	N/A	-

PCAQCD conducted the Screen exercise on the 9 highest emitted HAPs. While the short-term impacts (1-hour and 24-hour) were all found to be in compliance with the AAAQGs, for 2 pollutants, benzene and formaldehyde, the maximum annual concentration modeled exceeds that of the AAAQGs[14]. PCAQCD staff brought this issue up with Frito-Lay and suggested that more detailed analysis (modeling) would be appropriate for these 2 pollutants.

5.7 Frito-Lay's Refined Model

On 4/13/2010, Frito-Lay submitted a refined model using AERMOD for emissions of formaldehyde and benzene from the biomass boiler to demonstrate that the AAAQGs are not being exceeded for either of these pollutants.

Frito-Lay modeled both pollutants using the emission rates in 5.3 above. While source release parameters used by Frito-Lay are slightly different than those used by PCAQCD, we find that they are more conservative (lower stack height, lower exit flow rate). The modeled impacts are below

[14] AAAQGs are not enforceable standards, only guidelines. Frito-Lay is working with PCAQCD to show that the estimated emissions from the boiler will not exceed these guidelines.

the 1-hour, 24-hour and annual AAAQGs as shown in the table below.

AAAQG ANALYSIS RESULTS: AERMOD				
Pollutant	Averaging Period	Max. Modeled Conc. (µg/m^3)	AAAQG (µg/m^3)	% of AAAQG
Benzene	1-hr	2.47	170	1.45
	24-hr	1.22	44	2.77
	Annual	0.056	0.12	46.67
Formaldehyde	1-hr	2.58	25	10.32
	24-hr	1.27	16	7.94
	Annual	0.058	0.076	76.32

6. LIST OF ABBREVIATIONS

ADS . . . . Agglomerative Dust Suppression
AP-42 . . . .
"Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources", 5th Edition
CAA . . . . Clean Air Act
CAM . . . . Compliance Assurance Monitoring
CFR . . . . Code of Federal Regulations
CO . . . . Carbon Monoxide
hr . . . . Hour
lb . . . . Pound
MACT . . . . Maximum Achievable Control Technology
MMBTU . . . . Million British Thermal Units
Mod. . . . . Modification
MSDS . . . . Material Safety Data Sheet
NOX . . . . Nitrogen Oxides
NSPS . . . . New Source Performance Standard
NSR . . . . New Source Review
PCAQCD . . . . Pinal County Air Quality Control District
PGCAQCD . . . . Pinal-Gila Counties Air Quality Control District
PM10 . . . . Particulate Matter nominally less than 10 Micrometers
PSD . . . . Prevention of Significant Deterioration
SIC . . . . Standard Industrial Code
SOX . . . . Sulfur Dioxide
tpy . . . . tons per year
TSD . . . . Technical Support Document
VOC . . . . Volatile Organic Compound
yr . . . . year

ATTACHMENT 1:
UNCONTROLLED EMISSIONS BY SOURCE

UNCONTROLLED POTENTIAL EMISSIONS (TPY)							
	NOx	VOC	CO	PM10	PM2.5	SOx	HAPs
Corn Transfer	0	0	0	0.09	0.09	0	0
Corn Cleaner	0	0	0	1.11	1.11	0	0
Scrubber/fryer	0	0	0	24.53	24.53	0	0
Corn Chip Fryer	0	0	0	7.36	7.36	0	0
Corn Chip Ambient Cooler	0	0	0	0.79	0.79	0	0
Tortilla Chip Ovens	5.26	0.26	19.8	0.33	0.33	0.52	0
Tortilla Chip Fryers	0	0	0	2.32	2.32	0	0
Dorito Ambient Cooler	0	0	0	0.92	0.92	0	0
Corn Meal Transfer	0	0	0	0.01	0.01	0	0
Cheese Puff Extruder	0	0	0	1.66	1.66	0	0
Cheese Puff Fryer	0	0	0	0.85	0.85	0	0
Cheese Puff Ambient Cooler	0	0	0	0.79	0.79	0	0
Cheese Puff Fume Scrubber	0	0	0	0.18	0.18	0	0
Natural Gas Boiler[15]	43.41	1.70	28.43	2.42	2.42	3.81	0
Starch Dryer	0.26	0.01	0.13	0.57	0.57	0.02	0
Propane Flare	1.01	0.04	0.13	0.03	0.03	0.07	0
Sun Chip Line	0	0.72	0	14.61	14.61	0	0
Biomass Boiler	102.9	17.1	99.5	137.2	106.44	12.69	12.74
Fuel Handling System	0	0	0	0.92	0.14	0	0
Fly Ash System	0	0	0	0.1	0.1	0	0
TOTAL	**152.84**	**19.83**	**147.99**	**197**	**165.25**	**17.11**	**12.74**

[15] The application for the biomass boiler shows NOX uncontrolled emissions of 72.14 tpy for the existing natural gas boiler. This number is incorrect as it reflects an old AP-42 emission factor for propane that has been revised. Using the most recent AP-42 factors, the correct uncontrolled NOx emissions are 43.41tpy.

ATTACHMENT 2:
CONTROLLED EMISSIONS BY SOURCE

CONTROLLED POTENTIAL EMISSIONS (TPY)							
	NOx	VOC	CO	PM10	PM2.5	SOx	HAPs
Corn Transfer	0	0	0	0.09	0.09	0	0
Corn Cleaner	0	0	0	0.22	0.22	0	0
Scrubber/fryer	0	0	0	2.76	2.76	0	0
Corn Chip Fryer	0	0	0	0.74	0.74	0	0
Corn Chip Ambient Cooler	0	0	0	0.79	0.79	0	0
Tortilla Chip Ovens	5.26	0.26	19.8	0.33	0.33	0.52	0
Tortilla Chip Fryers	0	0	0	0.22	0.22	0	0
Dorito Ambient Cooler	0	0	0	0.92	0.92	0	0
Corn Meal Transfer	0	0	0	0.01	0.01	0	0
Cheese Puff Extruder	0	0	0	0.79	0.79	0	0
Cheese Puff Fryer	0	0	0	0.85	0.85	0	0
Cheese Puff Ambient Cooler	0	0	0	0.79	0.79	0	0
Cheese Puff Fume Scrubber	0	0	0	0.18	0.18	0	0
Natural Gas Boiler	43.41	1.7	28.43	2.42	2.42	3.81	0
Starch Dryer	0.26	0.01	0.13	0.57	0.57	0.02	0
Propane Flare	1.01	0.04	0.13	0.03	0.03	0.07	0
Sun Chip Line	0	0.6	0	3.20	3.2	0	0
Biomass Boiler	102.9	17.1	99.5	8.6	2.93	12.69	12.74
Fuel Handling System	0	0	0	0.92	0.14	0	0
Fly Ash System	0	0	0	0.1	0.1	0	0
TOTAL	**153**	**20**	**148**	**25**	**18**	**17**	**13**

ATTACHMENT 3:
UNCONTROLLED EMISSIONS FROM BIOMASS BOILER

FRITO-LAY BIOMASS BOILER COMBUSTION- UNCONTROLLED EMISSIONS 5/25/10

Heat Input =	78.3	MMBtu/hr	685908	MMBtu/yr	
Hours Oper =	8760	hours/year			
Wood Heat Input (93%) =		72.819	MMBtu/hr		
TDF Throughput[3]	353.6	lb/hr =	0.0001768	1000 tons/hr =	1548.824516 tpy TDF
					4.24 tpd

Pollutant	Uncontrolled EF (woodwaste) (lb/MMBtu)	Uncontrolled EF (woodwaste) (lb/hr)	Uncontrolled EF (TDF) (lb/MMBtu)	Uncontrolled EF (TDF) (lb/hr)	Total EF (lb/hr)	Uncontrolled Emissions (lb/yr)	Uncontrolled Emissions (tpy)	Source
NOX	0.3	23.49				205772.4	102.89	Manufacturer
CO	0.29	22.71				198913.32	0.00	Manufacturer
PM10	0.4	31.32				274363.2	137.18	AP-42, 1.6-1
PM2.5	0.31	24.27				212631.48	106.32	AP-42, 1.6-1
VOC	0.05	3.92				34295.4	17.15	Manufacturer
SO2[1]			0.037	2.90	2.90	25378.596	12.69	EPA Emissions Scrap Tire
1,1,1 Trichloroethane			8.72e-07	6.83e-05	6.83e-05	0.60	0.00	EPA Emissions Scrap Tire
Acetaldehyde	8.30e-04	6.04e-02			6.04e-02	529.45	0.26	AP-42, 1.6-3
Acetophenone	3.70e-06	2.69e-04			2.69e-04	0.00	0.00	NCASI
Acrolein	4.00e-03	2.91e-01			2.91e-01	2551.58	1.28	AP-42, 1.6-3
Benzene	4.20e-03	3.06e-01	2.91e-07	2.28e-05	3.06e-01	2679.36	1.34	AP-42, 1.6-3/2.5-3/2.5-4
DEHP	4.70e-08	3.42e-06			3.42e-06	0.03	0.00	AP-42, 1.6-3
Bromoethane			5.00e-07	3.92e-05	3.92e-05	0.34	0.00	EPA Emissions Scrap Tire
Carbon Disulfide			7.98e-07	6.25e-05	6.25e-05	0.55	0.00	EPA Emissions Scrap Tire
Carbon Tetrachloride	4.50e-05	3.28e-03			3.28e-03	28.71	0.01	AP-42, 1.6-3
Chlorobenzene	3.30e-05	2.40e-03	5.00e-07	3.92e-05	2.44e-03	21.39	0.01	AP-42, 1.6-3
Chloroform	2.80e-05	2.04e-03			2.04e-03	17.86	0.01	AP-42, 1.6-3
Chloromethane			1.66e-06	1.30e-04	1.30e-04	1.14	0.00	EPA Emissions Scrap Tire
Cumene	1.80e-05	1.31e-03			1.31e-03	11.48	0.01	NCASI
Dibutylphthalate	3.30e-05	2.40e-03			2.40e-03	21.05	0.01	NCASI
2,4 Dinitrophenol	1.80e-07	1.31e-05			1.31e-05	0.11	0.00	AP-42, 1.6-3
Ehtylbenzene	3.10e-05	2.26e-03	5.00e-07	3.92e-05	2.30e-03	20.12	0.01	AP-42, 1.6-3/2.5-3/2.5-4
Formaldehyde	4.40e-03	3.20e-01			3.20e-01	2806.74	1.40	AP-42, 1.6-3
HCL	1.90e-02	1.38e+00			1.38e+00	12119.99	6.06	AP-42, 1.6-3
Heptane			6.58e-07	5.15e-05	5.15e-05	0.45	0.00	EPA Emissions Scrap Tire
Hexane			5.70e-07	4.46e-05	4.46e-05	0.39	0.00	EPA Emissions Scrap Tire
Idomethane			5.00e-07	3.92e-05	3.92e-05	0.34	0.00	EPA Emissions Scrap Tire
2-methyl propene			5.33e-06	4.17e-04	4.17e-04	3.66	0.00	EPA Emissions Scrap Tire
2-methyl-2-propanol benzene			5.00e-07	3.92e-05	3.92e-05	0.34	0.00	EPA Emissions Scrap Tire
Methanol	1.50e-03	1.09e-01			1.09e-01	956.84	0.48	NCASI
MIK	6.60e-04	4.81e-02			4.81e-02	421.01	0.21	NCASI/AP-42, 2.5-3/2.5-4
Naphthalene	2.00e-04	1.46e-02			1.46e-02	127.58	0.06	NCASI
4-Nitrophenol	1.10e-07	8.01e-06			8.01e-06	0.07	0.00	AP-42, 1.6-3
Nonane			1.70e-06	1.33e-04	1.33e-04	1.17	0.00	EPA Emissions Scrap Tire
Pentachlorphenol	5.10e-08	3.71e-06			3.71e-06	0.03	0.00	AP-42, 1.6-3
Phenol	5.10e-05	3.71e-03			3.71e-03	32.53	0.02	AP-42, 1.6-3/2.5-3/2.5-4
Styrene	1.90e-03	1.38e-01	1.86e-06	1.46e-04	1.39e-01	1213.28	0.61	AP-42, 1.6-3/2.5-3/2.5-4
2,3,7,8 Tetrachlorodibenzo-p-dioxin	8.60e-12	6.26e-10			6.26e-10	0.00	0.00	AP-42, 1.6-3
Toluene	9.20e-04	6.70e-02	1.17e-06	9.16e-05	6.71e-02	587.67	0.29	AP-42, 1.6-3
Trichloroethylene	4.30e-06	3.13e-04			3.13e-04	2.74	0.00	NCASI
2,4,6 Trichlorophenol	2.00e-08	1.46e-06			1.46e-06	0.01	0.00	AP-42, 1.6-3
Vinyl Chloride	1.80e-05	1.31e-03			1.31e-03	11.48	0.01	AP-42, 1.6-3
oXylene	2.50e-05	1.82e-03			1.82e-03	15.95	0.01	AP-42, 1.6-3
mXylene	5.30e-06	3.86e-04			3.86e-04	3.38	0.00	NCASI
pXylene	5.30e-06	3.86e-04			3.86e-04	3.38	0.00	NCASI
					Total HAPs	(tpy)	12.74	**(Includes 1% wood contamination totals)**
					Single HAP	(tpy)	6.06	

NOTES:

1) SO2 factors from "Air Emissions from Scrap Tire Combustion" for 90% woodwaste and 10% TDF.

2) For Woodwaste HAPs, PCAQCD always chose the most conservative emission factor.

3) TDF throughput = Total Heat Input x 7% /15550 Btu/lb (based on "Air Emissions from Scrap Tire Combstion" EPA CATC Oct 1997 EPA-600/R-97-115)

4) HAPs calculations from TDF use were done using total fuel input (78.3MMBtu/hr) because cited emission factors are for a 7% TDF in natural gas.

ATTACHMENT 4:
CONTROLLED EMISSIONS FOR BIOMASS FUEL HANDLING AND ASH HANDLING

FRITO-LAY BIOMASS BOILER FUEL HANDLING SYSTEM- UNCONTROLLED EMISSIONS

Ash Material Handling & Conveyor transfer points- Particulate Fugitive Emissions

Based emission factors calculated per AP-42 Section 13.2.4, November 2006. Annual operation of: 8,760 hrs/yr.

E, emission factor (lb/ton):

$$E = k\,(0.0032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \quad \text{(lb/ton)}$$

k, particle size multiplier (dimensionless) for PM_{10}: 0.35

k, particle size multiplier (dimensionless) for PM2.5: 0.053

U, mean wind speed (mph): 6.2 http://www.ncdc.noaa.gov/oa/climate/online/ccd/avgwind.html

M, material moisture content (%): 10

Hourly Ash Emissions from Biomass Boiler (classified as PM10): 504.0 lb/hr — Fuel Throughput = 17294 lb/hr (manufacturer's data)

Annual Ash Emissions from Biomass Boiler (classfied as PM10): 2,207.5 tpy — 75747.72 tpy

With material at 10% moisture content:

Source Description	U (mph)	M (%)	PM10 EF (lb/ton)	PM10 Emissions (tpy)	PM2.5 EF (lb/ton)	PM2.5 Emissions (tpy)	
Ash Transfer to collection bin	6.20	10	1.56e-04	1.72e-04	2.36e-05	2.60e-05	AP42 13.2.4
Fuel xfer to Storage Pile	6.20	10	1.56e-04	5.89e-03	2.36e-05	8.93e-04	AP42 13.2.4
Fuel xfer to conveyor from pile	6.20	10	1.56e-04	5.89e-03	2.36e-05	8.93e-04	AP4213.2.4
Fuel xfer from conveyor to boiler	6.20	10	1.56e-04	5.86e-03	2.36e-05	8.93e-04	AP42 13.2.4
Woodwaste Hauling	6.20	10	1.18e+00	0.922	1.80e-01	0.138	AP42 Table 13.2.1-1; 0.18 VMT/hr, 0.45 mi/trip; 0.39 trip/hr
			TOTALS (tpy)	0.94		0.14	