San Joaquin Valley
Unified Air Pollution Control District

Best Performance Standard (BPS) x.x.xx

Date: June 25, 2010

Class	**Dryers and Dehydrators**
Category	**Pistachio Dryer**
Best Performance Standard	**Natural Gas-Fired Column Dryer with Staggered Heaters and Fans with Premium Efficiency Electric Motors Powering Fans and Augers (GHG Emissions of 556.6 lb-CO_2e/ton), or equivalent**
Percentage Achieved GHG Emission Reduction Relative to Baseline Emissions	**8.1%**

District Project Number	C-1100390
Evaluating Engineer	Derek Fukuda
Lead Engineer	Joven Refuerzo
Initial Public Notice Date	June 25, 2010
Final Public Notice Date	July 15, 2010
Determination Effective Date	

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I. Best Performance Standard (BPS) Determination Introduction

A. Purpose

To assist permit applicants, project proponents, and interested parties in assessing and reducing the impacts of project specific greenhouse gas emissions (GHG) on global climate change from stationary source projects, the San Joaquin Valley Air Pollution Control District (District) has adopted the polic*y: District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency.* This policy applies to projects for which the District has discretionary approval authority over the project and the District serves as the lead agency for CEQA purposes. Nonetheless, land use agencies can refer to it as guidance for projects that include stationary sources of emissions. The policy relies on the use of performance based standards, otherwise known as Best Performance Standards (BPS) to assess significance of project specific greenhouse gas emissions on global climate change during the environmental review process, as required by CEQA. Use of BPS is a method of streamlining the CEQA process of determining significance and is not a required emission reduction measure. Projects implementing BPS would be determined to have a less than cumulatively significant impact. Otherwise, demonstration of a 29 percent reduction in GHG emissions, from business-as-usual, is required to determine that a project would have a less than cumulatively significant impact.

B. Definitions

Best Performance Standard for Stationary Source Projects for a specific Class and Category is the most effective, District approved, Achieved-in-Practice means of reducing or limiting GHG emissions from a GHG emissions source, that is also economically feasible per the definition of Achieved-in-Practice. BPS includes equipment type, equipment design, and operational and maintenance practices for the identified service, operation, or emissions unit class and category.

Business-as-Usual is - the emissions for a type of equipment or operation within an identified class and category projected for the year 2020, assuming no change in GHG emissions per unit of activity as established for the baseline period, 2002-2004. To relate BAU to an emissions generating activity, the District proposes to establish emission factors per unit of activity, for each class and category, using the 2002-2004 baseline period as the reference.

Category is - a District approved subdivision within a “class” as identified by unique operational or technical aspects.

Class is - the broadest District approved division of stationary GHG sources based on fundamental type of equipment or industrial classification of the source operation.

C. Determining Project Significance Using BPS

Use of BPS is a method of determining significance of project specific GHG emission impacts using established specifications. BPS is not a required mitigation of project related impacts. Use of BPS would streamline the significance determination process by pre-quantifying the emission reductions that would be achieved by a specific GHG emission reduction measure and pre-approving the use of such a measure to reduce project-related GHG emissions.

GHG emissions can be directly emitted from stationary sources of air pollution requiring operating permits from the District, or they may be emitted indirectly, as a result of increased electrical power usage, for instance. For traditional stationary source projects, BPS includes equipment type, equipment design, and operational and maintenance practices for the identified service, operation, or emissions unit class and category.

II. Summary of BPS Determination Phases

The District has established pistachio dryers as a separate class and category which requires implementation of a Best Performance Standard (BPS) pursuant to the District's Climate Change Action Plan (CCAP). The District's determination of the BPS for this class and category has been made using the phased BPS development process established in the District's Final Staff Report, Addressing Greenhouse Gas Emissions under the California Environmental Quality Act. A summary of the specific implementation of the phased BPS development process for this specific determination is as follows:

Table 1
BPS Development Process Phases for Pistachio Dryers

Phase	Description	Date	Comments
1	Initial Public Process	2/10/10	The District's intent notice is attached as Appendix 1.
2	BPS Development	N/A	See Section III of this evaluation document.
3	Public Review	6/25/10	A Draft BPS evaluation was provided for public comment.

III. Class and Category

The dryers and dehydrators class consist of units used to drive free water from products like fruits, vegetables, and nuts, at an accelerated rate without damage to the product, and devices in which material is dried or curred in direct contact with the products of combustion. Since pistachio dryers are used to frive free water from pistachio nuts at an accelerated rate without damage to the product, pistachio dryers are included in the dryers and dehydrators class.

The pistachio harvest and hulling season is approximately 45 days in length because freshly harvested pistachios are extremely prone to damage. A delay in the hulling and drying of harvested pistachios not only results in stained pistachio shells, which makes the nuts much less valuable than unstained shells, but also results in the production of aflatoxin, a toxic byproduct of mold. Therefore, pistachios must be hulled and dried as soon as they are harvested. Due to the physical composition of the pistachio hull, it is best to process pistachios in a wet process. Since pistachios are processed in a wet process, the hulled nut is saturated with water and needs to be dried before it can be stored. The nuts are transferred to the dryers to reduce the moisture content from 30-40% to 7-10% and then conveyed to storage silos where moisture content is further reduced to approximately 5% with the use of fans and the limited use of heaters.

Since pistachios are the only type of nut produced in the District that are hulled in a wet process, pistachio nut dryers will be a separate class and category from other types of nut dryers and dehydrators.

IV Public Notice of Intent

Prior to developing the development of BPS for this class and category, the District published a Notice of Intent. Public notification of the District's intent to develop BPS for this class and category was sent on April 10, 2010 to individuals registered with the CCAP list server. The District's notification is attached as Appendix 1.

No comments were received during the initial public outreach.

V. BPS Development

STEP 1. Establish Baseline Emissions Factor for Class and Category

The Baseline Emission Factor (BEF) is defined as the three-year average (2002-2004) of GHG emissions for a particular class and category of equipment in the San Joaquin Valley (SJV), expressed as annual GHG emissions per unit of activity. The Baseline Emission Factor is calculated by first defining an operation which is representative of the average population of units of this type in the SJV during the Baseline Period and then determining the specific emissions per unit throughput for the representative unit.

A. Representative Baseline Operation

For pistachio dryers**,** the representative baseline operation has been determined to be a 27 MMBtu/hr natural gas-fired column dryer with 100 hp "standard efficiency" fans and 10 hp "standard efficiency" auger motors. This determination is based on a conversation with a consulting company that specified the typical pistachio dryer operating in the SJVAPCD during the baseline period. A review of the currently permitted pistachio nut dryers operating in the District verifies that a 27 MMBtu/hr dryer is a conservative choice for the representative pistachio drying operation during the baseline period.

B. Basis and Assumptions

- All direct GHG emissions are produced due to combustion of natural gas in this unit.
- Fuel consumption for this unit is 5.0 MMBtu/ton throughput. This number is based on information provided by an consultant for the pistachio industry. The consultant specified that on average a pistachio dryer will use 300 MMBtu/day of fuel while drying pistachios at an average rate of 2.5 tons/hr.
- The GHG emission factor for natural gas combustion is 117 lb-CO_2e/MMBtu per CCAR document.
- Indirect emissions are produced due to operation of the main process fans and auger motors. There are four fans that require 25 horsepower each and two augers that require 10 horsepower each when the unit is operating at a rate of 2.5 tons per hour.
- Electric motor efficiency is 91.7% (NEMA EPAct Motor Standard for 25 hp motors).
- Indirect emissions from electric power consumption are calculated based on the current PG&E electric power generation factor of 0.524 lb-CO_2e per kWh

C. Unit of Activity

To relate Business-as-Usual to an emissions generating activity, it is necessary to establish an emission factor per unit of activity, for the established class and category, using the 2002-2004 baseline period as the reference.

The resulting emissions factor is the combination of:
- GHG emission reductions achieved through technology, and
- GHG emission reductions achieved through changes in activity efficiencies.

D. Calculations

Specific electricity consumption for the fans is:

[(25 hp x 4 fans) + (10 hp x 2 augers)] - hr/2.5 tons x 0.7457 kW/hp x (1/91.7%) = 39.0 kWh/ton

Indirect GHG Emissions are:

39.0 kWh/ton x 0.524 lb-CO_2e per kWh = 20.4 lb-CO_2e/ton

Direct GHG emissions are:

5.0 MMBtu/ton x 117 lb-CO_2e/MMBtu = 585.0 lb-CO_2e/ton

The Baseline Emission Factor is the sum of the direct and the indirect emissions:

BEF = 20.4 + 585.0 = 605.4 lb-CO_2e/ton

STEP 2. List Technologically Feasible GHG Emission Control Measures

For the specific equipment or operation being proposed, all technologically feasible GHG emissions reduction measures are listed, including equipment selection, design elements and best management practices, that do not result in an increase in criteria pollutant emissions compared to the proposed equipment or operation. The following findings or considerations are applicable to this class and category:

<u>Heat Recovery System on Column Dryer</u>

A heat recovery system captures the warm exhaust air from the dryer and re-circulates it back into the drying plenum. By reusing the preheated exhaust air, the dryer burner can be fired at a lower rate and still heat the plenum air to the same temperature. This can result in a decrease in fuel consumption and GHG emissions.

Heat recovery systems have been used on grain dryers, however they are not used in pistachio drying operations. Based on information from industry, the humidity in the exhaust from a nut dryer is high enough that it negitively effects the efficiency of the dryer when it is re-circulated into the drying plenum. Heat recovery systems can be used in grain column dryers that are operated in cold weather locations with low ambient air temnperature. Pistachio column dryers are operated during the months of August and September; therefore low ambient air temperature is not an issue.

Column Dryer with Staggered Heaters and Fans

By staggering of fans and heaters on opposite ends of the column dryer the dryer is able to deliver more uniform heat throughout the entire dryer regardless of which column it is in. As the product is passed through the dryer, the heat from the burners is more efficiently and evenly distributed to the product. As a result the product is more evenly dried (higher quality product) and less fuel is needed to process the same amount of product. A recent Purdue University study has shown that by staggering the fans and heaters on a column dryer, fuel consumption can be reduced by 10% from a column dryer without staggered heaters and fans.

Use of Premium Efficiency Motors with Speed Control

An electric motor efficiency standard is published by the National Electrical Manufacturers Association (NEMA) which is identified as the “NEMA Premium Efficiency Electric Motors Program”. For large motors, the NEMA premium efficiency motor provides a gain of approximately 5-8 percentage points in motor efficiency when compared to a standard efficiency motor. The NEMA specification covers motors up to 500 horsepower and motors meeting this specification are in common use and are available from most major electric motor manufacturers.

Control of a fan operation by use of a variable speed electric motor provide substantial energy savings when compared to a fan which is operated at a fixed speed and controlled by throttling the discharge flow. Since pistachio dryers are usually not run at high turndown ratios, the use of a variable speed electric motor will not provide substantial savings. In addition, based on conversations with industry representatives, variable speed electric motors are not currently used on any pistachio dryers.

Based on a review of available technology and with consideration of input from industry, manufacturers, and other members of the public, the following is determined to be the technologically feasible GHG emission reduction measures for this class and category:

Table 2
Technologically Feasible GHG Control Measures for Pistachio Dryers

GHG Control Measures	Qualifications
Natural Gas-Fired Column Dryer with Staggered Heaters and Fans (i.e. GSI X-Stream Model)	By staggering of fans and heaters on opposite ends of the column dryer the dryer is able to deliver more uniform heat throughout the entire dryer regardless of which column it is in. As the product is passed through the dryer, the product is more evenly dried and resulting in a higher quality product at a lower cost. By uniformily distributing the heat, the burner is not required to produce as much heat, and significant fuel savings can be achieved.
Heat Recovery System on Column Dryer	On multi-fan dryers, heat recovery systems can reduce the amount of heat that is lost to the atmosphere. By reducing the amount of heat lost to the atmosphere, fuel consumption from the dryer is reduced.
Electric motors driving combustion air fans, induced draft fans, and auger motors shall have an efficiency meeting the standards of the National Electrical Manufacturer's Association (NEMA) for "premium efficiency" motors. Motors shall be operated with a variable frequency speed control or equivalent for control of flow through the fans	Use of premium efficiency motors with variable speed drives significantly reduces electric power consumption by the drying operaiton, particularly during periods of reduced-rate operation.

All of the control measures identified above are equipped with control equipment for criteria pollutants which meets current regulatory requirements. None of the identified control measures would result in an increase in emissions of criteria pollutants.

STEP 3. Identify all Achieved-in-Practice GHG Emission Control Measures

For all technologically feasible GHG emission reduction measures, all GHG reduction measures determined to be Achieved-in-Practice are identified. Achieved-in-Practice is defined as any equipment, technology, practice or operation available in the United States that has been installed and operated or used at a commercial or stationary source site for a reasonable period of time sufficient to demonstrate that the equipment, the technology, the practice or the operation is reliable when operated in a manner that is typical for the process. In determining whether equipment, technology, practice or operation is Achieved-in-Practice, the District will consider the extent to which grants, incentives or other financial subsidies influence the economic feasibility of its use.

The following findings or considerations are applicable to this class and category:

- A survey of permitted units in the District indicated that there are several pistachio column dryers operating with a burner blower staggered alignment operating in the District. In addition, there is currently a major manufacturing company that has installed these types of dryers in other parts of the country.
- There are currently no pistachio dryers in operation in the SJVAPCD that utilize a heat recovery system. In a conversation with a distributor of column pistachio dryers, it was stated that the heat recovery systems are only used on grain column dryers in cold climate locations. Since there are currently no heat recovery systems in operation on a pistachio dryer and pistachio dryers are only operated in the hot summer months of August and September, this technology will not be considered Achieved in Practice.
- Premium efficiency electric motors are readily available and currently operating at many facilities.
- Based on a converstation with a pistachio dryer vendor, variable speed drives are not currently being used in any pistachio dryer. Therefore; variable speed drives will not be considered Achieved in Practice.

Based on a review of available technology and with consideration of input from industry, manufacturers and other members of the public, the following is determined to be the Achieved-in-Practice GHG emission reduction measures for this class and category:

Table 3
Achieved-in-Practice GHG Control Measures for Pistachio Dryers

GHG Control Measures	Achieved-Qualifications
Natural Gas-Fired Column Dryer with Staggered Heaters and Fans with Premium Efficiency Electric Motors Powering Fans and Augers	Column dryers with staggered heater and fans are currently in operation in the District and are being operated by other facilities outside the District. Premium efficiency electric motors are readily available and can be used to power the blowers and augers associated with the dryer.

STEP 4. Quantify the Potential GHG Emission and Percent Reduction for Each Identified Achieved-in-Practice GHG Emission Control Measure

For each Achieved-in-Practice GHG emission reduction measure identified:
a. Quantify the potential GHG emissions per unit of activity (G_a)
b. Express the potential GHG emission reduction as a percent (G_p) of Baseline GHG emissions factor per unit of activity (BEF)

Natural Gas-Fired Column dryer with staggered heater and fans and premium-efficiency electric motors powering fans and augers

A. Basis and Assumptions:

- All direct GHG emissions are produced due to combustion of natural gas in this unit.
- Fuel consumption for a representative baseline unit is 5.0 MMBtu/ton throughput.
- Indirect emissions are produced due to operation of the main process fans and auger motors. There are four fans that require 40 horsepower each and two augers that require 10 horsepower each when the unit is operating at a rate of 2.5 tons per hour.
- Electric motor efficiency is 93.6% (NEMA Premium Motor Standard for 25 hp motors).

B. Calculation of Potential GHG Emissions per Unit of Activity (G_a):

Specific electricity consumption for the blowers/fans are:

[(40 hp x 4 fans) + (10 hp x 2 augers)]-hr/2.5 tons x 0.7457 kW/hp x (1/93.6%) = 57.4 kWh/ton

Indirect GHG Emissions are:

57.4 kWh/ton x 0.524 lb-$CO_{2(e)}$ per kWh = 30.1 lb-CO_2e/ton

Direct GHG emissions are:

The staggering of the heater and the fans in the column dryer is expected to increase fuel efficiency by 10%.

Fuel Consumption = (5.0 MMBtu/ton) x (1 – 0.10)
= 4.5 MMBtu/ton

4.5 MMBtu/ton x 117 lb-$CO_{2(e)}$/MMBtu = 526.5 lb-CO_2e/ton

GHG Emissions per Unit of Activity is then calculated as:

G_a = 30.1 + 526.5 = 556.6 lb-CO_2e/ton

C. Calculation of Potential GHG Emission Reduction as a Percentage of the Baseline Emission Factor (G_p):

$G_p = (BEF - G_a) / BEF = (605.4 – 556.6)/605.4 = 8.1\%$

STEP 5. Rank all Achieved-in-Practice GHG emission reduction measures by order of % GHG emissions reduction

Since only a single achieved in practice control measure is identified, no ranking is necessary.

STEP 6. Establish the Best Performance Standard (BPS) for this Class and Category

For Stationary Source Projects for which the District must issue permits, Best Performance Standard is – "For a specific Class and Category, the most effective, District approved, Achieved-In-Practice means of reducing or limiting GHG emissions from a GHG emissions source, that is also economically feasible per the definition of achieved-in-practice. BPS includes equipment type, equipment design, and operational and maintenance practices for the identified service, operation, or emissions unit class and category".

Based on the definition above and the ranking given in Table 3 from Section II.5, Best Performance Standard (BPS) for this class and category is determined as:

Best Performance Standard for Pistachio Dryers:

Natural Gas-Fired Column Dryer with Staggered Heaters and Fans with Premium Efficiency Electric Motors Powering Fans and Augers.

STEP 7. Eliminate All Other Achieved-in-Practice Options from Consideration as Best Performance Standard

Since the BPS selected for pistachio dryers was the only Achieved-in-Practice GHG control measure identified in Table 3, no Achieved-in-Practice options need to be eliminated.

VI. Appendices

Appendix 1 Public Notice of Intent: Notice

Appendix 1

Public Notice of Intent: Notice

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING

Notice Of Development Of
Best Performance Standards

NOTICE IS HEREBY GIVEN that the San Joaquin Valley Air Pollution Control District solicits public comment on development of Best Performance Standards for the following Stationary Source class and category of greenhouse gas emissions:

DRYERS AND DEHYDRATORS
Subject to District Permit Requirements

The District is soliciting public input on the following topics for the subject Class and Category of greenhouse gas emission source:

- Recommendations regarding the scope of the proposed Class and Category (Stationary GHG sources group based on fundamental type of equipment or industrial classification of the source operation),
- Recommendations regarding processes or operational activities the District should consider when establishing Baseline Emissions for the subject Class and Category,
- Recommendations regarding processes or operational activities the District should consider when converting Baseline Emissions into emissions per unit of activity, and
- Recommendations regarding technologies to be evaluated by the District, when establishing Best Performance Standards for the subject Class and Category.

Information regarding development of Best Performance Standard for the subject Class and Category of greenhouse gas emission source can be obtained from the District's website at http://www.valleyair.org/Programs/CCAP/CCAP_idx.htm.

Written comments regarding the subject Best Performance Standard should be addressed to Derek Fukuda by email, Derek.Fukuda@valleyair.org, or by mail at SJVUAPCD, 1990 East Gettysburg Avenue, Fresno, CA 93726 and must be received by **February 23, 2010**. For additional information, please contact Derek Fukuda by e-mail or by phone at (559) 230-5917.

Information regarding the District's Climate Action Plan and how to address GHG emissions impacts under CEQA, can be obtained from the District's website at http://www.valleyair.org/Programs/CCAP/CCAP_idx.htm.

Derek Fukuda

From: dryers_bps@lists.valleyair.org
Sent: Tuesday, February 09, 2010 9:27 AM
To: Derek Fukuda
Subject: [Dryers_BPS] Notice of Development - Dryers
Attachments: ATT4699359.txt

The San Joaquin Valley Air Pollution Control District is soliciting public input on the development of Best Performance Standards. The Notice of Development for Dryers, Dehydrators, and Ovens is available here.

Written comments regarding the subject Best Performance Standard should be addressed to Derek Fukuda by email, Derek.Fukuda@valleyair.org, or by mail at SJVUAPCD, 1990 East Gettysburg Avenue, Fresno, CA 93726 and must be received by **February 23, 2010**. For additional information, please contact Derek Fukuda by e-mail or by phone at (559) 230-5917.

Derek Fukuda

From:	dryers_bps@lists.valleyair.org
Sent:	Thursday, February 25, 2010 1:21 PM
To:	Derek Fukuda
Cc:	Arnaud Marjollet
Subject:	[Dryers_BPS] Notice of development of BPS for dryers/dehydrators:Extension to commenting period
Attachments:	ATT2093692.txt

Subject: Extension to Commenting Period for Dryers/Dehydrators

The District is extending the initial commenting period regarding development of Best Performance Standards (BPS) for dryers/dehydrators. The information requested below will be used when establishing Best Performance Standards for the subject Class and Category:

- Aspects of operating the subject emissions source that are unique to your industry
- Technologies or operational activities currently in practice to which should be considered.

Comments must be received by the District by Thursday, March 4, 2010.

Written comments regarding the subject Best Performance Standard should be addressed to Derek Fukuda by email, Derek.Fukuda@valleyair.org, or by mail at SJVUAPCD, 1990 East Gettysburg Avenue, Fresno, CA 93726. For additional information, please contact Derek Fukuda by e-mail or by phone at (559) 230-5917.