VERMONT AGENCY OF NATURAL RESOURCES
Department of Environmental Conservation
Air Pollution Control Division

TECHNICAL SUPPORT DOCUMENT FOR A TITLE V PERMIT TO CONSTRUCT AND OPERATE

#AOP-08-018
DEC# RU98-0179

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SOURCE:
Cheese Manufacturing
Agri-Mark, Inc.
869 Exchange Street
Middlebury, Vermont

APPLICATION CONTACT:
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I. INTRODUCTION

Agri-Mark, Inc. (referred to herein as "Owner/Operator") owns and operates a cheese manufacturing plant (also referred to herein as "Facility") in Middlebury, Vermont. The Facility produces cheddar cheese for the national retail market. The Facility operates two Nebraska boilers for space and process heat. Other potential emission sources include two emergency diesel-powered generators, two propane fired whey dryers and a cooling tower. The Facility's allowable air contaminant emissions are outlined below:

Air Contaminant Emissions (tons/year)					
PM/PM_{10}	**SO_2**	**NO_x**	**CO**	**VOCs**	**HAPs**
51	174	83	14	<50	<10/25

II. FACILITY LOCATION AND DESCRIPTION

A. Facility Location

Agri-Mark, Inc. owns and operates the cheese plant located at 869 Exchange Street in Middlebury, Vermont. The area surrounding the Facility is primarily industrial. The closest residences to the facility are greater than one half kilometer away. The Facility is located next to Otter Creek Brewery and across the street from Sun Fitness Center. The Facility is located 97 kilometers from the Lye Brook Wilderness area in Manchester, Vermont and greater than 100 kilometer from the Great Gulf and Dry River Wilderness areas in New Hampshire.

B. Facility Description

The Facility is a cheese manufacturer listed under the Standard Industrial Classification ("SIC") Code #2022, production of natural, processed or imitation cheese. The existing regulated sources of air contaminant emissions at the Facility are two 27 MMBtu/hr Nebraska boilers, two propane fired whey dryers, a whey vacuum air filtration system, one cooling towers and two Cummins emergency generators.

Boilers: Agri-Mark, Inc. operates two Nebraska boilers for space and process heat. The boilers burn No. 6 fuel oil and each unit has an estimated heat input of approximately 27 MMBtu/hr. Both boilers were installed in 1974. Approximately 90% of the steam demand at the facility is for process heat, so seasonal variation in fuel consumption is minimal. Both boilers exhaust through a common stack that is 115 feet above grade and 48 inches in diameter. Operation of the boilers results in the emission of sulfur dioxide ("SO_2"), nitrogen oxides ("NO_x"), carbon monoxide ("CO"), particulate matter ("PM"), volatile organic compounds ("VOCs") and hazardous air pollutants ("HAPs") to the ambient air.

Whey Dryers: The two propane fired whey dryers are rated at 8 MMBtu/hr and 12 MMBtu/hr maximum heat input. The 8 MMBtu/hr whey dryer spray dries whey protein concentrate ("WPC"). Emissions from this dryer are controlled by cyclones and fabric filters. The 12 MMBtu/hr whey dryer is used to spray dry whey permeate. Following the spray dryer, the permeate drying is completed in a fluidized bed. The emissions from the permeate dryer are controlled by cyclones followed by a wet venturi-style scrubber system and a demister. The fluidized bed emissions are controlled by fabric filters. Emissions from the whey dryers include both products of combustion and whey particulates. Products of combustion include NO_x, CO, and VOCs. Whey particulate emissions would be classified as particulate matter less than 10 microns in diameter ("PM_{10}").

Whey Vacuum Filtration System: The whey vacuum filtration system is used to store, transfer and package the finished whey product. Emissions from the system are controlled by a fabric

filter. As the whey vacuum filtration system discharges inside the building, it is not a source of ambient air contaminants.

Evapco Cooling Tower: The flow rate of the Evapco cooling tower is 1200 gallons per minute. Although the cooling tower emits particulate matter, calculations demonstrate that the emissions are negligible.

Lilly Hoffman Cooling Tower: Based on the permit application for AOP-08-018, Agri-Mark, Inc. no longer operates the Lilly Hoffman cooling tower.

Cheese Production: The process begins with the heating (pasteurization) of raw milk to kill any harmful bacteria. Following pasteurization, the milk is pumped to a coagulation tank, mixed with rennin, and cooked at approximately 100 ^{o}F. During coagulation the milk solids begin to separate from the liquid portion, which is also known as the whey. Both the pasteurization and coagulation tanks are heated using steam from the boilers.

After coagulation, the cheese is chopped into curds and salted. The whey is removed by vacuum in a packing tower. The packed cheese is then cut into 40-pound blocks, shrinkwrapped, and packaged for shipping.

Whey Concentration Processes: The whey is removed from the cheese and passed through a whey separator to remove butter fat. The whey is then processed through the ultra filtration system to separate the protein and permeate. The whey protein stream is dried in the 8 MMBtu/hr whey dryer. The whey permeate stream is condensed in the evaporator and then dried in the 12 MMBtu/hr whey permeate dryer.

Emission Sources and Control Devices

Emission Source	Fuel	Control Devices
2 Nebraska Boilers (27 MMBtu/hr)	No. 6 Fuel Oil	none
2 Diesel Emergency Generators	Diesel	none
Whey Protein Concentrate Dryer (8 MMBtu/hr)	Propane	cyclones and fabric filters
Whey Permeate Dryer (12 MMBtu/hr)	Propane	cyclones, fabric filters, wet scrubber system and demister
Evapco Cooling Tower	n/a	mist eliminator

C. Description of Compliance Monitoring Devices

The Facility currently operates “broken bag detectors” on all fabric filters to monitor compliance. The broken bag detectors are designed to alert the operator of potential exceedances of the particulate emission limit by an audible or visual alarm.

III. FEDERAL APPLICABLE REQUIREMENTS

40 *CFR* Part 64 - Compliance Assurance Monitoring. Pursuant to requirements concerning enhanced monitoring and compliance certification under the *Clean Air Act* ("*CAA*"), EPA promulgated new regulations and revised regulations on October 22, 1997. These new requirements implemented compliance assurance monitoring ("CAM") for major stationary sources of air pollution that are required to obtain operating permits under Title V of the *CAA*. Subject to certain exemptions, the new regulations require owners or operators of such sources to conduct monitoring that satisfies particular criteria established in the rule to provide a reasonable assurance of compliance with applicable requirements under the *CAA*. Monitoring is proposed to focus on emissions units that rely on pollution control device equipment to achieve compliance with applicable standards. The regulations also provide procedures for coordinating these new requirements with the operating permits program regulations.

Section 64.2 of 40 *C.F.R*. specifies that each pollutant specific emission unit at a facility that meets a three-part test is subject to the requirements for CAM. An emission unit must:

(1) be subject to an emission limit or standard;
(2) use a control device to achieve compliance;
(3) have **pre-control** emissions that exceed or are equivalent to the major source threshold in 40 *CFR* Part 70 (i.e., 10 tpy individual HAP, 25 tpy total HAP, 50 tpy VOCs, or 100 tpy for any other air contaminant).

Equipment at the Facility that meets the first criteria are the boilers and the exhausts for the two whey dryers. As the boilers do not use control devices (criteria #2), they are not subject to CAM. The cyclones and baghouses collecting product from the whey dryers are not considered pollution control devices as they are inherent process equipment that collect product (40 *CFR* §64.1). The wet scrubber on the whey permeate line does meet the first two criteria, consequently the pre-control emissions from the wet scrubber have been calculated for comparison to the third criteria. As stated in the 16 November 2001 Agri-Mark Trip Report from C.E. Rogers Company, the dry solids flow rate to the wet scrubber are between 17 and 18.8 lbs/hr. This results in 82 tpy of particulate entering the wet scrubber [(18.8 lb/hr) x (8760 hr/yr) / (2000 lb/ton)], which is less than the major source threshold for particulates of 100 tpy.

As none of the equipment at the Facility meets the three criteria listed above, the Facility is currently not subject to CAM.

40 *CFR* Part 68 - Chemical Accident Prevention Provisions (*CAA* 112(r): Risk Management Plan). Pursuant to 40 *CFR* §68.215, Facilities storing quantities of chemicals greater than threshold amounts are required to file a Risk Management Plan with the EPA. Agri-Mark, Inc. has filed such a plan for storage of anhydrous ammonia at the Middlebury facility.

IV. QUANTIFICATION OF POLLUTANTS

The quantification of emissions from a stationary source is necessary in order to establish the regulatory designation of the Facility and proposed modification, and consequently determine the level of review that is required under the *Regulations*. The designation of a stationary source is determined by its allowable emissions. Allowable emissions are defined as "the emission rate calculated using the maximum rated capacity of the source and, if applicable, either: (a) the applicable emission standard contained in the *Regulations*, if any, or (b) the emission rate or design, operational or equipment standard specified in any order or agreement issued under these *Regulations* that is state and federally enforceable". This means that allowable emissions must be determined assuming continuous operation of the stationary source (i.e. 8760 hours per year) at maximum capacity, unless the owner/operator of the source operates under enforceable limits that restrict operation to a lower level. An applicant may impose in its application an emission rate or design, operational or equipment limitation on its operations to be incorporated into the permit to restrict the Facility's allowable emissions. Such limitations may include fuel restrictions such as a limit on sulfur content of the fuel below the regulation maximum allowable, a restriction on annual fuel usage, or a production limit such as a cap on the amount of product to be produced on which the allowable emissions would be calculated.

EMISSION CALCULATIONS

Nebraska Boilers (2) 27 MMBtu/hr Fuel Cap: 2,200,000 gal/ yr, Residual Oil, 1.0% S	Emission Factor			Allowable Emissions
	Factor	Units	Source	tons per year
SO_2	157 S	lb/ 1000 gal	AP-42 Table 1.3-1 (9/98)	173
NO_x	72.7*	lb/ 1000 gal	AP-42 Table 1.3-1 (9/98)	80
PM	9.19 (S) + 3.22 + 1.55*	lb/ 1000 gal	AP-42 Table 1.3-1 (9/98)	15.4
CO	5	lb/ 1000 gal	AP-42 Table 1.3-1 (9/98)	5.5
VOC	0.28	lb/ 1000 gal	AP-42 Table 1.3-3 (9/98)	0.3
HAPs	0.047	lb/ 1000 gal	AP-42 Tables 1.3-9 & 1.3-11 (9/98)	0.05

* Note that the emission factors for NO_x and PM have been updated and the increase in allowable emissions is not due to any actual increase in emissions from the facility. The NO_x emission factor was updated from 55 to 72.7 lbs/1000 gallons. The PM emission factor now includes a factor of 1.55 to reflect condensibles.

Emergency Generators (2): 100 kW, 166 hp Cummins 250 kW, 390 hp Cummins Diesel Generators Limited to 100 hrs per year Max Capacity: (166 hp + 390 hp) x 100 hrs/yr = 55,600 hp-hr per year	Emission Factor			Allowable Emissions
	Factor	Units	Source	tons per year
SO_2	2.05×10^{-3}	lb/ hp-hr	AP-42 Table 3.3-1 (10/96)	0.1
NO_x	3.1×10^{-2}	lb/ hp-hr	AP-42 Table 3.3-1 (10/96)	0.9
PM	2.2×10^{-3}	lb/ hp-hr	AP-42 Table 3.3-1 (10/96)	0.1
CO	6.68×10^{-3}	lb/ hp-hr	AP-42 Table 3.3-1 (10/96)	0.2
VOC	2.5×10^{-3}	lb/ hp-hr	AP-42 Table 3.3-1 (10/96)	0.1
HAPs	4.52×10^{-5}	lb/ hp-hr	AP-42 Table 3.3-2 (10/96)	0

Evapco Cooling Tower

- 1,200 gal/min design flowrate
- Maximum solids content of water (0.125 ppm) is based on an original mineral content of 5000 ppm that has been treated by reverse osmosis (RO) twice. The RO is at least 99.5% efficient.
- Emissions are estimated using AP-42 factor of 0.019 pounds of PM_{10} drift per thousand gallons of cooling water (AP-42, Table 13.4-1).

PM_{10} Emissions = 1,200 $^{gal}/_{min}$ x 60 $^{min}/_{hr}$ x 8,760 $^{hr}/_{yr}$ x (1.9×10^{-5} $^{lb\ drift}/_{gal}$) x 1.25×10^{-7} $^{lb\ solids}/_{lb\ drift}$

= 0.0015 pounds per year

= Negligible

Whey Protein Concentrate Dryer and Permeate Dryer Fabric Filters (EP-8, EP-9, EP-10, EP-11, EP-12)

- Potential air contaminants from propane combustion: NO_2, CO, SO_2 and VOC. Whey paticulates are a source of PM_{10} emissions.
- Sulfur content of propane (S): 10 gr/100 cf.
- MSER for dried whey powder emissions is 0.01 gr/dscf (Note: This calculation quantifies all the PM emissions from both the Whey Protein Concentrate and the Whey Permeate Dryers, except for the Whey Permeate Wet Scrubber and the Dryer)

$$34{,}600 \text{ dscfm} \times 0.01 \text{ gr/dscf} \times 7.14 \times 10^{-8} \text{ ton}/_{\text{gr}} \times 525{,}600 \text{ min}/_{\text{year}} = 13 \text{ tons}/_{\text{year}}$$

Whey Protein Concentrate Dryer: 8 MMBtu/hr Propane Fired burner Max Capacity:64 gallons per hour (560,640 gallons propane per year)	Emission Factor			Allowable Emissions
	Factor	Units	Source	tons per year
SO_2	0.1S	lb/1000 gal	AP-42 Table 1.5-1 (10/96)	0.3
NO_x	4.5	lb/1000 gal	mfg. data	1.3
PM	0.01	gr/dscf	MSER	13
CO	12.6	lb/1000 gal	mfg. data	3.5
VOC	0.5	lb/1000 gal	AP-42 Table 1.5-1 (10/96)	0.14

Permeate Dryer Wet Scrubber (EP-13)

- Potential air contaminants from propane combustion: NO_2, CO, SO_2 and VOC. Whey paticulates are a source of PM_{10} emissions.
- Sulfur content of propane (S): 10 gr/100 cf.
- MSER for the wet scrubber on the permeate dryer is 0.02 gr/dscf.

$$28{,}000 \text{ dscfm} \times 0.02 \text{ gr/dscf} \times 7.14 \times 10^{-8} \text{ ton}/_{\text{gr}} \times 525{,}600 \text{ min}/_{\text{year}} = 21 \text{ tons}/_{\text{year}}$$

Whey Permeate Dryer: 12 MMBtu/hr Propane Fired burner Max Capacity:71 gallons per hour (621,960 gallons propane per year)	Emission Factor			Allowable Emissions
	Factor	Units	Source	tons per year
SO_2	0.1S	lb/1000 gal	AP-42 Table 1.5-1 (10/96)	0.3
NO_x	4.5	lb/1000 gal	mfg. data	1.4
PM	0.02	gr/dscf	MSER	21
CO	12.6	lb/1000 gal	mfg. data	3.9
VOC	0.5	lb/1000 gal	AP-42 Table 1.5-1 (10/96)	0.16