APPENDIX F

Air Quality and Greenhouse Gas Emissions Technical Appendix

APPENDIX F-1

CalEEMod Operational Emissions Calculations

"Remarks" for the Hillcrest Dairy Expansion Project CalEEMod (v.2020.4.0) Model Run

"Remarks" are typically used in California Emissions Estimator Model (CalEEMod) to explain non-default inputs. For the current modeling, this document replaces the "remarks" section of the referenced CalEEMod model to provide more space to both identify non-default inputs and to explain how CalEEMod is used to calculate emissions for the current project. When defaults were retained and no further explanation was necessary, no "remarks" are recorded below. The proposed project construction emissions and increment of increase of operational emissions were estimated as set forth below.

Hillcrest Dairy Expansion Model Run

Land Use

- The General Heavy Industrial land use subtype was used to represent the dairy project, an industrial agriculture project. With implementation of the proposed dairy expansion, new structures would consist of approximately 195,678 square feet of construction.

Construction Phase

- The proposed structure construction would occur within two phases. Construction modeling was completed separately and can be found in EIR Appendix G, *Health Risk Assessment and Ambient Air Quality Analysis*.

Vehicle Trips

- Since the residential dwellings would not change, these trips were not included in the model as an increment of increase. Animal Confinement Facilities operate 7 days a week. The proposed expanded operations would generate an increase of approximately 4.5 average daily trips (ADTs) (or 0.03 trips per 1,000 square feet).

Operational Off-Road Equipment

- The increase in the number of hours for feed loading, bedding delivery, manure scraping, manure loading, and feed delivery was used based on estimates from the project applicant.

Area Sources, Energy, Water and Wastewater, Solid Waste

- These rates are not applicable to the Hillcrest Dairy, and were not included. Electricity use provided by project applicant and calculated for GHG separately. Solid waste based on similar type of project.

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Hillcrest Dairy Expansion

Merced County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Heavy Industry	195.68	1000sqft	4.49	195,678.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	49
Climate Zone	3			**Operational Year**	2026
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - See notes

Construction Phase - Operations model only

Off-road Equipment - Operations model only

Grading - Operations model only

Vehicle Trips - See notes

Area Coating - n/a

Landscape Equipment - n/a

Energy Use - See notes

Water And Wastewater - See notes

Solid Waste - See notes

Operational Off-Road Equipment - See notes

Hillcrest Dairy Expansion - Merced County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Consumer Products - Parking n/a

Table Name	Column Name	Default Value	New Value
tblAreaCoating	Area_Nonresidential_Exterior	97839	0
tblAreaCoating	Area_Nonresidential_Interior	293517	0
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstructionPhase	NumDays	5.00	0.00
tblConsumerProducts	ROG_EF_Degreaser	3.542E-07	0
tblEnergyUse	LightingElect	2.70	0.00
tblEnergyUse	NT24E	4.16	0.00
tblEnergyUse	NT24NG	3.84	0.00
tblEnergyUse	T24E	1.75	0.00
tblEnergyUse	T24NG	16.86	0.00
tblGrading	AcresOfGrading	0.00	7.50
tblLandscapeEquipment	NumberSummerDays	180	0
tblLandUse	LandUseSquareFeet	195,680.00	195,678.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	1.00
tblOffRoadEquipment	UsageHours	8.00	0.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	52.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	365.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	365.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	52.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	365.00
tblOperationalOffRoadEquipment	OperHorsePower	367.00	275.00
tblOperationalOffRoadEquipment	OperHorsePower	97.00	163.00
tblOperationalOffRoadEquipment	OperHorsePower	97.00	110.00
tblOperationalOffRoadEquipment	OperHorsePower	97.00	284.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	0.10
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	1.00

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	0.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	0.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	2.00
tblOperationalOffRoadEquipment	OperLoadFactor	0.48	0.37
tblOperationalOffRoadEquipment	OperLoadFactor	0.37	0.36
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblSolidWaste	SolidWasteGenerationRate	242.64	115.00
tblVehicleTrips	ST_TR	6.42	0.03
tblVehicleTrips	SU_TR	5.09	0.03
tblVehicleTrips	WD_TR	3.93	0.03
tblWater	AerobicPercent	87.46	0.00
tblWater	AnaDigestCombDigestGasPercent	100.00	0.00
tblWater	AnaerobicandFacultativeLagoonsPercent	2.21	0.00
tblWater	ElectricityIntensityFactorForWastewaterTreatment	1,911.00	0.00
tblWater	ElectricityIntensityFactorToDistribute	1,272.00	0.00
tblWater	ElectricityIntensityFactorToSupply	2,117.00	0.00
tblWater	ElectricityIntensityFactorToTreat	111.00	0.00
tblWater	IndoorWaterUseRate	45,251,000.00	0.00
tblWater	SepticTankPercent	10.33	100.00

2.0 Emissions Summary

Hillcrest Dairy Expansion - Merced County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.7642	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	3.1800e-003	8.3500e-003	0.0329	9.0000e-005	8.5300e-003	9.0000e-005	8.6300e-003	2.2900e-003	9.0000e-005	2.3800e-003	0.0000	8.4035	8.4035	3.6000e-004	5.4000e-004	8.5734
Offroad	0.0162	0.1175	0.1782	5.3000e-004		4.7500e-003	4.7500e-003		4.3700e-003	4.3700e-003	0.0000	46.4249	46.4249	0.0150	0.0000	46.8003
Waste						0.0000	0.0000		0.0000	0.0000	23.3440	0.0000	23.3440	1.3796	0.0000	57.8337
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.7836**	**0.1258**	**0.2110**	**6.2000e-004**	**8.5300e-003**	**4.8400e-003**	**0.0134**	**2.2900e-003**	**4.4600e-003**	**6.7500e-003**	**23.3440**	**54.8284**	**78.1724**	**1.3950**	**5.4000e-004**	**113.2074**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.7642	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	3.1800e-003	8.3500e-003	0.0329	9.0000e-005	8.5300e-003	9.0000e-005	8.6300e-003	2.2900e-003	9.0000e-005	2.3800e-003	0.0000	8.4035	8.4035	3.6000e-004	5.4000e-004	8.5734
Offroad	0.0162	0.1175	0.1782	5.3000e-004		4.7500e-003	4.7500e-003		4.3700e-003	4.3700e-003	0.0000	46.4249	46.4249	0.0150	0.0000	46.8003
Waste						0.0000	0.0000		0.0000	0.0000	23.3440	0.0000	23.3440	1.3796	0.0000	57.8337
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.7836**	**0.1258**	**0.2110**	**6.2000e-004**	**8.5300e-003**	**4.8400e-003**	**0.0134**	**2.2900e-003**	**4.4600e-003**	**6.7500e-003**	**23.3440**	**54.8284**	**78.1724**	**1.3950**	**5.4000e-004**	**113.2074**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation	Site Preparation	1/29/2025	1/28/2025	5	0	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Acres of Grading (Site Preparation Phase): 7.5

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation	Rubber Tired Dozers	1	0.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation	1	3.00	0.00	0.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Site Preparation - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Site Preparation - 2025

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	3.1800e-003	8.3500e-003	0.0329	9.0000e-005	8.5300e-003	9.0000e-005	8.6300e-003	2.2900e-003	9.0000e-005	2.3800e-003	0.0000	8.4035	8.4035	3.6000e-004	5.4000e-004	8.5734
Unmitigated	3.1800e-003	8.3500e-003	0.0329	9.0000e-005	8.5300e-003	9.0000e-005	8.6300e-003	2.2900e-003	9.0000e-005	2.3800e-003	0.0000	8.4035	8.4035	3.6000e-004	5.4000e-004	8.5734

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Heavy Industry	5.87	5.87	5.87	22,680	22,680
Total	5.87	5.87	5.87	22,680	22,680

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
General Heavy Industry	14.70	6.60	6.60	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Heavy Industry	0.530302	0.047786	0.155927	0.140874	0.027072	0.006797	0.014220	0.050043	0.000830	0.000457	0.020823	0.002143	0.002726

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Heavy Industry	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.7642	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.7642	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.7642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.7642**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.7642					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.7642**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.0 Water Detail

7.1 Mitigation Measures Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Heavy Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Heavy Industry	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	23.3440	1.3796	0.0000	57.8337
Unmitigated	23.3440	1.3796	0.0000	57.8337

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Heavy Industry	115	23.3440	1.3796	0.0000	57.8337
Total		**23.3440**	**1.3796**	**0.0000**	**57.8337**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Heavy Industry	115	23.3440	1.3796	0.0000	57.8337
Total		**23.3440**	**1.3796**	**0.0000**	**57.8337**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Scrapers	1	0.10	52	275	0.37	Diesel

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Tractors/Loaders/Backhoes	1	1.00	365	163	0.36	Diesel
Tractors/Loaders/Backhoes	1	0.00	365	110	0.37	Diesel
Tractors/Loaders/Backhoes	1	0.00	52	97	0.37	Diesel
Tractors/Loaders/Backhoes	1	2.00	365	284	0.37	Diesel

UnMitigated/Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Equipment Type	tons/yr										MT/yr					
Scrapers	1.3000e-004	1.2000e-003	1.0100e-003	0.0000		5.0000e-005	5.0000e-005		4.0000e-005	4.0000e-005	0.0000	0.2500	0.2500	8.0000e-005	0.0000	0.2520
Tractors/Loaders/Backhoes	0.0160	0.1163	0.1771	5.3000e-004		4.7100e-003	4.7100e-003		4.3300e-003	4.3300e-003	0.0000	46.1749	46.1749	0.0149	0.0000	46.5482
Total	**0.0162**	**0.1175**	**0.1782**	**5.3000e-004**		**4.7600e-003**	**4.7600e-003**		**4.3700e-003**	**4.3700e-003**	**0.0000**	**46.4249**	**46.4249**	**0.0150**	**0.0000**	**46.8003**

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

APPENDIX F-2

VOC and PM_{10} Emissions Calculations

Rev. January 6, 2020

Pre-Project Facility Information

1. Does this facility house Holstein or Jersey cows? Holstein
   Most facilities house Holstein cows unless explicitly stated on the PTO or application.
2. Does the facility have an anaerobic treatment lagoon? no
3. Does the facility land apply liquid manure? yes
   Answering "yes" assumes worst case.
4. Does the facility land apply solid manure? yes
   Answering "yes" assumes worst case.
5. Is any scraped manure sent to a lagoon/storage pond? no
   Answering "yes" assumes worst case.

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	4,000				4,000
Dry Cows				750	750
Support Stock (Heifers, Calves, and Bulls)				3,300	3,300
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves							0

Total Herd Summary	
Total Milk Cows	4,000
Total Mature Cows	4,750
Support Stock (Heifers, Calves, and Bulls)	3,300
Total Calves	0
Total Dairy Head	8,050

Pre-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn			
Alfalfa			
Wheat			

Post-Project Facility Information

1. Does this facility house Holstein or Jersey cows? Holstein
   Most facilities house Holstein cows unless explicitly stated on the PTO or application.
2. Does the facility have an anaerobic treatment lagoon? no
3. Does the facility land apply liquid manure? yes
   Answering "yes" assumes worst case.
4. Does the facility land apply solid manure? yes
   Answering "yes" assumes worst case.
5. Is any scraped manure sent to a lagoon/storage pond? no
   Answering "yes" assumes worst case.
6. Does this project result in an increase or relocation of uncovered surface area for any lagoon/storage pond? no

Post-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	5,000				5,000
Dry Cows				750	750
Support Stock (Heifers, Calves, and Bulls)				4,000	4,000
Large Heifers					0
Medium Heifers					0
Small Heifers					0
Bulls					0

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves							0

Total Herd Summary	
Total Milk Cows	5,000
Total Mature Cows	5,750
Support Stock (Heifers, Calves, and Bulls)	4,000
Total Calves	0
Total Dairy Head	9,750

Post-Project Silage Information

Feed Type	Max # Open Piles	Max Height (ft)	Max Width (ft)
Corn			
Alfalfa			
Wheat			

This spreadsheet serves only as a resource to calculate potential emissions from dairies, and may not reflect the final emissions used by the District due to parameters not addressed in this spreadsheet and/or omissions from the spreadsheet. Any other permittable equipment (e.g. IC engines, gasoline tanks, etc.) at a facility will need to be calculated separately. All final calculations used in permitting projects will be conducted by District staff.

Pre-Project Potential to Emit (PE1)

Pre-Project Herd Size

Herd	Flushed Freestalls	Scraped Freestalls	Flushed Corrals	Scraped Corrals	Total # of Animals
Milk Cows	4,000	0	0	0	4,000
Dry Cows	0	0	0	750	750
Support Stock (Heifers, Calves and Bulls)	0	0	0	3,300	3,300
Large Heifers	0	0	0	0	0
Medium Heifers	0	0	0	0	0
Small Heifers	0	0	0	0	0
Bulls	0	0	0	0	0

	Calf Hutches				Calf Corrals		
	Aboveground Flushed	Aboveground Scraped	On-Ground Flushed	On-Ground Scraped	Flushed	Scraped	Total # of Calves
Calves	0	0	0	0	0	0	0

Silage Information

Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	0	0	0	
Alfalfa	0	0	0	
Wheat	0	0	0	

Milking Parlor

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	**4.4**	**1,600**	**1.5**	**547**

Cow Housing

Cow	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**158.0**	**57,711**	**303.5**	**110,811**	**99.6**	**36,287**

Liquid Manure Handling

Cow	VOC		NH3		H2S*	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	21.2	7,720	83.2	30,360	1.6	590
Dry Cows	0.0	0	0.0	0	0	0
Support Stock (Heifers, Calves and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	**21.2**	**7,720**	**83.2**	**30,360**	**1.6**	**590**

Solid Manure Handling

Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	5.3	1,920	31.0	11,320
Dry Cows	0.5	195	2.9	1,073
Support Stock (Heifers, Calves and Bulls)	1.8	660	6.8	2,475
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	**7.6**	**2,775**	**40.7**	**14,868**

Feed Handling and Storage

	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	0.0	0
Alfalfa Emissions	0.0	0
Wheat Emissions	0.0	0
TMR	177.5	64,773
Total	**177.5**	**64,773**

Calculations for milking parlor:

Annual PE = (# milk cows) x (EF1 lb-pollutant/hd-yr)

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

Annual PE = [(# milk cows) x (EF1 lb-pollutant/hd-yr)] + [(# dry cows) x (EF1 lb-pollutant/hd-yr)] + [(# large heifers) x (EF1 lb-pollutant/hd-yr)] + [(# medium heifers) x (EF1 lb-pollutant/hd-yr)] + [(# small heifers) x (EF1 lb-pollutant/hd-yr)] + [(# calves) x (EF1 lb-pollutant/hd-yr)] + [(# bulls) x (EF1 lb-pollutant/hd-yr)]

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

The H2S emission factor is assumed to be 10% of the NH3 lagoon/storage pond(s) emission factor, for each respective herd size.

Calculations for silage emissions:

Annual PE = (EF1) x (area ft^2) x (0.0929 m^2/ft^2) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calculation for TMR emissions:

Annual PE = (# cows) x (EF1) x (0.658 m^2) x (525,600 min/yr) x (2.20E-9 lb/µg)

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Notes

Calves are not included in TMR calculation.

*Since there will be no change to the lagoons/storage ponds surface area, no change in H2S emissions is expected. Therefore, it will be assumed that PE1 for H2S emissions is equal to PE2 for H2S emissions.

Total Daily Pre-Project Potential to Emit (lb/day)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0.0	0.0	0.0	0.0	4.4	1.5	0.0
Cow Housing	0.0	0.0	99.6	0.0	158.0	303.5	0.0
Liquid Manure	0.0	0.0	0.0	0.0	21.2	83.2	1.6
Solid Manure	0.0	0.0	0.0	0.0	7.6	40.7	0.0
Feed Handling	0.0	0.0	0.0	0.0	177.5	0.0	0.0
Total	**0.0**	**0.0**	**99.6**	**0.0**	**368.7**	**428.9**	**1.6**

Major Source Emissions (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	4,680
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**4,680**

Total Annual Pre-Project Potential to Emit (lb/yr)

Permit	NOx	SOx	PM10	CO	VOC	NH3	H2S
Milking Parlor	0	0	0	0	1,600	547	0
Cow Housing	0	0	36,287	0	57,711	110,811	0
Liquid Manure	0	0	0	0	7,720	30,360	590
Solid Manure	0	0	0	0	2,775	14,868	0
Feed Handling	0	0	0	0	64,773	0	0
Total	**0**	**0**	**36,287**	**0**	**134,579**	**156,586**	**590**

Post-Project Potential to Emit (PE2)

Post-Project Herd Size							
Herd	**Flushed Freestalls**	**Scraped Freestalls**	**Flushed Corrals**	**Scraped Corrals**	**Total # of Animals**		
Milk Cows	5,000	0	0	0	5,000		
Dry Cows	0	0	0	750	750		
Support Stock (Heifers, Calves, and Bulls)	0	0	0	4,000	4,000		
Large Heifers	0	0	0	0	0		
Medium Heifers	0	0	0	0	0		
Small Heifers	0	0	0	0	0		
Bulls	0	0	0	0	0		
	Calf Hutches				**Calf Corrals**		
	Aboveground Flushed	**Aboveground Scraped**	**On-Ground Flushed**	**On-Ground Scraped**	**Flushed**	**Scraped**	**Total # of Calves**
Calves	0	0	0	0	0	0	0

Silage Information				
Feed Type	Maximum # Open Piles	Maximum Height (ft)	Maximum Width (ft)	Open Face Area (ft^2)
Corn	0	0	0	
Alfalfa	0	0	0	
Wheat	0	0	0	

Milking Parlor				
Cow	VOC		NH3	
Milk Cows	lb/day	lb/yr	lb/day	lb/yr
Total	**5.5**	**2,000**	**1.9**	**684**

Cow Housing						
	VOC		NH3		PM10	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Total	**190.3**	**69,489**	**365**	**133,212**	**119**	**43,437**

Liquid Manure Handling						
Cow	VOC		NH3		H2S	
	lb/day	lb/yr	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	26.4	9,650	104.0	37,950	1.6	590
Dry Cows	0.0	0	0.0	0	0	0
Support Stock (Heifers, Calves, and Bulls)	0.0	0	0.0	0	0	0
Large Heifers	0.0	0	0.0	0	0	0
Medium Heifers	0.0	0	0.0	0	0	0
Small Heifers	0.0	0	0.0	0	0	0
Calves	0.0	0	0.0	0	0	0
Bulls	0.0	0	0.0	0	0	0
Total	**26.4**	**9,650**	**104.0**	**37,950**	**1.6**	**590**

Solid Manure Handling				
Cow	VOC		NH3	
	lb/day	lb/yr	lb/day	lb/yr
Milk Cows	6.6	2,400	38.8	14,150
Dry Cows	0.5	195	2.9	1,073
Support Stock (Heifers, Calves, and Bulls)	2.2	800	8.2	3,000
Large Heifers	0.0	0	0.0	0
Medium Heifers	0.0	0	0.0	0
Small Heifers	0.0	0	0.0	0
Calves	0.0	0	0.0	0
Bulls	0.0	0	0.0	0
Total	**9.3**	**3,395**	**49.9**	**18,223**

Feed Handling and Storage		
	Daily PE (lb-VOC/day)	Annual PE (lb-VOC/yr)
Corn Emissions	0.0	0
Alfalfa Emissions	0.0	0
Wheat Emissions	0.0	0
TMR	214.9	78,452
Total	**214.9**	**78,452**

Calculations for milking parlor:

Annual PE = (# milk cows) x (EF2 lb-pollutant/hd-yr)

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calculations for cow housing:

See detailed calculations under Cow Housing Calculations worksheet.

Calculations for liquid manure and solid manure handling:

Annual PE = [(# milk cows) x (EF1 lb-pollutant/hd-yr)] + [(# dry cows) x (EF2 lb-pollutant/hd-yr)] + [(# large heifers) x (EF2 lb-pollutant/hd-yr)] + [(# medium heifers) x (EF2 lb-pollutant/hd-yr)] + [(# small heifers) x (EF2 lb-pollutant/hd-yr)] + [(# calves) x (EF2 lb-pollutant/hd-yr)] + [(# bulls) x (EF2 lb-pollutant/hd-yr)]

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

The H2S emission factor is assumed to be 10% of the NH3 lagoon/storage pond(s) emission factor, for each respective herd size.

Calculations for silage emissions:

Annual PE = (EF2) x (area ft^2) x (0.0929 m^2/ft^2) x (8,760 hr/yr) x (60 min/hr) x 2.20E-9 lb/µg

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calculation for TMR emissions:

Annual PE = (# cows) x (EF2) x (0.658 m^2) x (525,600 min/yr) x (2.20E-9 lb/µg)

Daily PE = (Annual PE lb/yr) ÷ (365 day/yr)

Calves are not included in TMR calculation.

Total Daily Post-Project Potential to Emit (lb/day)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0.0	0.0	0.0	0.0	5.5	1.9	0.0
Cow Housing	0.0	0.0	119.2	0.0	190.3	364.9	0.0
Liquid Manure	0.0	0.0	0.0	0.0	26.4	104.0	1.6
Solid Manure	0.0	0.0	0.0	0.0	9.3	49.9	0.0
Feed Handling	0.0	0.0	0.0	0.0	214.9	0.0	0.0
Total	**0.0**	**0.0**	**119.2**	**0.0**	**446.4**	**520.7**	**1.6**

Major Source Emissions (lb/yr)					
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**
Milk Parlor	0	0	0	0	0
Cow Housing	0	0	0	0	0
Liquid Manure	0	0	0	0	5,850
Solid Manure	0	0	0	0	0
Feed Handling	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**5,850**

Total Annual Post-Project Potential to Emit (lb/yr)							
Permit	**NOx**	**SOx**	**PM10**	**CO**	**VOC**	**NH3**	**H2S**
Milking Parlor	0	0	0	0	2,000	684	0
Cow Housing	0	0	43,437	0	69,489	133,212	0
Liquid Manure	0	0	0	0	9,650	37,950	590
Solid Manure	0	0	0	0	3,395	18,223	0
Feed Handling	0	0	0	0	78,452	0	0
Total	**0**	**0**	**43,437**	**0**	**162,986**	**190,069**	**590**

Herd Breakout

	Existing	Proposed
Milking Cow	4,000	5,000
Dry Cow	750	750
Heifer (15-24 mo)	1,400	1,625
Heifer (7-14 mo)	500	1,625
Calves (4-6 mo)	1,400	750
Calf (under 3 mo)	0	0
Bulls	0	0
Totals	8,050	9,750

The estimated VOC emissions used in this analysis are from the SJVAPCD dairy emissions calculator dated January 2020 and estimates from CalEEMod v.2020.4.0

VOC Emissions from Harvested Acres in Merced County

	tons/day	lbs/year	lbs/acre/yr
Merced Farm	0.81	591,300	1.19
Harvested Acres	497,467		
		lbs/year	**tons/year**
Acres Existing	2,758	3,278	**1.64**
Acres Proposed	2,758	3,278	**1.64**

Farm Equipment emissions were calculated using an emissions factor of 1.19 lbs/acre/year of VOC based on an estimated 0.81 tons/day VOC emitted from farming equipment in the County, with 497,467 acres harvested. This emission factor is based on 2017 inventory data, the latest available, and would represent a conservative estimate of emissions.

This emission factor was applied to the existing 2,294 acres harvested (fields are harvested multiple times a year with double-cropping patterns) and to the proposed 2,294 acres harvested (fields would be harvested multiple times a year with double-cropping patterns).

California Air Resources Board. CEPAM2019V1.03 Emission Projection Data. 2017 Estimated Annual Average Emissions. Merced County. Accessed on March 24, 2022 at <https://ww2.arb.ca.gov/applications/emissions-county>

United States, Department of Agriculture (USDA). 2017. 2017 Census of Agriculture – County Data: Total Cropland - Harvested Cropland, Acres. Merced County. Accessed on March 24, 2022 at < https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Census_by_State/California/ >

VOC Emissions

Emission Source	Existing VOC/ ROG Emissions (tons/yr)	Proposed VOC/ROG Emissions (tons/yr)	Increment of Increase with Proposed Expansion
Traffic, Onsite Mobile Source, and Area Sources			0.78
Farm Equipment	1.64	1.64	0.00
Feed and Manure Management	134,579	162,986	
Feed and Manure Management	67.29	81.49	14.20
	68.93	83.13	14.98

VOC emissions from traffic and area sources were estimated using CalEEMod Version 2020.4.0. VOC emissions from feed and manure management (including cow housing, liquid manure, and solid manure) were estimated using the SJVAPCD dairy emissions calculator. See Appendix F for calculator emissions and CalEEMod results.

Herd Breakout

	Existing	Proposed
Milking Cow	4,000	5,000
Dry Cow	750	750
Heifer (15-24 mo)	1,400	1,625
Heifer (7-14 mo)	500	1,625
Heifer (4-6 mo)	1,400	750
Calf (under 3 mo)	0	0
Bulls	0	0
Totals	8,050	9,750

PM 10 Emissions from Cow Housing

	Existing Total Emissions (lbs/yr)	Proposed Total Emissions (lbs/yr)	Increment of Increase
Totals	36,287	43,437	
Tons/Year	**18.14**	**21.72**	**3.58**

See SJVAPCD Calculator for PM10 Calculation Worksheets and Controls

Wind Erosion Cropped Fields

	PM Emission Factor (tons/acre/yr)	PM10/PM2.5 Emission Factor (tons/acre/yr)	Emission Factor (lbs/acre/yr)	Existing Acreage	Existing Emissions (tons/year)	Proposed Acreage	Proposed Emissions (tons/year)
PM10	0.013659	0.0061466	12.3	2,758	16.95	2,758	16.95
PM2.5*		0.0010594	2.12	2,758	2.92	2,758	2.92
	Note: PM2.5 Emissions Factor estimated from a comparison of Annual Average Emissions of both PM10 and PM2.5 as found in CARB Almanac Emission Projection Data (Published in 2013). 2012 Estimated Annual Average Emissions. 2012 Emissions Data for Merced County, Dust from Agricultural Lands (Non-Pasture). http://www.arb.ca.gov/ei/emissiondata.htm						
	PM Emission Factor found in Methodology for California Air Resources Board, Section 7.12, Windblown Dust - Agricultural Lands, Revised July 1997. http://www.arb.ca.gov/ei/areasrc/index7.htm						

PM 10 Emissions from Mobile Sources

Emissions	Increment of Increase (tons/year)
Traffic & Onsite Mobile Source	0.0134
Tons/Year	**0.0134**

See Appendix F-1 for CalEEMod results.

Land Preparation and Harvesting

	Crop Type	PM10 Emission Factor (lbs/acre/year)	PM2.5 Emission Factor (lbs/acre/year)	Existing Acreage	Existing PM10 Emissions (tons/year)	Existing PM2.5 Emissions (tons/year)	Proposed Acreage	Proposed PM10 Emissions (tons/year)	Proposed PM2.5 Emissions (tons/year)
Land Preparation	Corn, silage	6.90	0.10	1,147	3.96	0.06	1,147	3.96	0.06
	Wheat	3.70	0.06	785	1.45	0.02	785	1.45	0.02
	Sorghum	3.70	0.06	362	0.67	0.01	362	0.67	0.01
	Pistachios	3.13	0.47	464	0.73	0.11	464	0.73	0.11
Total Land					6.81	0.20		6.81	0.20
Harvesting	Corn, silage	0.17	0.00	1,147	0.10	0.00	1,147	0.10	0.00
	Wheat	5.80	0.09	785	2.28	0.03	785	2.28	0.03
	Sorghum	5.80	0.09	362	1.05	0.02	362	1.05	0.02
	Pistachios	3.12	0.05	464	0.72	0.01	464	0.72	0.01
Total Harvesting					4.15	0.06		4.15	0.06
Total Farming Operations					**10.95**	**0.26**		**10.95**	**0.26**
	Notes: CARB PM10 emission factors based on 2012 crop acreage. PM2.5 Emissions Factor estimated from CARB speciation profiles included in resource below.								
	California Air Resources Board, Section 7.4, Agricultural Land Preparation Operations, Revised and updated, April 2016. Section 7.5, Agricultural Harvest Operations, Updated April 2016, Revised March 2017. http://www.arb.ca.gov/ei/areasrc/index7.htm								
	Based on double-cropping, several fields would undergo land preparation twice in a year, and therefore the acreage was considered for each occurrence. Harvesting operations would occur multiple times for project fields. Cropping patterns obtained from existing and proposed NMPs.								

Dry Manure Application PM10 Emissions

	Emission Factor (lbs/ acre/yr)	Existing Acreage	Existing Emissions (tons/year)	Proposed Acreage	Proposed Emissions (tons/year)
PM10	5.07	330	0.84	165	0.42
	Based on double-cropping, several fields would undergo land preparation and harvesting operations twice in a year, and therefore the acreage was considered for each occurrence. Cropping patterns obtained from existing and proposed NMPs.				

Aggregate PM10 and PM2.5

Emission Source	Existing PM_{10} Emissions (tons/year)	Proposed PM_{10} Emissions (tons/year)	Project Increase PM10 Emissions	Existing $PM_{2.5}$ Emissions (tons/year)	Proposed $PM_{2.5}$ Emissions (tons/year)	Project Increase PM2.5 Emissions
Wind Erosion	16.95	16.95	0.00	2.92	2.92	0.00
Farming Operations	10.95	10.95	0.00	0.26	0.26	0.00
Traffic & On-Site Mobile Source	-	-	0.01			0.01
Animal Movement	18.14	21.72	3.58			
Dry Manure Application	0.84	0.42	-0.42	NA	NA	NA
Total	**46.89**	**50.04**	**3.17**	**3.18**	**3.18**	**0.01**

Farming Equipment: NOx Emissions from Harvested Acres in Merced County

	tons/day	lbs/year	lbs/acre/yr	tons/year	Increment of Increase
Merced Farm	4.59	3,350,700	6.74		
Total Harvested Acres	497,467				
Harvested Acres Existing	2,758	18,576.57		**9.29**	
Harvested Acres Proposed	2,758	18,576.57		**9.29**	**0.00**

Farm Equipment emissions were calculated using an emissions factor of 6.74 lbs/acre/year of NO_X based on an estimated 4.59 tons/day NO_X emitted from farming equipment in Merced County, with 497,467 acres harvested. This emission factor is based on 2017 inventory data, the latest available, and would represent a conservative estimate of emissions.
This emission factor was applied to the existing 2,758 acres harvested (fields are harvested multiple times a year) and to the proposed 2,758 acres harvested (fields would be harvested multiple times a year).

California Air Resources Board. CEPAM2019V1.03 Emission Projection Data. 2017 Estimated Annual Average Emissions. Merced County. Accessed on March 24, 2022 at <https://ww2.arb.ca.gov/applications/emissions-county>
United States, Department of Agriculture (USDA). 2017. 2017 Census of Agriculture – County Data: Total Cropland - Harvested Cropland, Acres. Merced County. Accessed on March 24, 2022 at < https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Census_by_State/California/ >

Total NOx Emissions

	Increment of Increase
	tons/yr
Traffic, Onsite Mobile Source, and Area Sources	0.13
Farming Equipment	0.00
Total	**0.13**

Vehicle Trips estimated using CalEEMod v.2020.4.0

Table 1. **County Summary Highlights: 2017** (continued)

[For meaning of abbreviations and symbols, see introductory text.]

Item	Merced	Modoc	Mono	Monterey	Napa	Nevada	Orange
Farms ..... number	2,337	423	65	1,104	1,866	673	193
Land in farms ..... acres	946,385	571,191	73,031	1,340,142	255,778	52,061	32,401
Average size of farm ..... acres	405	1,350	1,124	1,214	137	77	168
Median size of farm ..... acres	40	239	36	80	11	10	4
Estimated market value of land and buildings:							
Average per farm ..... dollars	5,299,308	2,640,981	2,158,060	8,944,364	6,052,361	574,346	3,205,502
Average per acre ..... dollars	13,086	1,956	1,921	7,368	44,154	7,425	19,094
Estimated market value of all machinery and equipment $1,000	782,567	82,713	9,143	889,335	175,969	23,051	31,350
Average per farm ..... dollars	334,860	195,540	140,666	805,557	94,303	34,251	162,436
Farms by size:							
1 to 9 acres	384	41	12	276	843	295	130
10 to 49 acres	867	65	24	227	555	253	31
50 to 179 acres	465	81	6	148	256	74	14
180 to 499 acres	284	66	6	138	103	34	11
500 to 999 acres	165	52	2	92	57	11	4
1,000 acres or more	172	118	15	223	52	6	3
Total cropland ..... farms	1,851	319	36	789	1,788	377	147
acres	546,460	159,907	7,913	366,709	67,701	4,816	9,564
Harvested cropland ..... farms	1,777	283	30	704	1,753	318	142
acres	497,467	115,640	7,591	299,378	60,978	3,313	5,803
Irrigated land ..... farms	1,975	310	47	638	1,749	465	138
acres	493,726	142,138	41,736	294,590	60,945	4,952	4,214

CEPAM2019v1.03 Emission Projection Data by EIC

2017 Annual Average Emissions (Tons/Day)

MERCED COUNTY
MISCELLANEOUS PROCESSES
650-FUGITIVE WINDBLOWN DUST

Download these results (as a comma delimited file).
Start a new query.

EMISSIONS INVENTORY CATEGORY	TOG	ROG	CO	NOX	SOX	PM	PM10	PM2.5	NH3
650-650-5400-0000 Methodology 650-DUST FROM AGRICULTURAL LANDS (NON-PASTURE) 5400-DUST 0000-SUB-CATEGORY UNSPECIFIED	-	-	-	-	-	12.25	5.57	0.96	-
650-651-5400-0000 Methodology 651-DUST FROM PASTURE LANDS 5400-DUST 0000-SUB-CATEGORY UNSPECIFIED	-	-	-	-	-	2.73	1.24	0.21	-
650-652-5400-0000 Methodology 652-DUST FROM UNPAVED ROADS AND ASSOCIATED AREAS 5400-DUST 0000-SUB-CATEGORY UNSPECIFIED	-	-	-	-	-	0.78	0.46	0.06	-
TOTAL	-	-	-	-	-	15.75	7.26	1.24	-
FARM EQUIPMENT	0.94	0.81	4.91	4.59	0.00	0.29	0.29	0.26	0.00

CEPAM2019v1.03 Emission Projection Data by EIC

2017 Annual Average Emissions (Tons/Day)

MERCED COUNTY
MISCELLANEOUS PROCESSES
620-FARMING OPERATIONS

Download these results (as a comma delimited file).
Start a new query.

EMISSIONS INVENTORY CATEGORY	TOG	ROG	CO	NOX	SOX	PM	PM10	PM2.5	NH3
620-614-5400-0000 Methodology 614-TILLING DUST 5400-DUST 0000-SUB-CATEGORY UNSPECIFIED	-	-	-	-	-	9.31	4.23	0.63	-
620-615-5400-0000 Methodology 615-HARVEST OPERATIONS - DUST 5400-DUST 0000-SUB-CATEGORY UNSPECIFIED	-	-	-	-	-	11.17	5.08	0.76	-

Existing and Proposed Cropped Fields						
Field	**Acres Planted**	**Acres Harvested**	**Crop**	**Total Planted Acres**	**Total Harvested Acres**	**Crop Type**
1	59	59	Corn	0	0	oats
	59	59	Sorghum Sudan	1147	1147	corn
2	9	9	Corn		0	Alfalfa, hay
	9	9	Sorghum Sudan		0	earlage
3	33	33	Corn	0	0	Sudangrass, silage
	33	33	Sorghum Sudan		0	Almond
4	76	76	Corn	785	785	Wheat
	76	76	Sorghum Sudan	362	362	Sorghum Sudan
5	35	35	Corn		464	Pistachios
	35	35	Sorghum Sudan			
6	57	57	Corn	**2,294**	**2,758**	
	57	57	Sorghum Sudan			
7	13	13	Wheat			
	13	13	Corn			
12	93	93	Corn			
	93	93	Sorghum Sudan			
13	79	79	Wheat			
	79	79	Corn			
14	74	74	Wheat			
	74	74	Corn			
15	78	78	Wheat			
	78	78	Corn			
16	50	50	Wheat			
	50	50	Corn			
17	28	28	Wheat			
	28	28	Corn			
18	50	50	Wheat			
	50	50	Corn			
20N	37	37	Wheat			
	37	37	Corn			
21	15	15	Wheat			
	15	15	Corn			

Existing and Proposed Cropped Fields							
Field	**Acres Planted**	**Acres Harvested**	**Crop**		**Total Planted Acres**	**Total Harvested Acres**	**Crop Type**
22	115	115	Wheat				
	115	115	Corn				
24E	81	81	Wheat				
	81	81	Corn				
25	91	91	Wheat				
	91	91	Corn				
26	74	74	Wheat				
	74	74	Corn				
		464	Pistachios				
Total Acres	**2294**	**2758**					

Dry Manure Applied - Existing	
Field Name	**Acres**
25	91

Dry Manure Applied - Proposed	
Field Name	**Acres**
25	91

Dry Manure Applied - Existing	
	91
26	74
	74
Total Acres	**330**

Dry Manure Applied - Proposed	
	0
26	74
	0
Total Acres	**165**

APPENDIX F-3

Greenhouse Gas Emissions Model Methodology and Calculations

GREENHOUSE GAS EMISSIONS QUANTIFICATION: METHODOLOGY AND CALCULATIONS

For the proposed dairy project Environmental Impact Report (EIR), greenhouse gas (GHG) emissions were estimated using the Dairy Gas Emissions Model, Version 3.3, from the Pasture Systems and Watershed Management Research Unit, Agricultural Research Service (ARS), United States Department of Agriculture (USDA). The Dairy Gas Emissions Model (DairyGEM) was created for the USDA ARS and made available for public use in February 2011. An earlier model, the Dairy Greenhouse Gas Emissions Model, was made available in June 2009 in conjunction with tools and information to help affected producers comply with the Environmental Protection Agency (EPA) Final Mandatory GHG Reporting Rule. Because this model estimates GHG emissions from the entire production system, and some assumptions were made regarding the project operations with best available information, the calculations reported in this EIR are considered a conservative estimate.

The DairyGEM is a software tool for estimating the ammonia, hydrogen sulfide, GHG, and volatile organic compound (VOC) emissions of dairy production systems. A dairy production system generally represents the processes used on a given farm, but the full system extends beyond the farm boundaries. A production system is defined to include emissions during the production of all feeds whether produced on a given farm or elsewhere. It also includes GHG emissions and energy use that occur during the production of resources used on the farm such as machinery, fuel, electricity, and fertilizer. Manure is assumed to be applied to cropland producing feed, but any portion of the manure produced can be exported to other uses external to the system.

DairyGEM also uses process-based relationships and emission factors to predict the primary GHG emissions from the production system. Primary sources include the net emission of carbon dioxide plus all emissions of methane and nitrous oxide occurring from the production system. Emissions are predicted through a daily simulation of feed use and manure handling. Daily emission values of each gas are summed to obtain annual values. For the purposes of this analysis, only the GHG emission results of the modeling are included in the EIR.

Total greenhouse gas emission is determined as the sum of the net emissions of the three GHG where methane and nitrous oxide are converted to carbon dioxide equivalent units (CO_2e)[1]. This net emission is determined through a partial life cycle assessment of the production system. Emissions include both primary and secondary sources. Secondary emissions are those that occur during the manufacture or production of resources used in the production system. These resources include machinery, fuel, electricity, fertilizer, pesticides, plastic, and any replacement animals not raised on the farm. Secondary emissions from the manufacture of equipment are apportioned to the feed produced or manure handled over their useful life.

For more in depth description on modeling equations and rationale, the reference manual can be found at: www.ars.usda.gov/Main/docs.htm?docid=21345

[1] The conversion to CO_2e is done using global warming potentials for methane and nitrous oxide of 25 and 298, respectively. Therefore, each unit of methane is equal to 25 units of carbon dioxide and each unit of nitrous oxide is equal to 298 units of carbon dioxide.

Dairy GEM GHG Emissions Hillcrest Dairy Expansion

		Existing (lb/yr)	Existing (ton/yr)	Proposed (lb/yr)	Proposed (ton/yr)
	Housed animals	50,991,552	23,129	61,901,356	28,078
	Manure storage	40,715,652	18,468	43,203,252	19,597
	Feed production	4,310,477	1,955	5,311,776	2,409
	Net Biogenic CO_2	-62,570,420	-28,381	-81,525,872	-36,980
	Fuel combustion	2,363,753	1,072	2,749,959	1,247
	Secondary sources	33,683,116	15,278	41,348,828	18,756
	Not allocated to milk	-27,588,006	-12,514	-30,390,182	-13,785
	Net emission	41,906,124	19,008	42,599,117	19,323
Increment of Increase					314

Hillcrest Existing

GASEOUS EMISSIONS

	Average daily lb/cow	Average daily lb	Total annual lb/cow	Total annual lb
Ammonia				
Housing facility	0.515	2061	188.0	752139
Manure storage	0.192	768	70.1	280312
Field applied manure	0.046	183	16.7	66743
Total farm	0.753	3011	274.8	1099195
Hydrogen Sulfide				
Housing facility	0.123	491	44.8	179181
Manure storage	0.000	0	0.0	156
Field applied manure	0.000	0	0.0	68
Total farm	0.123	492	44.9	179405
VOC (Ozone Equivalents)				
Silo face	0.004	16	1.5	5872
Silage feeding	0.003	13	1.1	4590
Housing manure	0.004	17	1.5	6088
Manure storage	0.014	57	5.2	20983
Field applied manure	0.002	8	0.8	3097
Total farm	0.028	111	10.2	40629
Methane				
Housed animals	1.295	5179	472.6	1890227
Manure storage	0.681	2723	248.5	993971
Field applied manure	0.000	1	0.1	283
Total emission	1.976	7903	721.1	2884482
Nitrous Oxide				
Housed animals	0.023	90	8.3	33020
Manure storage	0.006	23	2.1	8270
Direct and indirect land	0.011	45	4.1	16266
Total emission	0.039	158	14.4	57555
Biogenic Carbon Dioxide				
Housed animals	49.441	197763	18045.8	72183384
Manure storage	2.257	9028	823.8	3295106
Assimilated in feed	-92.297	-369188	-33688.4	-134753792
Net emission	-40.599	-162398	-14818.8	-59275264
Anthropogenic Carbon Dioxide	1.619	6476	590.9	2363753

ANNUAL ENVIRONMENTAL FOOTPRINTS

	Unit	Mean	SD
Water Use			
Feed production	ton	2820000	0
Drinking	ton	177343	1331
Animal cooling	ton	20221	2146
Parlor and equipment cleaning	ton	40234	0
Supplementary feed and resource inputs	ton	40013484	48313
Not allocated to milk production	ton	-9187419	8755
Water footprint	lb/lb FPCM	712	1
Energy Use			
Feed production and feeding	MBtu	9429872	7727
Manure handling	MBtu	2239521	2086
Milking and milk cooling	MBtu	9559631	1
Animal housing ventilation and lighting	MBtu	1916932	0
Production of resource inputs	MBtu	101918688	80575
Not allocated to milk production	MBtu	-27267896	15416
Energy footprint	MBtu/lb FPCM	1.03	0.00
Greenhouse Gas Emissions (CO2e)			
Animal emissions	lb	50991552	39027
Manure emissions	lb	40715652	3837470
Direct and indirect land emissions	lb	4310477	161103
Net biogenic carbon dioxide emission	lb	-62570420	76582
Anthropogenic carbon dioxide emission	lb	2363753	1559
Production of resource inputs	lb	33683116	27391
Not allocated to milk production	lb	-27588006	674786
Carbon footprint without biogenic CO2	lb/lb FPCM	1.10	0.03
Carbon footprint with biogenic CO2	lb/lb FPCM	0.55	0.03

FPCM is fat and protein corrected milk (4.0% fat and 3.3% protein)

GASEOUS EMISSIONS

	Average daily lb/cow	Average daily lb	Total annual lb/cow	Total annual lb
Ammonia				
Housing facility	0.497	2483	181.3	906451
Manure storage	0.221	1104	80.6	402898
Field applied manure	0.024	122	8.9	44564
Total farm	0.742	3709	270.8	1353912
Hydrogen Sulfide				
Housing facility	0.119	596	43.5	217497
Manure storage	0.000	0	0.0	172
Field applied manure	0.000	0	0.0	46
Total farm	0.119	596	43.5	217715
VOC (Ozone Equivalents)				
Silo face	0.003	16	1.2	5872
Silage feeding	0.003	16	1.2	5935
Housing manure	0.004	20	1.5	7404
Manure storage	0.010	51	3.7	18441
Field applied manure	0.001	5	0.4	1766
Total farm	0.022	108	7.9	39418
Methane				
Housed animals	1.258	6291	459.3	2296250
Manure storage	0.519	2597	189.6	947843
Field applied manure	0.000	1	0.0	195
Total emission	1.778	8888	648.9	3244288
Nitrous Oxide				
Housed animals	0.022	112	8.2	40858
Manure storage	0.007	36	2.6	12970
Direct and indirect land	0.011	55	4.0	20044
Total emission	0.040	202	14.8	73873
Biogenic Carbon Dioxide				
Housed animals	48.209	241043	17596.1	87980552
Manure storage	1.538	7689	561.3	2806515
Assimilated in feed	-92.880	-464401	-33901.3	-169506352
Net emission	-43.134	-215669	-15743.9	-78719344
Anthropogenic Carbon Dioxide	1.507	7534	550.0	2749959

ANNUAL ENVIRONMENTAL FOOTPRINTS

	Unit	Mean	SD
Water Use			
Feed production	ton	3440000	0
Drinking	ton	219925	1657
Animal cooling	ton	25276	2682
Parlor and equipment cleaning	ton	50292	0
Supplementary feed and resource inputs	ton	48894104	57857
Not allocated to milk production	ton	-10444213	10511
Water footprint	lb/lb FPCM	710	1
Energy Use			
Feed production and feeding	MBtu	11535054	9192
Manure handling	MBtu	1763283	1590
Milking and milk cooling	MBtu	11949537	0
Animal housing ventilation and lighting	MBtu	2331816	0
Production of resource inputs	MBtu	124639256	95408
Not allocated to milk production	MBtu	-30695158	18110
Energy footprint	MBtu/lb FPCM	1.02	0.00
Greenhouse Gas Emissions (CO2e)			
Animal emissions	lb	61901356	45550
Manure emissions	lb	43203252	4499652
Direct and indirect land emissions	lb	5311776	197263
Net biogenic carbon dioxide emission	lb	-81525872	139636
Anthropogenic carbon dioxide emission	lb	2749959	1713
Production of resource inputs	lb	41348828	32737
Not allocated to milk production	lb	-30390182	783708
Carbon footprint without biogenic CO2	lb/lb FPCM	1.04	0.03
Carbon footprint with biogenic CO2	lb/lb FPCM	0.48	0.03

FPCM is fat and protein corrected milk (4.0% fat and 3.3% protein)

Uncontrolled GHG Emission Factors (lbs/hd-yr)						
Animal Type	CH4 (Anaerobic Treatment Lagoon)	CH4 (Lagoon)	CH4 (Manure Spreading)	CH4 (Solid Manure Storage)	CH4 (Enteric)	CO2 Equivalent Multiplier for CH4
Milk Cows	513	307.8	3.5	27.7	271.5	21
Dry Cows	513	307.8	3.5	27.7	271.5	21
Support Stock*	110.4	110.4	1.6	–	151.6	21
Large Heifers	110.4	110.4	1.6	–	151.6	21
Medium Heifers	110.4	110.4	1.6	–	100.5	21
Small Heifers	110.4	110.4	1.6	–	100.5	21
Calves	–	–	–	–	–	–
Bulls*	110.4	110.4	1.6	–	151.6	21

Uncontrolled GHG Emission Factors (lbs/hd-yr)					
Animal Type	N2O (Anaerobic Treatment Lagoon)	N2O (Manure Spreading)	N2O (Solid Manure Storage)	N2O (Enteric)	CO2 Equivalent Multiplier for N2O
Milk Cows	1.5	0	2.6	0	310
Dry Cows	1.5	0	2.6	0	310
Support Stock*	1.4	0	–	0	310
Large Heifers	1.4	0	–	0	310
Medium Heifers	1.4	0	–	0	310
Small Heifers	1.4	0	–	0	310
Calves	–	0	–	0	–
Bulls*	1.4	0	–	0	310

*Emission factors for Suppot Stock and Bulls assumed to be the same as Large Heifers.

1 short ton = 0.9072 metric ton

CO2e from CH4 = [CH4 (anaerobic treatment) lagoon + CH4 manure spreading + CH4 solid manure storage + CH4 enteric] x 21 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

CO2e from N2O= [N20 anearobic treatment lagoon + N2O manure spreading + N20 solid manure storage + N2O enteric] x 310 x 0.9072 metric tons/short tons ÷ 2000 lb/ton

Pre-Project CO2e Emissions

Pre-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)				
Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	4,000	307.8	21.0	11,728
Dry Cows	0	307.8	21.0	0
Support Stock	0	110.4	21.0	0
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	0	–	–	0
Bulls	0	110.4	21.0	0

Pre-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)						
Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	4,000	3.5	27.7	271.5	21.0	11,534
Dry Cows	750	3.5	27.7	271.5	21.0	2,163
Support Stock	3,300	1.6	--	151.6	21.0	4,816
Large Heifers	0	1.6	--	151.6	21.0	0
Medium Heifers	0	1.6	--	100.5	21.0	0
Small Heifers	0	1.6	--	100.5	21.0	0
Calves	0	--	--	--	--	0
Bulls	0	1.6	--	151.6	21.0	0

Pre-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	4,000	0.0	310.0	0
Dry Cows	0	0.0	310.0	0
Support Stock	0	0.0	310.0	0
Large Heifers	0	0.0	310.0	0
Medium Heifers	0	0.0	310.0	0
Small Heifers	0	0.0	310.0	0
Calves	0	0.0	--	0
Bulls	0	0.0	310.0	0

Pre-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)						
Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	4,000	0.0	2.6	0.0	310.0	1,462
Dry Cows	750	0.0	2.6	0.0	310.0	274
Support Stock	3,300	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Pre-Project CO2e Emissions (metric tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	23,262	1,462	24,724
Dry Cows	2,163	274	2,437
Support Stock	4,816	0	4,816
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	**31,976**

Post-Project CO2e Emissions

Post-Project Lagoon CO2e Emissions from CH4 (metric tons/yr)				
Animal Type	Number of Cows	CH4 Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	5,000	307.8	21.0	14,660
Dry Cows	0	307.8	21.0	0
Support Stock	0	110.4	21.0	0
Large Heifers	0	110.4	21.0	0
Medium Heifers	0	110.4	21.0	0
Small Heifers	0	110.4	21.0	0
Calves	0	–	–	0
Bulls	0	110.4	21.0	0

Post-Project Non-Lagoons CO2e Emissions from CH4 (metric tons/yr)						
Animal Type	Number of Cows	CH4 Manure Spreading (lbs/hd-yr)	CH4 Solid Manure Storage (lbs/hd-yr)	CH4 Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	5,000	3.5	27.7	271.5	21.0	14,417
Dry Cows	750	3.5	27.7	271.5	21.0	2,163
Support Stock	4,000	1.6	--	151.6	21.0	5,837
Large Heifers	0	1.6	--	151.6	21.0	0
Medium Heifers	0	1.6	--	100.5	21.0	0
Small Heifers	0	1.6	--	100.5	21.0	0
Calves	0	--	--	--	--	0
Bulls	0	1.6	--	151.6	21.0	0

Post-Project Lagoon CO2e Emissions from N2O (metric tons/yr)				
Animal Type	Number of Cows	N2O Lagoons (lb/hd-yr)	CO2e Multiplier	CO2e Lagoons (metric tons/yr)
Milk Cows	5,000	0.0	310.0	0
Dry Cows	0	0.0	310.0	0
Support Stock	0	0.0	310.0	0
Large Heifers	0	0.0	310.0	0
Medium Heifers	0	0.0	310.0	0
Small Heifers	0	0.0	310.0	0
Calves	0	0.0	--	0
Bulls	0	0.0	310.0	0

Post-Project Non-Lagoons CO2e Emissions from N2O (metric tons/yr)						
Animal Type	Number of Cows	N2O Manure Spreading (lbs/hd-yr)	N2O Solid Manure Storage (lbs/hd-yr)	N2O Enteric (lbs/hd-yr)	Multiplier	CO2e Non-Lagoons (metric tons/yr)
Milk Cows	5,000	0.0	2.6	0.0	310.0	1,828
Dry Cows	750	0.0	2.6	0.0	310.0	274
Support Stock	4,000	0.0	--	0.0	310.0	0
Large Heifers	0	0.0	--	0.0	310.0	0
Medium Heifers	0	0.0	--	0.0	310.0	0
Small Heifers	0	0.0	--	0.0	310.0	0
Calves	0	0.0	--	0.0	--	0
Bulls	0	0.0	--	0.0	310.0	0

Total Post-Project CO2e Emissions (metric tons/yr)			
Animal Type	CO2e from CH4	CO2e from N2O	Total
Milk Cows	29,077	1,828	30,905
Dry Cows	2,163	274	2,437
Support Stock	5,837	0	5,837
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	**39,179**

Change in CO2e Emissions

Change in Project GHG Emissions			
Animal Type	Pre-Project CO2e (metric tons/yr)	Post-Project CO2e (metric tons/yr)	Change (metric tons/yr)
Milk Cows	24,724	30,905	6,181
Dry Cows	2,437	2,437	0
Support Stock	4,816	5,837	1,022
Large Heifers	0	0	0
Medium Heifers	0	0	0
Small Heifers	0	0	0
Calves	0	0	0
Bulls	0	0	0
		Total	**7,203**

APPENDIX F-4

Proposed Greenhouse Gas Emissions Threshold

GREENHOUSE GAS EMISSIONS THRESHOLD FOR THE PROPOSED DAIRY EXPANSION EIR

Introduction

The California Environmental Quality Act (CEQA) requires agencies to identify a project's potentially significant effects on the environment, and to mitigate significant effects whenever feasible. This includes the potential environmental effects of greenhouse gas (GHG) emissions. CEQA encourages public agencies to adopt "thresholds of significance" to use in determining the significance of environmental effects. A threshold of significance is an identifiable quantitative, qualitative, or performance level of a particular environmental effect. Exceedance of a threshold of significance would normally result in a determination that the project would have a significant environmental impact. Conversely, non-exceedance of a significance threshold would normally result in a determination that project would not have a significant environmental impact. In regards to thresholds of significance for GHG emissions, CEQA Guidelines Section 15064.7(c) states that a lead agency "may consider thresholds of significance previously adopted or recommended by other public agencies or recommended by experts, provided the decision of the lead agency to adopt such thresholds is supported by substantial evidence."

CEQA requires projects to be evaluated for consistency with "applicable general plans and regional plans" (CEQA Guidelines Section 15125(e)). Such plans would include "plans for the reduction of greenhouse gas emissions" (CEQA Guidelines Section 15183.5(b)). These plans involve legislative or regulatory programs applicable to all projects or classes of projects within the region. They establish standards that are independent of the impact analysis described in the CEQA Guidelines (see provisions beginning with Section 15126). The program for GHG emission reductions and maintenance, which ultimately is intended to result from AB 32, would constitute such a regional plan **when adopted**. However, under AB 32, that program does not yet exist. Furthermore, at this time there is no regional or Merced County greenhouse gas reduction plan or climate action plan. Therefore, there is no local, regional, or statewide plan regulating global warming by which the proposed project can be measured. The California Air Resources Board (CARB) has established preliminary approaches to establishing significance thresholds, and the San Joaquin Valley Air Pollution Control District (SJVAPCD) has issued guidance for evaluating project-level GHG effects.

Threshold Options

In January of 2008, the California Air Pollution Control Officers Association (CAPCOA) released a resource document, *CEQA and Climate Change* (CAPCOA 2008), that collected and presented information to support local governments as they undertake a review of GHG emissions from projects subject to CEQA. The document considers various approaches to determining the significance of emissions, evaluates available methodologies and tools for quantifying GHG emissions, and provides a summary of GHG mitigation measures for projects.

The CAPCOA white paper discusses three basic options air districts and lead agencies can pursue when contemplating the issues of CEQA thresholds for greenhouse gas emissions. The paper explores each path and discusses the benefits and detriments of each. The three basic paths are:

- No significance threshold for GHG emissions;
- GHG emissions threshold set at zero; or
- GHG threshold set at a non-zero level.

The CAPCOA paper explores the basis and implications of setting no threshold, setting a threshold at zero, and two primary approaches for those who may choose to consider a non-zero threshold. Each has inherent advantages and disadvantages. Air districts and lead agencies may believe the state or national government should take the lead in identifying significance thresholds to address this global impact. Alternatively, the agency may believe it is premature or speculative to determine a clear level at which a threshold should be set. A brief summary of each methodology and its implications are included below.

Implementing CEQA Without a Threshold

A lead agency is not required to establish significance thresholds for GHG emissions from stationary sources. The lead agency may find that it needs more information or experience evaluating GHG from these types of projects to determine an appropriate significance threshold. As with other project types, the lead agency could conduct a project specific analysis to determine whether an environmental impact report is needed and to determine the level of mitigation that is appropriate. The agency might also rely on thresholds established for criteria pollutants as a screening method, and analyze GHG emissions (and require mitigation) from projects with emissions above the criteria pollutant thresholds. Over time, the agency could amass information and experience with specific project categories that would support establishing explicit thresholds. The lead agency may also choose to base local CEQA thresholds on state guidelines or on the category-specific reduction targets established by ARB in its scoping plan for implementing AB 32. It is important to note here that lack of a threshold does *not* mean lack of significance. An agency may argue lack of significance for any project, but that argument would have to be carried forth on a case-by-case, project specific basis. By extension then, a decision not to establish thresholds for GHG is likely to result in a greater workload for responsible and lead agencies as they consider individual projects under CEQA.

Implementing CEQA with Threshold of Zero

A lead agency may find that any increase in GHG emissions is potentially significant under CEQA. If the zero threshold option is chosen, all projects subject to CEQA would be required to quantify and mitigate their GHG emissions, regardless of the size of the project or the availability of GHG reduction measures available to reduce the project's emissions. Projects that could not meet the zero-emission threshold would be required to prepare environmental impact reports to disclose the unmitigable significant impact, and develop the justification for a statement of overriding consideration to be adopted by the lead agency.

Implementing CEQA with a Non-Zero Threshold

A non-zero threshold could minimize the resources spent reviewing environmental analyses that do not result in real GHG reductions or to prevent the environmental review system from being overwhelmed. The practical advantages of considering non-zero thresholds for GHG significance

determinations can fit into the concept regarding whether the project's GHG emissions represent a "considerable contribution to the cumulative impact" and therefore warrant analysis. Specifying a non-zero threshold could be construed as setting a de minimis value for a cumulative impact. In effect, this would be indicating that there are certain GHG emission sources that are so small that they would not contribute substantially to the global GHG budget. This could be interpreted as allowing public agencies to approve certain projects without requiring any mitigation of their GHG emissions.

Thresholds Previously Adopted or Recommended

United States Environmental Protection Agency (EPA)

EPA's Final Mandatory GHG Reporting Rule became effective December 29, 2009. The rule requires reporting of GHG emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial greenhouse gases, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons per year (t/yr) or more of GHG emissions are required to submit annual reports to EPA. EPA estimates that the reporting rule will cover about 85 percent of GHG emissions in the United States.

For manure management systems, such as on a dairy, the animal population threshold level below which facilities are not required to report emissions is 3,200-cow dairy herd, which represents a conservative estimate of the 25,000 t/yr CO_2 equivalent (CO_2e) threshold level. Facilities that meet or exceed these populations will need to conduct an analysis to determine if they emit more than 25,000 t/yr CO_2e. While congress restricted EPA from expending any funds in fiscal years 2010 through 2021 for the purpose of implementing the manure management section of the rule, this did not change the requirements of the rule, and facilities that meet the threshold size are advised to keep the appropriate records.

California Air Resources Board

On October 24, 2008, CARB released its Preliminary Draft Staff Proposal, *Recommended Approaches for Setting Interim Significance Thresholds for Greenhouse Gases under the California Environmental Quality Act*. CARB staff believes that zero thresholds are not warranted in light of the fact that (1) some level of emissions in the near term and at mid-century is still consistent with climate stabilization and (2) current and anticipated regulations and programs apart from CEQA will proliferate and increasingly will reduce the GHG contributions of past, present, and future projects. But any non-zero threshold must be sufficiently stringent to make substantial contributions to reducing the State's GHG emissions peak, causing that peak to occur sooner, and putting California on track to meet its interim (2020) and long-term (2050) emissions reduction targets. CARB staff's objective was to develop a threshold of significance that would result in the vast majority (~90 percent statewide) of the GHG emissions from new industrial projects being subject to CEQA's requirement to impose feasible mitigation (CARB 2008).

A key aspect of CARB's approach is to recognize that different GHG thresholds of significance may apply to projects in different sectors. Two primary reasons that sector-specific thresholds are appropriate are: (1) some sectors contribute more substantially to the problem, and therefore should have a greater obligation for emissions reductions, and, (2) looking forward, there are differing levels of emissions reductions expected from different sectors in order to meet California's climate objectives. CARB also believes that different types of thresholds - quantitative, qualitative, and

performance-based - can apply to different sectors under the premise that the sectors can and must be treated separately given the state of the science and data. A sector-specific approach is consistent with CARB's proposed Scoping Plan.

California's Mandatory Greenhouse Gas Reporting Rule. The California Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (California Mandatory Reporting Rule) (17 CCR, Section 95100-95157), approved in 2007, is similar to the U.S. EPA Mandatory Reporting Rule in that it requires certain large emitters and suppliers to report their GHG data on an annual basis; however, the California emissions threshold is lower at only 10,000 metric tons of CO_2e per year. The California Mandatory Reporting Rule excludes GHG emissions related to livestock manure management systems and agricultural irrigation pumps.

San Joaquin County Air Pollution Control District (SJVAPCD)

To assist Lead Agencies, project proponents, permit applicants, and interested parties in assessing and reducing the impacts of project specific GHG on global climate change, the SJVAPCD adopted the following guidance on December 17, 2009: *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* and the policy: *District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency* (SJVAPCD 2009). The guidance and policy rely 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. The guidance does not limit a lead agency's authority in establishing its own process and guidance for determining significance of project related impacts on global climate change.

Projects complying with BPS would not require specific quantification of GHG emissions and would be determined to have a less than significant cumulative impact for GHG emissions. Projects not complying with Best Performance Standards would require quantification of GHG emissions and demonstration that GHG emissions have been reduced or mitigated by 29 percent, as targeted by CARB's AB 32 Scoping Plan. Furthermore, quantification of GHG emissions would be required for all projects for which the lead agency has determined that an Environmental Impact Report is required, regardless of whether the project incorporates BPS. (SJVAPCD 2009)

Best performance standards for GHG emissions have not yet been developed for all sources of GHG emissions. Given that understanding and regulation of GHG emission sources and mitigations is evolving, the SJVAPCD staff expects the development of BPS to be an ongoing effort. Consistent with CEQA Guidelines Section 15064(h)(3), for projects implementing best performance standards, or their equivalent, the District would conclude that the project's incremental contribution to the cumulative impact on global climatic change is not cumulatively considerable. (SJVAPCD 2009)

The following bullet points illustrate the SJVAPCD's process for evaluating GHG significance. Project impact can be reduced by:

- Using any combination of District approved GHG Emission Reduction Measures to meet BPS
- Complying with an approved GHG plan or mitigation program
- Reducing GHG emissions by at least 29 percent.

The SJVAPCD has developed illustrative examples for potential BPS. At this stage, these illustrative BPS should not be considered District-approved standards, but rather provide an opportunity for public input into the development of BPS and ultimate development of final BPS. The illustrative BPS now being proposed for livestock operations include that all operations shall utilize all three following control measures:

(1) All ruminant animal feed shall include at least six percent cottonseed, or, upon SJVAPCD approval, based on sufficient demonstration that use of cottonseed is not feasible, an equivalent substitute (estimated to generate a 12 percent reduction in methane emissions from this source);

(2) Manure from animal housing areas for mature cows shall be removed and transferred into appropriate treatment facilities at least four times a day and at least once a day for all other animals (estimated to generate a 7.1 percent reduction in methane emissions from this source); and

(3) Collected manure shall be treated anaerobically in digesters or covered lagoons, designed and operated per NRCS standards, with captured methane used for energy recovery in a method that displaces current or required fossil fuel use, such as, but not limited to, injection into natural gas pipeline, or powering mobile equipment. Taking the effect of the CO_2 produced from the combustion of CH_4 into account, an overall reduction of 63.5 percent of fugitive CH_4 emissions can be achieved by the use of properly designed and controlled anaerobic treatment as a BPS. (SJVAPCD 2009)

Although permit requirements for many livestock farms took effect in 2004, the particular BPS proposed, with the exception of frequent manure removal from livestock housing areas, have never been implemented as mandatory permit requirements. Instead, many other control measures aimed at reducing VOC and PM_{10} emissions have been applied with greater emphasis. Until these BPS are finalized, the following conditions would be most applicable according to the SJVAPCD:

- In order to minimize Greenhouse Gas emissions and optimize equipment efficiency, all equipment shall be operated in accordance with manufacturer specifications and approved design specifications.
- All ruminant animal feed shall include at least 6 percent cottonseed.
- Manure from animal housing areas shall be removed and transferred into appropriate treatment facilities at least four times a day for mature cows and at least once a day for all other animals. (SJVAPCD 2009)

The illustrative BPS now being proposed by the SJVAPCD for farming operations and the application of manure to cropland include that all operations shall utilize the following control measure:

(1) Manure shall be incorporated into soil within 24 hours after application. In a report entitled "Recommendations to the San Joaquin Valley Air Pollution Control Officer Regarding Best Available Control Technology for Dairies in the San Joaquin Valley", the Dairy Permitting Advisory Group (DPAG) concluded that VOC emissions could be reduced by 29 to 58 percent by the prompt incorporation of manure into soil after application to land. Based on this information, this BPS assumes a similar benefit as far as the reduction of CH_4 emissions is concerned. However due to the lack of data, the lower control efficiency of 29 percent of methane emissions from this source will be used.

The California Attorney General (AG) has expressed opposition to SJVAPCD strategy, claiming it leaves a number of unanswered questions, and the AG's office issued a letter dated November 4, 2009 stating that the proposed approach would "not withstand legal scrutiny and may result in significant lost opportunities for the Air District and local governments to require mitigation of GHG emissions." The AG noted several deficiencies, primarily that the SJVAPCD does not discuss a particular environmental objective that would be achieved by implementing the proposed thresholds, such as meeting a GHG emissions reduction trajectory consistent with that set forth in AB 32 and Executive Order S-03-05 within the Air District's jurisdiction. Also, the BPS are described as "illustrative" only, and it is not possible at this time to determine whether the BPS ultimately adopted will reduce GHG emissions in the San Joaquin Valley and, if so, by how much. Further, the threshold does not take into account the need for new development to be more GHG-efficient than existing development to achieve AB 32 goals, given that past and current sources of emissions, which are substantially less efficient than this average, will continue to exist and emit. The AG also points out that the SJVAPCD proposal appears to award emission reduction "points" for undertaking mitigation measures that are already required by local or state law and could offer an incentive to project proponents to artificially inflate the hypothetical project to show that the proposed project is, by comparison, GHG-efficient. Most importantly, the AG noted that according to the SJVAPCD guidance, any project employing certain, as of yet unidentified, mitigation measures would be considered to not result in a significant level of GHG emissions or a significant impact, regardless of the project's total GHG emissions, which could be very large.

Because of the uncertain direction of legal opinion, and because BPS for dairies and agricultural operations have not been adopted and are illustrative only, this EIR does not use project compliance with BPS as a threshold of significance.

Comparison of Non-Zero Significance Thresholds

In efforts to identify a numeric threshold that could be appropriate for this analysis, a survey of several California Air Quality Management Districts' CEQA guidance was completed. The table below summarizes significance thresholds and mandatory reporting thresholds as set forth by the EPA, the CARB, the SJVAPCD, Sacramento Metropolitan Air Quality Management District (SMAQMD), and South Coast Air Quality Management District (SCAQMD). Neither the SMAQMD nor the SCAQMD guidance contain any numeric thresholds or guidance specific to agricultural activities.

Comparison of Thresholds

Category	EPA (Mandatory Reporting)	CARB (Mandatory Reporting)	SCAQMD	SJVAPCD	SMAQMD
Construction	--	--	30-yr amortization applied to operational	--	1,100 t/yr CO_2e
Industrial/ Stationary Sources Operation	25,000 t/yr CO_2e	10,000 t/yr CO_2e	10,000 t/yr CO_2e	BPS	10,000 t/yr CO_2e
Dairy/Agricultural Project	25,000 t/yr CO_2e	10,000 t/yr CO_2e	--	BPS	--

t/yr = metric tons per year; CO_2e = carbon dioxide equivalents

While the EPA's Mandatory GHG Reporting Rule threshold of 25,000 t/yr CO_2e represents a reporting threshold and not a threshold of significance specifically, it is estimated to capture approximately 85 percent of the U.S emissions of GHGs and capture all large sources of GHG emissions. This is very similar to the CARB goal of emissions capture of 90 percent to meet AB 32 goals.

Except for EPA, no other agency has established any adopted thresholds for agricultural or dairy uses at this time (April 2022). Because SJVAPCD BPS for dairies and agricultural operations have not been adopted and are illustrative only, application of BPS as a threshold is not possible at this time. The EPA's reporting threshold of 25,000 t/yr of CO_2e represents a conservative value that would capture many large emitters of GHGs. However, the EPA's 25,000 t/yr CO_2e is a permit threshold that represents emissions from the entire facility and not just the increment of increase. Therefore, a dual threshold is identified that uses 10,000 t/yr CO_2e (used by both SCAQMD and SMAQMD for industrial stationary sources) as the maximum increment of increase and also 25,000 t/yr CO_2e as a threshold for total facility emissions.

Identified EIR Threshold

In accordance with CEQA Guideline Section 15064.4, Determining the Significance of Impacts from Greenhouse Gas Emissions, a lead agency should determine the amount of GHG emissions resulting from a project, which may be determined by either using a model or methodology to quantify GHG emissions or by relying on a qualitative analysis or performance-based standards. Additionally, a lead agency may consider: (1) whether the project would increase or reduce GHG emissions as compared to the existing environmental setting; (2) whether the project's emissions exceed a threshold of significance that the lead agency has determined applies to the project; or (3) the extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of GHG emissions.

Merced County has not established significance criteria for GHG emissions. Many GHG emission reduction strategies have few or limited agricultural measures, making compliance with these strategies as a threshold an illogical choice. In efforts to capture both large increases in GHG emissions and large emitters of GHGs, and in consideration of the foregoing, for the purposes of this EIR, the project's contribution to GHG emissions would be considered significant if either of the following apply:

- The increment of increase of the project's GHG emissions would be greater than 10,000 t/yr of CO_2e.

- The increment of increase of the project's GHG emissions would be less than 10,000 t/yr of CO_2e, but the total project facility's GHG emissions (existing plus project increment) would be greater than 25,000 t/yr of CO_2e (or greater than a 3,200-mature-cow dairy herd as based on the EPA's Final Mandatory GHG Reporting Rule).

This numeric threshold would only be applicable to dairies, and would not apply to industrial, commercial, residential, or other development types.

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