

Title V Permit Evaluation

Site Number: A0927

Site Name: California Oils

Site Address: 1145 Harbor Way South
Richmond, CA. 94804

California Oils Corporation operates a solvent extraction for vegetable oil production in Richmond, California. This plant produces an edible vegetable oil by crush safflower seed and by removing oil from safflower through direct contact with hexane solvent. The District has identified solvent extraction for the production vegetable oil as a major source of a single hazardous air pollutant, n-hexane.

Periodic Monitoring:

Summary Tables

NOx Sources

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-2 Dowtherm Vaporizer Deodorizer No. 2	BAAQMD 9-7-305.1	150 ppm @ 3% O ₂ (dry)	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-306.1	150 ppm @ 3% O ₂ (dry)	N/A	Annual Source Test (proposed)
S-5 & S-8 Boilers	BAAQMD 9-7-301.1	30 ppmv @ 3% O ₂ , dry, 3-hr average	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-302.1	40 ppmv @ 3% O ₂ dry 3-hr average	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-305.1	150 ppmv @ 3% O ₂ , dry, 3-hr average	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-306.1	150 ppmv @ 3% O ₂ , dry, 3-hr average	N/A	Annual Source Test (proposed)

CO Sources

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-2 Dowtherm Vaporizer Deodorizer No. 2	BAAQMD 9-7-305.1	150 ppm @ 3% O ₂ (dry)	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-306.1	150 ppm @ 3% O ₂ (dry)	N/A	Annual Source Test (proposed)
S-5, and S-8 Boilers	BAAQMD 9-7-301.2	400 ppmv @ 3% O ₂ , dry, 3-hr average	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-302.2	400 ppmv @ 3% O ₂ , dry, 3-hr average	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-305.2	400 ppmv @ 3% O ₂ , dry, 3-hr average	N/A	Annual Source Test (proposed)
	BAAQMD 9-7-306.2	400 ppmv @ 3% O ₂ , dry, 3-hr average	N/A	Annual Source Test (proposed)

TSP Sources

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-2 Dowtherm Vaporizer Deodorizer No. 2	BAAQMD 9-7-305.1	Ringelmann No. 1	N/A	Visible inspection (proposed)
	BAAQMD 9-7-306.1	0.15 gr. Per dscf	N/A	Visible inspection (proposed)
S-5 and S-8 Boilers	BAAQMD 6-301 (natural gas)	Ringelmann No. 1	Less than 1.0 tpy (natural gas)	Not required for natural gas combustion, per CAPCOA/ARB/EPA agreement

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
	BAAQMD 6-301 (fuel oil)	Ringelmann No. 1	N/A (fuel oil)	Visible emissions check for every day fuel oil is burned per boiler
	BAAQMD 6-310	0.15 grains/dscf	N/A (natural gas)	Not required for natural gas combustion, per CAPCOA/ARB/EPA agreement
S-11 Soapstock Reactors #1, S-12 Soapstock Reactors #2, and S-13 Soapstock Reactors #3	BAAQMD 6-301	Ringelmann No. 1	N/A	Visible emission evaluation periods (proposed)
	BAAQMD 6-310	0.15 grains/dscf	N/A	Visible emission evaluation periods (proposed)
	BAAQMD 6-310	0.15 grains/dscf	N/A (fuel oil)	Visible emissions check for every day fuel oil is burned per boiler (proposed)
S-27 Meal Loading System	BAAQMD 6-301	Ringelmann No. 1	N/A	Visible emission evaluation periods (proposed)
	BAAQMD 6-310	0.15 grains/dscf	N/A	Visible emission evaluation periods (proposed)
	BAAQMD 6-311	4.10P ^{0.67} lb/hr, where P is process weight, ton/hr	N/A	Visible emission evaluation periods (proposed)
S-33 Clay Silo #1, S-34 Clay Silo #2, S-35 Clay Silo #3, S-36 Clay Silo #4,	BAAQMD 6-301	Ringelmann No. 1	N/A	Visible emission evaluation periods (proposed)
	BAAQMD 6-310	0.15 grains/dscf	N/A	Visible emission evaluation periods (proposed)
	BAAQMD 6-311	4.10P ^{0.67} lb/hr, where P is process weight, ton/hr	N/A	Visible emission evaluation periods (proposed)

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-37 Meal Silo #1; S-38 Meal Silo # 2, S-39 Meal Silo #3, S-40 Meal Silo #4, S-41 Meal Silo #5, S-42 Meal Silo #6	BAAQMD 6-301	Ringelmann No. 1	N/A	Visible emission evaluation periodic. daily (proposed)
	BAAQMD 6-310	0.15 grains/dscf	N/A	Visible emission evaluation periods (proposed)
	BAAQMD 6-311	4.10P ^{0.67} lb/hr, where P is process weight, ton/hr	N/A	Visible emission evaluation periods (proposed)

SO₂ Sources

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-2 Dowtherm Vaporizer Deodorizer No. 2	BAAQMD 9-1-302	300 ppmv, dry (natural gas)	N/A	Not required for commercial natural gas combustion, per CAPCOA/ARB/EPA agreement
	BAAQMD 9-1-304	0.5% S	N/A	Fuel Certification (proposed)
S-5, and S-8 Boilers	BAAQMD 9-1-302	300 ppmv, dry (natural gas)	N/A	Not required for commercial natural gas combustion, per CAPCOA/ARB/EPA agreement
	BAAQMD 9-1-304	0.5% S	N/A	Fuel Certification (proposed)

VOC Sources

S# & Description	Federally Enforceable Emission Limit Citation	Federally Enforceable Emission Limit	Potential to Emit: tpy	Monitoring
S-3 Meal Desolventizer-Discharger conveyor	BAAQMD 8-41-302	90% controls	3.2 tons	HC Analyzer and Annual source testing (proposed)
S-6 Extractor	BAAQMD 8-41-301	90 % controls	1.7 tons as hexane	HC Analyzer and Annual source testing (proposed)
S-23 Desolventizer - Toaster/ cooler	BAAQMD 8-41-301.1	90 % controls	16.1 tons	HC Analyzer and Annual source testing (proposed)
S-25 Underground hexane storage tank	BAAQMD 8-5-301	100,000 gallons	0.2 ton	Recordkeeping
S-26 Wastewater	BAAQMD 8-8-301	Covered	1.0 tpy	Recordkeeping
S-37through 42, Meal Silos	BAAQMD 8-2-301	Emissions of total carbon, dry basis, shall not exceed 15 lb/day and 300 ppm	4.8 tpy as hexane	HC Analyzer
Equipment leaks	BAAQMD 8-18-301	100 ppm for connectors 500 ppm for pumps 500 ppm for valves	1.0 tpy	EPA Method 21

Permit Conditions

Adequate recordkeeping requirements are in place for the sources at the facility to monitor the solvent usage from the sources. However, to ensure adequate abatement efficiencies and combustion emission limits are achieved while operating, additional monitoring (i.e, annual source testing) is recommended for specific sources (indicated in the tables above as “(proposed)”.

Discussion: VOC monitoring

Emissions from S-23

500 ft³/min of air flow from desolventizer/ toaster to condenser and mineral oil scrubber (90% abatement efficiency required by District regulation)

$$\frac{500 \text{ ft}^3/\text{min} \times 10,000 \text{ ppm of hexane} \times 86 \text{ MW} \times 60 \text{ min/hr}}{385 \times 10^6} = 67.01 \text{ lb/hr}$$

67.01 lb/ hr x 24 hr/day = 1608 lb of hexane loss/day (uncontrolled)

1608 lb/day x (1.00 – 0.90) = 160.8 lb of hexane/hr

160.8 lb/ hr x 200 days of operation = 32160 lb of hexane loss/hr or 16.1 tons/yr

Maximum allowable hexane in meal – permit conditions 1,500 ppm of hexane by weight

0.0015 x 100,000 tons x 2000 lb/ton = 300,000 lb of hexane remains in the meal

150 tons of hexane (laboratory analysis indicate meal contain about 40-110 ppm of hexane)

Emissions from S-26 Wastewater

Exempt from permit- less than 200 gallons per day

Owner or operator must keep records of the amount of wastewater.

Fugitives Emissions from Equipment leaks

Fugitive emissions from equipment leaks must be monitored quarterly by EPA Method 21

Assume: 500 ppm leak from valves and pumps for light liquids (LL)

100 ppm leak from connectors for light liquids

Number of Components in organic service

	#	Avg. emission factor- lb/hr/source	Total
Connectors (flanges) LL	550	8.4 x 10 ⁻⁵ *	0.046
Valves LL	170	9.5 E-04 *	0.162
Pumps	18	1.17E-03*	0.021

0.229 lb/hr x 24hrs/day x 365 days/yr = **2006 lb/yr 1.003 ton/yr**

* Emission factors from EPA correlation for Market Terminal

Emission from S-37 through S-42

Permit condition of 15 lb/day of hexane per silo

15 lb/day x 100 days /yr = 1500 lb of hexane/yr per silo

0.75 ton/year x 6 silos = 4.5 tons per year

Discussion of Particulate monitoring

The particulate sources listed above are abated by cyclones or dust collectors that should not exhibit visible emissions under normal operating conditions. Records of dust collector preventive maintenance activities and periodic visual evaluation of each cyclone or dust collector are sufficient to insure ongoing compliance with Ringelmann number 1 limitation.

Under normal operating conditions, all dust collectors should comply with the grain loading emission standard of 0.15 gr./dscf. Violations of this standard would only occur during a failure of filters. Records of dust collector preventive maintenance activities are sufficient to insure ongoing compliance with this emission standard.

Under normal operating conditions, all dust collectors should comply with the mass rate standard of Regulation 6-311. Violations of this standard would only occur during a failure of filters. Records of dust collector preventive maintenance activities are sufficient to insure ongoing compliance with this emission standard.

Discussion of Particulate monitoring for natural gas and fuel oil combustion

BAAQMD Regulation 6-310.3 limits PM emissions from “heat transfer operations” to 0.15 gr/dscf @ 6% O₂. The limit includes filterable particulate only. This limit must be compared to the following emissions factors:

- filterable PM emission factor of 1.9 lb/mmscf (Rating: B) for natural gas fired utility/large industrial boilers (>100 mm Btu/hr)” from EPA AP-42 Table 1.4-2 “Emission Factors For Particulate Matter (PM) From Natural Gas Combustion”, dated July, 1998
- filterable PM emission factor of 2 lb/mgal fuel oil (Rating: A) from EPA AP-42 Table 1.3-1 “Criteria Pollutant Emission Factors for Uncontrolled Fuel Oil Combustion”, dated September, 1998.

Natural gas:

For a typical natural gas fuel with a gross heating value of 1050 btu/scf, 0.15 gr/dscf @ 6% O₂ can be converted to lb/mmscf (natural gas fired) as follows:

From 40 CFR 60, Appendix A, Method 19, the stoichiometric dry natural gas combustion factor of 8,710 dscf (combustion products)/mmbtu (natural gas) can be derived from Table 19-1. At 6% excess O₂, this factor becomes:

$$8,710 \times [21\% / (21\% - 6\%)] = 12,194 \text{ dscf (combustion products)/scf (natural gas)}$$

Therefore, the conversion of 0.15 gr/dscf @ 6% O₂ to lb/mmscf for natural gas is:

$$(12,194 \text{ dscf/mmbtu}) \times (0.15 \text{ gr/dscf}) \times (\text{lb}/7000 \text{ gr}) \\ \times (1050 \text{ mmbtu/mmscf natural gas})$$

= 274.3 lb/mmescf (natural gas)

This limit is two orders of magnitude above the emission factor.

Fuel Oil:

For a typical fuel oil with a gross heating value of 139,000 btu/gal, 0.15 gr/dscf @ 6% O₂ can be converted to lb/mmescf as follows:

$$9,190 \times [21\% / (21\% - 6\%)] = 12,866 \text{ dscf (combustion products)/mmbtu}$$

Therefore, the conversion of 0.15 gr/dscf @ 6% O₂ to lb/mgal for fuel oil is:

$$(12,866 \text{ dscf/mmbtu}) \times (139 \text{ mmbtu/mgal}) \times (0.15 \text{ gr/dscf}) \times (1\text{ lb}/7000 \text{ gr}) \\ = 38.3 \text{ lb/mgal (fuel oil)}$$

This limit is an order of magnitude above the emission factor.

Since the limit is so far above the worst-case AP-42 factors for filterable particulate for boilers burning natural gas or fuel oil, the addition of periodic monitoring to demonstrate compliance with this limit would not be appropriate.

Alignment of Information in Application and Proposed Permit:

The following sources:

S-37	Meal Silo #1
S-38	Meal Silo #2
S-39	Meal Silo #3
S-40	Meal Silo #4
S-41	Meal Silo #5
S-42	Meal Silo #6
S-43	Seed Storage Warehouse # 1 (Cement Bldg) with Hopper and Enclosed Conveyor
S-44	Seed Storage Warehouse # 2 (Metal Bldg) with Hopper and Enclosed Conveyor

were added to the Title V permit since the original application, while

S-3	Meal Desolventizer Discharger Conveyor (archived 9/24/97)
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have been shutdown and removed from service (and the Title V permit).

Permit Shield:

No Permit Shield was requested.

Alternate Operating Scenario:

No alternate operating scenario was requested.

Compliance Status:

When the Title V application was originally submitted to the District in 1995, California Oils indicated that Desolventizer/Toaster unit was in compliance with all requirements.