The attachment shows the staff's modifications to the originally proposed Small Off-Road Engine exhaust regulations and the "California Exhaust Emission Standards And Test Procedures For 2005 And Later Small Off-Road Engines". The 30-day Notice modifications to the original proposal are shown in **bold double-underline** to indicate additions and **~~bold strikeout~~** to indicate deletions.
The newly modified text is shown in **shaded bold double-underline** to indicate additions and **~~shaded bold strikeout~~** to indicate deletions. *Note: Only the parts of the sections that have changed from the text contained in the previously released 45-day and 30-day packages are shown (sections 2403(b)(1), 2403(b)(2), 2404(c)(4)(H), 2408(f)(1), 90.103(a)(1), 90.103(a)(3), 90.104(h)(2), 90.117(c), 90.118(f), 90.307, 90.409(a)(3) and 90.410(b)).*

Modifications to the Originally Proposed Regulations

§ 2403. Exhaust Emission Standards and Test Procedures – Small Off-Road Engines.

(b)…. (1) Exhaust emissions from small off-road engines manufactured for sale, sold, or offered for sale in California, or that are introduced, delivered or imported into California for introduction into commerce, must not exceed:

Exhaust Emission Standards
grams per brake horsepower-hour
[grams per kilowatt-hour]

Calendar Year	Engine Class[1]	Hydrocarbon plus Oxides of Nitrogen[2]	Hydrocarbon[2]	Carbon Monoxide	Oxides of Nitrogen	Particulate
1995	I	12.0	—	300	—	0.9[3]
	II	10.0	—	300	—	0.9[3]
	III[4]	—	220	600	4.0	—
	IV[4]	—	180	600	4.0	—
	V[4]	—	120	300	4.0	—
1996 to1999	I	12.0[5]	—	350	—	0.9[3]
	II	10.0[5]	—	350	—	0.9[3]
	III[4]	—	220[5]	600	4.0[5]	—
	IV[4]	—	180[5]	600	4.0[5]	—
	V[4]	—	120[5]	300	4.0[5]	—

Exhaust Emission Standards for Spark-Ignition Engines
grams per brake horsepower-hour
[grams per kilowatt-hour]

Model Year	Engine Class[1]	Durability Periods (hours)	Hydrocarbon plus Oxides of Nitrogen[2]	Carbon Monoxide	Particulate
2000-2001[5]	~~SI~~	50/125/300	54	400	1.5[4]
	0-65 cc, inclusive		[72]	[536]	[2.0]
	~~SI~~	NA	12.0	350	
	>65 cc - <225 cc		[16.1]	[467]	
	~~SI~~	NA	10.0	350	
	≥225 cc		[13.4]	[467]	
2002-200~~5~~4[5]	~~SI~~	50/125/300	54	400	1.5[4]
	0-65 cc, inclusive		[72]	[536]	[2.0]
	~~SI~~ >65 cc - <225 cc	125/250/500	12.0	410	
	Horizontal-Shaft Engine		[16.1]	[549]	
	~~SI~~ >65 cc - <225 cc	NA	12.0	350	
	Vertical-Shaft Engine		[16.1]	[467]	
	~~SI~~	125/250/500	9.0	410	
	≥225 cc		[12.0]	[549]	
~~2006 and~~	~~SI~~	~~50/125/300~~	~~54~~	~~400~~	~~1.5[4]~~
	~~0-65 cc, inclusive~~		~~[72]~~	~~[536]~~	~~[2.0]~~
~~subsequent[5]~~	~~SI~~	~~125/250/500~~	~~12.0~~	~~410~~	
	~~>65 cc - <225 cc~~		~~[16.1]~~	~~[549]~~	
	~~SI~~	~~125/250/500~~	~~9.0~~	~~410~~	

~~≥ 225 cc~~ ~~[12]~~ ~~[549]~~

Exhaust Emission Standards for Spark-Ignition Engines
grams per kilowatt-hour

Model Year	Displacement Category	~~Option~~	Durability Periods (hours)	Hydrocarbon plus Oxides of Nitrogen[(2)(6)]	Carbon Monoxide	Particulate
2005 and subsequent	<50 cc		50/125/300	50	536	2.0[(4)]
	50-80 cc, inclusive		50/125/300	72	536	2.0[(4)]
2005	>80 cc - <225 cc ~~Horizontal-shaft Engine~~ Horizontal-shaft Engine	~~Horizontal-shaft Engine~~	125/250/500	16.1	549	
	~~>80 cc - <225 cc Vertical-shaft Engine~~ ~~≥80 cc - <225 cc~~ Vertical-shaft Engine	~~Vertical-shaft Engine~~	NA	16.1	467	
	≥225 cc		125/250/500	12.1	549	
2006	>80 cc - <225 cc		125/250/500	16.1	549	
	≥ 225 cc		125/250/500	12.1	549	
2007~~(1)~~	>80 cc - <225 cc	~~Option A~~	~~125/250/500~~	~~8.0~~	~~549~~	
		~~Option B~~	**125/250/500**	**10.0**	**549**	
	≥ 225 cc		125/250/500	12.1	549	
2008 and subsequent ~~(1)~~	>80 cc - <225 cc	~~Option A~~	~~125/250/500~~	~~8.0~~	~~549~~	
		~~Option B~~	**125/250/500**	**10.0**	**549**	
	≥ 225 cc	~~Option A~~	~~125/250/500/1000~~	~~6.0~~	~~549~~	
		~~Option B~~	**125/250/500/1000**	**8.0**	**549**	

(1) "Class I" means small off-road engines greater than 65 cc to less than 225 cc in displacement.

"Class II" means small off-road engines greater than or equal to 225 cc in displacement.

"Class III" means small off-road engines less than 20 cc in displacement.

"Class IV" means small off-road engines 20 cc to less than 50 cc in displacement.

"Class V" means small off-road engines greater than or equal to 50 cc to 65 cc in displacement.

(2) The Executive Officer may allow gaseous-fueled (i.e., propane, natural gas) engine families, that satisfy the requirements of the regulations, to certify to either the hydrocarbon plus oxides of nitrogen or hydrocarbon emission standard, as applicable, on the basis of the non-methane hydrocarbon (NMHC) portion of the total hydrocarbon emissions.

(3) Applicable to all diesel-cycle engines.

(4) Applicable to all two-stroke engines.

(5) Engines used exclusively in snowthrowers and ice augers need not certify to or comply with the HC and NO_x standards or the crankcase requirements at the option of the manufacturer.

(6) Engines used exclusively to power products which are used exclusively in wintertime, such as snowthrowers and ice augers, at the option of the engine manufacturer,

need not certify to or comply with standards regulating emissions of $HC+NO_x$ or $NMHC+NO_x$, as applicable. If the manufacturer exercises the option to certify to standards regulating such emissions, such engines must meet such standards. If the engine is to be used in any equipment or vehicle other than an exclusively wintertime product such as a snowthrower or ice auger, it must be certified to the applicable standard regulating emissions of $HC+NO_x$ or $NMHC+NO_x$ as applicable.

~~**(7) Engine families that comply with the Option A may comply with any of the Sections 2754 or 2754.1 or 2751(b). Engine families that comply with the Option B may of Regulations, Section 2754.1 or 2751(b).**~~

(2) Low-emitting Blue Sky Series engine requirements.

~~**(A)**~~ *Voluntary standards*. Engines may be designated "Blue Sky Series" engines by meeting**:**

(A) All applicable requirements of this Article, and

(B) ~~t~~The following voluntary exhaust emission standards, which apply to all certification and compliance testing.

Blue Sky Series engines shall not be included in the averaging, banking, and trading program. **Zero-emission small off-road equipment may certify to the Blue Sky Series emission standards. Manufacturers of zero-emission small off-road equipment are not required to perform emissions testing, but must file an application of certification and comply with the administrative requirements outlined in the 2005 and Later Test Procedures to certify their equipment for sale in California.**

Voluntary Emission Standards
(grams per kilowatt-hour)

Model Year	Displacement Category	Hydrocarbon plus Oxides of Nitrogen	Carbon Monoxide	Particulate*
2005 and subsequent	<50 cc	25	536	2.0
	50 - 80 cc, inclusive	36	536	2.0
2007 and subsequent	>80 cc - <225 cc	~~**4.0**~~**5.0**	549	
2008 and subsequent	≥225 cc	~~**3.0**~~**4.0**	549	

* Applicable to all two-stroke engines

(B) *Additional standards*. Blue Sky Series engines are subject to all provisions that would otherwise apply under this part. Engine families that comply with the Blue Sky Series emission standards may comply with any of the applicable evaporative emission standards, as noted in Title 13, California Code of Regulations, Sections 2754 or 2754.1 or 2751(b) or 2757.

§ 2404. Emission Control Labels and Consumer Information – 1995 and Later Small Off-Road Engines.

(c)(4)…. (H) An unconditional statement of compliance with the appropriate calendar year (for 1995-1999) or model year**(s)** (for 2000 and later) California regulations; for example, "THIS ENGINE MEETS 2005 CALIFORNIA **EXH** EMISSION REGULATIONS FOR SMALL OFF-ROAD ENGINES." For engines certified to emission standards subject to a durability period as set forth in §2403(b), the durability period must be stated in the owner's manual.

§ 2408. Emission Reduction Credits – Certification Averaging, Banking, and Trading Provisions.

(f)…. (1) For each engine family, $HC+NO_x$ and Particulate Matter certification emission credits (positive or negative) are to be calculated according to the following equation and rounded to the nearest gram. Consistent units are to be used throughout the equation.

Credits = (Standard – FEL) x Sales x Power x EDP x Load Factor

Where:
Standard = the current and applicable small off-road engine $HC+NO_x$ ($NMHC+NO_x$) or Particulate Matter emission standard ~~in grams per brake-horsepower hour~~ as determined in Section 2403.
FEL = the family emission limit for the engine family in grams per brake-horsepower hour or g/kW-hr as applicable.
Sales = eligible sales as defined in section 2401. Annual sales projections are used to project credit availability for initial certification. Actual sales volume is used in determining actual credits for end-of-year compliance determination.

Power = the sales weighted maximum modal power, in horsepower or kilowatts as applicable. This is determined by multiplying the maximum modal power of each configuration within the family by its eligible sales, summing across all configurations and dividing by the eligible sales of the entire family. Manufacturers may use an alternative if approved by the Executive Officer **(for example, maximum modal power of the test engine)**.
EDP = the Emissions Durability Period for which the engine family was certified.
Load Factor = For Test Cycle A and Test Cycle B, the Load Factor = 47% (i.e., 0.47). For Test Cycle C, the Load Factor = 85% (i.e., 0.85). For approved alternate test procedures, the load factor must be calculated according to the following formula:

$$\sum_{i=1}^{n}(\%\text{MTT mode}_i)\times(\%\text{MTS mode}_i)\times(\text{WF mode}_i)$$

Where:
%MTT mode$_i$ = percent of the maximum torque for mode *i*
%MTS mode$_i$ = percent of the maximum engine rotational speed for mode *i*
WF mode$_i$ = the weighting factor for mode *i*

Modifications to the Originally Proposed Test Procedures

§ 90.103 Exhaust emission standards.

(a)…. (1) Exhaust emissions from small off-road spark-ignition engines manufactured for sale, sold, offered for sale in California, or that are introduced, delivered or imported into California for introduction into commerce, must not exceed:

Exhaust Emission Standards for Spark-Ignition Engines
(grams per kilowatt-hour)

Model Year	Displacement Category	~~Option~~	Durability Periods (hours)	Hydrocarbon plus Oxides of Nitrogen[(1)(3)]	Carbon Monoxide	Particulate
2005 and subsequent	<50 cc		50/125/300	50	536	2.0[(2)]
	50-80 cc, inclusive		50/125/300	72	536	2.0[(2)]
2005	>80 cc - <225 cc ~~Horizontal-shaft Engine~~ Horizontal-shaft Engine	~~Horizontal-shaft Engine~~	125/250/500	16.1	549	
	~~>80 cc - <225 cc Vertical-shaft Engine~~ >80 cc - <225 cc Vertical-shaft Engine	~~Vertical-shaft Engine~~	NA	16.1	467	
	≥225 cc		125/250/500	12.1	549	
2006	>80 cc - <225 cc		125/250/500	16.1	549	
	≥ 225 cc		125/250/500	12.1	549	
2007~~[4]~~	>80 cc - <225 cc	~~Option A~~	~~125/250/500~~	~~8.0~~	~~549~~	
		~~Option B~~	125/250/500	10.0	549	
	≥ 225 cc		125/250/500	12.1	549	
2008 and subsequent ~~[4]~~	>80 cc - <225 cc	~~Option A~~	~~125/250/500~~	~~8.0~~	~~549~~	
		~~Option B~~	125/250/500	10.0	549	
	≥ 225 cc	~~Option A~~	~~125/250/500/1000~~	~~6.0~~	~~549~~	
		~~Option B~~	125/250/500/1000	8.0	549	

(1) The Executive Officer may allow gaseous-fueled (i.e., propane, natural gas) engine families, that satisfy the requirements of the regulations, to certify to either the hydrocarbon plus oxides of nitrogen or hydrocarbon emission standard, as applicable, on the basis of the non-methane hydrocarbon (NMHC) portion of the total hydrocarbon emissions.

(2) Applicable to all two-stroke engines.

(3) Engines used exclusively to power products which are used exclusively in wintertime, at the option of the engine manufacturer, may comply with the provisions in section 90.103(a)(2)(ii).

~~(4) Engine families that comply with Option A may comply with any of the evaporative emission standards, in Title 13, California Code of Regulations, Sections 2754 or 2754.1 or 2751(b). Engine families that comply with Option B~~

~~may only comply with the evaporative emission standards, in Title 13, California Code of Regulations, Sections 2754.1 or 2751(b).~~

(a)…. (3) Low-emitting Blue Sky Series engine requirements.

~~(i)~~ *Voluntary standards*. Engines may be designated "Blue Sky Series" engines by meeting**:**

(i) All applicable requirements of this Article, and

(ii) ~~t~~**T**he following voluntary exhaust emission standards, which apply to all certification and compliance testing.

Blue Sky Series engines shall not be included in the averaging, banking, and trading program. **Zero-emission small off-road equipment may certify to the Blue Sky Series emission standards. Manufacturers of zero-emission small off-road equipment are not required to perform emissions testing, but must file an application of certification and comply with the administrative requirements outlined in these procedures.**

Voluntary Emission Standards
(grams per kilowatt-hour)

Model Year	Displacement Category	Hydrocarbon plus Oxides of Nitrogen	Carbon Monoxide	Particulate*
2005 and subsequent	<50 cc	25	536	2.0
	50 - 80 cc, inclusive	36	536	2.0
2007 and subsequent	>80 cc - <225 cc	~~4.0~~**5.0**	549	
2008 and subsequent	≥225 cc	~~3.0~~**4.0**	549	

* Applicable to all two-stroke engines

~~(ii) *Additional standards*~~**. Blue Sky Series engines are subject to all provisions that would otherwise apply under this part. Engine families that comply with the Blue Sky Series emission standards may comply with any of the applicable evaporative emission standards, in Title 13, California Code of Regulations, Sections 2754 or 2754.1 or 2751(b) or 2757.**

(a)(3)…. (ii) *Additional standards*. Blue Sky Series engines are subject to all provisions that would otherwise apply under this part. ~~**Engine families that comply with the Blue Sky Series emission standards may comply with any of the applicable evaporative emission standards, in Title 13, California Code of Regulations, Sections 2754 or 2754.1 or 2751(b) or 2757.**~~

§ 90.104 Compliance with emission standards.

(h)…. (2) For engines not using assigned **~~dfs~~deterioration factors** from Table 1 or Table 2 of paragraph (g) of this section, **~~dfs~~deterioration factors** shall be determined as follows:

(i) The new prototype engine must be emissions tested at break-in with all emission control systems (e.g., EGR, catalysts, etc.) installed.

(ii) The engine must be aged on the emissions durability cycle to the first test point. The manufacturer may choose its test points provided that, the points are equally divided (same number of hours ± 2 hours). An emissions test is conducted at half the emissions durability period ± 2 hours.

(iii) The prototype engine must be emissions tested at each test point. Following testing the durability cycle must be continued to the next point.

(iv) Only specified maintenance may be performed during durability cycle testing.

(v) When the prototype engine has been aged on the durability cycle to the full emissions durability cycle, a final emissions test must be conducted.

(vi) For each pollutant, a line must be fitted to the data points treating the initial test as occurring at hour=0, and using the method of least-squares. The deterioration factor is the calculated emissions at the end of the emissions durability period divided by the calculated emissions at zero hours.

(vii) If the engine manufacturer conducts more than one test at a test point, the number of tests at every test point must be the same. All tests must be used in the linear regression analysis as separate points to determine the deterioration factor.

(viii) Additional engines identical to the original test engine may be tested with prior approval from the Executive Officer. In such cases, data collection must remain consistent for all test engines. The testing of multiple engines requires the determination of separate deterioration factors for each test engine. The official deterioration factor shall be the average of the separate deterioration factors for each test engine.

~~(vii)~~(ix) The product of the zero-hour (break-in) results from the engine multiplied by the deterioration factor is the emissions certification value for that engine family and pollutant. **In the case of multiple zero-hour tests on a single engine, the engine manufacturer must select the last zero-hour test as the official zero-hour test upon which the deterioration factor is applied. If multiple engines are zero-hour test upon which the deterioration factor is applied.**

§ 90.117 Certification procedure – test engine selection.

(c) Each **~~M~~m**anufacturer shall provide to the Executive Officer **in the engine family certification application** the reason for its **test** engine choice **subject to Executive Officer approval**. **~~The Executive Officer will approve or disapprove the documents within ten days of the date such documents are received from the engine manufacturer.~~ In the event that the Executive Officer determines that the test engine configuration does not meet the requirements specified in paragraph (a), the Executive Officer will notify the manufacturer.** Any disapproval must be accompanied by a statement of the reasons thereof. In the event of disapproval, the manufacturer may petition the California Air Resources Board to review the decision of the Executive Officer.

§ 90.118 Certification procedure – service accumulation and usage of deterioration factors.

(f) The use of auxiliary ~~cooling~~ fans for engine cooling must be indicated in the application for certification ~~approved by the Executive Officer prior to service accumulation~~. The manufacturer must detail the use of such fans and demonstrate that the supplemental cooling resulting from the use of the fans is representative of in-use engine operation. The records shall be maintained by the manufacturer and shall be made available to the Executive Officer upon request.

§ 90.307 Engine cooling system.

An engine cooling system is required with sufficient capacity to maintain the engine at normal operating temperatures as prescribed by the engine manufacturer. Auxiliary fan(s) may be used to maintain sufficient engine cooling during engine dynamometer operation. **The use of auxiliary ~~cooling~~ fans for engine cooling must be indicated in the application for certification ~~approved by the Executive Officer prior to testing~~. The manufacturer must detail the use of such fans and demonstrate that the supplemental cooling resulting from the use of the fans is representative of in-use engine operation. The records shall be maintained by the manufacturer and shall be made available to the Executive Officer upon request.**

§ 90.409 Engine dynamometer test run.

(a)…. (3) For engines greater than 80 cc displacement volume equipped with an engine speed governor, the governor must be used to control engine speed during all test cycle modes except for Mode 1 or Mode 6, and no external throttle control may be used that **~~interference~~ interferes** with the function of the engine's governor; a controller may be used to adjust the governor setting for the desired engine speed in Modes 2 - 5 or Modes 7 - 10; and during Mode 1 or Mode 6 fixed throttle operation may be used to determine the 100 percent torque value. **For vertical shaft engines greater than 80 cc but less than 225 cc displacement volume equipped with an engine speed governor, the manufacturer may carry over certification of its 2004 model year California certified engine family to the 2005 model year. The engine test results done without the use of the governor may be used for compliance. Prior written approval of the Executive Officer is required. The manufacturer must meet all other requirements for 2005 model year compliance.**

§ 90.410 Engine test cycle.

(b) For engines not equipped with an engine speed governor, during each non-idle mode, hold both the specified speed and load within ± five percent of point. During the idle mode, hold speed within ± ten percent of the manufacturer's specified idle engine speed. For engines greater than 80 cc displacement volume equipped with an engine speed governor, during Mode 1 or Mode 6 hold both the specified speed and load within ± five percent of point, during Modes 2-3, Modes 7-8 hold the specified load with ± five percent of point, during Modes 4-5 or Modes 9-10, hold the specified load within the larger range provided by +/- 0.27 Nm (+/- 0.2 lb-ft), or +/- ten (10) percent of point, and during the idle mode hold the specified speed within ± ten percent of the manufacturer's specified idle engine speed (see Table 1 in Appendix A of this subpart for a description of test Modes). The use of alternative test procedures is allowed if approved in advance by the Executive Officer. **For vertical shaft engines greater than 80 cc but less than 225 cc displacement volume equipped with an engine speed governor, the manufacturer may carry over certification of its 2004 model year California certified engine family to the 2005 model year. The engine test results done without the use of the governor may be used for compliance. Prior written approval of the Executive Officer is required. The manufacturer must meet all other requirements for 2005 model year compliance.**