

# Short-Term NAAQS Compliance Internal Management Directive



## **Air Operations**

700 NE Multnomah St.  
Suite 600  
Portland, OR 97232  
Phone: 503-229-5696  
800-452-4011  
Fax: 503-229-6124  
Contact: Jill Inahara  
[www.oregon.gov/DEQ](http://www.oregon.gov/DEQ)

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State of Oregon  
Department of  
Environmental  
Quality

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# Document Development

Prepared By: Jill Inahara

Approved By:   
Ali Mirzakhali (Sep 1, 2021 13:11 PDT)  
Ali Mirzakhali

Sep 1, 2021  
Date

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# 1. Intent/Purpose/Statement of Need

The purpose of this IMD is to ensure the short-term (1-hour and 24-hour) National Ambient Air Quality Standards (NAAQS) are not exceeded for new sources constructing and for certain new permitting activities in Oregon. Specifically, this IMD is clarifying that permits issued by DEQ must ensure that the NAAQS are protected, and confirms that the NAAQS criteria applies to new sources and to existing sources. Existing sources will be addressed at a later date.

## 2. Applicability

This IMD is to be used by DEQ air quality permitting staff when permitting:

- New sources on Simple Air Contaminant Discharge Permits (ACDPs) or Standard ACDPs; and
- Sources that trigger New Source Review.

## 3. Summary

DEQ rules provide that DEQ will establish permit requirements “to prevent violation of an ambient air quality standard caused or projected to be caused substantially by emissions from the source as determined by modeling, monitoring, or a combination thereof.” [\[OAR 340-226-0140\(1\)\]](#) DEQ rules also authorize DEQ to request information from existing sources to determine applicability and compliance with requirements. [\[OAR 340-214-0110\]](#) In 2010, EPA established 1-hour NAAQS for both NO<sub>2</sub> and SO<sub>2</sub> for the first time. In 2006, EPA lowered the primary and secondary 24-hour PM<sub>2.5</sub> standards. Permitting actions to protect the NAAQS have been accomplished through Oregon’s New Source Review (NSR) program. NSR is applicable to sources that increase annual emissions compared to Significant Emission Rates (SERs), which were established in 1980, before 1-hour NAAQS were set. SERs are based on long-term (annual) emissions which do not take into account the variability of operations on a short-term basis. Because of this, SERs may not be protective of the short-term NAAQS in many cases. In order to protect short-term NAAQS, in compliance with the Clean Air Act, DEQ must apply its existing rules to require modeling information to be able to implement the policy of OAR 340-226-0140(1).

## 4. Background

The Clean Air Act requires EPA to set National Ambient Air Quality Standards for six principal pollutants (“criteria” air pollutants) which can be harmful to public health and the environment. The Clean Air Act identifies two types of National Ambient Air Quality Standards. Primary standards provide public health protection, including protecting the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

### Statutory and Rule Authority

DEQ’s authority for requiring sources to ensure compliance with the NAAQS comes from the following:

**ORS 468A. 025 Air purity standards; air quality standards; treatment and control of emissions; rules.**

(4) The commission shall specifically fulfill the intent of the policy under ORS 468A.010 (1)(a) as it pertains to the highest and best practicable treatment and control of emissions from stationary sources through the adoption of rules:

.....

(b) To require typically achievable control technology for new, modified and existing sources of air contaminants or precursors to air contaminants for which ambient air quality standards are established, to the extent emission units at the source are not subject to other emission standards for a particular air contaminant and to the extent the department determines additional controls on such sources are necessary to carry out the policy under ORS 468A.010 (1)(a).

(c) To require controls necessary to achieve ambient air quality standards or prevent significant impairment of visibility in areas designated by the commission for any source that is a substantial cause of any exceedance or projected exceedance in the near future of national ambient air quality standards or visibility requirements.

**340-214-0110**

**Request for Information**

All stationary sources must provide in a reasonably timely manner any and all information that DEQ reasonably requires for the purpose of regulating the stationary source. Such information may be required on a one-time...basis and may include, but is not limited to, information necessary to:

\* \* \*

(2) Ascertain applicability of any requirement; [and]

(3) Ascertain compliance or noncompliance with any applicable requirement...

**340-226-0140**

**Highest and Best Practicable Treatment and Control: Additional Control Requirements for Stationary Sources of Air Contaminants**

In addition to other applicable requirements, DEQ may establish control requirements by permit if necessary as specified in sections (1) through (5):  
 (1) Requirements will be established to prevent violation of an ambient air quality standard caused or projected to be caused substantially by emissions from the source as determined by modeling, monitoring, or a combination thereof.

**NAAQS History**

The history of the NAAQS and how they are implemented in the state of Oregon is long and reflects changes in the understanding of the health effects of the criteria pollutants. The following table summarizes these changes for NO<sub>2</sub>, which together with SO<sub>2</sub>, currently have 1-hour standards.

**History of the NO<sub>2</sub> NAAQS**

Date Rule/ Decision	Primary/ Secondary	Averaging Time	Action	Level		Form	Reference
				ppb	ug/m <sup>3</sup>		
1971	Primary & Secondary	Annual	new	53	100	Annual arithmetic average	36 FR 8186
1985	Primary & Secondary	Annual	no revision	53	100	Annual arithmetic average	50 FR 25532
1996	Primary & Secondary	Annual	no revision	53	100	Annual arithmetic average	61 FR 52852
2010	Primary	1-hour	new	100	188	98th %tile, avg. over 3 years (H8H)	75 FR 6474
	Primary & Secondary	Annual	no revision	53	100	Annual arithmetic average	75 FR 6474
2012	Secondary	Annual	no revision	53	100	Annual arithmetic average	77 FR 20218

The SO<sub>2</sub> NAAQS have a similar revision history in which the annual standard is supplemented or replaced with shorter averaging time standards. In its present form, the SO<sub>2</sub> annual and 24-hour standards have been revoked by the EPA and replaced with the 1-hour and 3-hour standards. Note that Oregon still retains the annual and 24-hour SO<sub>2</sub> standards.

**History of the SO<sub>2</sub> NAAQS**

Final Rule/ Decision	Primary/ Secondary	Action	Averaging Time	Level	Form	Reference	Date
1971	Primary	new	24-Hour	0.14 ppm	Not to be exceeded more than once per year	36 FR 8186	Apr 30, 1971
		new	Annual	0.03 ppm	Annual arithmetic average		
	Secondary	new	3-Hour	0.5 ppm	Not to be exceeded more than once per year		
		new	Annual	0.02 ppm	Annual arithmetic average		
1973	Secondary	Secondary 3-hour SO <sub>2</sub> standard retained, without revision; secondary annual SO <sub>2</sub> standard revoked.				38 FR 25678	Sep 14, 1973
1996	Primary	Existing primary SO <sub>2</sub> standards retained, without revision.				61 FR 25566	May 22, 1996
2010	Primary	new	1-hour	75 ppb	99th percentile, averaged over 3 years	75 FR 35520	Jun 22, 2010
		Primary annual and 24-hour SO <sub>2</sub> standards revoked.					
2012	Secondary	Existing secondary SO <sub>2</sub> standard (3-hour average) retained, without revision.				77 FR 20218	Apr 3, 2012
2019	Primary	Existing primary SO <sub>2</sub> standard retained, without revision.				84 FR 9866	Mar 18, 2019

As one can see, there is a shift in focus from the long-term annual effects to the 1-hour exposure time frame, reflective of evolving scientific studies showing health impacts due to shorter exposure periods. Both the NO<sub>2</sub> and SO<sub>2</sub> 1-hour standards were set because of ‘strong scientific evidence indicating that short-term exposures to NO<sub>2</sub> [and SO<sub>2</sub>] can worsen asthma symptoms in

people with the disease.’<sup>1</sup> Some studies indicate that as little as 5-10 minutes of exposure to SO<sub>2</sub> can exacerbate asthma symptoms.<sup>2</sup>

The PM<sub>10</sub> and PM<sub>2.5</sub> NAAQS have experienced similar trend towards shorter-time standards, also as health effects were better understood. As can be seen in the table below, the indicator PM pollutant has changed from TSP in 1971 to PM<sub>2.5</sub> in 1997.

### History of the Particulate Matter NAAQS

Rule/Decision	Primary/Secondary	Pollutant	Averaging Time	Action	NAAQS ug/m <sup>3</sup>	SER tpy	Form	Reference	Date
1971	Primary	TSP*	24-hour	new	260	25	Not to be exceeded more than once per year	36 FR 8186	Apr 30, 1971
1987	Primary & Secondary	PM <sub>10</sub>	24-hour	new	150	15	Not to be exceeded more than once per year on average over a 3 years	52 FR 24634	Jul 1, 1987
1997	Primary & Secondary	PM <sub>2.5</sub>	24-hour	new	65	10	98th percentile, averaged over 3 years	62 FR 38652	Jul 18, 1997
2006	Primary & Secondary	PM <sub>2.5</sub>	24-hour	new	35	10	98th percentile, averaged over 3 years	71 FR 61144	Oct 17, 2006
1971	Primary	TSP	Annual	new	75	25	Annual geometric mean	36 FR 8186	Apr 20, 1971
1987	Primary & Secondary	PM <sub>10</sub>	Annual	new	50	15	Annual arithmetic mean, averaged over 3 years	52 FR 24634	Jul 1, 1987
1997	Primary & Secondary	PM <sub>2.5</sub>	Annual	new	15	10	Annual arithmetic mean, averaged over 3 years	62 FR 38652	Jul 18, 1997
2006	Primary & Secondary	PM <sub>10</sub>	Annual	revoked				72 FR 61144	Oct 17, 2006
2012	Primary	PM <sub>2.5</sub>	Annual	new	12	10	Annual arithmetic mean, averaged over 3 years	78 FR 3085	Jan 15, 2013

\*TSP = Total Suspended Particulate

The changes in the PM indicator were accompanied by changes in the NAAQS and the Significant Emission Rates, which are further described below. Essentially, the PM SERs were based on modeled back-calculations using 4% of the 24-hour NAAQS concentration. Although the value of the PM<sub>2.5</sub> 24-hour NAAQS changed from 65 ug/m<sup>3</sup> in 1997 to 35 ug/m<sup>3</sup> in 2006, the SER was not recalculated, but remained at 10 tons per year. Note that the PM<sub>10</sub> annual NAAQS was revoked in 2006, contemporaneous with the tightening of the PM<sub>2.5</sub> NAAQS. There is a parallel between the derivation of the SER used for the 24-hour PM<sub>2.5</sub> NAAQS of 35 ug/m<sup>3</sup>, and the derivation of the SER used for the 1-hour NO<sub>2</sub> NAAQS of 188 ug/m<sup>3</sup>; the former was based on a 24-hour NAAQS of 65 ug/m<sup>3</sup> (almost double), and the latter based on an annual NAAQS of 100 ug/m<sup>3</sup> established in 1971.

### NAAQS Protection

Oregon protects the NAAQS through its designated authority in the EPA approved [State Implementation Plan](#) (SIP) and in the [Oregon Revised Statute 468A.025 Air purity standards; air quality standards; treatment and control of emissions; rules](#). Oregon’s air quality permitting program has required computer modeling to demonstrate that the NAAQS are protected if NSR is triggered ([OAR 340-224-0010](#)).

NSR is a permitting process created by the US Congress in 1977 as part of a series of amendments to the Clean Air Act. The NSR process requires industry to undergo pre-construction review for environmental controls if they propose either building new facilities or any modifications to existing facilities that would create a “significant increase” of a regulated pollutant. Significant increases, called Significant Emission Rates, are based on thresholds for

<sup>1</sup> [https://www.epa.gov/sites/production/files/2018-04/documents/no2\\_naaqs.final\\_action.fact\\_sheet\\_4.6.18.pdf](https://www.epa.gov/sites/production/files/2018-04/documents/no2_naaqs.final_action.fact_sheet_4.6.18.pdf)

<sup>2</sup> [https://www.epa.gov/sites/production/files/2019-02/documents/fact\\_sheet\\_primary\\_so2\\_naaqs\\_nfr\\_0.pdf](https://www.epa.gov/sites/production/files/2019-02/documents/fact_sheet_primary_so2_naaqs_nfr_0.pdf)



increases of annual emissions, not short-term emissions. SERs were defined in 1980, well before any short-term NAAQS were set.

Under the NSR program, Oregon utilizes a tiered screening approach that first compares a source's emission rate increases to the SERs. If emissions equal or exceed the SERs, then the source must show that emissions are less than the Significant Impact Levels (SILs) and NAAQS through refined computer modeling. Fundamental to this process is the assumption that the SERs are protective of the NAAQS in all forms, including the 1-hour and 24-hour standards. The history of the SER indicates this assumption may not be justified.

The SERs were originally established in 1980 ([45 FR 52708](#)) by EPA using air quality modeling to estimate emission rates that would result in air concentrations equivalent to a fraction of the NAAQS. For NO<sub>x</sub>, a concentration that represented 2% of the annual NAAQS for NO<sub>2</sub> was used, and for SO<sub>2</sub> and PM, 4% of the 24-hour NAAQS was used. The reason the NO<sub>x</sub> level was set at 2% and not 4% was based on two broad assumptions. First, annual NAAQS concentrations are smaller than the 24-hour NAAQS by virtue of the averaging period. Second, the decision to set the level at 2% was done in order to set the NO<sub>x</sub> SER equal to that of the SO<sub>2</sub> SER of 40 ton per year (tpy), primarily for convenience purposes. As one can see, the development of the SERs was based on broad assumptions and scaling of annual and 24-hour standards, and do not represent a robust scientific analysis of short-term health effects.

### **Issues**

As described above, the NO<sub>x</sub> SER was developed based on an annual average emission rate, and SO<sub>2</sub> and PM<sub>2.5</sub> SERs based on 24-hour average emissions. In reality, emission rates vary throughout the year, and annual average emissions can obscure high peak 1-hour emissions that may exceed the NAAQS. In addition, the development of the SERs did not take into account hourly meteorological conditions. These two factors, varying emissions coupled with varying meteorology, become important considerations when modeling sources with high intermittent emissions at 1-hour averaging times. In addition, as noted above, the development of the SO<sub>2</sub> and NO<sub>x</sub> SERs were based on broad assumptions and simplified policy decisions, rather than a robust scientific analysis.

As a result, facility emissions that are below the SERs may still cause short-term NAAQS exceedances. DEQ in-house analyses have demonstrated, through the modeling of hypothetical facilities, that a 1-hour standard can be exceeded while annual average emissions are below the SER. Both the basis of the SERs and the in-house modeling demonstrations lead DEQ to conclude the current practice of using the SERs to screen out sources from NAAQS modeling may not sufficiently demonstrate that the NO<sub>2</sub> and SO<sub>2</sub> 1-hour NAAQS, and the 24-hour PM<sub>2.5</sub> NAAQS are protected.

## 5. Acronyms Used in This Directive

ACDP	Air Contaminant Discharge Permit
CAO	Cleaner Air Oregon
DEQ	Department of Environmental Quality
EPA	Environmental Protection Agency
NAAQS	National Ambient Air Quality Standard
NO <sub>2</sub>	Nitrogen Dioxide
NO <sub>x</sub>	Nitrogen Oxides
NSR	New Source Review
PM	Particulate Matter
PM <sub>10</sub>	Particulate Matter less than 10 microns
PM <sub>2.5</sub>	Particulate Matter less than 2.5 microns
SER	Significant Emission Rate
SIL	Significant Impact Level
SO <sub>2</sub>	Sulfur Dioxide

## 6. Directive

- Assess potential NAAQS impact of all new construction sources applying for Simple ACDPs or Standard ACDPs. This includes sources discovered to be operating illegally without a Simple or Standard ACDP. The applicants must provide the air quality analysis and all the supporting information necessary to demonstrate the NO<sub>2</sub> and SO<sub>2</sub> 1-hour NAAQS and the PM<sub>2.5</sub> 24-hour NAAQS are protected. Permit writers must clearly state whether the permit as recommended for issuance is protective of all NAAQS and provide supporting documentation. This new requirement applies to new sources who have pending applications as of, or after, June 9, 2021.
- Advise all existing sources called in by Cleaner Air Oregon (now and until a plan for existing sources is completed) of the option to perform air quality modeling to demonstrate the NO<sub>2</sub> and SO<sub>2</sub> 1-hour NAAQS and the PM<sub>2.5</sub> 24-hour NAAQS are protected. Because these sources are currently conducting modeling for risk assessments, this modeling can also be used to determine if the short-term NAAQS are protected, saving time and resources for both industry and DEQ. Sources that choose the option of doing the NAAQS modeling in conjunction with the CAO modeling have the option of doing the modeling or having DEQ perform the modeling.
- Ensure all new or modified sources that trigger major NSR or State NSR for any pollutant, also perform air quality modeling to demonstrate the NO<sub>2</sub> and SO<sub>2</sub> 1-hour NAAQS and the PM<sub>2.5</sub> 24-hour NAAQS are protected.

- DEQ may approve proposed computer modeling protocol proposed by a source in accordance with [Air Quality Dispersion Modeling Recommended Procedures](#).

For the large number of existing sources in Oregon that are on a Simple ACDP, Standard ACDP or Title V permit or existing sources that have been called in to CAO but opted not to perform NAAQS modeling concurrently with CAO modeling, DEQ will develop a process to address the short-term NAAQS protection requirement. DEQ will provide additional information about that process when it is available.

## 7. Record of Revisions to IMD

Revision	Date	Changes	Editor
#1	09/01/21	<ul style="list-style-type: none"> <li>• Correct typos</li> <li>• Added acronyms for pollutants and DEQ</li> <li>• Require short-term NAAQS modeling for all sources that trigger NSR for any pollutant</li> </ul>	Jill Inahara