

**TAHOE
REGIONAL
PLANNING
AGENCY**

Threshold Update

AIR QUALITY

MEASURING WHAT MATTERS: THRESHOLD AND MONITORING UPDATE

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AIR QUALITY BACKGROUND

The Bi-State Compact (Compact) formally introduced the notion of an *environmental threshold carrying capacity* (threshold standard) and defines it as *“an environmental standard necessary to maintain a significant scenic, recreational, educational, scientific or natural value of the region or to maintain public health and safety within the region. Such standards shall include but not be limited to standards for air quality, water quality, soil conservation, vegetation preservation and noise”* (114th Congress 2016).

The Compact requires that the Regional Plan *“at a minimum, the plan and all its elements, as implemented through agency ordinances, rules and regulations, achieves and maintains the adopted environmental threshold carrying capacities”* (114th Congress 2016). The Compact also includes specific requirements for attaining and maintaining federal, state, and local air and water quality standards in the Regional Plan; *“Federal, State, or local air and water quality standards, whichever are strictest, in the respective portions of the region for which the standards are applicable”* (114th Congress 2016). The Compact does allow for the adoption of stricter air and water quality standards, where the standards are necessary to serve the *“purposes of this Compact”*(114th Congress 2016).

For the protection of public health and the environment, U.S. EPA establishes National Ambient Air Quality Standards (NAAQS) for six criteria pollutants (carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide). The EPA defines both primary and secondary standards for many pollutants, with primary standards designed to protect public health, and secondary standards established to protect environmental health including animals and crops. Under the clean air act, states are authorized to set ambient air quality standards that are stricter than the national standards.

There are 13 threshold standards adopted in the air quality category (Appendix II). The adopted standards contain a mix of national, state, and Tahoe specific standards. The EPA has established 12 standards across the six pollutant categories. While CARB has adopted 17 ambient air quality standards across 11 pollutant categories. NDEP has adopted 16 ambient air quality standards across 8 pollutant categories. The adopted air quality thresholds are notably different than the state and nationally adopted standards, both the targeted constituents and the adopted standards for the constituents

(Appendix III). The differences originated when the threshold standards were initially adopted and continue to this day.

At the time the threshold standards were adopted in 1982, NAAQS standards had been adopted for particulate matter (EPA 2022a), sulfur dioxide (EPA 2022b), lead (EPA 2022c), and nitrogen dioxide (EPA 2022d). Despite the presence of the federal standards, TRPA proposed and adopted some but not all federal standards as threshold standards (TRPA 1982). There is no historical documentation to provide guidance for why threshold standards were not proposed or adopted for NAAQS pollutants: lead, sulfur, particulate matter, and nitrogen dioxide.

Threshold standards for particulate matter were adopted in 2012 as part of the regional plan update, but the update did not include full adoption of other state and federal standards (TRPA 2012). Threshold standards are currently adopted for carbon monoxide, ozone, and particulate matter, but not for the other three constituents. In the three categories for which there are both NAAQS and threshold standards, the adopted threshold standards do not include all national standards that have been adopted. The NAAQS include standards for carbon monoxide concentrations at both 1 hour and 8 hour time periods, while a threshold standard was only adopted for the 8 hour time period (TRPA 2019). In addition to the pollutants under NAAQS, CARB has adopted standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles. There are threshold standards for visibility, but no standards for sulfates, hydrogen sulfide, or vinyl chloride.

The adoption of threshold standards that incorporate state or federal standards verbatim confers no additional environmental protection, because the agency is already obligated to achieve and maintain state, federal, and local air and water quality standards through the Regional Plan.

ALTERNATIVE APPROACHES TO STANDARD DEFINITION

The unique requirements for air and water quality in the Compact require the partnership to make choices in the adoption of air and water quality threshold standards that it does not have to make in other threshold categories. At least four alternative approaches exist for the establishment of air and water quality standards for the region and their reconciliation with state and federal standards. None of the options vary in the level of environmental protection they provide. The options vary primarily in how they define what should be a threshold standard.

The options include:

- 1) Adopt Tahoe specific standards and some state and federal standards
- 2) Adopt Tahoe specific standards and all state and federal standards
- 3) Adopt only Tahoe specific standards
- 4) Adopt Tahoe specific standards and state and federal standards where unique to Tahoe

Each alternative is discussed below.

1) Adopt Tahoe specific standards and some State and Federal Standards

The current set of air quality threshold standards follows this approach. The inclusion of some, but not all, state and federal standards creates a framework that appears inconsistent. What is lacking from the approach is a rationale for why some state and federal standards are adopted as threshold standards, but others are not, and what implication (if any) the designation as a threshold standard has in addition to status as a state or federal standard.

2) Adopt Tahoe specific standards and all State and Federal Standards

To avoid this inconsistency, threshold standards could be adopted for all state and federal standards. The benefits of the approach would be twofold. First, it would create a complete list of standards that apply in the Region. Second, it would create a logically consistent approach to adoption of air and water quality threshold standards, in that all standards that apply are adopted as threshold standards. The downsides of the approach also warrant consideration. The approach would result in a significant

increase in the number of threshold standards, for which the concerns of Tahoe agencies are not materially different from other geographies around the country.

Lead and sulfur dioxide provide useful examples here. Lead is an environmental pollutant known to impact the human nervous system, kidney function, immune system, reproductive and developmental systems. Infants and young children are most susceptible to lead exposure. The removal of lead from gasoline resulted in a 98% decrease of atmospheric lead between 1980 and 2014 (EPA 2022e). Today the primary sources of atmospheric lead are from processing of metals and ores and leaded aviation fuel (EPA 2022e).

Sulfur dioxide is known to cause respiratory problems, and at high concentrations can harm tree/plant growth and contribute to acid rain. Established measures to reduce SO_x emissions have reduced atmospheric concentrations significantly in the last thirty years; 91% since 1990 (EPA 2022f). The primary sources of sulfur dioxide today are power plants and other industrial facilities.

In both examples, the concerns related to impacts of the pollutant in Tahoe are similar to those in other regions, and the regional partnership is not principally driving progress on the issue.

When the agency adopted PM_{2.5} standards in 2012, it adopted the state and federal standards at the time. However, EPA updated PM_{2.5} standards in early 2013, but the threshold standard was not updated to maintain consistency with the change in the federal standard (Box 1). When the PM_{2.5}

RESPIRABLE AND FINE PARTICULATE MATTER

NUMERICAL STANDARDS

AQ12) Particulate Matter_{2.5} Annual Arithmetic Average - Maintain Particulate Matter_{2.5} at or below annual arithmetic average of 12µg/m³ in the portion of the Region within California and maintain Particulate Matter_{2.5} at or below annual arithmetic average of 15µg/m³ in the portion of the Region within Nevada. Particulate Matter_{2.5} measurements shall be made using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.

National Ambient Air Quality Standards (NAAQS) Primary PM_{2.5} Annual - 12.0 µg/m³

Box 1: NAAQS AND THRESHOLD STANDARD FOR ANNUAL AVERAGE PARTICULATE MATTER 2.5

threshold standard was adopted, California had a stricter standard for PM10, than was in place in Nevada or Federally. In deference to the two states, the adopted standard specified different annual average standards, one for the California side and one for the Nevada side (Box 1). This created a strange situation where a single agency adopted two different standards in different regions, not because of underlying physical differences or varying science in the two geographies, but solely because of a political boundary. Less than a month after the PM2.5 standard was adopted by the TRPA Governing Board, EPA updated its annual average PM2.5 standard to 12µg/m³, consistent with the California standard (EPA 2013), meaning that TRPA's threshold standard was no longer in conformance with the stricter national standard.

As shown above, this approach also creates an additional administrative and technical burden, in that it requires review and updating of the threshold standards to ensure that they remain current with state and federal standards. This burden of maintaining consistency with state and federal standards would likely not result in any additional environmental benefit since, historically, state and federal air quality standards have generally become stricter through time (EPA 2022d, 2022c, 2022c, 2022a). If state and federal standards were to become less strict or were altered in a manner that was not readily identifiable as stricter or less strict, Tahoe would need to review the evidence presented by State and/or Federal agencies and decide if the evidence warranted a change to the threshold standards.

The current annual average PM10 threshold standard (AQ10) poses similar challenge to the partnership as described above (Box 2). The adopted threshold standard references an annual average PM10 concentration of 50µg/m³ on the Nevada side of the basin, referencing an EPA standard that was

RESPIRABLE AND FINE PARTICULATE MATTER

NUMERICAL STANDARDS

AQ10) Particulate Matter 10 Annual Arithmetic Average - Maintain Particulate Matter 10 at or below annual arithmetic average of 20µg/m³ in the portion of the Region within California, and maintain Particulate Matter 10 at or below annual arithmetic average of 50µg/m³ in the portion of the Region within Nevada. Particulate Matter 10 measurements shall be made using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.

BOX 2: THRESHOLD STANDARD FOR ANNUAL AVERAGE PARTICULATE MATTER 10

adopted in 1997, but was removed in 2006 and replaced with a single standard for 24-hour concentration (EPA 2013, 2022a). EPA's decisions, including the PM10 decision, are informed by an independent scientific advisory panel, the Clean Air Scientific Advisory Committee (CASAC), which provides advice to EPA on the review and establishment of national air quality standards (CASAC 2010, 2021). Because the national standard was adopted as a threshold standard for the Nevada side of the Region, the agency needs to decide if the annual PM10 threshold standard should be updated for Nevada. Should the old national standard be retained? Should the standard on the Nevada side be removed and replaced with a standard only for the California side of the Region?

3) Adopt only Tahoe specific standards

In order to avoid the administrative and technical requirements associated with maintaining threshold standards in response to non-Tahoe specific state and federal standard changes, threshold standards could be adopted only for Tahoe specific goals that were not adopted state or federally, or that are more strict than the state or federal standards.

The approach would be logically consistent, in that any standard that is already adopted by either state or the federal government is already required to be attained in Tahoe, and thus would be the most economical set of threshold standards. While the approach may result in the most efficient set of standards, it would result in the exclusion of Tahoe specific goals as threshold standards if they were already adopted by the states. Because both states are active partners in Tahoe, this approach would create some oddities if implemented. Within air quality for example, California and TRPA both adopted the stricter carbon monoxide standard for the Tahoe region (Box 3), relative to the national and Statewide standard in California which is set at 9.0 ppm (10 mg/m³) (CARB 2016).

CARBON MONOXIDE

NUMERICAL STANDARDS

AQ1) Maintain carbon monoxide concentrations at or below 6 parts per million (7 mg/m³) averaged over 8 hours.

BOX 3: THRESHOLD STANDARD FOR 8HR CARBON MONOXIDE

The approach if carried over to the water quality threshold standards (the Compact also requires all state and federal water quality standards to be attained) would result in further oddities in that the goal for restoration of lake clarity would not be included as a threshold standard, since it is already a state and federal goal (Lahontan & NDEP 2010).

4) Adopt Tahoe specific standards and state and federal standards where unique to Tahoe

The approach would be a hybrid of the above approaches but adopting state and federal standards only where they are unique or specific to Tahoe, such as the lake clarity standard. The Tahoe partnership often plays an active role in the development of Tahoe specific standards, and the exclusion of these standards from the threshold standards would provide an incomplete snapshot of our work that would likely be confusing to stakeholders. The approach improves on alternative two in which all state and federal air and water quality standards would be adopted and maintained as threshold standards; in that it is more directed in the role of the Tahoe partnership. The approach focuses on values where Tahoe specific standards are necessary because of unique interests or values arising from the irreplaceable nature of Tahoe.

The recommended standards for air quality follow this approach.

RECOMMENDATION











Staff recommends the approach that is outlined in option 4 above. This option allows the partnership the flexibility to work with appropriate experts to set Tahoe specific air and water quality standards where necessary to achieve the goals of the Compact and to defer to state and federal experts on more general issues of air and water quality. This option would not alter the monitoring of, or Compact requirement to achieve all state and federal air and water quality standards.

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APPENDIX I – OUTLINE FOR AIR QUALITY THRESHOLD STANDARDS

THRESHOLD STANDARD	SYSTEM TAGS
1) CARBON MONOXIDE - 8 HR AVERAGE – RETAIN CURRENT STANDARD	  
2) OZONE – 1 HR STANDARD – RETAIN CURRENT STANDARD	  
3) REGIONAL VISIBILITY – 50% STANDARD – RETAIN CURRENT STANDARD	
4) REGIONAL VISIBILITY – 90% STANDARD – RETAIN CURRENT STANDARD	
5) SUBREGIONAL VISIBILITY – 50% STANDARD – RETAIN CURRENT STANDARD	
6) SUBREGIONAL VISIBILITY – 90% STANDARD – RETAIN CURRENT STANDARD	

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APPENDIX II – ADOPTED AIR QUALITY THRESHOLD STANDARDS

CARBON MONOXIDE

NUMERICAL STANDARD

- AQ1) Maintain carbon monoxide concentrations at or below 6 parts per million (7 mg/m³) averaged over 8 hours.

MANAGEMENT STANDARD

- AQ2) Reduce traffic volumes on the U.S. 50 Corridor by 7 percent during the winter from the 1981 base year between 4:00 p.m. and 12:00 midnight, provided that those traffic volumes shall be amended as necessary to meet the respective state standards.

OZONE

NUMERICAL STANDARDS

- AQ3) Maintain ozone concentrations at or below 0.08 parts per million averaged over 1 hour.
AQ4) Maintain oxides of nitrogen (NO_x) emissions at or below the 1981 level.

REGIONAL VISIBILITY¹

NUMERICAL STANDARDS

- AQ5) Achieve an extinction coefficient of 25 Mm⁻¹ at least 50 percent of the time as calculated from aerosol species concentrations measured at the Bliss State Park monitoring site (visual range of 156 kilometers, 97 miles).
AQ6) Achieve an extinction coefficient of 34 Mm⁻¹ at least 90 percent of the time as calculated from aerosol species concentrations measured at the Bliss State Park monitoring site (visual range of 115 kilometers, 71 miles).

SUBREGIONAL VISIBILITY²

NUMERICAL STANDARDS

- AQ7) Achieve an extinction coefficient of 50 Mm⁻¹ at least 50 percent of the time as calculated from aerosol species concentrations measured at the South Lake Tahoe monitoring site (visual range of 78 kilometers, 48 miles).
AQ8) Achieve an extinction coefficient of 125 Mm⁻¹ at least 90 percent of the time as calculated from aerosol species concentrations measured at the South Lake Tahoe monitoring site (visual range of 31 kilometers, 19 miles).

RESPIRABLE AND FINE PARTICULATE MATTER

NUMERICAL STANDARDS

¹ Amended 03/22/00. Calculations will be made on three year running periods. Beginning with the existing 1991-93 monitoring data as the performance standards to be met or exceeded.

² Amended 03/22/00. Calculations will be made on three year running periods. Beginning with the existing 1991-93 monitoring data as the performance standards to be met or exceeded.

- AQ9) Particulate Matter₁₀ 24-hour Standard: Maintain Particulate Matter₁₀ at or below 50µg/m³ measured over a 24-hour period in the portion of the Region within California, and maintain Particulate Matter₁₀ at or below 150 µg/m³ measured over a 24-hour period in the portion of the Region within Nevada. Particulate Matter₁₀ measurements shall be made using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.
- AQ10) Particulate Matter₁₀ Annual Arithmetic Average - Maintain Particulate Matter₁₀ at or below annual arithmetic average of 20µg/m³ in the portion of the Region within California, and maintain Particulate Matter₁₀ at or below annual arithmetic average of 50µg/m³ in the portion of the Region within Nevada. Particulate Matter₁₀ measurements shall be made using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.
- AQ11) Particulate Matter_{2.5} 24-hour Standard - Maintain Particulate Matter_{2.5} at or below 35µg/m³ measured over a 24-hour period using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.
- AQ12) Particulate Matter_{2.5} Annual Arithmetic Average - Maintain Particulate Matter_{2.5} at or below annual arithmetic average of 12µg/m³ in the portion of the Region within California and maintain Particulate Matter_{2.5} at or below annual arithmetic average of 15µg/m³ in the portion of the Region within Nevada. Particulate Matter_{2.5} measurements shall be made using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.

NITRATE DEPOSITION

MANAGEMENT STANDARDS

- AQ13) Reduce the transport of nitrates into the Basin and reduce oxides of nitrogen (NO_x) produced in the Basin consistent with the water quality thresholds.

APPENDIX III – COMPARISON OF AIR QUALITY STANDARDS – NATIONAL / STATE/ THRESHOLD STANDARDS

Pollutant	Standard Type	Averaging Time	EPA	CARB	NDEP	TRPA
<u>Carbon Monoxide (CO)</u>	Primary	8 hours	NONE	6 ppm (Tahoe Only)	6 ppm (above 5,000 ft)	6 ppm
		8 hours	9 ppm	9 ppm	9 ppm (below 5,000 ft)	
		1 hour	35 ppm	20 ppm	35 ppm	NONE
<u>Lead (Pb)</u>	primary and secondary	30 day	NONE	1.5 µg/m	NONE	NONE
		Rolling 3 month average	<u>0.15 µg/m³</u>	NONE	1.5 µg/m ³	NONE
<u>Nitrogen Dioxide (NO₂)</u>	Primary	1 hour	100 ppb	0.18 ppm	0.053 ppm	NONE
	primary and secondary	1 year	<u>53 ppb</u>	0.030 ppm	0.053 ppm	NONE
<u>Ozone (O₃)</u>	primary and secondary	8 hours	<u>0.070 ppm</u>	0.070 ppm	0.070 ppm	NONE
		1 hour	NONE	0.09 ppm	0.10 ppm (Tahoe)	Maintain ozone concentrations at or below 0.08 parts per million averaged over 1 hour.

Pollutant		Standard Type	Averaging Time	EPA	CARB	NDEP	TRPA
<u>Particle Pollution (PM)</u>	PM _{2.5}	Primary	1 year	12.0 µg/m ³	12 µg/m ³	NONE	Maintain Particulate Matter _{2.5} at or below annual arithmetic average of 12µg/m ³ in the portion of the Region within California and maintain Particulate Matter _{2.5} at or below annual arithmetic average of 15µg/m ³ in the portion of the Region within Nevada. Particulate Matter _{2.5} measurements shall be made using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.
		Secondary	1 year	15.0 µg/m ³		NONE	

Pollutant		Standard Type	Averaging Time	EPA	CARB	NDEP	TRPA
		primary and secondary	24 hours	35 µg/m ³	NONE	NONE	Maintain Particulate Matter _{2.5} at or below 35µg/m ³ measured over a 24-hour period using gravimetric or beta attenuation methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.
PM ₁₀		primary and secondary	24 hours	150 µg/m ³	50 µg/m ³	150 µg/m ³	Maintain Particulate Matter ₁₀ at or below 50µg/m ³ measured over a 24-hour period in the portion of the Region within California, and maintain Particulate Matter ₁₀ at or below 150 µg/m ³ measured over a 24-hour period in the portion of the Region within Nevada. Particulate Matter ₁₀ measurements shall be made using gravimetric or beta attenuation

Pollutant		Standard Type	Averaging Time	EPA	CARB	NDEP	TRPA
							methods or any equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.
			1 year	NONE	20 µg/m ³	NONE	Maintain Particulate Matter ₁₀ at or below annual arithmetic average of 20µg/m ³ in the portion of the Region within California, and maintain Particulate Matter ₁₀ at or below annual arithmetic average of 50µg/m ³ in the portion of the Region within Nevada. Particulate Matter ₁₀ measurements shall be made using gravimetric or beta attenuation methods or any

Pollutant		Standard Type	Averaging Time	EPA	CARB	NDEP	TRPA
							equivalent procedure which can be shown to provide equivalent results at or near the level of air quality standard.
<u>Sulfur Dioxide (SO2)</u>		primary	1 hour	75 ppb	0.25 ppm	75 ppb	NONE
		secondary	3 hours	0.5 ppm	NONE	0.5 ppm	NONE
			24 Hour	NONE	0.04 ppm	0.14 ppm	NONE
			Annual	NONE	NONE	0.030 ppm	NONE
Visibility	Regional			NONE	extinction of 0.07 per kilometer (Tahoe)	NONE	AQ5) Achieve an extinction coefficient of 25 Mm-1 at least 50 percent of the time as calculated from aerosol species concentrations measured at the Bliss State Park monitoring site (visual range of 156 kilometer, 97 miles).
				NONE	extinction of 0.23 per kilometer (statewide)	NONE	AQ6) Achieve an extinction coefficient of 34 Mm-1 at least 90 percent of the time as calculated from aerosol species concentrations measured at the Bliss

Pollutant		Standard Type	Averaging Time	EPA	CARB	NDEP	TRPA
							State Park monitoring site (visual range of 115 kilometers, 71 miles).
	Subregional			NONE		NONE	AQ7) Achieve an extinction coefficient of 50 Mm-1 at least 50 percent of the time as calculated from aerosol species concentrations measured at the South Lake Tahoe monitoring site (visual range of 78 kilometers, 48 miles).
				NONE		NONE	AQ8) Achieve an extinction coefficient of 125 Mm-1 at least 90 percent of the time as calculated from aerosol species concentrations measured at the South Lake Tahoe monitoring site (visual range of 31 kilometers, 19 miles).
Sulfates			24 Hour	NONE	25 µg/m ³	NONE	NONE
Hydrogen Sulfide			1 Hour	NONE	0.03 ppm (42 µg/m ³)	0.08 ppm	NONE

Pollutant	Standard Type	Averaging Time	EPA	CARB	NDEP	TRPA
Vinyl Chloride		24 Hour	NONE	0.01 ppm (26 µg/m ³)	NONE	NONE

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