ADEQ 2021 Regional Haze State Implementation Plan Source Screening Methodology

The Regional Haze program requires decadal evaluations of controls for sources of particulate emissions that significantly impact visibility in Class I areas. The goal of a State adopted control program is to provide reasonable progress towards Class I area visibility improvement. Adopted controls are evaluated for reasonableness through the utilization of the 4-factor analysis; however, a State must first determine those sources which are most appropriate to evaluate for the 4-factor analysis. In doing so, EPA has presented several options towards screening sources to isolate those that should be considered for the 4-factor analysis. While EPA's draft guidance document does provide preferred approaches to performing source screening, the decision on a methodology is ultimately left up to the State planning agency, so long as that approach is adequate and well justified.

This document presents ADEQ's initial source screening methodology for the second round of Regional Haze planning. The methodology presented is a variation of the recommended WRAP source screening methodology.

In the distribution of this document, ADEQ hopes to provide EPA, Federal Land Managers, and stakeholder feedback on the approach so that we can better engage our partners and customers early in this process and respond, as necessary, to your feedback.

Significantly Contributing PM species

EPA draft guidance states that:

"If a PM species makes only a small absolute and relative contribution to overall anthropogenic light extinction at a Class I area on each of the 20 percent most impaired days, and if there is no reason for concern about degradation on the 20 percent most impaired or 20 percent clearest days due to future increases in that PM species, in general each contributing state may justify screening out sources of that PM species and its precursors for purposes of reasonable progress at that Class I area for the second implementation period…The EPA recommends that states not exclude PM species representing more than 10 percent of current anthropogenic light extinction at the Class I area on the 20 percent most impaired days, and that excluded PM species should not total more than 20 percent of current anthropogenic light extinction."

ADEQ evaluated the anthropogenic light extinction for the particulate species on the 20% most impaired days at Class I areas within the State of Arizona. Based on this evaluation, the following percentage breakdowns of total anthropogenic extinction was calculated for each of the species on the 20% most impaired days in Arizona Class I areas:

Table 1: 2013-2017 Most Impaired Days particulate matter species relative anthropogenic impact (% total average light extinction)

Site	Sulfate	Nitrate	OMC	LAC	Soil	CM
BALD1	78.7%	2.6%	9.3%	7.8%	1.6%	0.0%
CHIR1	71.4%	3.1%	3.7%	5.2%	2.2%	14.4%
GRCA2	80.5%	6.2%	2.3%	7.5%	3.4%	0.0%
IKBA1	56.7%	12.3%	11.8%	8.1%	3.0%	8.2%
PEFO1	58.0%	5.6%	9.6%	15.2%	2.9%	8.7%
SAGU1	48.4%	10.7%	8.9%	7.7%	5.2%	19.1%
SAWE1	36.9%	9.6%	9.3%	7.9%	7.0%	29.3%
SIAN1[a]						
SYCA1[a]						
TONT1	52.9%	7.9%	12.4%	7.4%	4.1%	15.3%

[a] Values cannot be calculated for these sites for 2013-2017 due to incomplete data.

Given the results presented in the table above, ADEQ determined that ammonium sulfate (sulfate), ammonium nitrate (nitrate), and coarse mass should be evaluated for source controls during this planning period, as each of these species exceeds 10% of the visibility impact for at least one of the State's Class I areas.

It should also be noted that organic carbon mass (OMC) and light absorbing carbon (LAC) also exceed 10% of the light extinction impact for at least one of the Class I areas; however ADEQ is not proposing to include these species for the following reasons[1]:

1. Sulfate, nitrate, and coarse mass account for 72% - 89% of anthropogenic light extinction in Arizona Class I areas.
2. OMC and LAC species are generally dominated by fire related emissions and ADEQ intends to partially address the impacts of prescribed wildland fires through the Uniform Rate of Progress adjustment.
3. For non-fire related OMC and LAC, ADEQ expects that a control strategy targeting sulfate, nitrate, and coarse mass emissions will additionally provide ancillary reductions, for some sources, to organic carbon and light absorbing carbon emissions.
4. ADEQ will commit to reevaluating the impact from OMC and LAC in future planning periods and include these species in future control analyses, as needed.

Point Source Screening Methodology

The following steps outline ADEQ's methodology for source screening of point sources. The methodology generally follows the Q/d approach recommended by the Western Regional Air Partnership (WRAP); however, some slight adjustments were made to ADEQ's approach.

[1] In addition, WRAP outlines additional reasons State's should not targeting OCM and LAC emissions in the document: *Draft WRAP Reasonable Progress Source Identification and Analysis Protocol for Second 10-year Regional Haze State Implementation Plans*.

1. Gather all 2014 major permitted source emissions data within the State of Arizona (Data requests were forwarded to Maricopa, Pinal, and Pima Counties for any permitted source information they may not have previously shared with ADEQ and/or EPA. Additional data was received and added to the datasets for major and minor permitted sources).
2. Sum facility-wide PM_{10} primary, nitrogen oxide, and sulfur dioxide annual emissions (tons/yr) to calculate "Q".[2,3]
3. Isolate those sources with a "Q" value greater than 10.
4. Utilize GIS to plot the location of each point source and the boundary of all Class I areas within Arizona and surrounding States.
5. Calculate the distance from each source to the nearest Class I area boundary in kilometers to calculate "d".
6. Calculate "Q/d" and isolate those sources with a "Q/d" value greater than 20.

While ADEQ investigated WRAP's recommended screening approach, ADEQ deviated from WRAP's suggested Q/d threshold of 10. ADEQ determined that it was appropriate to investigate a higher Q/d threshold for the following reasons, which differ from WRAP's proposed strategy and made ADEQ's approach more stringent:

1. ADEQ is additionally investigating nonpoint source controls (see next section), and
2. ADEQ is including fugitive emissions in its source screening analysis

In addition, utilizing a Q/d threshold of 20 is more restrictive than EPA's Q/d approach included in the 2014 EPA Federal Implementation Plan (FIP) for Regional Haze.[4] EPA's FIP screening approach implemented a Q/d threshold of 10 for screening point sources, which is lower that ADEQ's proposal of using a Q/d threshold of 20; however, EPA only examined one pollutant (NO_x) when determining their Q. ADEQ's current approach calculates Q as the combination of NO_x, SO_2, and PM_{10}. Therefore, a Q/d threshold of 20 is justified.

Utilizing the proposed permitted source screening approach, the permitted source list becomes those sources listed in *Table 2*. These sources combine to account for > 90% of the total major permitted point source "Q".

[2] WRAP's current suggested approach also calls for the inclusion of SO_4; however, ADEQ believes that the addition of SO_4 would result in double counting since the NEI currently includes SO_4 as a subset of $PM_{2.5}$ and thus PM_{10}. Therefore, SO_4 was not included in our calculations.

[3] WRAP further suggests the exclusion of fugitive PM_{10} emissions; however, ADEQ has chosen to include fugitive emissions. ADEQ considers these emissions of equal importance to stack emissions in visibility degradation.

[4] 79 FR 52420, "Promulgation of Air Quality Implementation Plans; Arizona; Regional Haze and Interstate Visibility Transport Federal Implementation Plan"

Table 2: Arizona major permitted sources with a Q > 10 and a Q/d greater than 20.

Source	Q (tpy)	d (km)	Q/d	Nearest Class I Areas
ASARCO LLC - HAYDEN SMELTER	17,700	46	381	Galiuro WA
TUCSON ELECTRIC POWER CO - SPRINGERVILLE	15,555	50	309	Mount Baldy WA
APS - CHOLLA POWER PLANT	13,174	30	433	Petrified Forest NP
AEPCO - APACHE GENERATING STATION	11,087	45	247	Chiricahua WA
CORONADO GENERATING PLANT	8,171	48	169	Petrified Forest NP
FREEPORT MCMORAN MIAMI SMELTER	4,975	18	277	Superstition WA
CHEMICAL LIME NELSON PLANT	3,614	27	134	Grand Canyon NP
ASARCO LLC, Mission Complex - Mission Complex	3,399	42	81	Saguaro WA
Irvington	2,533	16	160	Saguaro WA
FREEPORT-MCMORAN MORENCI INC.	2,503	54	47	Gila WA
CALPORTLAND-RILLITO CEMENT PLANT (APCC)	2,449	8	303	Saguaro WA
EPNG - WILLIAMS COMPRESSOR STATION	1,070	19	55	Sycamore Canyon WA
PHOENIX CEMENT - CLARKDALE	902	10	91	Sycamore Canyon WA
Ray Complex - Ray Operations	874	26	34	Superstition WA
TW - FLAGSTAFF COMPRESSOR STATION	626	19	33	Sycamore Canyon WA

Sources controlled in Regional Haze round 1 are highlighted in yellow.

Nonpoint Source Screening Methodology

During and following ADEQ's October 2nd, 2018 Regional Haze 2021 planning stakeholder kickoff meeting, ADEQ received feedback from stakeholders asking that we consider sources that were not previously controlled in the last round of planning. Given that the last round of controls were focused on major permitted sources, ADEQ determined that it was appropriate to also examine area sources that contribute to visibility impacting emissions. As such ADEQ employed the following approach when screening area sources for the 4-factor analysis:

1. Gather 2014 EPA NEIv2 county-level nonpoint datasets for the State of Arizona.
2. Isolate source classification code (SCC) annual emissions (tons/yr) for PM_{10} primary, nitrogen oxide, and sulfur dioxide.
3. Remove PM_{10}-PRI emissions from consideration for those counties that are not located within 50 km of a Class I area since PM_{10} does not generally experience high transport distances.
4. Sum the remaining SCC-specific PM_{10} primary, nitrogen oxide, and sulfur dioxide annual emissions to calculate "Q".
5. Sort all SCCs from highest to lowest "Q".
6. Determine the "Q"-threshold which achieved inclusion of the SCCs with the largest "Q's" until >80% of total "Q" emissions across all SCCs are accounted for (i.e. "Q" >13,500 tpy includes 6 sectors which account for 81.6% of the total nonpoint "Q").
7. Isolate those sources with a "Q" value greater than 13,500 tpy.

Based on the approach outlined above, the area source sectors that would be screened into a 4-factor analysis are presented in *Table 3*.

Table 3: Arizona nonpoint source sectors with a Q >13,500 tons/year (tpy).

SCC	NO_x	PM_{10}	SO_2	Q	Sector
2285002006	18,045	541	11	18,597	Mobile - Locomotives
2294000000	0	14,501	0	14,501	Dust - Paved Road Dust
2296000000	0	107,924	0	107,924	Dust - Unpaved Road Dust
2311020000	0	15,536	0	15,536	Dust - Construction Dust
2325000000	0	44,753	0	44,753	Industrial Processes - Mining
2701220000	13,912	0	0	13,912	Biogenics - Vegetation and Soil

Source Screening Emissions Consistency

During emissions collection and source screening evaluation, it became apparent that certain major sources from the mining industry may not be calculating and/or reporting their fugitive emissions consistently with other sources within the industry. Given that fugitive emissions can represent the majority of emissions from major permitted mines, ADEQ has determined that will be necessary to follow up with these sources to consistently and accurately account for fugitives from these sources. ADEQ will develop a more detailed approach to revising emission estimates; however, in general ADEQ will follow those steps outlined for major point source screening outlined previously in this document with the following steps to ensure consistency:

1. Isolate any major mines not otherwise screened into the process during the point source screening steps (outlined previously).
2. Review the 2014 reported emissions for these mines to determine which of those sources did not report fugitive emissions[5] or utilized in appropriate emission factors, including:
    a. Drilling
    b. Blasting
    c. Hauling
    d. Loading/Unloading
    e. Crushing
    f. Road/Pit maintenance
3. For those sources isolated in Step 2, contact the source to request that they provide updated 2014 emissions for those processes missing information or found to utilize inappropriate emission factors[6].
4. Once the source has updated their emissions, recalculate Q/d to determine if their revised value is > 20. Those sources with a Q/d > 20 should undergo a 4-factor analysis.

Table 4: Sources that will require emissions review to ensure consistent fugitive emission reporting

[5] ADEQ recognizes that some emissions within the mine/pit may not have significant impact on Class I areas but also realizes that this will depend on a number of factors including proximity to a Class I area, pit/mine dimensions, local topography, and meteorological conditions. Therefore, ADEQ is suggesting the use of modeling of all facility emissions to determine their impacts on Class I area visibility.

[6] Where 2014 data is unavailable a more recent year emission estimates may be used and ADEQ can work with the source to determine the most accurate method for substituting these emissions or scaling them to represent 2014.

Source
ASARCO LLC, Mission Complex - Mission Complex
FREEPORT-MCMORAN MORENCI INC.
CALPORTLAND-RILLITO CEMENT PLANT (APCC)[7]
PHOENIX CEMENT – CLARKDALE[7]
Ray Complex - Ray Operations
Freeport-McMoRan Sierrita, Inc.
DRAKE CEMENT

[7] While this facility is not a mine, cement plants also have the potential for large fugitive emission releases. Therefore, ADEQ is also committing to review the fugitives from cement plants in a similar manner to that provided for mines in this document.