NEVADA REGIONAL HAZE STATE IMPLEMENTATION PLAN

A Plan for Implementing
Section 308 (40 CFR § 51.308)
of the Regional Haze Rule

State of Nevada
Division of Environmental Protection
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NOTE TO READERS

Nevada's Regional Haze State Implementation Plan (SIP) was developed for submittal to the U.S. Environmental Protection Agency under Section 308 of the Regional Haze Rule (40 CFR § 51.308) as a revision to the applicable Nevada state implementation plan. The SIP is based on data that existed as of January 5, 2009 with one exception. In response to public comments, Nevada re-evaluated the Best Available Retrofit Technology emission limits for SO_2 at NV Energy's Reid Gardner facility. The limits were lowered based on 2009 data. This document is the initial step in a sequential planning effort working toward achieving the national goal of returning to natural visibility conditions in mandatory Class I areas by 2064.

Nevada's Regional Haze SIP and related documents can be found on the following website: http://ndep.nv.gov/baqp/planmodeling/rhaze.html. Western Regional Air Partnership (WRAP) reports and documents can be found on the following websites: http://www.wrapair.org/ or at the WRAP TSS website: http://vista.cira.colostate.edu/tss/.

Nevada has chosen to link to websites on the internet for many references cited in this SIP. We have backed up these links by putting electronic copies of reference documents on the Nevada Division of Environmental Protection's (NDEP) server. If any of the links in this document do not work for you, you may contact the NDEP Bureau of Air Quality Planning at 901 South Stewart Street, Suite 4001, Carson City, Nevada 89701 or by telephone at 775-687-9349 for assistance.

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The supporting technical information in this plan was assembled with the assistance of the WRAP staff, member states and their consultants, the Western Governor's Association, and the Western States Air Resources Council. In addition, NV Energy, Southern California Edison and Nevada Cement provided BART analyses for their sources.

EXECUTIVE SUMMARY

REGULATORY HISTORY

In 1977, Congress amended the Clean Air Act (CAA) establishing a national goal to protect visibility in Class I federal areas -- national parks, forests and wilderness areas. The amendments called for the "prevention of any future, and the remedying of any existing, impairment of visibility in mandatory class I Federal areas which impairment results from manmade air pollution." (CAA § 169A) In 1979, the United States Environmental Protection Agency (USEPA), in consultation with the Secretary of Interior, promulgated a list of 156 mandatory Class I areas in which visibility was determined to be an important factor. In Nevada, only one area was designated: the Jarbidge Wilderness Area (Jarbidge WA) in the northeast corner of the state.

On December 2, 1980, USEPA promulgated regulations to address visibility impairment that is "reasonably attributable" to a single source or small group of sources. These regulations represented the first phase in addressing visibility impairment; action on regional haze was deferred. In 1990, the act was amended to require that regional haze issues be addressed. Subsequently, USEPA adopted phase II visibility rules, or the Regional Haze Rule (RHR), thereby establishing a comprehensive visibility protection program for Class I federal areas.

The intent of the RHR is to improve visibility over the next 55 years in all 156 mandatory Class I areas across the country. It requires each affected state to develop and adopt an implementation plan that will improve the haziest days and protect the clearest days at each mandatory Class I area in the state with a goal of returning to natural visibility conditions by the year 2064. Each plan must provide a comprehensive analysis of natural and man-made sources of haze in each mandatory Class I area in the state and contain strategies to control anthropogenic emissions that contribute to haze. The plan must also address the transport of haze across state boundaries. This document is Nevada's *Regional Haze State Implementation Plan* (RH SIP) and has been prepared to meet the requirements of the federal RHR as codified in Title 40 of the Code of Federal Regulations (CFR) Part 51 Section 308.

REGIONAL HAZE STATE IMPLEMENTATION PLAN REQUIREMENTS

The RHR covers a long period, broken into several planning phases to ultimately meet the national visibility goal by the year 2064. The approach taken in preparing this RH SIP is to set the initial planning period (2008 through 2018) as the "foundational plan" for the subsequent planning periods. Though national visibility goals are to be achieved by the year 2064, this plan meets the requirements of improving visibility for the most impaired days and ensuring no degradation in visibility for the least impaired days for the period ending in 2018, the first planning period in the federal rule.

Nevada's RH SIP has been prepared by the Nevada Division of Environmental Protection (NDEP) and contains strategies and elements related to each requirement of the federal rule. The SIP is based on data that existed as of January 5, 2009 with one exception. In response to public

comments, Nevada re-evaluated the Best Available Retrofit Technology (BART) emission limits for SO_2 at NV Energy's Reid Gardner facility. The limits were lowered based on 2009 data.

The appendices at the end of this document provide additional information, including new Nevada Administrative Code (NAC) associated with this plan and evidence of public participation, along with public comments and NDEP responses to those comments. Technical support documents and reference material (technical analyses and reports) prepared by the Western Regional Air Partnership (WRAP), the Regional Planning Organization (RPO) designated by USEPA to assist western states in the development of regional haze plans, and other sources are linked in the text to the web site where they are publicly available.

A brief summary, organized according to the regional haze program requirements in 40 CFR 51.308, of how Nevada has fulfilled the requirements of the RHR for the first planning period and how Nevada intends to fulfill future requirements follows.

Reasonable Progress Goals and Calculations of Baseline and Natural Visibility Conditions

The RHR at 40 CFR 51.308(d)(1) requires the state, for each mandatory Class I area within the state, to establish reasonable progress goals that will achieve the national goal of a return to natural visibility conditions by 2064. 40 CFR 51.308(d)(2) requires the state to calculate baseline, current and natural visibility conditions, which in turn are used to calculate the uniform rate of progress (URP) per year necessary to achieve natural conditions by 2064. States are directed to show graphically what would be the URP for each mandatory Class I area within the state. To develop the URP, or glidepath, states must determine baseline visibility conditions for the period 2000 through 2004 and natural background visibility conditions in 2064.

Visibility conditions and the glidepath for the Jarbidge WA are presented in Chapter Two. The baseline visibility condition for the period 2000 through 2004 for the 20 percent worst days is 12.07 deciviews (dv) and 2.56 dv for the 20 percent best days. The natural background visibility condition at Jarbidge is estimated to be 7.87 dv for the 20 percent worst days and 1.14 dv for the 20 percent best days. The URP value for the planning period ending in 2018 for Jarbidge WA is 11.09 dv.

Analysis of baseline period monitoring data at Jarbidge WA shows that organic matter carbon (OMC) and elemental carbon (EC) extinction account for more than 45 percent of the total average annual reconstructed extinction for the 20 percent worst days. Coarse and fine particle mass (CM and SOIL) extinction account for an additional 30 percent. Approximately 20 percent of the annual extinction budget results from the formation of ammonium sulfate (sulfate) and ammonium nitrate (nitrate) due to emissions of sulfur oxides (SO_x) and nitrogen oxides (NO_x) from predominantly anthropogenic sources. Based on these findings, NDEP concludes that windblown dust and natural fire emissions contribute significantly to visibility impairment at the Jarbidge WA. The data suggest that visibility improvement due to emissions reductions of SO_x and NO_x from anthropogenic sources may be overwhelmed by emissions from natural sources, in particular seasonally variable OMC and CM, as well as EC and SOIL.

Visibility modeling was used to determine the expected 2018 visibility improvements resulting

from existing federal and state air quality regulations in effect by 2018. This modeling included a limited assessment of the impacts of applying BART to BART-eligible coal-fired electric generating units to achieve the presumptive limits for sulfur dioxide (SO_2). The modeling results are presented in Chapter Four. Modeling shows that as a result of regulatory requirements at the local, state and federal levels during the planning period of this SIP, emission reductions will result in greater visibility improvement than the URP value for the Jarbidge WA in 2018.

The demonstration of reasonable progress requires setting goals for the 20 percent worst and the 20 percent best days in each Class I area, based on an evaluation of how BART and other regional haze strategies will reduce emissions and improve or protect visibility. Chapter Six of this plan describes the reasonable progress demonstration in detail. Nevada has determined that implementation of BART and the federal, state and local programs included in the 2018 visibility modeling represents reasonable progress in Nevada for the initial regional haze planning period. Nevada actually exceeds URP requirements for the Jarbidge WA in 2018 and meets its share of emission reduction obligations at out-of-state Class I areas. It is not necessary to consider additional emission controls on non-BART Nevada sources at this time. It is appropriate to evaluate additional reductions in the future for later planning periods in order to sustain a consistent glidepath toward the 2064 goal.

Long-term Strategy for Regional Haze

The RHR at 40 CFR 51.308(d)(3) requires the state to submit a long-term strategy that addresses regional haze visibility impairment at all mandatory Class I areas that may be impacted by emissions from the state. The strategy must include enforceable emissions limitations, compliance schedules and other measures as necessary to achieve the state's reasonable progress goals. As part of the technical basis for the long-term strategy, the state must identify its baseline emissions inventory and all anthropogenic sources of visibility impairment. This SIP covers long-term strategies for visibility improvement between baseline conditions and visibility conditions projected for 2018.

Chapter Three describes Nevada's baseline and 2018 emissions inventories and analyzes the sources of visibility impairment by source category. Total emissions for all visibility impairing pollutants in 2018 are projected to be 1,336,811 tons. Of that total, 27 percent are from anthropogenic sources; 73 percent are from natural sources. Emissions from natural sources are considered uncontrollable. Of the eight visibility impairing pollutants analyzed, anthropogenic sources are important contributors to three of them: SO_x, NO_x, and NH_3. SO_x emissions in Nevada come predominantly from point and area sources, 61 and 31 percent, respectively. NO_x emissions come predominantly from point sources, approximately 50 percent; mobile sources account for another 27 percent. NH_3 emissions come predominantly from area sources, 59 percent, with another 23 percent from on-road mobile sources. Volatile organic compounds (VOC), primary organic aerosol (POA), EC, PM fine and PM coarse emissions are dominated by natural source categories, and those source categories are not controllable.

Chapter Four presents the results of visibility and source apportionment modeling, which show that the Jarbidge WA will meet the URP value for 2018. The modeling results and technical analyses indicate that, although Nevada sources contribute to visibility impairment at the

Jarbidge WA and Class I areas located in adjacent states, sources outside the State of Nevada have the greatest impact on regional haze at Jarbidge WA. Furthermore, regional weighted emissions potential analyses show the significant role of emissions from windblown dust, fugitive dust and natural fire in visibility impairment at the Jarbidge WA.

The 2018 Particulate Matter Source Attribution Tracking modeling demonstrates that "Outside Domain," or boundary conditions, emissions comprise almost 44 percent of the total sulfate at Jarbidge WA -- four times greater than any other regional source. Nevada's contribution is less than six percent. Sulfur oxide emissions from point, area and natural fire sources each contribute approximately one third to visibility impairment at Jarbidge WA. For nitrate, Idaho is the largest regional source contributor; about 30 percent. Nevada contributes approximately 13 percent. Point, mobile and area source emissions contribute the most to nitrate, with a much smaller portion from natural fire emissions.

Nevada evaluated its contribution to visibility impairment at Class I areas in adjacent states: Arizona, California, Idaho, Oregon and Utah. Nevada calculated the visibility reductions needed at these Class I areas to achieve the 2018 URP; the percentage of the needed reduction achieved; Nevada's emissions reduction share; the contribution of Nevada emissions to sulfate and nitrate extinction; the percentage change in Nevada's emissions from baseline to 2018; and the percentage change in Nevada's weighted emission potential from baseline to 2018. The percentage of Nevada's state-wide emissions reductions exceeds the percentage of Nevada's contribution to visibility impairment at all impacted Class I areas. Therefore, the state meets its share of emission reduction obligations necessary for achieving reasonable progress in each mandatory Class I area it affects.

Nevada's long-term strategy is presented in Chapter Seven and comprises all of the "on-the-way" and "on the books" control programs and federal, state and local rules discussed in Chapter Six together with additional control programs discussed in Chapter Seven and the BART requirements found in Chapter Five. In developing this strategy, Nevada considered ongoing control programs, measures to mitigate construction activities, source retirement and replacement schedules, smoke management techniques for agriculture and forestry and enforceability of specific measures as required by 40 CFR 51.308(d)(3).

Nevada has numerous existing emission control programs to improve and protect visibility in Class I areas. Generally, Nevada considers its New Source Review (NSR) and Prevention of Significant Deterioration (PSD) programs meet the long-term strategy requirements for preventing future visibility impairment from proposed major stationary sources or major modifications to existing facilities. Nevada's continued implementation of NSR requirements, with FLM involvement for Class I area impact review, will protect the least impaired days from further degradation and will assure that no Class I areas with a potential to be impacted by Nevada emissions will experience degradation from a new source or a major modification of an existing source.

As noted above, for the planning period of this SIP, visibility modeling shows that emission reductions resulting from the implementation of regulatory requirements at the local, state and federal levels will provide greater visibility improvement than the URP for the Jarbidge WA in

2018. Furthermore, Nevada is meeting its share of emission reduction obligations at mandatory Class I areas that it affects in neighboring states. The RHR requires an evaluation every five years of reasonable further progress. Nevada will evaluate reasonable further progress for the Jarbidge WA on this schedule and, if necessary, revise its long-term strategy as appropriate.

Monitoring Strategy, Emission Inventory, Recordkeeping and Reporting

The RHR at 40 CFR 51.308(d)(4) requires the state to develop a monitoring strategy for measuring, characterizing and reporting regional haze visibility impairment that is representative of all mandatory Class I areas within Nevada. This strategy must also coordinate with the monitoring strategy required in 40 CFR 51.305 for reasonably attributable visibility impairment, as well as provide for a variety of other requirements designed to evaluate reasonable progress toward meeting national visibility goals.

Nevada's monitoring strategy is presented in Chapter Eight. Visibility conditions in mandatory Class I areas throughout the United States are presently measured by the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring network, which is operated and maintained through a formal cooperative relationship between USEPA and Federal Land Manager (FLM) agencies. Nevada's regional haze monitoring strategy relies on information generated through the IMPROVE network for the Class I area at the Jarbidge WA. Nevada commits to continue using the IMPROVE monitoring data and to update Nevada's emissions inventory periodically, as required by the RHR. The inventory updates will be used for state tracking of emission changes and trends, to provide input into the evaluation of whether reasonable progress goals will continue to be achieved at Jarbidge WA and for other regional analyses.

40 CFR 51.305 requires states to develop a strategy for monitoring reasonably attributable visibility impairment in its Class I areas. To satisfy this requirement, Nevada is subject to a federal visibility protection plan (visibility FIP). Nevada's regional haze monitoring strategy will coordinate with Nevada's visibility FIP by continuing to use the data collected by the IMPROVE program and will promote reasonable progress toward the national visibility goal.

The RHR at 40 CFR 51.308(d)(4)(v) requires a statewide emission inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I area. Several emission inventories were prepared by the Regional Modeling Center for the WRAP as part of the regional haze effort. Chapters One and Three discuss the development of these inventories and the baseline and projected emissions for SO_x (particulate and gaseous phases), SO_2 (gas phase only), NO_x, VOC, POA, EC, PM fine, PM coarse and NH_3 in Nevada.

Nevada commits to continue developing emission inventory data to allow for tracking emission increases or decreases as related to regional haze as funding and resources allow. Information collected will be made available periodically, as required by the RHR.

Best Achievable Retrofit Technology

The RHR at 40 CFR 51.308(e) requires states to determine BART and compliance schedules for

each BART-eligible source in the state that emits any air pollutant that may reasonably be anticipated to cause or contribute to impairment of visibility in any mandatory Class I federal area. Section 169A(b) of the CAA defines BART-eligible sources as sources in 26 specific source categories, in operation within a 15-year period prior to enactment of the 1977 PSD rules. States must determine BART according to five factors set out in section 169A(g)(2) of the CAA. Emission limitations representing BART and schedules for compliance with BART for each source subject to BART must be included in the state's long-term strategy.

Nevada's RH SIP fulfills the requirements of 40 CFR 51.308 (e)(1); Chapter Five describes the BART determination in detail. The BART analyses conducted by Nevada were based, in part, on an assessment of many of the same factors (including the 4-factor analysis) that must be addressed in establishing the reasonable progress goal. Four facilities, comprising 10 units, are subject to BART: NV Energy's generating stations at Tracy (units 1, 2 and 3), Ft. Churchill (units 1 and 2) and Reid Gardner (units 1, 2 and 3); and Southern California Edison's generating station at Mohave[1] (units 1 and 2). The control requirements imposed by Nevada's BART determinations satisfy the reasonable progress goal-related requirements for source review in the first planning period.

A substantial reduction in NO_x, SO_2 and PM_{10} emissions are anticipated upon installation of Nevada BART controls. Emissions reductions resulting from the installation and operation of BART at these sources are estimated to be greater than 20,000 tpy for NO_x, greater than 40,000 tpy for SO_2 and greater than 4,000 tpy for PM_{10}. Nevada will not require non-BART sources to install and operate new emissions controls in the first planning period of the RHR.

Periodic Revisions and Reports; Adequacy Determination

The RHR at 40 CFR 51.308(f)-(h) requires RH SIP revisions every ten years, reports describing progress towards the state's reasonable progress goals every five years and a determination of the adequacy of the SIP along with the five year reports. In Chapter Nine, Nevada commits to fulfill each of these requirements and each of the elements therein, as funding and resources allow.

State and Federal Land Manager Coordination

The RHR at 40 CFR 51.308(d)(1)(iv) and (d)(3)(i) requires states to coordinate with other states during the development of reasonable progress goals and emission management strategies. Nevada has met these requirements through participation in the WRAP and commits to continue to coordinate via the WRAP or other means in Chapter Nine. In the WRAP process, Nevada participated in various forums and workgroups to help develop a coordinated emissions inventory and analysis of the impacts that sources have on regional haze in the west. Coordination and evaluation of monitoring data and modeling processes were also overseen by WRAP participants. Although not a formal member, Nevada has been an active participant in

[1] On June 10, 2009, after the cutoff date for incorporating new information into this SIP (January 5, 2009), the owners of the Mohave Generating Station announced the decision to decommission the station and remove the generating facility from the site. This new information is noted at relevant places in the SIP, but the SIP has not been revised to incorporate this information.

the WRAP since its inception, and in the forums, workgroups and committees that were formed to address many elements of the SIP.

40 CFR 51.308(i) further requires states to coordinate with FLMs in developing the RH SIP. States must provide a contact to whom FLMs can submit recommendations on the implementation of the RHR; provide FLMs an opportunity for consultation at least 60 days prior to holding any public hearing on the SIP; provide a public record of how the state addressed any FLM comments; and provide procedures for continuing consultation with FLMs on the implementation of the state's RH SIP.

Chapter Nine describes Nevada's coordination and consultation with FLMs for this SIP and our commitment to continued coordination. Again, participation in the WRAP fulfills a significant portion of the consultation requirements with FLMs. This included an opportunity to discuss their assessment of visibility impairment at the Jarbidge WA and to provide recommendations on reasonable progress goals and the development and implementation of visibility control strategies. A draft of Nevada's RH SIP was provided to the FLMs with a 60-day comment period prior to the public hearing on the SIP. FLM comments and Nevada's responses are found in Appendix C. Additional FLM comments and other public comments on the RH SIP submitted during the public comment period are included in Appendix D, together with NDEP's responses.

Nevada commits to continued participation with the WRAP as long as it exists and to coordinating future plan revisions with other states in addressing regional haze. Involvement with the WRAP will contribute significantly to Nevada's inter-state coordination for future SIP revisions and progress reports.

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Acronyms, Abbreviations and Terms

Anthropogenic	Caused or produced by humans
BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
Base02	2002 actual baseline emissions
Base18	2018 base case emissions
CAA	Clean Air Act
CAIR	Clean Air Interstate Rule
CAMD	Clean Air Markets Division
CAM_x	Comprehensive Air Quality Model with Extensions
CENRAP	Central Regional Air Planning Association
CFR	Code of Federal Regulations
CIRA	Cooperative Institute for Research in the Atmosphere
CM	Coarse matter
CMAQ	Community Multi-Scale Air Quality model
CO	Carbon monoxide
COHA	Causes of Haze Assessment
dv	Deciview; a measure of light extinction
EC	Elemental carbon
EDMS	Emissions Data Management System
EGAS	Economic Growth Analysis System
EGU	Electric generating unit
EI	Emissions Inventory
EIA	Energy Information Administration
FETS	Fire Emissions Tracking System
FGR	Flue gas recirculation
FIP	Federal Implementation Plan
FLM	Federal Land Manager
Glidepath	The linear rate of improvement sufficient to attain natural conditions by 2064
HI	Haze index
IMPROVE	Interagency Monitoring of Protected Visual Environments
IWG	Implementation Work Group
JARB1	IMPROVE monitoring site at Jarbidge Wilderness Area
lb/MMBtu	Pounds per million British thermal units

LNB	Low NO_X Burners
LTS	Long term strategy
MACT	Maximum Achievable Control Technology
Mm^{-1}	Inverse mega meter; a measure of particle extinction
MM5	Meteorological Mesoscale 5
MW	Megawatt
NAC	Nevada Administrative Code
NDEP	Nevada Division of Environmental Protection
NEI	National Emission Inventory
NH_3	Ammonia
NMHC	Non-Methane Hydrocarbons
NOAA	National Oceanic and Atmospheric Administration
NO_3	Ammonium nitrate or NH_4NO_3
NO_x	Nitrogen oxides
NSR	New source review
NTEC	National Tribal Environmental Council
O_3	Ozone
OMC	Organic matter carbon
Plan02	2000 through 2004 typical baseline emissions
PM	Particulate matter
PNG	Pipeline natural gas
POA	Primary organic aerosol
ppm	Parts per million
PRP	Preliminary Reasonable Progress
PRP18	2018 Preliminary Reasonable Progress Emissions
PSAT	Particulate Matter Source Attribution Tracking
PSD	Prevention of significant deterioration
RHR	Regional Haze Rule
RMC	WRAP's Regional Modeling Center
ROFA	Rotating over fire air
RPG	Reasonable progress goal
RPO	Regional Planning Organization
RRF	Relative Response Factors
SCC	Source Classification Code
SIP	State implementation plan

SNCR	Selective non-catalytic reduction
SOA	Secondary organic aerosols
SOIL	Fine soil
SO_2	Sulfur dioxide
SO_4	Ammonium Sulfate or $(NH_4)_2SO_4$
SO_x	Sulfur oxides
TSS	Technical Support System
TSSA	Tagged Species Source Apportionment
URP	Uniform rate of progress
USEPA	United States Environmental Protection Agency
VOC	Volatile organic compound
WA	Wilderness Area
WEP	Weighted emissions potential
WESTAR	Western States Air Resources Council
WGA	Western Governor's Association
WRAP	Western Regional Air Partnership

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