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WRAP Policy

Annual Emission Goals for Fire

DRAFT

**Prepared by the Annual Emission Goals Task Team
for the
Fire Emissions Joint Forum of the
Western Regional Air Partnership**

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WRAP Policy

Annual Emission Goals for Fire

Executive Summary

The Western Regional Air Partnership (WRAP) is charged with developing technical and policy tools to assist states (or the delegated regulatory authority) and tribes with implementing the Regional Haze Rule (Rule).

The WRAP Policy on Annual Emission Goals for Fire (WRAP AEG Policy) has been developed over a six-month period through a stakeholder-based consensus process to assist the WRAP region states and tribes in addressing emissions from fire sources. In this Policy, the WRAP seeks to provide a consistent framework that states and tribes can use to efficiently develop their individual implementation plans. The WRAP recognizes states' and tribes' authority and responsibility to develop, adopt and implement their regional haze implementation plans, and recognizes the Rule as the principal document on which states and tribes should rely.

The Rule requires states to develop implementation plans (SIPs) for addressing regional haze in the Nation's 156 mandatory Class I areas. Additionally, the Rule requires effective management of fire sources. The Rule provides two pathways for western states to follow as they implement the requirements of the Rule: 1) develop their regional haze implementation plans per the nationally applicable provisions of Section 308, or 2) Transport Region states may choose to incorporate the Grand Canyon Visibility Transport Commission (GCVTC) Recommendations into their regional haze implementation plans under Section 309 of the Rule.

Section 309 of the Rule specifically requires the establishment of annual emission goals that minimize emission increases from fire to the maximum extent feasible. Further, these goals must be developed in cooperation with states, tribes, land management agencies and private entities. The WRAP defines the annual emission goal as a quantifiable value that is used to measure progress toward the desired outcome of achieving the minimum emission increase from fire. In this WRAP AEG Policy, the WRAP outlines a process by which states/tribes may establish annual emissions goals to include in their regional haze implementation plans.

Although Section 309 of the Rule specifically requires the establishment of annual emission goals, the emission reduction techniques that are outlined in this WRAP AEG Policy could be considered by states and tribes that choose to follow the requirements of Section 308 of the Rule and/or may be used to protect visibility in non-mandatory Federal Class I areas.¹

¹ The Rule is only applicable to mandatory Class I areas. States/tribes in the WRAP region may utilize the AEG Policy to protect visibility in non-mandatory Class I areas.

1 Tribes are not subject to the same requirements of the Rule as states, but tribes wishing to
2 assume the regional haze requirements outlined in the Rule may, according to the Tribal
3 Authority Rule (TAR), seek approval under 40 CFR 49 to be “treated as States.” The intent
4 of this Policy is to assist both states and tribes with the development of their regional haze
5 implementation plans (SIPs/TIPs), and therefore, tribes are included in all references to
6 states, except where specific requirements and/or deadlines of the Rule are cited. In the case
7 of annual emission goals, the WRAP considers them a viable tool for all tribes in the WRAP
8 region to use to achieve the minimize emission increase from fire.

9
10 The WRAP AEG Policy document is comprised of four major sections. Section 1 is the
11 seven WRAP AEG Policy statements. Section 2 provides overall background for the WRAP
12 AEG Policy. Section 3 is an annotation of each of the seven policy statements, further
13 explaining and defining them. Finally, the Appendices include (A) a glossary of terms, (B) a
14 related documents listing, and (C) specific examples for states/tribes on the implementation
15 of annual emission goals, and D) additional resources for the development of annual
16 emission goals.

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1. WRAP Policy on Annual Emission Goals for Fire

Policy Statements

A) The establishment and implementation of annual emission goals is a viable technique to control fire emissions for WRAP states and tribes. Annual emission goals are required for states under Section 309 of the Regional Haze Rule.

B) Annual emission goals will achieve the minimum emission increase from fire. Annual emission goals are quantifiable values that are distinct from emission limits.

C) Annual emission goals are applied to all fire sources, excluding wildfire, due to their potential impacts on visibility.

D) The minimum emission increase from fire is accomplished through the optimal application of emission reduction techniques, which provide the basis for annual emission goals.

E) The use of emission reduction techniques to achieve annual emission goals is subject to economic, safety, technical and environmental feasibility criteria, and land management objectives.

F) States, tribes or the designated authority will establish annual emission goals in cooperation with federal land management agencies and private entities on a yearly basis.

G) States and tribes will need to develop a procedure for verifying the use of emission reduction techniques and for tracking the achievement of annual emission goals.

2. Background

2.1 Clean Air Act and Grand Canyon Visibility Transport Commission

In 1990, Congress amended the Clean Air Act (CAA), and as part of these amendments created the Grand Canyon Visibility Transport Commission (GCVTC).² The GCVTC was charged with assessing the current scientific information on visibility impacts and making recommendations for addressing regional haze in the western United States. The GCVTC signed and submitted more than 70 recommendations to the Environmental Protection Agency (EPA) in a report dated June 1996 that indicated that visibility impairment was caused by a wide variety of sources and pollutants, and that a comprehensive strategy was needed to remedy regional haze.

² The GCVTC was composed of the governors of eight western states (AZ, CA, CO, NM, NV, OR, UT, WY), four tribes (Acoma Pueblo, Hopi, Hualapai, and Navajo), four Federal land management agencies (Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Forest Service, National Park Service), the Columbia River Inter-Tribal Fish Commission, and the Environmental Protection Agency.

1 The GCVTC Report recognized that fire plays a significant role in visibility on the Colorado
2 Plateau. According to the GCVTC Report, emissions from wildfire and prescribed fire are
3 “an important episodic contributor to visibility-impairing aerosols, including organic carbon,
4 elemental carbon, and particulate matter (PM_{2.5}).”³ The GCVTC Report also stated that
5 agricultural burning emissions and their effects have been identified as a concern, but have
6 not been quantified due to insufficient data.⁴

7 8 2.2 Western Regional Air Partnership

9
10 The Western Regional Air Partnership (WRAP) was established in 1997 as the successor
11 organization to the GCVTC. The WRAP is a voluntary organization comprised of western
12 governors, tribal leaders and federal agencies,⁵ and is charged “to identify regional or
13 common air management issues, develop and implement strategies to address these issues,
14 and formulate and advance western regional policy positions on air quality.”⁶ These policies
15 and technical tools are developed through inclusive, stakeholder-based processes and
16 approved by consensus of the WRAP.

17
18 WRAP participants include state air quality agencies, tribes, federal/state/private land
19 managers, the EPA, environmental groups, industry, academia and other interested parties.
20 There are over 400 tribes within the WRAP region. The large number of tribes limits the
21 participation of all of them in WRAP activities, and accordingly, in the development of this
22 Policy. Therefore, the tribal representatives involved in the development of this Policy may
23 not represent all tribal concerns.

24 25 2.3 Regional Haze Rule

26
27 Following the issuance of the GCVTC Report, the EPA issued the Regional Haze Rule
28 (Rule) in July 1999 to improve visibility in 156 national parks and wilderness areas across
29 the country. The Rule outlines the requirements for states and tribes to address visibility
30 impairment in mandatory Class I areas due to emissions from all sources, including fire
31 activities. EPA incorporated all of the GCVTC recommendations into Section 309 of the
32 Rule, which may be used by some of the WRAP states/tribes. The remaining WRAP states
33 must/tribes may utilize the nationally applicable Section 308 provisions of the Rule. Tribes
34 are not subject to the same requirements of the Rule as states, but tribes wishing to assume
35 the regional haze requirements outlined in the Rule may, according to the Tribal Authority

³ GCVTC Report, p. 47.

⁴ Ibid.

⁵ The WRAP members include the governors of thirteen western states (AK, AZ, CA, CO, ID, MT, ND, NM, OR, SD, UT, WA, and WY). Tribal nations selected as WRAP members include Pueblo of Acoma, Campo Band of Kumeyaay Indians, Cortina Indian Rancheria, Hopi Tribe, Hualapai Nation of the Grand Canyon, Nez Perce Tribe, Northern Cheyenne Tribe, Salish and Kootenai Confederated Tribes, Pueblo of San Felipe, and Shoshone-Bannock Tribes of Fort Hall. Federal WRAP members are the Department of the Interior, the Department of Agriculture, and the Environmental Protection Agency.

⁶ WRAP Charter, Purpose, p. 1.

1 Rule (TAR), seek approval under 40 CFR 49 to be “treated as States.”⁷ In these cases, EPA
2 still recognizes that “unlike States, tribes are not required by the TAR to adopt and
3 implement CAA plans or programs, thus tribes are not subject to mandatory deadlines for
4 submittal of implementation plans.”⁸ Although provision for flexibility in the submission of
5 programs and implementation plans for tribes is made under TAR, EPA does “encourage
6 tribes choosing to develop implementation plans to make every effort to submit by the
7 deadlines to ensure that the plans [TIPs] are integrated with and coordinated with regional
8 planning efforts.”⁹

9
10 EPA recognizes the WRAP as the Regional Planning Organization that is developing the
11 necessary policy and technical tools to implement the Rule in the WRAP region. A WRAP
12 policy, once approved, represents the WRAP’s consensus position on the best means for
13 states and tribes to implement the portion of the Rule at issue. The WRAP recognizes states’
14 and tribes’ authority and responsibility to develop, adopt and implement their regional haze
15 state and tribal implementation plans, and the seminal guidance to do this is the Rule.¹⁰

16 17 **3. Annotated Policy**

18 19 3.1 Introduction

20
21 The WRAP AEG Policy is the result of the WRAP region-wide multi-state/tribe stakeholder
22 planning and coordination effort. The intent of the WRAP AEG Policy is to assist states (or
23 the delegated authority) and tribes to address smoke impacts on visibility associated with fire
24 in a way that is adequate for SIP/TIP implementation.

25
26 The WRAP AEG Policy provides states/tribes with a consistent method for the identification,
27 use, and tracking of ERTs to meet the annual emission goals requirement of the Rule.
28 Although this Policy promotes the use of ERTs to meet the annual emission goals
29 requirement of Section 309 of the Rule, it does not prescribe how each state/tribe integrates
30 this Policy into its regional haze SIP/TIP or limit the use of alternative approaches to the
31 implementation of annual emission goals.

32
33 This WRAP AEG Policy has been developed to embody appropriate regulatory and policy
34 requirements and to provide a predictable framework for annual emissions goals that can be
35 reasonably implemented by states and tribes. The WRAP believes that states, tribes, or EPA
36 on behalf of the tribes maintain the ultimate responsibility for the implementation of the
37 annual emission goal program.

38
39 The WRAP recognizes states/tribes authority and responsibility to develop, adopt and
40 implement their regional haze state and tribal implementation plans. The WRAP further

⁷ 64 FR 35759.

⁸ 64 FR 35758.

⁹ 64 FR 35759.

¹⁰ WRAP Charter, p.1.

1 recognizes that the implementation plans will be revisited and revised, per the schedule
2 specified in the Rule, giving opportunities to refine individual programs for annual emission
3 goals that reflect technical advances and policy updates.

4 5 3.2 Annual Emission Goals Required Under Section 309

6 *Policy Statement A: The establishment and implementation of annual emission goals*
7 *is a viable technique to control fire emissions for WRAP states and tribes. Annual*
8 *emission goals are required for states under Section 309 of the Regional Haze Rule.*
9

10 In this Policy, the WRAP seeks to provide a consistent and equitable framework that states
11 and tribes can use to efficiently develop their regional haze implementation plans
12 (SIPs/TIPs). Under Section 309, the Rule calls for “establishment of annual emission goals
13 for fire (excluding wildfire) that will minimize emission increases from fire to the maximum
14 extent feasible.”¹¹ The Policy can be considered by all other states and tribes as a means to
15 control fire emissions, and annual emission goals may be a viable technique for controlling
16 fire emissions if a state’s or tribe’s visibility impairment analysis for Section 308 of the Rule
17 shows that fire sources contribute to visibility impairment in a mandatory Class I area.

18 19 3.3 Annual Emission Goal Defined

20 *Policy Statement B: Annual emission goals will achieve the minimum emission*
21 *increase from fire. Annual emission goals are quantifiable values that are distinct*
22 *from emission limits.*
23

24 In its Report, the GCVTC acknowledged federal and state land managers’ projection of
25 “significant increases in prescribed fire in order to reduce the effects of wildfire resulting
26 from past decades of fire suppression.”¹² The Rule also recognized that “forest fuels have
27 built up over many years due to past management practices designed to protect public health
28 and safety through fire suppression.” And further that this “...has led to an increased risk of
29 wildfire...”, which would need to be offset by “the increased use of prescribed fire...”¹³
30

31 This increase in fire activity prompted the GCVTC to recommend the establishment of
32 annual emission goals that would minimize increases from fire emissions, which the Rule
33 then adopted as part of Section 309.¹⁴
34

35 In relation to annual emission goals for fire, the term “goal” is not synonymous to “cap”, as
36 used in the GCVTC Report. A cap is defined in the GCVTC Report as a limit on the amount
37 of specific air pollutants that can be released in a defined geographic area,¹⁵ and is used in the
38 GCVTC Report in its section on Stationary Sources.¹⁶ Although not formally defined, a goal

¹¹ 64 FR 35771 §51.309 (d)(6)(v).

¹² GCVTC Report, p. 23.

¹³ 64 FR 35735.

¹⁴ GCVTC Report, p. 50.

¹⁵ GCVTC Report, p. xi.

¹⁶ GCVTC Report, pp. 32-37.

1 is specifically used in the GCVTC Report in the contexts of both Area Sources and Air
2 Pollution Prevention to focus efforts on a desired outcome.¹⁷ This desired outcome has a
3 numeric measure associated with it, but it is distinct from a limit. Further, a goal does not
4 involve the regulatory consequences associated with a cap. If the GCVTC had intended the
5 annual emission goal to be an emission limit, or for it to be an enforceable limit with the
6 attendant regulatory consequences, it seems likely that the Commission would have used that
7 language, as it did elsewhere in its Report.

8
9 The GCVTC further clarifies the term “cap” by distinguishing it from “target” as follows:

10
11 ... “targets” are intended as firm limitations on emissions and have the same
12 effect as a “cap.” However, we are reserving the term “cap” to refer to the limits
13 set under a regulatory program, which would be triggered if the “targets” are
14 exceeded.¹⁸

15
16 The Rule supports this distinction by utilizing the GCVTC’s language in the Preamble, both
17 in the treatment of the GCVTC recommendations and in its discussion of the Annex.¹⁹
18 Therefore, the WRAP AEG Policy defines annual emission goals as quantifiable indicators
19 of progress toward the desired outcome of minimizing increases from fire emissions.

20 21 3.4 Annual Emission Goal Applicability

22 *Policy Statement C: Annual emission goals are applied to all fire sources, excluding*
23 *wildfire, due to their potential impacts on visibility.*

24
25 The Rule, the GCVTC, and WRAP policy development to date acknowledge that all types of
26 fire must be addressed equitably as part of a visibility protection strategy since all fire
27 contributes to regional haze.²⁰ Therefore, the WRAP AEG Policy applies to all fire sources,
28 except for wildfire, which is specifically excluded in Section 309 of the Rule.²¹

29
30 The Rule excludes wildfire from the annual emission goals requirement of Section 309 due
31 to the inability to control the emissions from wildfires. The same concern would be relevant
32 to states under Section 308 or tribes that choose to use annual emission goals as a method to
33 control fire emissions.

34
35 This Policy applies to federal, tribal, and state land managers and to private landowners that
36 use prescribed fire, wildland fire used for resource benefits (WFU)²² or agricultural burning
37 to achieve land management objectives on agricultural land or wildland.²³ In accordance

¹⁷ GCVTC Report, p. 30.

¹⁸ GCVTC Report, p. 34, footnote 4.

¹⁹ 64 FR 35748 and 35756.

²⁰ GCVTC Report, p. 47, 64 FR 35735, WRAP ESMP and Fire Categorization Policies.

²¹ 64 FR 35771 §51.309 (d)(6)(v).

²² Also known as Prescribed Natural Fire (PNF).

²³ WRAP Policy for Categorizing Fire Emissions, November 15, 2001 (hereafter referred to as “WRAP
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1 with Section 118(a) of the CAA requires that all entities, federal and non-federal, be subject
2 to the same requirements, authorities and processes,²⁴ the WRAP AEG Policy will be applied
3 equitably to all fire sources.

4
5 The WRAP AEG Policy specifically does not apply to Native American cultural non-
6 vegetative burning for traditional, religious, or ceremonial purposes (e.g., cremation, sweat
7 lodge fires).²⁵ Nor does it apply to open burning activities on residential, commercial, or
8 industrial property (e.g., backyard burning, garbage incineration, residential wood
9 combustion, construction debris).²⁶ However, states/tribes may choose to consider the
10 impacts of these fire sources when developing their regional haze implementation plans.

11 12 3.5 Emission Reduction Techniques (ERTs)

13 *Policy Statement D: The minimum emission increase from fire is accomplished*
14 *through the optimal application of emission reduction techniques, which provide the*
15 *basis for annual emission goals.*

16
17 Recognizing that the projected increase in fire activity will result in episodic impacts on
18 visibility in the West, the WRAP AEG Policy focuses on a strategy for minimizing that
19 impact through the reduction of fire emissions generated on a project-specific basis.²⁷

20
21 A reduction of fire emissions on a project-specific basis is accomplished through the control
22 of fire emissions, i.e., a reduction in the total amount of emissions generated. Control of fire
23 emissions is accomplished by using techniques such as biomass utilization, increasing
24 combustion efficiency, and other ERTs.²⁸ Control measures are distinct from smoke
25 management techniques, which are currently used in the West by land managers to minimize
26 smoke impacts on public health, nuisance and visibility. A key smoke management technique
27 is the timing of ignitions for better smoke dispersion leading to avoidance of sensitive areas,
28 with consideration of downwind air quality and visibility. The WRAP AEG Policy focuses
29 on reducing fire emission increases through the control of fire emissions, i.e., ERTs.

30
31 In doing so, this Policy focuses resources on determining how to reduce fire emissions on
32 specific projects rather than calculating emission increases and then determining appropriate
33 reductions, i.e., an emission limit. Currently, it does not appear that an adequate fire
34 emissions inventory exists throughout the WRAP Region to support the establishment of an
35 emissions limit on fire sources.²⁹ The WRAP recognizes, however, that scientific advances

Fire Categorization Policy”), p. 8. See also Appendix C for further details.

²⁴ Clean Air Act §118(a).

²⁵ WRAP Fire Categorization Policy, p. 24.

²⁶ Ibid, however “industrial property” would not include land such as industrial forestland.

²⁷ “Project-specific basis” means that the decision has already been made to burn a specific area.

²⁸ See Appendix C for more examples of specific ERTs and the application of ERTs.

²⁹ In order to implement an emission limit, states/tribes would need to have emissions inventory data adequate to establish an emissions baseline, establish the baseline, conduct periodic evaluations of the effectiveness of the baseline, and institute sufficient enforcement mechanisms. Even so, the baseline may not be a reliable tool due to the variability of fire emissions.

1 may support the feasibility of an emissions limit (either target or cap) in the future. This
2 Policy is based on emission goals in accordance with the GCVTC's intent of allowing
3 emission increases from fire. In distinguishing between goals and limits, it is not the intent of
4 this Policy to weaken any approaches that utilize limits, nor to curtail the establishment of
5 emission limits in the future.

6
7 The WRAP AEG Policy utilizes ERTs as a means for meeting the annual emission goals
8 requirement because ERTs are a proven method for reducing fire emissions.³⁰ The emission
9 reductions that are achieved through the use of ERTs can be calculated on a project-specific
10 basis. The annual emission goal in this case would be the sum of emissions reductions from
11 all projects across the state or tribal jurisdiction, for the upcoming year.

12 13 3.5.1 Implementation Options

14
15 Some options for the utilization of ERTs to meet the annual emission goal have been
16 outlined below. These options are based on current use of ERTs, science and technology.
17 The first option is based on estimations of emissions averted by the application of ERTs, and
18 allows the calculation of an annual numeric value that indicates progress toward minimizing
19 increases from fire emissions. The second option is provided for instances where estimates of
20 emissions averted are not feasibly calculated due to insufficient data. In this second option,
21 the annual numeric value is based on total percent use of ERTs with subsequent emission
22 reductions assumed.

23
24 The options explored here are not exhaustive or definitive in structure or design. Application
25 of these or any other options can be considered for each individual fire source sector or for
26 combinations of them. All options for use of ERTs are subject to feasibility criteria as
27 outlined in Policy Statement E. Additionally, state/tribal authorities will want to be mindful
28 of equitable treatment of sources in the implementation of ERTs.

29
30 In either Option 1 or Option 2, state/tribes will need to determine the appropriate ERTs to be
31 used for specific vegetation/crop types that will be treated to allow attainment of land
32 management objectives. It is a common practice to apply a certain ERT to a specific
33 vegetation/crop type although more than one ERT may be feasible for a certain
34 vegetation/crop type. See Appendix D for an example of common vegetation types in the
35 WRAP region and the corresponding ERT benefit. Next, in establishing annual emission
36 goals, the designation of all appropriate ERTs for each of the identified vegetation or crop
37 type needs to be completed (see Appendix C). Appendix D will be augmented by a
38 subsequent report by the WRAP that will summarize ERT options for both prescribed fire on
39 wildlands and agricultural burning. This report can be used in combination with known local
40 practices to determine appropriate ERTs for the respective vegetation or crop type.

41

³⁰ The GCVTC projected the use of optimal smoke management measures (which include the use of ERTs) could decrease fine particle (PM_{2.5}) emissions from prescribed fires by approximately 15-20%. This resulted in modeled visibility improvements over the planning period of the GCVTC. GCVTC Report, p. 87.

1 Option 1

2
3 Once applicable ERTs for the respective vegetation or crop type are agreed upon, the
4 potential percentage use of ERTs would be determined subject to the feasibility
5 criteria for the specific project. The potential percentage use is estimated by
6 determining the portion of the project where ERTs are to be applied. Then an
7 estimate of the emissions averted can be made. The annual emission goal is the
8 emissions averted through the use of ERTs for all projected fire projects across the
9 state or tribal jurisdiction.

10
11 Option 2

12
13 An estimate of emissions averted may not be feasible if ERT emission factors are not
14 available (i.e., the specific amount of emissions reduction has not been determined
15 through research). In this case, the annual emission goal is the percent of total acres
16 on which ERTs are used where fire is to be employed across a state or tribal
17 jurisdiction for the upcoming year.

18
19 The WRAP AEG Policy recommends, for either Option 1 or Option 2, that the annual
20 emission goal for using ERTs is established by source sector in order to account for
21 differences in management practices between agricultural and wildland burning, as well as in
22 the availability of ERTs. Establishing the annual goal for using ERTs by source sector may
23 alleviate equity issues since the goal is applied across projects with similar vegetative or crop
24 types and land management objectives. The annual goal should be established with the
25 evaluation of all potentially applicable ERTs.

26
27 This Policy encourages states/tribes to coordinate with neighboring states/tribes to improve
28 the knowledge base of ERTs and to maintain consistency in calculating emissions averted.
29 Interstate coordination is key for minimizing visibility impacts in mandatory Federal Class I
30 areas and for addressing regional haze in the WRAP region.³¹

31
32 3.6 Feasibility Criteria

33 *Policy Statement E: The use of emission reduction techniques to achieve annual*
34 *emission goals is subject to economic, safety, technical and environmental feasibility*
35 *criteria, and land management objectives.*

36
37 The feasibility of ERT use is variable and dependent on criteria as established in the WRAP
38 Fire Categorization Policy:

39
40 Per the GCVTC Recommendations, economic, safety, technical and
41 environmental considerations are part of the application of emission controls for
42 the implementation of this Policy statement. Due to these considerations, the
43 control of emissions from some fire types may not be feasible, which will be

³¹ 64 FR 35728.

1 determined by the land manager in collaboration with the applicable air quality
2 regulatory authority.³²
3

4 The WRAP AEG Policy also recommends that land management objectives be evaluated
5 using these criteria during the decision-making process to ensure that ERTs are used
6 appropriately and at levels of usage that are feasible. It should be noted that the specific land
7 management objective for an area could preclude the use of a specific ERT where that ERT
8 would prevent the attainment of the land management objective, e.g., if the land management
9 objective is to reduce downed large fuels in an area, the use of burning under high fuel
10 moisture of large woody fuels (i.e., the ERT being considered) would not be an option. See
11 Appendix C for more detailed information on the application of ERTs.
12

13 3.7 Collaborative Establishment

14 *Policy Statement F: States, tribes or the designated authority will establish annual*
15 *emission goals in cooperation with federal land management agencies and private*
16 *entities on a yearly basis.*
17

18 Section 309 of the Rule requires that annual emission goals are “established in cooperation
19 with States, tribes, Federal land management agencies, and private entities.”³³ In addition, the
20 WRAP’s policies on fire to date endorse the importance of using this collaborative process.
21 Annual emission goals will be reviewed and revised on a yearly basis. Coordination within
22 states and across jurisdictional boundaries is key for minimizing visibility impacts in
23 mandatory Federal Class I areas and for addressing regional haze in the WRAP region.³⁴
24

25 3.8 Tracking Procedure

26 *Policy Statement G: States and tribes will need to develop a procedure for verifying*
27 *the use of emission reduction techniques and for tracking the achievement of annual*
28 *emission goals.*
29

30 Development of a procedure for verifying the use of ERTs, and for tracking an estimate of
31 the emission reductions achieved where possible, is essential to assess whether the annual
32 emission goal is being achieved. Such a procedure could also facilitate the state’s/tribe’s
33 ability to ensure accountability of the source sectors in utilizing emission reduction
34 techniques. It is possible to track other parameters indirectly, such as fuel moisture, to
35 indicate which ERTs are being used in the field.
36

37 The tracking information will be invaluable for assessing whether revisions need to be made
38 to the annual emission goal in the future. The WRAP Fire Tracking System Policy outlines a
39 basic fire tracking system that may be expanded to include additional parameters so as to
40 satisfy a tracking procedure for annual emission goals.

³² WRAP Fire Categorization Policy, p. 11.

³³ 64 FR 35771 §51.309(d)(6)(v).

³⁴ 64 FR 35728.

1 States/tribes can utilize the tracking procedure for the annual emission goal as a means for
2 assessing the effectiveness of the control measures (i.e., ERTs) in their SIPs/TIPs. States
3 under Section 309 are required to submit periodic reports to EPA that assess the effectiveness
4 of their control measures (i.e., ERTs), including “...a summary of the emissions reductions
5 achieved throughout the State through implementation...” of such measures.³⁵
6

³⁵ 64 FR 35772 §51.309(d)(10)(i)(A).
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1 **4. Appendices**

2
3 **Appendix A**
4 **Glossary**

5
6 Agricultural Fire/Burning – Any fire ignited by management actions to meet specific
7 objectives (i.e., managed to achieve resource benefits) on agricultural land.

8
9 Agricultural Land – Agricultural land includes croplands, pasture, and other lands on which
10 crops or livestock are produced. Rangeland will be included with wildland for the purposes
11 of the Fire Emissions Joint Forum work.

12
13 Alternatives to Burning – Land management practices that treat fuel without using fire.

14
15 Best Available Control Measures (BACM) – A term used to refer to the most effective
16 measures (according to EPA guidance) for controlling small or dispersed particulates and
17 other emissions from sources such as roadway dust, soot and ash from woodstoves and open
18 burning of brush, timber, grasslands, or trash.

19
20 Best Management Practices (BMPs) – A term applied collectively to any administrative or
21 on-the-ground procedure that reduces the negative impacts of some action. An example of a
22 Best Management Practice with respect to air quality would be conducting a prescribed burn
23 when atmospheric ventilation is good, which in turn promotes smoke dispersal.

24
25 Cap – A limit on the amount of specific air pollutants that can be released in a defined
26 geographic area, or a limit on the amount of a specific air pollutant that is allowed to be in
27 the air in a defined geographic area.

28
29 Class I Area – An area set aside under the Clean Air Act to receive the most stringent
30 protection from air quality degradation. Mandatory Class I Federal Areas are: 1)
31 international parks, 2) national wilderness areas and memorial parks larger than 5,000 acres
32 in size, 3) national parks that exceed 6,000 acres in size and which were in existence when
33 the 1977 Clean Air Act amendments were enacted. The extent of a mandatory Class I
34 Federal area includes subsequent changes in boundaries, such as park expansions. Class I
35 areas can also include lands designated by states or tribes, but these areas are not deemed
36 mandatory by the Clean Air Act.

37
38 Emission – pollution discharged into the atmosphere from smokestacks, other vents, and
39 surface areas of commercial or industrial facilities; from residential chimneys; and from
40 motor vehicle, locomotive, aircraft, or other non-road engines.

41
42 Emission Cap - An enforceable limit on the amount of specific air pollutants that can be
43 released or on the amount of a specific pollutant that is allowed to be in the air in a defined
44 geographic area, and that has regulatory consequences. See also Emission Goal and Emission

1 Target.

2
3 Emission Goal - A desired future outcome that may be represented by a numeric indicator,
4 but without regulatory consequences, and as distinguished from a limit (i.e., target or cap).
5 See also Emission Cap and Emission Target.

6
7 Emission Reduction Technique - A technique for controlling emissions from prescribed fires
8 to minimize the amount of emission output per unit of area treated.

9
10 Emission Target - A firm limit on the amount of specific air pollutants that can be released
11 or on the amount of a specific pollutant that is allowed to be in the air in a defined
12 geographic area, but without regulatory consequences (as distinguished from a cap). See also
13 Emission Cap and Emission Goal.

14
15 Enhanced Smoke Management Program (ESMP) - A program for fire that considers visibility
16 effects, in addition to health and nuisance objectives, and is based on the criteria of
17 efficiency, economics, law, emission reduction opportunities, management objectives, and
18 reduction of visibility impact.

19
20 Fire - When this term appears, it refers inclusively to wildfire, prescribed natural
21 fire/wildland fire managed for resource benefits, prescribed fire, rangeland fire, and
22 agricultural fire.

23
24 Land Managers - When this term appears, it refers inclusively to federal, state, tribal, and
25 private land managers.

26
27 Prescribed Fire - Any fire ignited by management actions to meet specific objectives, i.e.,
28 managed to achieve resource benefits.

29
30 Rangelands - Land on which the historic climax plant community is predominantly grasses,
31 grass-like plants, forbs, or shrubs. Includes lands re-vegetated naturally or artificially when
32 routine management of that vegetation is accomplished mainly through manipulation of
33 ecological principles. Rangeland includes natural grasslands, savannas, shrub lands, most
34 deserts, tundra, alpine communities, coastal marshes and wet meadows (Natural Resources
35 Conservation Service National Range and Pasture Handbook, 1997.)

36
37 Regional Haze - Visibility impairment caused by the cumulative air pollutant emissions from
38 numerous sources over a wide geographic area.

39
40 Smoke Effects - The effects on visibility (both plume blight and regional haze), public
41 nuisance, and the health-based NAAQS due to emissions from fire.

42
43 Smoke Management - Programs, practices, and techniques to minimize and/or reduce smoke
44 emissions or impacts from fire.

1 State Implementation Plan (SIP) - Plans devised by states to carry out their responsibilities
2 under the Clean Air Act. SIPs must be approved by the U.S. Environmental Protection
3 Agency and include public review.

4
5 Tribal Implementation Plan (TIP) - Plans devised by tribes to carry out their responsibilities
6 under the Clean Air Act. TIPs must be approved by the U.S. Environmental Protection
7 Agency and include public review.

8
9 Wildfire - Any unwanted, non-structural fire.

10
11 Wildland - An area where development is generally limited to roads, railroads, power lines,
12 and widely scattered structures. The land is not cultivated (i.e., the soil is disturbed less
13 frequently than once in 10 years), is not fallow, and is not in the USDA Conservation
14 Reserve Program (CRP). The land may be neglected altogether or managed for such
15 purposes as wood or forage production, wildlife, recreation, wetlands, or protective plant
16 cover (EPA Interim Air Quality Policy on Wildlands and Prescribed Fires). The land is not
17 “agricultural land” as operationally defined above. Silvicultural land and rangelands (per the
18 FEJF charge), woodlots, and private timberlands will be included with wildlands for the
19 purposes of the FEJF work.

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Appendix B Related Documents Listing

Regional Haze Rule

Published in the Federal Register on July 1, 1999, 64 FR 35714.

http://www.epa.gov/ttn/oarpg/t1/fr_notices/rhfedreg.pdf

Grand Canyon Visibility Transport Commission Report

Grand Canyon Visibility Transport Commission, Recommendations for Improving Western Vistas, Report to the U.S. EPA, June 10, 1996.

<http://www.wrapair.org> Go to the GCVTC link.

EPA Interim Air Quality Policy on Wildland and Prescribed Fire

U.S. EPA, Office of Air Quality Planning and Standards, Interim Air Quality Policy on Wildland and Prescribed Fires, April 23, 1998.

<http://www.epa.gov/ttn/oarpg/t1/memoranda/firefnl.pdf>

AAQTF Recommendation on Air Quality Policy

Agricultural Air Quality Task Force, Air Quality Policy on Agricultural Burning, Recommendation to the U.S. Department of Agriculture, November 10, 1999.

<http://fargo.nserl.purdue.edu/faca/Archives/2000/Policy/Burning%20Policy.htm>

Tribal Authority Rule

Published in the Federal Register on February 12, 1998, 63 FR 7253.

<http://www.epa.gov/fedrgstr/EPA-AIR/1998/February/Day-12/a3451.htm>

WRAP Policy for Categorizing Fire Emissions

Approved by the Western Regional Air Partnership, November 15, 2001.

<http://www.wrapair.org/commindex.htm> Go to the FEJF Task Teams, then Natural Background.

Prescribed Burning Background Document and Technical Information Document for Prescribed Burning Best Available Control Measures

U.S. EPA, Office of Air Quality Planning and Standards, September 1992. Research Triangle Park, NC. EPA-450/2-92-003.

<http://www.epa.gov/ttncaaa1/t1bid.html>

Smoke Management Guide for Prescribed and Wildland Fire

National Wildfire Coordinating Group Fire Use Working Team (NWCG), 2001 Edition.

<http://www.nwcg.gov>

Class I Area Map

<http://www.wrapair.org> Go to About WRAP, then WRAP Boundaries and Regional Visibility Planning in the West.

Appendix C
Annual Emission Goal Implementation Guidance

1. Applicability

As this Policy builds on the WRAP Fire Categorization Policy, the scope and applicability in regard to the “anthropogenic” or “natural” classifications defined by the WRAP Fire Categorization Policy is clarified below. Those interested should consult the WRAP Fire Categorization Policy for further detail.

Fire Categories³⁶	WRAP AEG Policy Applicability
Natural Sources <ul style="list-style-type: none"> • Wildfire • Prescribed fire (including WFU) used for ecosystem maintenance purposes • Native American cultural burning for traditional, religious, and ceremonial purposes 	Not Covered Covered Covered
Anthropogenic Sources <ul style="list-style-type: none"> • Prescribed fire (including WFU) used for any purpose except ecosystem maintenance 	Covered
Exempted Sources <ul style="list-style-type: none"> ▪ Native American cultural non-vegetative burning 	Not Covered

2. Regional Haze SIP/TIP

2.1 Section 308/309 Requirements

It is anticipated that the annual emission goals will be incorporated into the Section 309 SIPs/TIPs submitted to EPA in order to meet the requirements of the Rule. States/tribes complying with Section 309 are required to have a regional haze SIP/TIP that addresses the 16 mandatory Federal Class I areas of the Colorado Plateau submitted by December 31, 2003, with implementation of certain control measures, including the annual emission goals, by the following year. All other mandatory Federal Class I areas in the GCVTC transport region will be addressed by 2008 under the Section 308 or 309 SIP/TIP schedule.

Although Section 309 of the Rule specifically requires the establishment of annual emission goals for fire, the methods that are promoted in this Policy could be considered by states/tribes that choose to follow the requirements of Section 308 of the Rule as a means to

³⁶ WRAP Fire Categorization Policy, p.8.
WRAP AEG Policy Draft: 10/24/02

1 meet reasonable progress demonstration requirements for regional haze.

2
3 The Rule requires under Section 309 that annual emission goals for fire, excluding wildfire,
4 be established through 2018 as a means for demonstrating reasonable progress
5 requirements.³⁷ The annual emission goal approach may be a viable strategy to control fire
6 emissions and, thereby, make reasonable progress toward the attainment of natural conditions
7 by 2064, as required by the Rule.³⁸

8 9 2.2 Submission of Periodic Reports

10
11 Beginning in 2008, states/tribes are required by the Rule to submit periodic reports to the
12 EPA to assess the adequacy of its SIP/TIP, including assessing the adequacy of certain
13 elements, such as the annual emission goals. These periodic reports are due every five years.

14 If the state/tribe determines that the SIP/TIP is or may be inadequate to meet reasonable
15 progress goals, the state/tribe is required to develop additional strategies to address
16 deficiencies in the plan. These strategies are then submitted to EPA for approval.

17 18 19 **3. Current Regulatory Programs**

20
21 ERTs are proven to be effective methods to control fire emissions and are applied in different
22 ways by regulatory authorities. For example, some regulatory authorities promote the use of
23 ERTs as part of a voluntary management program while others enforce the use of ERTs
24 through rule making. For example, the California Agricultural Burning Guidelines enforce
25 the use of ERTs by specifying requirements for the burning of rice, barley, oat, and wheat
26 straw. The Guidelines require the use of a "crackle test" to determine if the fuel is dry
27 enough to burn. In the state of Washington, wildland land managers are encouraged to use
28 techniques, such as fans, crane piling, mass ignition, accelerated mop-up, and other methods
29 of increasing combustion efficiency and reducing the smoldering stage of burning.

30
31 Although a few states in the WRAP region do promote or require the use of ERTs and
32 specify burning conditions that must be met in order to burn, currently no systems are in
33 place to track the emissions averted from the application of such methods across all fire
34 source sectors.

35
36 The following paragraphs provide a summary of current efforts by regulatory entities to use
37 ERTs as a means to reduce emissions from prescribed fire and agricultural burning.

38 39 3.1 California

40
41 In California, the California Agricultural Burning Guidelines specify requirements for the
42 burning of rice, barley, oat and wheat straw. The Guidelines require the straw to be burned

³⁷ 64 FR 35771 §51.309 (d)(6)(v).

³⁸ WRAP Initiatives Oversight Committee (IOC), Transmittal Letter, November 15, 2001.
WRAP AEG Policy Draft: 10/24/02

1 under optimal moisture conditions, use of a mechanical spreader to ensure even distribution
2 (rice straw only), use of specific firing techniques, and specific burning windows. In
3 addition, the Guidelines require the use of a “crackle test” to determine if the fuel is dry
4 enough to burn. If the straw makes an audible crackle when it is bent sharply, it is dry
5 enough to burn.

6
7 California also specifies certain requirements for rangeland improvement burns, forest
8 management burning, and wildland vegetation management burning. These requirements
9 include, but are not limited to, specific burning windows, and drying periods to ensure
10 optimal fuel moisture.

11 12 3.2 Oregon

13
14 In Oregon, the rules for agricultural burning include, but are not limited to, measures to
15 ensure that crop residues are evenly distributed and in good burning condition, rapid ignition
16 techniques are employed, and alternatives to open burning of fields are considered. For
17 prescribed fires on wildlands, the Oregon Smoke Management Program requires land
18 managers to consider utilization of residue, fuel reduction measures, alternate treatment
19 practices, and reduction of prescribed burning emissions to achieve emissions reduction
20 goals established within the Oregon Visibility Protection Plan. Burning during the spring
21 when the 1000-hour and larger fuels have high fuel moisture is promoted. Post-burn reports
22 require the tracking of fuel moisture content, ignition method, and other information to
23 support calculation of ERT use.

24 25 3.3 Washington

26
27 In Washington, wildland land managers are encouraged to use techniques, such as fans, crane
28 piling, mass ignition, accelerated mop-up, and other methods of increasing combustion
29 efficiency and reducing the smoldering stage of burning. No tracking of specific ERTs is
30 required. The Washington Smoke Management Plan for silvicultural burning does establish
31 a tracking system to measure progress toward specific emission reduction targets. Burn days
32 and specific burning conditions are established by the Department of Ecology for agricultural
33 burning and a permitting system is in place.

34 35 3.4 Utah

36
37 In Utah, agricultural burning is not regulated by the State of Utah. But, counties require such
38 burns to be conducted during optimal dispersion conditions. State air quality regulations
39 require wildland land managers to take measures to prevent smoke impacts. State law
40 requires identification of best management practices including the use of ERTs. Land
41 managers are required to identify the techniques that are employed in addition to fuel
42 moisture and ignition method in their daily emissions report.

1 **4. Establishment of Annual Emission Goals**

2
3 4.1 Current ERT Application

4
5 Research has shown that ERTs can result in emission reductions, which, in turn, reduce
6 smoke impacts on air quality. According to the National Wildfire Coordination Group’s
7 (NWCG) *Smoke Management Guide for Prescribed and Wildland Fire*, methods used to
8 reduce emissions generated from prescribed burning on wildlands are: reducing the area
9 burned, reducing fuel loading, reducing fuel production, reducing fuel consumed, scheduling
10 burning before new fuels appear, and increasing combustion efficiency.³⁹

11
12 EPA’s *Prescribed Burning Background Document and Technical Information Document for*
13 *Prescribed Burning Best Available Control Measures* states that the methods for reducing the
14 amount of emissions generated from agricultural burning include: reducing the acres burned
15 annually, altering the fuel distribution, improving firing techniques, and burning under
16 optimum fuel moisture.⁴⁰

17
18 4.2 Non-burning Alternatives and Annual Emission Goals

19
20 ERTs are can be planned in advance at programmatic and project-specific scales. ERTs can
21 include techniques such as the mechanical removal of fuels prior to burning, i.e., fuel
22 exclusion. Typically, federal land managers decide whether to use fire or non-burning
23 alternatives in their long-term (e.g., 10-year) programmatic plans, and not in project-specific
24 plans. By the time the project plan is being developed, the decision to use fire as a tool to
25 meet the land management objective has been made. Therefore, the only emissions averted
26 through the use of ERTs that are included in the annual emission goal are those that are used
27 in combination with fire, i.e., as part of a project-specific plan. The option to use a non-
28 burning alternative is not part of the annual emission goal at this time.

29
30 Annual emission goals, under this Policy, are established annually and apply to the upcoming
31 year’s projects where fire has been determined as the best tool for meeting specific land
32 management objectives. Currently, it is not feasible to track the use of non-burning
33 alternatives that are utilized due to inadequate tracking and emission calculation
34 mechanisms. The WRAP recognizes that scientific and technological advances may support,
35 in the future, the feasibility of tracking the emissions averted from non-burning alternatives.

36
37 This WRAP AEG Policy supports efforts to utilize alternatives to burning, such as collection
38 and removal of residue for use offsite with no subsequent in-site burning, in land
39 management and fire management plans or other equivalent long-term plans. The WRAP
40 encourages each state/tribe to work cooperatively with land managers to identify, implement,

³⁹ NWCG’s *Smoke Management Guide For Prescribed And Wildland Fire*, 2001 Edition (hereafter referred to as “2001 Smoke Management Guide”), pages 143-151.

⁴⁰ EPA’s *Prescribed Burning Background Document and Technical Information Document for Prescribed Burning Best Available Control Measures*, September 1992, (hereafter referred to as “EPA’s BACM Document”), p. 9-13.

1 and track all feasible non-burning alternatives, and the WRAP ESMP Policy specifically
2 includes the consideration of non-burning alternatives. The WRAP AEG Policy leaves the
3 decision to track the use of non-burning alternatives, during the development of enhanced
4 smoke management programs or another mechanism, to the discretion of states/tribes.

5 6 4.3 Determination of Appropriate ERTs

7
8 The opportunity for the application of ERTs varies greatly. The 2001 Smoke Management
9 Guide states, “ERTs vary widely in their applicability and effectiveness by vegetation type,
10 burning objective, region of the country, and whether fuels are natural or activity-
11 generated.”⁴¹

12
13 For example, a maintenance burn in a brush vegetative type within a wilderness area may
14 have virtually no options for ERT application. Alternatively, multiple ERTs may be
15 applicable in a ponderosa pine vegetation type where activity such as logging or thinning has
16 occurred. The applicability of a particular technique or practice will depend, in part, on the
17 objectives of that burn. For example, the objective of a prescribed burn on wildlands may be
18 to create open space for wildlife. A backing fire, which is a firing technique that is used to
19 reduce the amount of emissions generated, may not produce sufficient fire characteristics to
20 achieve the management objective.

21
22 It is important to note that while ERTs offer an excellent tool for meeting goals for visibility
23 protection, ERTs may cause negative effects such as soil compaction, nutrient loss, and
24 impaired water quality on other valuable resources. Therefore, it is imperative that ERTs are
25 used carefully, and that land managers and air regulators are provided the information and
26 training necessary to make informed decisions.

27 28 4.4 Feasibility Criteria

29
30 The use of ERTs should be based on economic, safety, technical and environmental
31 feasibility criteria, as well as land management objectives. In addition, the WRAP
32 recommends that education and training are included as feasibility criteria. It is imperative
33 that education and training are provided to ensure that ERTs are used appropriately. All of
34 the above criteria will affect the application of certain ERTs for vegetation/crop types,
35 burning objectives, and area in the WRAP region.

36
37 Examples of how states/tribes might apply the feasibility criteria are listed below.

38
39 Economic: What are the economic costs to apply a certain ERT? Is a specific ERT more
40 economical than others? Any ERT that significantly reduces crop yields or exceeds the cost
41 of a crop is not likely to be accepted by farmers or growers. The same concern is relevant to
42 the application of ERTs on wildlands.

43

⁴¹2001 Smoke Management Guide, p. 141.
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1 Safety: Are certain ERTs not feasible due to public and firefighter safety concerns? Are
2 certain ERTs not feasible due to control of the fire concerns, i.e., keeping the fire within
3 certain boundaries? Do certain ERTs minimize the possibility of nuisance and hazard
4 smoke?

5
6 Technical: Are the equipment and resources available to utilize a specific ERT? Are
7 sufficient training programs available in the use of ERTs for the land managers?

8
9 Environmental: Are there specific environmental limitations (e.g., vegetation/crop type, fire
10 type, time of year, area in WRAP region) that influence the use of certain ERTs?

11
12 Land Management Objectives: Is a certain ERT not feasible due to conflicts with land
13 management objectives? Do certain ERTs maximize the likelihood of achieving the land
14 management objective of the burn?

15 16 4.5 Existing Guidance Documents

17
18 Several guidance documents provide information on the use and effectiveness of various
19 types of ERTs that could be used by land managers to control fire emissions and reduce
20 smoke impacts. EPA's BACM Document, the 2001 Smoke Management Guide, and the
21 GCVTC's Fire Emission Project⁴² are three examples.

22
23 EPA's BACM Document provides information on ERTs for both wildland and agricultural
24 burning. The BACM Document is one of the best comprehensive references on potential
25 ERTs for agricultural burning. Most of the WRAP states do not have agricultural smoke
26 management programs, so the demand for additional research is minimal. Once agricultural
27 smoke management programs are developed, further research on common ERTs for
28 agricultural burning applications may be available.

29
30 The 2001 Smoke Management Guide presents information on the use and effectiveness of
31 ERTs, frequency of specific ERT usage, and qualitative assessment of emission reductions
32 achieved through the use of ERTs. The majority of the information presented in the Guide
33 was gathered from fire practitioners at three national workshops held during the fall of 1999.
34 Much of the research into ERTs and subsequent emissions benefits for wildlands, such as the
35 Consume software program,⁴³ has been conducted in the Pacific Northwest although the
36 general principles are applicable elsewhere in the WRAP Region.

37
38 The GCVTC's Fire Emission Project assessed the potential application of ERTs by wildland
39 vegetation type and fire type on a region-wide basis. Included in the assessment was
40 percentage of feasible use of ERTs for these wildland vegetation and fire types, with the
41 emissions reduced as a result of the use of ERTs also evaluated.

⁴² WRAP Report: Integrated Assessment Update and 2018 Emissions Inventory for Prescribed Fire, Wildfire and Agricultural Burning (DRAFT), Appendix A, pp. 61-96.

⁴³ Pacific Northwest Research Station, Forestry Sciences Laboratory, Consume Software, Version 2.1.

1 4.6 Research Needs

2
3 ERTs have been proven to reduce fire emissions through documented research, but more
4 research is needed to make them a more quantifiable tool for land managers. The 1999 Air
5 Quality Policy on Agricultural Burning emphasized this fact by stating, “Emission reduction
6 technology to reduce the impact of pollutants emitted from agricultural burning on ambient
7 concentrations is needed”.⁴⁴

8
9 The identification of common ERTs for agricultural burning is a difficult task since most of
10 the WRAP states do not have smoke management programs to address agricultural burning,
11 therefore the demand for such information is not great. Information regarding availability,
12 applicability, and cost effectiveness of ERTs can be found in various research documents but
13 a comprehensive guide does not currently exist.

14
15 The research on ERTs for wildland fire was predominantly conducted in the Pacific
16 Northwest. Although the general principles are applicable elsewhere in the WRAP Region,
17 more research is needed on ERTs for wildland fire, with emphasis placed on vegetation types
18 located outside of the Pacific Northwest.

19
20 4.7 Calculation of Averted Emissions

21
22 According to the 2001 Smoke Management Guide, “The overall potential for emission
23 reductions from prescribed fire depends on the frequency of use of emission reduction
24 techniques and the amount of emission reduction that each method offers.”⁴⁵ Therefore, in
25 order to determine the potential for emission reductions from prescribed fire, land managers
26 will need to calculate the specific amount of emission reduction that each method offers.
27 Consume 2.1, a fuel consumption and emissions model, can be used to estimate potential
28 emission reductions that may be achieved by employing certain ERTs.⁴⁶

29
30 The WRAP recognizes the need for a more comprehensive guide for estimating potential
31 emission reductions achieved through the use of ERTs for agricultural burning and wildland
32 fire. This guidance will be developed by the WRAP in a similar format to that of Appendix D
33 to support states’ and tribes’ use of annual emission goals. Appendix D provides a table that
34 lists ERT options that can be applied by land managers and the corresponding emissions
35 averted by using a particular ERT.

36
37 The 2001 Smoke Management Guide contains several tables that may be useful to
38 states/tribes in order to establish annual emission goals. The tables include information on
39 the frequency of use of specific ERT by region of the country, the general effectiveness of

⁴⁴Agricultural Air Quality Task Force’s (AAQTF) Air Quality Policy on Agricultural Burning, Recommendation to the U.S. Department of Agriculture, November 10, 1999.

⁴⁵ 2001 Smoke Management Guide, p. 152.

⁴⁶ Ottmar, Roger D.; Reinhardt, Timothy E.; Anderson, Gary; DeHerrera, Paul J. [In preparation]. Consume 2.1 User’s Guide. Gen. Tech. Rep. PNW-GTRxxx. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

1 specific ERTs, the significant constraints limiting the wider application of ERTs, and the
2 potential emission reductions that may be achieved by employing various ERTs as estimated
3 by Consume 2.1. There are some limitations to the information contained in the 2001 Smoke
4 Management Guide, as some vegetation types that are found in the WRAP region are not
5 included.

6

7 These tables should be utilized with the understanding that the effectiveness of a particular
8 ERT may vary considerably. Considering all burning nationally, if ERTs were optimally
9 used, emissions could probably be reduced by approximately 20-25 percent assuming all
10 other factors (vegetation types, acres, etc.) were held constant and land management goals
11 were still met.⁴⁷ Individual states/tribes or regions may be able to achieve greater emission
12 reductions than this or much less depending on the states or regions individual situations.

13

⁴⁷ J. Peterson and B. Leenhouts, “What Wildland Fire Conditions Minimize Emissions and Hazardous Air Pollutants and Can Land Management Goals Still Be Met?” (Draft), August 20, 1997.
WRAP AEG Policy Draft: 10/24/02

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APPENDIX D
Table on Potential Emission Reduction Techniques

Example of ERT & Associated Emission Averted Table
(Under further development by WRAP)

ERT Category	Practice	Treatment	Size Class	Vegetation Type	Smolder	Equation	Reduction Factor
Increased Combustion Efficiency	Backing Fires	First Entry	All	Ponderosa Pine		Tot_Emis = Tot_Emis * 0.9	0.9
			All	Pinyon/Juniper Woodland, Oak Brush, Sage, Desert Shrub, Annual Grass, Perennial Grass		Tot_Emis = Tot_Emis * 0.9	0.9
		Maintenance	All	Ponderosa Pine, Pinyon/Juniper, Woodland, Oak Brush, Sage, Desert Shrub, Annual Grass, Perennial Grass		Tot_Emis = Tot_Emis * 0.9	0.9

8