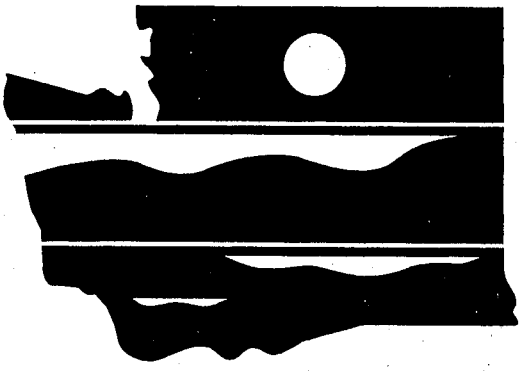
REVISION TO THE WASHINGTON VISIBILITY STATE IMPLEMENTATION PLAN



WASHINGTON STATE
DEPARTMENT OF
ECOLOGY

September 1999
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REVISION TO THE WASHINGTON VISIBILITY STATE IMPLEMENTATION PLAN

"It is declared to be the public policy to preserve, protect, and enhance the air quality for current and future generations.... It is further the intent of this chapter to protect the public welfare, to preserve visibility, to protect scenic, aesthetic, historic and cultural values...."

Washington Clean Air Act
Chapter 70.94.011

Air Quality Program
Washington Department of Ecology

P.O. Box 47600
Olympia, WA 98504-7600

September 1999
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SECTION I

INTRODUCTION

In Section 169A of the Clean Air Act (CAA) Amendments of 1977, Congress established as a national goal "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": (42 U.S.C. 7470). Mandatory Class I federal areas, were defined in Section 162 (a) of the CAA as all international parks, all national wilderness areas and memorial parks which exceed 5,000 acres in size, and all national parks which exceed 6,000 acres in size. In the state of Washington, eight such mandatory Class I federal areas exist, including three national parks (North Cascades, Olympic, and Mount Rainier) and five wilderness areas (Alpine Lake, Glacier Peak, Goat Rocks, Mount Adams, and Pasayten).

An initial step in developing programs for making reasonable progress towards meeting the national goal is set out in Section 169A(a)(2) of the CAA, which required the Secretary of the Interior to consult with the appropriate federal land managers (FLM) to review all mandatory Class I federal areas and identify those areas where visibility is an important value. The U.S. Environmental Protection Agency (EPA), after consulting with the Secretary of the Interior, promulgated a list of mandatory Class I federal areas where visibility is determined as an important value (Federal Register, Vol. 44, November 20, 1979). All eight mandatory Class I federal areas within the state of Washington were found to have visibility as an important value. The determination established that all mandatory Class I federal areas in the state require protection under the visibility section (169A) of the CAA.

In response to the requirements of the CAA (169A(a)(4)), on December 2, 1980, EPA promulgated its rule for visibility protection for mandatory Class I federal areas (45 FR 80089). The rule requires states to develop programs to assure reasonable progress toward meeting the national visibility goal.

The principal effect of the visibility regulations is to require states to revise their State Implementation Plan (SIP) to establish long-range goals, to establish a planning process, and to implement procedures requiring visibility improvement and protection for mandatory Class I federal areas where visibility impairment has been certified[1]. Specifically, the visibility portion of the SIP must;

1. Provide for continuing consultation between the State and the FLM on implementation of the visibility protection program.
2. Provide for a monitoring strategy for mandatory Class I federal areas and the use of available visibility data.

[1] A record of impairment certification can be found in Appendix A of Ecology Publication No. 97-206, *Review of the Washington State Visibility Protection State Implementation Plan Final Report.*

3. Contain a long-term (10 – 15 year) strategy necessary to make reasonable progress toward the national goal.
4. Require the proper operation and maintenance of any control equipment required under visibility protection provisions.
5. Determine if any existing stationary sources are currently subject to Best Available Retrofit Technology (BART) and perform a BART analysis if necessary.
6. Provide for the periodic review and revision, as appropriate, of the long-term strategy, not less frequently than every three years.
7. Provide for the review of any new sources or modifications to existing sources that may impact visibility in a mandatory Class I federal area.

The visibility portion of the SIP describes the program Washington will follow to protect and improve visibility in mandatory Class I federal areas and comply with federal regulations. It applies only to the eight mandatory Class I federal areas listed in Table III-1. Other non-Class I areas of the state in which visibility is considered an important value (such as Class II wilderness areas, scenic areas, or urban views) are not subject to this SIP.

SECTION II

SUMMARY

The Washington State Department of Ecology (Ecology) believes that it is important to protect and improve visibility in the mandatory Class I federal areas of Washington and other visually important areas of the state. We recognize not only the aesthetic value, but also the economic value of the visual experience to residents and to the many visitors who seek out our state's natural beauty.

If the state is successful in protecting its aesthetic resources from visibility degradation, and improving existing visibility, the value to the people of the state, as well as the attraction of out-of-state tourists, will increase with time.

In order to provide this protection and improvement, Ecology has developed revisions to the SIP including some changes recommended in the last periodic plan review[2]. These revisions identify and implement state and local programs, procedures and regulations that will assure visibility protection and improvement in the state's mandatory Class I federal areas. While the state and local air authorities have undertaken visibility protection efforts in areas outside the mandatory Class I federal areas, including urban areas and scenic areas, those efforts are not included or made a part of this plan. The key control strategies include regulations, and amendments to regulations, for existing and future stationary sources, the development of programs and procedures for reducing the emissions and managing the impacts of prescribed burning, and emission

[2] Review of the Washington State Visibility Protection State Implementation Plan Final Report. Ecology Publication No. 97-206

reductions that occur through other air quality programs. These strategies apply equally to all mandatory Class I federal areas of the state.

Authority for implementing these strategies is found in Chapter 70.94 RCW, Washington Clean Air Act. Regulations implementing these strategies are found in the SIP as currently submitted to EPA and, as such, are federally enforceable.

The control strategies for prescribed forest burning include scheduling of burns, management of smoke and a reduction in total emissions. These strategies are laid out in the Washington Smoke Management Plan (SMP), which is included as Appendix A. Prescribed burning that could impact mandatory Class I federal areas is greatly restricted during visibility important days (periods of high visitor use). The forest land managers established an objective of reducing total emissions from prescribed burning in western Washington by 20 percent from baseline levels[3] by December 31, 1994 and 50 percent from baseline levels by December 31, 2000. The Washington legislature codified these goals as requirements in RCW 70.94.665. Ecology believes this to be a reasonable requirement that, combined with burn scheduling and smoke management, should provide adequate protection of visibility from this source in mandatory Class I federal areas.

Other state and local air authority programs that will provide air quality improvements that will contribute to improved visibility include achievement and maintenance of National Ambient Air Quality Standards (NAAQS), Reasonably Available Control Technology (RACT) review program, commute trip reduction programs, wood stove certification program, open burning regulations and federal mobile sources emission reduction and clean fuels program.

An evaluation of the progress made in protecting and improving visibility as a result of the previously mentioned programs is conducted every three years. The purpose of these evaluations is to determine whether reasonable progress is being achieved by these control strategies and to present those findings to the public. A report on the results of the evaluation is made available to EPA and the public. Specific information about the kinds and degree of pollution impacting visibility in Washington, detailed monitoring data and trends in the levels of those pollutants can be found in the reports, not in this plan. Copies of the report on the latest evaluation may be obtained from the Department of Ecology's Air Quality Program.

SECTION III

DEFINITIONS

1. **Adverse impact on visibility;** visibility impairment which interferes with the management, protection, preservation, or enjoyment of the visitor's visual experience of the mandatory Class I federal area. This determination must be made on a case-by-

[3] Baseline levels are calculated from the annual emission s levels from 1985 to 1989

case basis taking into account the geographic extent, intensity, duration, frequency and time of visibility impairments, and how these factors correlate with (1) times of visitor use of the mandatory Class I federal area, and (2) the frequency and timing of natural conditions that reduce visibility. This term does not include effects on integral vistas.

2. **Best available retrofit technology (BART);** means an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant that is emitted by an existing stationary facility. The emission limitation must be established, on a case-by-case basis, taking into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use or in existence at the source, the remaining useful life of the source and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology

3. **Federal Land Manager;** the Secretary of the department with authority over the mandatory Class I federal area (or the Secretary's designee).

4. **Integral vista;** a view perceived from within the mandatory Class I federal area of a specific landmark or panorama located outside the boundary of the mandatory Class I federal area and listed in the visibility SIP.

5. **Major stationary source;** those sources identified in WAC 173-400-030 (41).

6. **Mandatory Class I federal area;** any area identified in part 81, subpart D of the Federal Clean Air Act I (see Figure III – 1 and Table III – 1).

7. **Natural Conditions;** visibility conditions that would occur in the absence of human-caused visibility impairment, including naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration.

8. **Reasonably attributable;** attributable by visual observation or any other technique the State deems appropriate.

9. **Reasonably available control technology (RACT);** means the lowest emission limit that a particular source or source category is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. RACT is determined on a case-by-case basis for an individual source or source category taking into account the impact of the source upon air quality the availability of additional controls, the emission reduction to be achieved by additional controls, the impact of additional controls on air quality, and the capital and operating costs of the additional controls. RACT requirements for a source or source category shall be adopted only after notice and opportunity for comment are afforded.

10. **Stationary source;** those sources identified in WAC 173-400-030 (75).

11. **Visibility impairment;** any humanly perceptible change in visibility from that which would have existed under natural conditions.

FIGURE III – 1 MANDATORY CLASS I FEDERAL AREAS

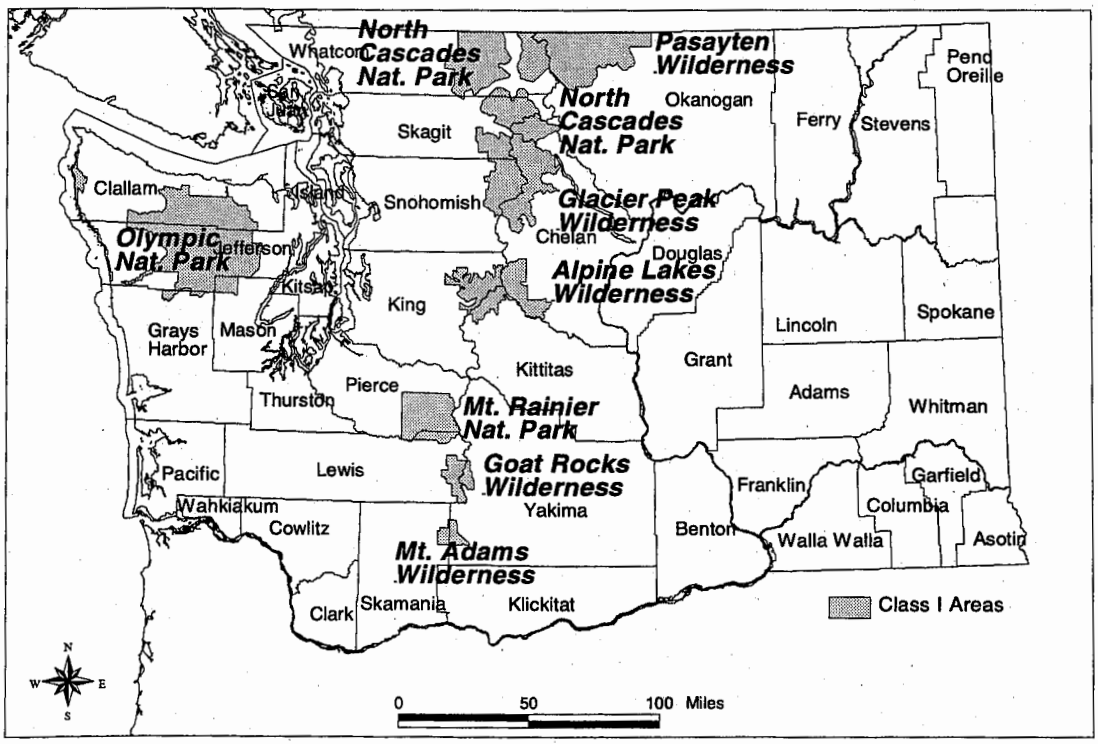

TABLE III – 1 MANDATORY CLASS I FEDERAL AREAS

Area Name	Acreage	Public Law Established	Federal Land Manager
Mount Rainier National Park	235,612	30th Stat. 993	USDI-NPS(1)
North Cascades National Park	504,782	90-554	USDI-NPS
Olympic National Park	922,651	75-778	USDI-NPS
Alpine Lake Wilderness Area	393,000	94-357	USDA-FS(2)
Glacier Peak Wilderness Area	572,738	88-577, 90-544, 98-339	USDA-FS
Goat Rocks Wilderness Area	108,439	88-577, 98-339	USDA-FS
Mount Adams Wilderness Area	56,681	88-577	USDA-FS
Pasayten Wilderness Area	530,031	90-544, 98-339	USDA-FS

(1) United States Department of Interior, National Park Service.
(2) United States Department of Agriculture, Forest Service.

NEWLY DESIGNATED CLASS I AREAS

Any lands redesignated under 40- CFR-51.166 to Class I status must be included in future visibility plan revisions for visibility protection if the appropriate land manager, (where land manager means the secretary of the federal department, head of the state department or head of the Indian governing body with authority over the Class I areas) sufficiently demonstrates to Ecology that visibility is an important value to the redesignated area. Upon state approval of such demonstration, and six months prior to the next plan revision, the Class I area will be included for visibility protection.

INTEGRAL VISTAS

The 1985 Visibility SIP included a list of "Preliminary Integral Vistas" identified by the NPS. In a later action the NPS decided not to finalize the list and did not follow procedures in 40-CFR-51.304. Instead, the NPS relied on existing coordination procedures between the FLM and the state to protect these visual resources. The 1985 Visibility SIP went on to state: "If the final vistas differ from the proposed list, only the final vistas will be considered for protection." Since there are no "final vistas" identified

in Washington, no formal actions are included in this revision of the SIP. Any vista from a mandatory Class I federal area is given informal consideration under the state's New Source Review program as described in Section X.

SECTION IV

PROCEDURES FOR CONSULTATION AND REVIEW

Ongoing coordination between the state and the FLM is required to successfully implement the control strategies identified in the visibility plan. Ecology has made, and will continue, a commitment to a strong State-FLM coordination program. This section of the plan explains procedures for maintaining coordination between involved agencies for New Source Review and for review and revision of the visibility SIP.

New Source Review

If a proposed new or modified source is under review to determine its impact on the visibility of a mandatory Class I federal area, then the coordination procedures with the responsible FLM will be followed as described in WAC 173-400-112 (9) or WAC 173-400-113 (6) as shown in Appendix B.

Review and Revision Procedures

The visibility plan must be formally reviewed by Ecology every three years from the date of adoption by EPA. The participating state and federal agencies will begin their review meetings six months prior to the due date so that the review will be completed by the required date.

Meetings will be scheduled as necessary throughout the six-month period. A report based on the results of this review will be released to the public and the EPA. This report will include an assessment of:

- The progress achieved in remedying existing impairment of visibility impairment in any mandatory Class I federal area.
- The ability of the long-term strategy to prevent future impairment of visibility impairment in any mandatory Class I federal area.
- Any change in visibility since the last report.
- Additional measures, including the need for SIP revisions, that may be necessary to assure reasonable progress toward the national visibility goal.
- The progress achieved in implementing BART and meeting other schedules set forth in the long-term strategy.
- The impact of any exemption from BART.

- The need for BART to remedy existing visibility impairment of any integral vista listed in the plan since the last report.

Any revision of the SIP resulting from this review will be adopted in accordance with required public participation procedures.

Miscellaneous

Meetings may be called by any involved agency at any time during the year to discuss miscellaneous matters or problems.

SECTION V

VISIBILITY MONITORING AND ASSESSMENT STRATEGY

A long-term visibility-monitoring program is essential to: (1) evaluate and identify contributing sources and their impacts; (2) differentiate between manmade and natural pollutants; and (3) assess the effectiveness of the visibility protection program.

Ecology commits to contribute to and participate in expanded visibility monitoring efforts through the Interagency Monitoring of Protected Visual Environments (IMPROVE) monitoring program. Monitoring network design, monitoring methodology, and monitoring data analysis will follow current IMPROVE protocol as closely as practicable, as described in Ecology publication 99-206 (or most current periodic Visibility SIP review). It is expected that EPA will continue to fund the IMPROVE program at, or above current levels. Additionally, Ecology will participate and support other state and local visibility monitoring efforts as priorities dictate and resources allow.

Ecology also commits to the development and maintenance of a statewide emission inventory that will support modeling efforts as needed to determine trends in visibility impairing emissions.

Every three years, as a part of the periodic Visibility SIP review, Ecology will review, analyze and prepare a written report interpreting available visibility monitoring data. Ecology, EPA and FLM will develop and seek public comment on a technical analysis protocol prior to the analysis. This written protocol will direct the review, analysis, and reporting of the monitoring data.

SECTION VI

LONG-TERM CONTROL STRATEGIES

Long-term strategies for making reasonable progress toward the national visibility goal are required to be included in this revision by EPA's visibility rule, 40 CFR 51 Subpart P. The strategy must cover any existing impairment the FLM certifies to the state six months prior to the plan revision. Visibility assessment, to date, shows that impairment still occurs in all mandatory Class I federal areas of the state. Impairment has been certified to the state by the FLM for the USDI-NPS and the USDA-FS. Details of the FLM certification of impairment may be found in the latest "Review of the Washington State Visibility Protection State Implementation Plan." Additionally, the USDI-NPS has asserted that visibility impairment at Mt. Rainier National Park can be reasonably attributed to emissions from the Centralia Power Plant[4].

There are three sources of emissions that need to be addressed in order to assure the long-term visibility improvement and protection of visibility in mandatory Class I federal areas. These include stationary sources, mobile sources and area sources. Strategies for dealing with these three source categories are described in the following paragraphs.

Stationary Sources

Best Available Retrofit Technology: For any visibility impairment of a mandatory Class I federal area that has been identified by the state as resulting from emissions from an existing single or small group of stationary sources, a BART review will be undertaken. A BART review will be conducted by Ecology to determine if the responsible source or sources should be required to adopt additional pollution control techniques to reduce the source's emissions and resulting visibility impairment. The control techniques include, but are not limited to: compliance with emission standards, prescribed design or control equipment, work practices, operational standards, or a combination thereof. The cost of compliance, energy, and non-air quality environmental impacts; pollution control already in place; and the remaining useful life of the source must be considered before requiring additional pollution control for any source. The BART regulation can be found in Appendix C.

New Source Review (NSR) / Prevention of Significant Deterioration (PSD): In Washington, the federal NSR program for non-attainment areas and the PSD program are incorporated into WAC 173-400. An active minor new source review program is included in 70.94 RCW. The non-attainment area NSR program is performed as part of

[4] A collaborative decision making process involving all appropriate parties was used to establish emission limits and schedules of compliance for the Centralia Power Plant. That process is described in Section VIII of this report and the orders containing those limits and schedules are included in, and made a part of this plan as Appendix D.

the local air pollution control agency's review program and is their major means to evaluate visibility impacts and incorporate appropriate controls. The State has retained the PSD program and operates that program under terms of a delegation agreement with EPA. All new and modified sources subject to the PSD program are required to analyze their impact on visibility in mandatory Class I federal areas and to incorporate any control measures needed to reduce those impacts. Emission reductions resulting from ongoing air pollution control programs including emission limitations and schedules for compliance; State and federal air quality programs, especially those associated with attainment of the NAAQS , have resulted, and will continue to result in significant reduction and control of emissions of fine particulate and precursors to ozone from stationary sources. These pollutants are also responsible for light extinction. These emission reductions are being integrated into the statewide emissions inventory which will be used to model visibility impacts in mandatory Class I federal areas.

Scheduled emission reductions from stationary sources are expected to result from the implementation of RACT. As Ecology and local air agencies analyze and impose RACT emission limits on stationary sources, emission reductions will occur that should have a positive impact on visibility in downwind areas.

Source retirement and replacement schedules: Ecology is not aware of any scheduled retirement or replacement of stationary sources of visibility impairing pollutants. Therefore, source retirement and replacement schedules are not included as part of the management strategies under existing state air management programs. If source retirement/replacement schedules become known in the future, reductions will be incorporated into the emissions inventory and considered in the long-term strategy.

Mobile Sources

On-road sources: Emissions of visibility impairing pollutants from on-road mobile sources have been reduced as part of ozone and particulate matter NAAQS attainment strategies in several urban areas of the state. These strategies have included inspection and maintenance (I/M) programs, oxygenated fuel programs, road paving and improved winter traction material programs. Additionally, federal requirements for lower emission cars and trucks will continue to reduce visibility-impairing emissions in the future. Lower emission diesel requirements and requirements for lower sulfur fuels are expected to have significant positive impacts.

Off-road sources: EPA continues to develop more stringent national standards for off-road mobile source emissions.

Area Sources

Smoke management techniques for agricultural and forestry management: A major source of visibility impairment was previously determined to be from prescribed burning.

Both long- and short-term strategies for reducing impairment due to prescribed burning were developed and have been successful. The Smoke Management Program for the state of Washington is a cooperative program that includes all state and federal agencies involved with the Washington visibility SIP. The SMP has been revised since the original version that addressed visibility impairment from prescribed fire. The latest version has emission reduction goals, an expanded visibility protection period, and a program for conducting forest health burning while maintaining enhanced visibility protection. A copy of the current SMP is included as Appendix A.

Land Management: Land managers of mandatory Class I federal areas, the USDI-NPS and USDA-FS, have current land management plans, goals and mandates for areas under their jurisdiction. Each land manager has been given land management responsibilities by congressional legislation.

The state had coordinated with these federal agencies in developing a visibility protection program that is consistent with existing management goals and plans, as well as with the national visibility goal. The FLM also have a congressional mandate to comply with the national visibility goal.

Major legislation clearly defines the responsibilities of the USDI-NPS to preserve natural and cultural resources for the enjoyment of present and future generations. Individual park acts and the Organic Act of August 25, 1916, call for general and specific actions for park protection. Additional legal authorities from which USDI-NPS derives its air resource management mission include the Wilderness Act of 1964, the National Environmental Policy Act of 1969, and the Endangered Species Act of 1973.

The CAA Amendments of 1977 granted the FLM substantial authority and responsibility to protect air quality related values, including visibility, in mandatory Class I federal areas. It also states that all federal agencies must conform to all federal, state, and local air pollution control requirements.

Due to the inclusion of wilderness areas within national forests and the proximity of national parks to national forests with the state, the USDA-FS has interpreted its mission as one of seeking ways to balance the visibility goal with two other congressional charges: to preserve the character of wilderness and to maintain productive forest lands. These congressional mandates for the USDA-FS are the Organic Act, the Wilderness Act, the National Environmental Policy Act, the Endangered Species Act, and the National Forest Management Act of 1976, as well as the various acts establishing the individual national forests.

The long-term strategy for visibility protection in Washington recognizes existing federal management goals and planning as a means of implementing measures that can achieve progress toward the national goal. The visibility program supports and endorses utilization efforts of the USDA-FS as stated in the Pacific Northwest Regional Plan (Draft, July 17, 1981) and efforts by the USDI-NPS concerning prescribed natural fires

and forest fire policy (USDI-NPS Pacific Northwest Region, Visibility Protection and Smoke Management in Class I Areas, November 9, 1982).

The state encourages and supports all land management planning efforts to achieve further progress toward meeting the national visibility goal.

Measures to mitigate the impact of construction activities: Construction activities have not been identified as contributing to any impairment in mandatory Class I federal areas. Ecology has no record of complaints of dust from construction activities at or near any mandatory Class I federal areas. Should complaints be received, they would be investigated and resolved. Construction activities as air pollution sources are under the jurisdiction of the state or local air pollution control agency. Construction activities are covered in WAC 400-040, subparagraph (3) and (8). Local air pollution agencies also have regulations, ordinances or guidelines governing mitigation of air pollution during construction activities.

Urban area sources: Suspended particulate from urban sources has not yet been conclusively identified by Ecology as specifically contributing to visibility impairment in any mandatory Class I federal area. Other studies, however, strongly suggest that there are links between urban sources in the state and visibility impacts in distant parks and wildernesses. During periods of stagnation, all urban sources contribute to the overall visibility degradation in the Puget Sound Basin and winds frequently move this air to Class I areas. Therefore, the pursuance of existing, ongoing programs to remedy and control urban air quality problems will likely contribute to visibility protection and improvement.

Interstate Coordination

Since emissions from Washington sources and sources in adjacent states can potentially impact each other's visibility, Washington will coordinate visibility protection strategies with the neighboring states and participate in regional planning efforts to the extent practicable. Current provisions in Ecology's and local air authorities' BART and NSR regulations are consistent with the requirement to protect visibility in mandatory Class I federal areas of neighboring states. Washington's SMP, administered by Washington Department of Natural Resources, does not contain specific provisions with respect to visibility in mandatory Class I federal areas of neighboring states. However, in practice the WDNR disallows any prescribed burn that would impact another state's mandatory Class I federal area. The DNR burn center is manned by individuals familiar with the location of neighboring mandatory Class I federal areas and anytime wind forecasts indicate smoke from a prescribed burn would impact one of those areas, no burn authorization is given.

Should any neighboring state reasonably demonstrate that these interstate visibility protection provisions are inadequate with respect to their mandatory Class I federal areas, Ecology will work with the affected state to resolve the issue.

Affected land managers of the neighboring states will be notified of new source permit applications in Washington that may potentially affect their mandatory Class I federal areas.

SECTION VII

OPERATION AND MAINTENANCE OF CONTROL EQUIPMENT

This plan relies on Chapter 173-400 WAC General Regulations For Air Pollution Sources, Chapter 173-401 Operating Permit Regulation, Chapter 173-405 WAC Kraft Pulping Mills, Chapter 173-410 WAC Sulfite Pulping Mills, Chapter 173-415 WAC Primary Aluminum Plants, Chapter 173-434 Solid Waste Incinerator Facilities and equivalent local rules for the authority to require the proper operation and maintenance of control equipment form stationary sources. It relies on field inspections by state and local air authority staff to ensure compliance with the requirements.

SECTION VIII

IDENTIFICATION AND ANALYSIS FOR BEST AVAILABLE RETROFIT TECHNOLOGY (BART)

In 1995 the USDI-NPS asserted that visibility impairment at Mt. Rainier National Park was reasonably attributable to emissions from the Centralia Power Plant (CPP) and asked Ecology to review, and if appropriate, confirm their finding of reasonable attribution.

In 1996 stakeholders[5] associated with issues related to emissions from the CPP met in a collaborative decision making process to arrive at emission limits and schedules of compliance that would satisfy the need to remedy existing impairment from this source, and avoid the costs and delays associated with a formal attribution/BART process. The stakeholders met over a period of 12 months and arrived at a plan that could be incorporated into an enforceable order for the plant.

An order for Reasonably Available Control Technology limitations for the CPP was issued by the Southwest Air Pollution Control Authority (SWAPCA) in February 1998 and was subsequently challenged by a private party. The order has been, and continues to be, under legal review. Ecology considers the order to be legally enforceable pending a court decision otherwise and therefore is including it, along with a subsequent Stay

[5] PacifiCorp and other owners of CPP, SWAPCA, Ecology, EPA, USDI-NPS, USDA-FS

Order revising a project milestone, as part of the visibility SIP. A copy of the order and the stay are included as Appendix D.

The Order will result in an annual exhaust gas emission limit for SO2 of 10,000 tons per year effective in calendar year 2002 and beyond. NOx emission rates are limited to an annual average not to exceed 0.30 lb/Mbtu and particulate matter shall not exceed 0.010 gr/dscf. Further, the Order finds that, while no formal BART determination has been made, based on the requirements in the Order and documentation in the Technical Support Document, the emission limits in the RACT Order represent BART under 40 CFR 51 Subpart P, WAC 173-400-151 and SWAPCA 400-151 for emissions of sulfur dioxide, particulate matter and nitrogen oxides by meeting the BART requirements for those pollutants.

SECTION IX

DOCUMENTATION AND EVALUATION OF PROGRESS TOWARD ACHIEVING THE NATIONAL VISIBILITY GOAL

The primary mechanism for documenting impairment and evaluating progress toward the national visibility goal will be the long-term visibility-monitoring program and periodic technical analysis. In an effective monitoring program, existing conditions will be defined and sources of manmade impairment identified. The technical analysis will be conducted under a protocol developed by Ecology, EPA, FLM and other interested parties. The protocol will specify such things as the emissions inventory that will be used/developed, the time period that will be analyzed, the tools such as modeling protocols, source profiles, trajectory analysis and extinction budgets that will be employed.

The long-term continuation of the monitoring program will make it possible to analyze trends over a period of years. The trend analysis will be used to evaluate the effectiveness of control strategies implemented to remedy impairment under Phase I of the visibility program.

The last evaluation of progress was documented in Ecology publication No. 99-206, **Review of the Washington State Visibility Protection State Implementation Plan, Final Report,** published in July 1999.

SECTION X

NEW SOURCE REVIEW

Ecology's New Source Review regulations, WAC 173-400-110 through 113, include the provisions required by 40 CFR part 51.307 for the protection of visibility in mandatory Class I federal areas. Additionally, it is the policy of Ecology to assess the impacts of

emissions from a proposed new source, on views looking in a 360-degree radius from the mandatory Class I federal area. If Ecology determines there is a potential for a significant impact on visibility, additional dispersion modeling or post construction monitoring is required by the applicant to assure data is available in the future to determine if visibility or other air quality related value impacts are occurring.

APPENDIX A

SMOKE MANAGEMENT PLAN

- *Washington State Department of Natural Resources Smoke Management Plan (1993, Revised 1998)*

Washington State

Department of Natural Resources

Smoke Management Plan

1993
Revised 1998

CLEAN AIR AND HEALTHY FORESTS
THE BALANCE THAT IS POSSIBLE

Adopted Kaleen Cottingham Date: 8/13/98

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STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

SMOKE MANAGEMENT PLAN

1993
(Revised 1998)

INTRODUCTION

The people of Washington State care about the quality of our air. In response to that concern, the Department of Natural Resources (DNR), Department of Ecology (DOE), U.S. Forest Service (USFS), National Park Service (NPS), Bureau of Land Management (BLM), participating Indian nations, military installations (DOD), and small and large forest landowners have worked together to deal with the effect of outdoor burning on our air.

Protection of public health and preservation of the natural attractions of the state are high priorities with the DNR and can be accomplished along with a limited, but necessary, outdoor burning program. Public health, public safety, and forest health can all be served through the application of the provisions of Washington State law and this plan, and with the willingness of those who do outdoor burning on forest lands to further reduce the negative effects of their burning.

This plan pertains to DNR-regulated silvicultural (forest land) outdoor burning only and does not include agricultural outdoor burning or outdoor burning that occurs on improved property. Although the portion of total outdoor burning covered by this plan is less than 10 percent of the total air pollution in Washington, it remains a significant and visible source. (Source: DOE "Clean Air Washington" fact sheet pamphlet, May 1991.)

Background

Washington State has had a Smoke Management Plan in effect since 1969. After the enactment of the original plan, and with the addition of the 1975 plan, the number of smoke intrusions into designated population areas has dropped significantly every year.

The 1975 Smoke Management Plan has undergone several informal and semi-formal modifications since its adoption, mainly by agreement with the plan's signatories and other agencies. These modifications represent significant changes in DNR operating procedures and emphases.

Some notable changes to the 1975 Plan have included:

- the addition of a professional Meteorologist to the Smoke Management Program to provide accurate meteorological information and forecasts to Regions to facilitate burn approval decisions;

- the close relationship and daily consultation with the Washington State DOE when burning is taking place;

- increased concern by DNR Region staff that outdoor burning only occur when it will not produce nuisance and negative public health effects; and

- the willingness of large forest companies to enter into voluntary agreements to limit burning that exceeds the existing State Implementation Plan (SIP) for visibility protection of Class I federal areas.

The earlier Smoke Management Plans of 1969 and 1975 have done their job well. Today the Pacific Northwest is regarded as a leader in controlling smoke from outdoor burning on forest lands; many other states have used our past plans as models in setting up their own smoke management programs. Now, with this latest plan, we begin a new chapter in smoke management in Washington.

The 1995 revision of the Smoke Management Plan reflects:

- organizational changes to the DNR;

- legislation directing that burning shall be prohibited when alternatives are available, reasonably economical, and less harmful to the environment;

- legislation acknowledging the role of fire in forest ecosystems and finding it to be in the public interest to use fire under controlled conditions to prevent wildfires by maintaining healthy forest and eliminating sources of fuel;

- legislation exempting burning conducted for the purpose of restoring forest health or preventing the additional deterioration of forest health from the reduction targets and calculations of the Washington Clean Air Act.

Purpose

The purpose of this plan is to coordinate and facilitate the statewide regulation of prescribed outdoor burning on lands protected by the DNR and on unimproved, federally-managed forest lands and participating tribal lands. Written under the authorities listed in Appendix 11, the plan is designed to meet the requirements of the Washington Clean Air

Act (RCW 70.94), Forest Protection laws (RCW 76.04), and the United States Clean Air Act (42 USC 7401 et seq.).

Goals

- Protect human health and safety from the effects of outdoor burning
- Facilitate the enjoyment of the natural attractions of the state
- Provide a limited burning program for the people of this state
- Provide the opportunity for essential forest land burning while minimizing emissions
- Reduce emissions from silvicultural burning other than for forest health reasons first by 20 percent and later by 50 percent, as required by law
- Foster and encourage the development of alternative methods for disposing, of or reducing the amount of, organic refuse on forest lands
- Acknowledge the role of fire in forest ecosystems and allow the use of fire under controlled conditions to maintain healthy forests.

Scope

This plan provides regulatory direction, operating procedures, and advisory information regarding the management of smoke and fuels on the forest lands of Washington State. It applies to all persons, landowners, companies, state and federal land management agencies, and others who do outdoor burning in Washington State on lands where the DNR provides fire protection, or where such burning occurs on federally-managed, unimproved forest lands and tribal lands of participating Indian nations in the state.

This plan does not apply to agricultural outdoor burning and open burning as defined by Washington Administrative Code (WAC) 173-425-030 (1) and (2), nor to burning done "by rule" under WAC 332-24 or on non-forested wildlands (e.g., range lands). All future reference to burning in this plan will refer only to silvicultural burning unless otherwise indicated.

The plan does not address nor attempt to regulate prescribed natural fire in wilderness areas and national parks for several reasons: the amount of emissions caused by such burning in this state is relatively small, it is impossible to "regulate" unforecastable natural ignitions, and it is nearly impossible to gather emission data efficiently in the areas where this type of burning generally takes place. Federal agencies that have adopted the use of prescribed natural fires will remain solely responsible for the administration of such programs.

The plan is supplemental to the forest fire protection laws of Washington State (RCW 76.04) and the Clean Air Acts of Washington State (RCW 70.94) and the United States (42 USC 7401 et seq.). If there is any contradiction between the requirements of this plan and statutes, the statutes will prevail.

PARTICIPATION

Those who receive fire protection from the DNR, or from agencies contracted by the DNR, must abide by the requirements of this plan. This includes all burning done on private and state-managed lands that pay, or are subject to paying, Forest Protection Assessment.

Federal agencies that do outdoor burning on forest lands must participate in and abide by the requirements of this plan under the direction of the federal Clean Air Act. These agencies include, but are not limited to, the Forest Service (USFS), Park Service (NPS), Fish and Wildlife Service (F&WS), Bureau of Land Management (BLM), and Department of Defense (DOD).

Indian nations may choose to participate in all or portions of the plan. Participation would be by written agreement between the Indian nation and the DNR. Advantages of participation by Indian nations would include statewide coordination of burning, shared weather forecasting services, uniform data reporting and storage, better protection of the public through a unified burn approval system, satisfaction of federal EPA requirements, and other services provided by either party to the other. Such future agreements would become appendices to this plan.

The "Directives" listed in this plan are requirements of Washington State Law Chapter 70.94 RCW, 76.04 RCW, and WAC 332-24.

ADMINISTRATION

Administrative Units

Individual administrative units of this plan are: DNR Region, National Forest, National Park, National Wildlife Refuge, Military Base, BLM-Spokane District, and Indian nation (if applicable). Working through these administrative units will make efficient use of existing organizational structures and facilitate implementation.

Permit issuance, plan enforcement, and plan administration will be based upon these administrative boundaries, but individual burn approvals will consider the cumulative effects of all burning to avoid severely affecting individual air sheds.

Responsibilities

The *DNR* is responsible for the overall administration of the Smoke Management Plan. The Resource Protection Division Manager delegates operating responsibilities to the DNR Regions. Other agencies in both the state and federal governments also have responsibilities under the plan, as discussed further in this section. (See the Appendices for specific operational responsibilities.)

The *Resource Protection Division Manager* is responsible for:

- Providing smoke management operating procedures for the DNR Regions and federal land managers
- Providing technical expertise, meteorological information and forecasts, and training related to this plan
- Developing performance standards for DNR Regions
- Coordinating among Smoke Management Plan participants
- Approving or disapproving burning depending upon meteorological conditions, potential smoke intrusions, and other air quality effects.
- Developing and maintaining systems for gathering, transmitting, and reporting data required by the plan (excluding computer software and hardware)
- Collecting required fees from federal Smoke Management Plan participants (and Indian nations where applicable)

DNR *Region Managers* are responsible for:

- Implementing the Smoke Management Plan on state and private lands that receive fire protection from the DNR
- Approving or disapproving burning on state and private lands that receive fire protection from the DNR
- Ensuring that DNR standards and operating procedures are followed
- Assigning priorities for burning on state and private lands
- Providing necessary information and required data to Resource Protection Division
- Collecting permit fees from state and private burners
- Reporting and documenting where and when smoke intrusions occur, and reacting to citizen complaints about smoke nuisances
- Coordinating plan implementation with local fire districts and local air pollution control authorities
- Ensuring that field enforcement is conducted and is consistently applied

The *Director of the Washington State DOE* is responsible for establishing "Designated Areas" and establishing and publishing air quality standards (see Appendix 10). The director also gathers air quality information from DOE sources and from local air pollution control agencies, and notifies the DNR when air quality has diminished to the point when "impaired air" or a "forecast stage of air pollution episode" have been, or are likely to be, declared. DOE confers with the DNR meteorologist as needed during the daily burn approval process. DOE is also responsible for creating the State Implementation Plan (SIP) for visibility protection of Class I federal areas.

The following officials are responsible for ensuring that the requirements and operating procedures of this plan are met as they apply to burning on federal lands under their control: the Forest Supervisor for the USFS, the Park Superintendent for the NPS, the Refuge Manager for the F&WS, the District Manager for the BLM, and the Base Commander for the Military Base.

Where there is an agreement between the DNR and an Indian nation over burning on tribal forest lands, the tribal designee or government body specified in the agreement will be responsible for ensuring that all requirements and operating procedures are met.

Annual Reporting

The DNR will provide an annual report to the legislature, DOE, and other interested parties that details the total emissions created by all burning included within the scope of this plan, other burning statistics and trends, and the progress made toward meeting the emission reduction targets of the Washington Clean Air Act.

GENERAL BURNING REQUIREMENTS

All burning **must be approved** before lighting the fire. The mechanism, criteria, and requirements for burning approval are different for large fires than for small fires.

General Directive:

All persons who do any burning that is subject to this plan must comply with the following general requirements:

Burning is allowed only if the fires do not contain prohibited materials as defined in WAC 332-24-205 (7), unless otherwise provided for in this plan.

Smoke from burning must not obscure visibility on public roads and highways.

Smoke from burning must not cause a nuisance as defined in WAC 332-24-205(8).

APPROVING LARGE FIRES

Large prescribed fires have specific approval criteria that represent current practice in the burn approval process.

Large fires defined:

> Large prescribed fires are fires that have the potential to create significant smoke impacts beyond the immediate fire area. The threshold for what makes up a large fire varies by geographic area, topography, and distance to communities. In areas near communities or prone to inversions the threshold will be 100 tons per burn. DNR Regions will use the criteria described in Appendix 18 to identify low risk areas where the threshold for pile burns will be set at 300 tons per ownership per DNR District.

Judgment, experience, science, and local knowledge have been successfully combined to produce an effective burn approval system. The appropriate weighting of factors in an ever-changing environment is the art of smoke management, and has been responsible for the program's success in the last nine years. A measure of the effectiveness of these criteria is that since implementation of the plan there have been very few intrusions of smoke into designated areas.

Burn Approval Criteria:

1. There is the likelihood of an "intrusion" of smoke into "designated areas," which includes air space 2,000 feet above the ground, or "sensitive areas," such as population centers (see map, Appendix 8).

2. There is any likelihood of an over-flight of smoke above a designated area or special public events specified by DNR Region Managers; but over-flights of smoke may be approved over designated areas on days when visibility would be reduced naturally by clouds, fog, rain, snow, etc.

3. Burning will not comply with the SIP of the federal Clean Air Act regarding visibility protection of Class I federal areas (see map, Appendix 7).

4. Any state or federal air quality regulations, laws, or rules would be violated.

5. Burning on state and private lands does not meet the requirements of Washington State's Forest Practice Rules and Regulations relating to threatened or endangered species protection.

6. Burning will cause mandatory emission reduction levels to be exceeded as described in this plan on page 13.

7. Burning will knowingly violate another state's published air quality standards.

8. Smoke will not significantly disperse within approximately eight hours of ignition, and be fully dispersed by 12:00 PM the next afternoon unless the burn meets the criteria and requirements of a multiple day burn. This does not include residual smoke in the immediate burn area itself.

There are several important factors considered by DNR Regions and the Smoke Management Section of Resource Protection Division to determine if the preceding criteria can be met.

Current and forecasted air quality are important factors in the burn approval process. The DOE's Meteorologist transmits air quality conditions to the DNR. The DNR's Smoke Management Meteorologist uses DOE-supplied data, along with National Weather Service observations and information supplied by local air pollution control agencies, to evaluate air quality. If air quality is deteriorating and is expected to continue to deteriorate and result in an episode being called in the next 24-hour period, burns greater than 100 tons are usually denied until conditions improve.

Current and forecasted weather conditions also have a direct influence on all burn approvals. The DNR's Smoke Management Meteorologist makes daily smoke management forecasts using data from the National Weather Service, the Forest Service, DNR Regions, and private industry sources. Wind speed and direction are both observed and predicted at various elevations above ground level. Air turbulence, mixing heights, inversion depths, and smoke dispersion potential are all considered in the smoke management forecast and the approval process.

Burn approvals will include consideration of *dispersal criteria and objectives*, that is, of an air shed's ability to disperse the pollutants created by burning. The Smoke Management Section predicts large scale dispersion potential and Regions include local knowledge of inversion and local dispersal patterns for individual burn sites.

Fuel moistures, timing of ignition, and the firing method are reviewed before issuing burn approvals. These factors relate to minimizing particulate emissions and the impacts of residual smoke on and around the burn site. Those burns that apply the best technology and firing techniques may receive a higher priority than other similar proposed burns using less-efficient firing techniques.

In the approval process, the DNR Region Managers consider the *availability of suppression forces* to react to potential prescribed burn escapes on DNR-protected lands. They also consider the level of wildfire activity in the Region. Units deemed to be "high risk" on DNR-protected land warrant special attention. Weather factors relating to fire danger, such as wind speed and relative humidity, are important considerations when evaluating the risk of

escape.

DAILY BURN PRIORITIZATION

For large prescribed fires (described on page 7), the DNR Region Managers and the various federal managers to which this plan applies will pre-approve and prioritize burns daily, and then submit those prioritized pre-approvals to the Smoke Management Section. The Smoke Management Section will in turn approve or disapprove each burn and notify the affected manager of the decision. The managers must then consider the following factors when they give **final** approval to those burns authorized by the Smoke Management Section:

Elimination of fire hazard or "extreme fire hazard" as defined in WAC 332-24-650 and WAC 332-24-652.

Burning conducted in eastern Washington for the purpose of restoring forest health or preventing the additional deterioration of forest health as determined by the Department.

Burning to maintain fire dependent ecosystems to preserve rare or endangered plants or animals within state, federal, and private natural area preserves, natural resource conservation areas, parks and other wildlife areas.

Burns using burning techniques that will produce the least particulate emissions per acre treated, as predicted by the USFS PNW Research Station computer model (see page 15).

Proposed burns from landowners who have an active program of using alternative slash management techniques.

Whether fire is the only viable tool to accomplish the fuel reduction, silvicultural practice, or other purpose for proposing burning.

The risk of smoke intrusion.

Directive: No large prescribed fires will be permitted on

State, private, federal and participating tribal lands that ARE protected by the DNR

unless

the Department's Resource Protection Division, Smoke Management Section, has given smoke management approval,

and

the Region Manager where the burning is proposed issues the final approval.

Directive: No large prescribed fires will be permitted on

federally managed and participating tribal lands NOT protected by the DNR

unless

the Department's Resource Protection Division, Smoke Management Section, has given smoke management approval,

and

the responsible Land Manager where the burning is proposed issues the final approval.

Directive: This plan requires that the specific operating procedures listed in Appendix 1 be used in requesting and granting individual burn approvals.

APPROVING SMALL FIRES

Small fires have the potential to affect public health when state or local authorities declare air pollution episodes and impaired air conditions. State law requires that burning be suspended in areas where episodes or conditions of impaired air have been declared.

Small fires defined:

small fires are individual fires that consume less than 100 tons of material in a 24-hour period, or one or more fires totaling less than the level defined in Appendix 18.

Directive: All persons who propose to burn small fires must first call 1-800-323-BURN and follow the instructions that apply for the day and location of the proposed burning.

If the message suspends burning because of poor air quality, all participants of this plan must comply. If burning is suspended because of high fire danger, then this suspension applies only to DNR-protected lands. (Federal Land Managers can establish their own criteria for suspension of burning because of high fire danger on lands they protect.)

APPROVING MULTIPLE DAY BURNS

A multiple day burn is a prescribed fire of any size conducted in eastern Washington for forest health purposes that cannot be managed so that the smoke will be fully dispersed by 12:00 p.m. on the day after the first ignition of the burn area. Burns that the landowner chooses to ignite over several days, but could reasonably be burned in one day or managed on a day by day basis will not be considered multiple day burns. Large pile burns burned over a period of days are not multiple day burns because ignition can be stopped and the piles mopped up, if needed.

Multiple day burns, regardless of size, will be approved following the criteria for approving large burns described on page 7. The following notification requirements must be met to provide DNR adequate time to review the project, and to inform other interested agencies and the public of the burn.

Beyond the other criteria used to approve large burns, The DNR will consider whether other burners in the area will have the opportunity to burn during the multiple day burn.

Notification Requirements for multiple day burns

- Three months before the burn the landowner must give the DNR sufficient burn plan information to determine the size and scope of the proposal for DNR's review.
- Two months before the burn DNR will determine if the burn has the potential to significantly affect communities, and will notify the landowner of additional steps needed.
- If DNR determines that the burn has the potential to affect communities, the landowner must notify the public of the burn at least one week before they plan to burn. The notification will be published in local newspapers, and may be a paid advertisement, press release, or public service announcement. The notice will list the location, size and duration of the burn, and must include a landowner's phone number to call for updates or more information about the burn.

SMOKE INTRUSIONS

There may be occasional intrusions of smoke into designated areas. The DNR Region staff and Resource Protection Division are responsible for complaint processing and intrusion reporting as described in the procedures in Appendix 5. Documentation of such occurrences will improve future prevention measures and properly inform responsible officials and the public.

VISIBILITY PROTECTION

The federal Clean Air Act (CAA) established a national visibility goal to ". . . prevent any future, and remedy any existing, impairment of visibility in mandatory Class I areas." Washington has eight (8) federal Class I areas that are national parks and wilderness areas (see map, Appendix 7).

All states must develop programs to make "reasonable progress" toward meeting the visibility goals in the Class I areas as part of its State Implementation Plan (SIP) for the federal Clean Air Act. The Washington State DOE has the primary responsibility for SIP development, with the DNR being responsible for enforcing the portions related to its jurisdiction.

One or more burns that consume 100 tons or more of material have the potential to affect visibility significantly over large areas. The cumulative effect of many smaller burns may also have an impact on visibility. The visibility portion of this plan concentrates on burns that consume 100 tons and greater at this writing. Added control of small burns may be included in future plan amendments if that source is a significant contributor to visibility degradation, and if workable implementation thresholds can be established.

The visibility protection section of the current SIP was created in 1985 after consultation with DNR, USFS, private landowners, DOE, and other stakeholders. Presently, visibility protection practices meet or exceed the requirements of the 1985 SIP, mainly because of voluntary agreements between large private landowners and the DNR.

In 1991, the Washington Clean Air Act amendments (RCW 70.94.011; Declaration of Public Policies and Purpose) added language describing the legislature's intent to ". . . preserve visibility, to protect scenic, aesthetic, historic, and cultural values, and to prevent air pollution problems that interfere with the enjoyment of life, property, or natural attractions of the state." This, combined with the federal visibility requirements, has motivated many stakeholders and the managers of Class I federal areas to ask for increased visibility protection beyond the 1985 SIP requirements and the current operating level developed through the voluntary agreements.

The following provisions of this plan will be another significant step toward making "reasonable progress" to meet national visibility goals for Class I federal areas, and will balance the needs of various stakeholders in meeting the intent of the legislature as stated in the Washington Clean Air Act amendments of 1991:

Reduced particulate emissions due to the mandatory emission reductions described in this plan and RCW 70.94.

Restricted burning during poor air quality days, which are also the days that have generally poor visibility conditions, due to implementation of the mandatory "call-in" requirement before igniting burns of less than 100 tons.

Increased use of alternative methods of debris disposal to reduce the need to burn forest debris.

Increased use of "pile-burning" techniques to reduce visible smoke by increasing combustion efficiency through the use of fans, etc. The use of pile-burning techniques will also allow burning to occur outside heavy tourism periods when broadcast burning is not possible, allow burning of large units to be done in smaller sub-units (thereby keeping smoke impacts more localized), and will allow burning during cloudy or low visibility rainy days.

Directive: Burns that will consume 100 tons or more of material will NOT be allowed under the following circumstances:

On weekends (midnight Thursday through midnight Sunday) between June 15 and October 1 statewide

On Independence Day or Labor Day holidays.

All burning on weekends between June 15 and October 1 in western Washington west of Interstate 5 may be approved by the Land Manager on a case-by-case basis if:

the burn will meet all of the eight criteria for burn approval described on page 8

and

the burn is a high-priority unit for abatement of extreme hazard if required by law,

or

the Land Manager determines that annual burning opportunities on a particular site are so limited as to justify an exception.

Multiple day burns conducted between June 15 and October 1 in eastern Washington may be approved by the land manager on a case-by-case basis if the land manager certifies in writing to the Department of Ecology that:

the burn is conducted to restore or maintain forest health, as defined in appendix 16,

and

the burn will meet all of the eight criteria for burn approval described on page 8,

and

the burn could not be conducted prior to June 15 due to unfavorable weather conditions

and

smoke impacts to Class I areas can be avoided and such consideration is included in the prescription for the burn. The burn plan will address visibility protection as an objective and will address management actions (i.e. stop lighting, rapid mopup, public notification) to be taken if these impacts are not avoided due to changing atmospheric conditions.

All of these provisions will be reviewed within one year of adoption of this plan to:

- determine their effectiveness toward improving visibility
- document the actual impact on burners' ability to meet their debris-management objectives
- allow time to review newly published studies related to silvicultural burning and their impact on Class I areas (National Park Service, "Prevent Study")
- allow additional time for industrial burners to develop management strategies for alternative methods of debris disposal

SMOKE MANAGEMENT PLAN EXCEPTIONS

The smoke management plan cannot anticipate or provide for every possible scenario related to prescribed fire. Occasionally, situations arise or landowners make proposals that the smoke management plan does not address. The exception process provides a framework to review these proposals in a timely manner, and approve or disapprove them based on their merit. Proposals that do not conform to the smoke management plan may be approved if the proposal will provide the same or better protection of public health, safety and welfare (such as Class I area visibility) to that provided in the plan.

How to Apply for an Exception

If a landowner has a proposal that does not conform to the smoke management plan, the landowner may request an exception to the smoke management plan by providing DNR, in writing:

A description of the proposal;

A statement describing how the proposal does not conform to the smoke management plan;

A description of how the proposal provides the same or better protection of public health, safety and welfare (such as Class I area visibility) to that provided by the plan.

The DNR and DOE will review the proposal in a timely manner. The time line for the review will consider needs of the proponent. If both agencies concur, the proposal will be allowed subject to all other requirements of the smoke management plan.

DNR will notify the landowner of the decision.

Potential use of the Exception

For example, if it has been an exceptionally wet spring, a landowner may request to conduct forest health burns during the summer weekend visibility protection period.

The exception process is not an appeal process for disapproval of burns. The process cannot be used to avoid procedural requirements like smoke management approval, or emissions inventory requirements.

REQUIREMENTS FOR EMISSION REDUCTION

Two of the primary goals of this plan are to protect public health and promote the enjoyment of the natural attractions of the state. Reduction of emissions produced from burning, coupled with the use of alternative methods of debris disposal, will meet these goals by improving general air quality.

Fire is a historic, necessary, and natural part of the environment. There are conflicting public benefits when limiting the use of fire as a land management tool to protect air quality. When people move into areas where wildfires historically occurred, it becomes even more important to use prescribed fire to manage fire hazards and provide for the protection of human life and property, as well as forest health.

An example of this conflict is beginning to be seen in eastern Washington, where the need to use prescribed fire is increasing to reduce very high fuel loads. These high fuel loads have resulted from drought, insect and disease infestations and from the exclusion of fire from large areas through decades of fire suppression activities. Failure to manage this fuel loading

increases the risk of a catastrophic wildfire.

The Legislature acknowledges the natural role of fire in forest ecosystems and finds it to be in the public interest to use fire under controlled conditions to prevent wild fires by maintaining healthy forests and eliminating sources of fuel.

This plan seeks to promote the efficient and wise use of fire, given the limited emission levels mandated by the legislature.

Directive: Emissions from burning covered by this plan must be reduced by 20 percent from baseline levels by December 31, 1994. This reduced level would provide a ceiling for emissions until December 31, 2000.

Emissions from burning covered by this plan must be reduced by 50 percent from baseline levels by December 31, 2000. This reduced level would provide a ceiling for emissions after that.

Emissions from silvicultural burning that is conducted in eastern Washington for the purpose of restoring forest health or preventing the additional deterioration of forest health are exempt from these ceilings.

If emission targets for December 31, 1994, are not met, the DNR will immediately limit burning not for forest health purposes to meet the 1994 target levels and ensure that burning in subsequent years will achieve equal annual incremental reductions to reach the December 31, 2000, reduction target level. If the emission reductions are met in 1994, but are not met by December 31, 2000, the Department must immediately limit burning not for forest health purposes to reduce emissions to the December 31, 2000, target level in all subsequent years. (If necessary, this will be done by implementing the mandatory allocation system.)

EMISSION REDUCTION THRESHOLDS

The following are three possible scenarios, any one of which would demonstrate satisfactory achievement of mandatory emissions reduction levels:

SCENARIO #1

The total emissions produced in calendar year 1994 are equal to, or less than, 80 percent of the baseline emission level,

and then

the total emissions produced in calendar year 2000 are equal to, or less than, 50 percent of the baseline emission level,

and then

the total emissions produced each calendar year after that do not exceed 50 percent of the baseline emission level.

SCENARIO #2

The total emissions produced in calendar year 1994 are greater than 80 percent of the baseline emission level,

but

the mandatory emissions allocation system is activated and total annual emissions are reduced in equal annual increments so that the total emissions produced in calendar year 2000 are equal to, or less than, 50 percent of the baseline emission level,

and

total emissions produced each calendar year thereafter do not exceed 50 percent of the baseline emission level.

SCENARIO #3

The total emissions produced in calendar year 1994 are equal to, or less than, 80 percent of the baseline emission level,

but

the total emissions produced in calendar year 2000 is greater than 50 percent of the baseline emissions level,

and then

the mandatory emissions allocation system is activated and emissions are reduced to 50 percent of the baseline emissions level each calendar year after that.

CREATING THE EMISSIONS BASELINE

The calculation of the emissions baseline is a central feature of this plan because it provides the gauge by which success can be measured. The actual calculation of the emissions baseline is

based on the final version of SMS-INFO developed by the USFS, Pacific Northwest Research Station, Seattle Forestry Lab in Seattle (PNW) in the Spring/Summer of 1993. The resulting emissions baseline will be published as an appendix to this plan as soon as it has been calculated. (A detailed explanation of the alternative baseline calculation methods considered is in Appendix 12.)

The baseline reflects historical levels of emissions from current participants of this plan only. Emissions data from past participants who are no longer included in this plan has been removed from the baseline calculations. Similarly, any Indian nations that choose to participate in the emissions reduction portion of this plan, and any other agencies not previously participating, will have their historical levels of emissions added to the baseline calculation and the total emissions baseline will be adjusted accordingly. All plan participants must supply available burning data to the DNR related to their management area for the baseline period.

The baseline determination method incorporates new fuels consumption and emissions research, computer modeling, and existing data from past burning. Where data from past burning have not been gathered, subjective estimates are made using a scientifically based statistical sampling from research. The backbone of the baseline determination method is the use of computer models created by the USFS, Pacific Northwest Research Station, Seattle Forestry Lab in Seattle (PNW), the basic field data gathered by those researchers over the past

10 years, and data supplied by burners during the baseline period. (Appendix 10 contains a more detailed description of the models used.)

"SMS - INFO"

The modeling system used to generate the baseline numbers and to calculate and track future emissions is called SMS-INFO. It was created by the U.S. Forest Service, Pacific Northwest Research Station, specifically at the request of Oregon Department of Forestry and Washington Department of Natural Resources to assist in the administration of their respective smoke management programs. This system reflects the best available science to predict the amount of emissions from broadcast burns, underburns, and pile burns. (See Appendix 10 for an overview of SMS-INFO.)

The types of emissions calculated by SMS-INFO include total particulate material (PM), particulate material 2.5 microns or less (PM-2.5), particulate material 10 microns or less in size (PM-10), carbon monoxide, methane, total non-methane hydrocarbons, and carbon dioxide.

PM-10 Emissions Baseline

This plan will use PM-10 emissions to measure compliance with mandated emission reductions levels.

The total emission baseline level will be the sum of broadcast/underburn emissions,

greater than 100-ton pile emissions, and under 100-ton pile burn emissions.

The baseline will not be altered, except to reflect additions or subtractions of plan participants, or to incorporate improvements within SMS-INFO resulting from new research. Any such alteration will be described in the annual Smoke Management Report for that year.

EMISSIONS CALCULATION AND TRACKING SYSTEM

The Clean Air of Washington Act requires a tracking system to measure progress toward the emission reduction targets.

This tracking system includes: mandatory reporting of completed burns, a summary of emissions created by each plan participant, calculation of pre-burn and post-burn emissions, and the annual total of emissions produced compared to the targets to determine whether there is a need to implement the mandatory emission allocation system (page 17).

"Rule burning" and prescribed natural fires will not be reported or tracked by the plan's tracking system. (See Scope of the Plan, page 3.)

Data Reporting

Directive: All participants in the Washington Smoke Management Plan must report their burning activities to the DNR according to the procedures listed in Appendix 2 of this plan.

Reporting is not required for the following types of burning:

- State and private lands where the burning does not require a written permit ("rule burns")
- federal lands where burning is related to recreation (e.g., campfires) or is a single pile less than 10 feet in diameter, and
- other outdoor burning not covered by this plan, such as agricultural burning or burning in improved areas.

The DNR will be responsible for receiving and storing all burning data, and will be the official source from which data will be distributed to other interested parties.

Gross Fuel Loading Estimates

Directive: The gross fuel loading of material to be burned must be estimated using approved methods listed in Appendix 3.

The responsibility for estimating the gross fuel loading on each burn site rests with the individual federal Land Manager, tribal designee, or the DNR on lands it protects.

Emissions Calculation

The tracking system will use SMS-INFO and gathered field data to calculate and record the post-burn tonnage consumed and emissions created from the completed burning. This will include broadcast burning, underburning, and pile burning. The DNR will generate the official emissions values to be used in the administration of this plan.

MANDATORY EMISSIONS ALLOCATION SYSTEM

The apportionment of burn approvals *may* become necessary if the emission reduction requirements of the Washington Clean Air Act are not met. The following mandatory system will provide an equitable and understandable method for apportioning emissions if it becomes necessary to activate it.

Responsibilities

The *Supervisor* will approve any deviation from this allocation plan and will notify the affected burner groups of the amount and duration of such deviation.

The Department's *Resource Protection Division Manager* is responsible for determining when the allocation system will be activated, and for coordinating or transferring surplus emission allotments (if any) between burner groups or between DNR Regions. The Resource Protection Division will continuously monitor emission production and periodically inform the managers of each burner group of their cumulative total emission production and trends.

Once the allocation system is activated, the following managers are responsible for prioritizing and limiting which burning will be approved on lands within their jurisdiction to avoid exceeding their emissions allotment: the *Region Manager* of each DNR Region; the *Regional Forester* of the USFS, Region 6; the *Regional Director* of the National Park Service, Pacific Northwest Region; the *Base Commander* of Fort Lewis or other military base where regulated burning occurs; the *Associate Director* for Oregon, Washington, and

Idaho of the U.S. Fish and Wildlife Service, Region 1; the *District Manager* of the Spokane District Office of the U.S. Bureau of Land Management; and the *tribal designee* of participating Indian nations.

Activation

Activation of the mandatory allocation system will occur only if emission reduction thresholds (see scenarios, pp. 13-14) are not met.

The Resource Protection Division will develop trend curves that describe the most recent five-year average annual burning pattern of each manager and monitor trends as burning progresses throughout a calendar year.

If burning activity appears to be deviating significantly from the most recent five-year trend, the Resource Protection Division will notify each manager. If the total burning remaining to be done will cause the emissions ceiling to be exceeded, the DNR will activate the mandatory emissions allocation system.

The Resource Protection Division will notify each manager directly, and the public through news releases, that the mandatory allocation system has been activated, and inform the managers of the amount of emissions they may produce during the remainder of that calendar year. The managers must then prioritize their burning so that their allocation will not be exceeded.

Directive: All managers must immediately curtail all burning in their management area when the mandatory allocation system has been activated and they are notified that their emissions allocation has been exhausted.

The allocation system will remain in effect until Resource Protection Division determines that emissions will not exceed the statewide ceiling, and notifies the managers in writing of its cancellation.

Distribution

Emission allocations will be made based upon the percentage of average annual emissions produced by each manager during the previous five calendar years. The emission allocation will be adjusted annually to reflect the most current five-year period. No manager group will be precluded from burning because of an absence of historical burning data. Their current burning will be recorded and become the basis for future allocations.

Individual managers may petition Resource Protection Division for additional allocation. Such a petition should include a description of the burning to be done and a justification

for deviating from the allocation system. The Resource Protection Division Manager will query the other managers for any surplus emissions that may be available. If none are available and the requesting manager wishes to pursue the request, it will be forwarded to the Supervisor for approval or denial. If approved, the remaining allocation for the other managers will be reduced proportional to their percentage of total emissions produced.

Nothing in this allocation system guarantees an emissions level to an individual manager. The Supervisor of the Department has the authority to make adjustments.

EMISSION REDUCTION TECHNIQUES

To maximize the effective use of fire within the emission levels allowed, it is necessary to employ improved burning techniques. The science of predicting the amount of emissions has improved within the last few years thanks to research done by the USFS Pacific Northwest Research Station. Computer models allow burners to analyze proposed burns and prepare burning prescriptions that will produce minimum emissions on each acre to be treated. Various site factors and burning technique scenarios can be tested in the models, and estimates of emissions that each scenario would produce can be calculated. This capability will allow burners to treat maximum acreage with minimum emission production.

When they become available, the DNR, in conjunction with the USFS, will distribute (at cost) copies of these models to burners who want them, and will provide, or arrange for, training in their operation.

Besides total emission reduction, it is an objective of this plan to reduce the amount of visible smoke produced in and around residential areas. The DNR encourages burners to use techniques, such as fans, crane piling, mass ignition, accelerated mop-up, and other methods of increasing combustion efficiency and reducing the smoldering stage of burning. Burning permits will require such practices in areas close to homes or other occupied structures not the property of the person doing the burning. The DNR will provide information about new burning techniques and equipment as this information becomes available.

ALTERNATIVES TO BURNING

Given the amount of acreage to be treated and the limited emission levels allowed, it is no longer possible to rely solely on burning to achieve silvicultural objectives and hazard abatement. Using alternatives to burning has become not only desirable, but necessary to meet the expectations of the legislature. Therefore, alternative methods should always be investigated before choosing to burn.

DNR Region Managers must consider the availability and feasibility of burning alternatives during the permit issuance and burn approval process

when selecting burns for approval after the mandatory allocation system has been activated,

where there is likelihood that burning in or near residential areas will cause a nuisance,

when alternatives are available, reasonably economical, and

when the use of the alternative will not cause other unacceptable environmental or human health effects.

As part of its obligation to encourage alternatives to burning, the DNR will

- gather and distribute information about burning alternatives through participation in interagency and industrial professional organizations and other appropriate forums. Various alternatives are already in use. (See Appendix 14.)

- cooperate with alternative disposal industries by bringing together industrial landowners and disposal industries.

- consult with local government agencies to determine the availability and cost of legal dumping at approved sites.

It is important to note here that the DNR's role in the area of burning alternatives is to facilitate technology transfer, not to initiate new research.

PUBLIC EDUCATION

Public education regarding burning regulations and emission reduction techniques is essential to the plan's success. The primary focus of this education effort will be small landowners and the general public.

DNR field representatives will be the center of this effort through daily contact with the public and small landowners while writing burning permits. They will provide written information

about rules and regulations, provide on-site training sessions about safe and efficient burning techniques, and answer questions.

Region office staff will answer general inquiries or direct those questions to field staff for follow-up action. They will also initiate contacts with local news media to generate feature stories about the burning program and burning regulations. The Regions will also include appropriate information about burning in displays used at public gatherings, such as fairs.

The *DNR* will provide press releases and public service announcements when needed, and distribute them to all media outlets within Washington State. It will also coordinate with other agencies' public affairs offices to combine information about burning when appropriate.

The *Resource Protection Division* will develop brochures and other printed materials to be used by the Region offices. It will also seek sponsors willing to distribute information materials supplied to them by the DNR, such as billing stuffers, grocery store handouts.

The *DNR* will also provide training about the provisions of this plan to private industrial landowners, if requested, through their professional organizations and trade groups.

Additional public education activities will be developed as an ongoing part of this plan.

BURNING PERMITS

Burning permits, either written or "by rule," are required by Washington State law (see Appendix 15) for burning on lands protected by the DNR. Failure to obtain or abide by the terms of an applicable permit is a violation. These requirements apply to all state and privately-owned lands in Washington that pay, or are subject to paying, Forest Protection Assessment.

Federal agencies are not required to obtain a permit; however, those agencies must abide by state and local air pollution control regulations.

Burning permits are issued and enforced by DNR Region staff or by other agencies that have contracted with the DNR to act on its behalf. The operational details of the burning permit program are in Appendix 4.

FEES

The Washington Clean Air Act requires the DNR to collect fees to pay for the costs of its air quality program, and to distribute those costs equitably among all sources whose emissions cause air pollution. Fees must be set by the DNR using required administrative procedures after consultation with the Forest Fire Advisory Board and the public. Fees are deposited in the Air Pollution Control Account administered by the State Treasurer. The legislature

appropriates funds to the DNR to cover the costs of administration and enforcement of the program.

The federal Clean Air Act requires all federal agencies that cause air pollution to comply with all state and local regulations and to pay fees to help defray the cost of those programs in the same manner and to the same extent as non-federal entities.

A method was developed, in consultation with the Forest Fire Advisory Board, that equitably distributes the DNR's air quality program costs among the various burner groups (see Appendix 13). The fee amounts reflect the best estimates of total program costs. Fees will be adjusted as necessary to reflect actual program costs. (The Forest Fire Advisory Board did not endorse the fee amount, only the method.)

The DNR will collect fees from state and private burners when validating written burning permits, and quarterly from federal burners through a billing process consistent with agency procedures. All fees are based upon the amount of emissions created as reflected by the number of tons of debris consumed. Fee amounts for federal agencies reflect their appropriate share of program costs, and are billed individually.

PLAN APPROVAL, REVIEW, AND UPDATING

This plan was reviewed by the public, participating agencies, forest landowners, and other interested parties before its adoption by the Supervisor of the Department of Natural Resources. Final plan adoption was announced in the news media, and by direct contact with the manager groups administering the plan.

All or portions of this plan may be further reviewed or updated as warranted. The Visibility Protection section will be reviewed within one year of adoption. A general review will occur within five years after initial adoption. The reviewers will include representatives of the original advisory committee and any others the DNR considers appropriate.

The original Smoke Management Plan advisory committee consisted of members from:

Department of Natural Resources
U.S. Forest Service
U.S. Park Service
Quinault Nation
Department of Ecology
County Fire Marshal
State Fire Chiefs' Association
Bureau of Indian Affairs
Fort Lewis
American Lung Association of Washington
Clean Air Coalition/Sierra Club

Local air pollution control agencies
Washington Forest Protection Association

The Resource Protection Division Manager will approve procedural changes that are *not* requirements of this plan, as necessary, and distribute those procedural changes to affected plan participants. Procedural changes that *are* requirements of this plan will be approved by the Resource Protection Division after consultation with the advisory committee.

General plan revisions will adopt the same review procedure as used for original adoption.

GLOSSARY

Agricultural Burning	The burning of vegetative debris from an agricultural operation necessary for disease or pest control, necessary for crop propagation and/or crop rotation, or where identified as the best management practice by the agricultural burning practices and research task force established in RCW 70.94.650 or other authoritative source on agricultural practices.
Air Pollution Episode	A period where a forecast, alert, warning, or emergency air pollution stage is declared, as stated in WAC 173-435.
Air Turbulence	Rapid fluctuations or changes in vertical motion of air over short distances.
Atmospheric Stability	The resistance of the atmosphere to vertical motion.
BLM	United States Department of Interior, Bureau of Land Management.
Broadcast Burning	Prescribed burning of debris on a designated unit of land, where the debris has not been piled or windrowed, by allowing fire to spread freely over the entire area.
Burn	A prescribed fire.
Class I Federal Areas	All international parks, national wilderness areas, and memorial parks larger than 5,000 acres, and all national parks larger than 6,000 acres (42 USC 7470).
DOD	United States Department of Defense.
DOE	State of Washington, Department of Ecology.
DNR	State of Washington, Department of Natural Resources.
Designated Areas	Critical areas designated by the Department of Ecology that are otherwise subject to air pollution from other sources. These currently are Port Angeles, Spokane, Grays Harbor, Raymond, and the I-5 corridor from Bellingham south to Vancouver.
Duff	The accumulation of partially decayed organic material found on the forest floor. Sometimes called a "humus" layer.

Escape	A condition which exists when a prescribed fire leaves the area where it was intended to remain.
Extreme Hazard	Particular hazardous forest fuel conditions as defined in WAC 332-24-650 and 332-24-652.
F&WS	United States Department of Interior, Fish and Wildlife Service.
Fire Dependent Ecosystem	Systems possessing organisms that require fire for their survival and continuance, with fire an essential part of the environment. The plant species that dominate are not only adapted to fire but possess fire-dependent structures, mechanisms, and functions. Where fire often serves as the driving source of life cycles.
Forest Land	Any unimproved lands that have enough trees, standing or down, to constitute in the judgement of the DNR, a fire menace to life or property. Sagebrush and grass areas east of the summit of the Cascade mountains may be considered forest lands when such areas are next to or intermingled with, areas supporting tree growth.
Impaired Air	A condition declared by the DOE or a local air pollution authority where meteorological conditions are conducive to an accumulation of air contamination with PM-10 and carbon monoxide at specified levels, and which threatens to exceed other limits established by DOE or an air authority.
Intrusion (Smoke Intrusion)	The intrusion of visible smoke into a designated area at an altitude less than 2,000 feet above ground level.
Inversion	A layer of air in which the temperature increases with height. The effect of various types of inversions is to greatly retard the dispersal of smoke.
LAN	A Local Area Network computer system.
Land Manager	The official responsible for ensuring that the requirements and operating procedures of this plan are met as they apply to burning on lands under their control: They include the DNR Region Manager, the Forest Supervisor for the USFS, the Park Superintendent for the NPS, the Refuge Manager for the F&WS, the District Manager for the BLM, and the Base Commander for the Military Base.

Landings	An area on a logging operation where logs that are taken from the forest are assembled, trimmed, limbed, and loaded for shipment.
Low Risk Areas	Remote areas where most pile burning represents little risk of causing smoke impacts to the public. Low risk areas have a higher threshold for burns requiring smoke management approval than other areas.
Mass Ignition	The rapid or simultaneous ignition of materials on a particular burn site.
Mixing Heights	A term used to describe the potential for vertical mixing. It defines the height above the surface through which relatively vigorous mixing will take place in the vertical due to convection.
Mop-Up	Action taken to completely extinguish a fire.
Multiple Day Burns	A prescribed fire of any size that cannot be managed so that the smoke will be fully dispersed by 12:00 p.m. on the day after the first ignition of the burn area. Burns that the landowner chooses to ignite over several days, but could reasonably be burned in one day or managed on a day by day basis will not be considered multiple day burns. Large pile burns burned over a period of days are not multiple day burns because ignition can be stopped and the piles mopped up, if needed.
NFDRS	National Fire Danger Rating System.
Non-Attainment Area	A clearly delineated geographic area that has been designated by the Environmental Protection Agency and promulgated as exceeding a national ambient air quality standard or standards for one or more of the criteria pollutants, which includes carbon monoxide, fine particulate matter, sulfur dioxide, ozone, and nitrogen dioxide.
NPS	United States Department of Interior, National Park Service.
Open Burning	All forms of outdoor burning *except* agricultural and silvicultural burning. Further definition can be found in WAC 173-425-020.

Over-Flight of Smoke	When a visible smoke column can be seen above a particular area, and is greater than 2,000 feet above ground level.
Pile Burning	Burning material in piles as opposed to other configurations.
PM-10	Particulate material with an aerodynamic diameter of 10 microns or less.
Prescribed Burning	Controlled application of fire to wildland fuels in either their natural or modified state under specific environmental conditions which allow the fire to be confined to a predetermined area, and at the same time to produce the fireline intensity and rate of spread required to attain planned management objectives.
Prescribed Natural Fire	Fires ignited by natural means, i.e., lightning, which are permitted to burn under specific environmental conditions, in preplanned locations, with adequate fire management personnel and equipment available to achieve defined objectives. Prescribed natural fires are used for maintaining natural conditions and ecological processes in native ecosystems.
Range Lands	Wildlands that do not meet the definition of forest lands.
Rule Burn	A specific type of small fire that doesn't require a written burning permit, but is subject to the rules listed in WAC 332-24-205 and WAC 332-24-211.
SIP	State Implementation Plan to meet the requirements and objectives of the United States Clean Air Act.
Sensitive Areas	Areas of heavy recreational use and population centers outside designated areas.
Silviculture	Management practices related to controlling, establishment, growth, composition, and quality of forest vegetation.
Silvicultural Burning	All burning on any land the DNR protects, or on any forest

	lands administered by federal agencies or Indian nations.
Smoke Dispersion	Those processes within the atmosphere which mix and transport smoke away from the source. This depends on three atmospheric characteristics: atmospheric stability, mixing height, and transport winds.
Suppression Forces	Persons and equipment necessary to contain a prescribed or wildfire.
Transport Winds	The wind speed and direction at the final height of smoke plume rise.
USFS	United States Department of Agriculture, Forest Service.
Underburning	Prescribed burning with low fire intensities under a timber canopy.
Unimproved Land	Land that is *not* cleared, pasture, or cultivated, that does *not* contain structures and accompanying yard, and that contains flammable material.
Visible Smoke	Smoke that is slightly visible but has a minimum impact on air quality or overall visibility.
WAC	Washington Administrative Code.
Wildfire	Any fire occurring on wildlands that is not meeting management objectives and thus requires a suppression response.

APPENDICES

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APPENDIX 1

Burn Submittal and Approval Procedures
Burns 100 Tons or Greater

Directive: The operating procedures listed in this appendix are requirements of this plan.

The following procedures apply to burning 100 tons of material or greater at a single burn site/permit site during a 24-hour period:

I. LANDS PROTECTED BY THE DEPARTMENT

A. Designated Regions are responsible for supplying the Smoke Management Meteorologist daily pilot balloon observations by 0700 hours during the burning season, as determined by Resource protection Division.

B. Pre-Burn Reporting

The Region is responsible for gathering and entering the pre-burn site data (see Appendix 2) into the smoke management reporting system prior to requesting authorization from the Smoke Management Section of Resource Protection Division.

C. Afternoon Before the Burn

The Region Manager is responsible for screening, pre-authorizing and prioritizing the burns submitted for the following day.

The Region submits a prioritized list of the next day's proposed burns via FAX or, when available, Resource Protection's Local Area Network (LAN) to the Smoke Management Section of Resource Protection Division the afternoon before the burn.

D. Day of the Burn

Smoke Management Section queries the FAX or, when available, LAN for all burns proposed for that day, by 0700 hours.

Smoke Management contacts the Region for update/clarification of burn site conditions at approximately 0800 hours if necessary.

Smoke Management verbally contacts Regions about which burns are authorized beginning at approximately 0800.

The Regions make the tentative approval decision, and begin to notify individual burners no later than 0830 hours.

Smoke Management Section posts a list of authorized burns for that day on the LAN by 1000 hours. Region Managers make the final decision about which burns receive final approval.

Regions may withhold final approvals for burning until site conditions are checked. This information is passed to the burn proponent via normal contact procedures. **Burning is not allowed until final approval has been given and permit validation has been done.**

E. After The Burn

Region gathers post-burn information (see Appendix 2) and transmits to Smoke Management within five business days after completion of the burn.

Smoke Management calculates actual tonnage consumed and notifies Region within three business days of receipt of the information from the Region.

II. FEDERAL AND PARTICIPATING TRIBAL LANDS

A. Pre-Burn Reporting

The Land Manager is responsible for gathering and entering the pre-burn site data (see Appendix 2) into the smoke management reporting system prior to requesting authorization from the Smoke Management Section of Resource Protection Division.

B. Afternoon Before the Burn

The Land Manager is responsible for pre-screening and prioritizing the burns submitted for the following day.

The Land Manager submits a prioritized list of the next day's proposed burns to the Smoke Management Section of Resource Protection Division via FAX, Resource Protection's Local Area Network (LAN) or SMS on the Forest Service communication system the afternoon before the burn.

C. Day of the Burn

Smoke Management gathers all burn requests for that day, by 0700 hours.

Smoke Management contacts the Land Manager about burns that are approved, beginning approximately at 0800 hours as soon as their office phone lines are open.

The Land Manager makes the final approval for burning and notifies their appropriate staff.

D. After the Burn

The Land Manager gathers post-burn information and transmits it to Smoke Management within five business days of burn completion, according to the procedure listed in Appendix 2.

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APPENDIX 2

Data Reporting Procedures

The Washington Clean Air Act requires that reductions to emissions from silvicultural burning must be made. To measure the reductions and to ensure that authorized emissions levels are not exceeded, data must be collected so that emissions can be calculated and recorded.

Directive: It is a requirement of this plan that the data described below and the timing and method for transferring that data be conducted according to the following procedures:

I. DATA COLLECTION REQUIRED

Data is required to be gathered for all burning for which a written permit has been issued by the DNR and all federal and tribal burning except:

- Prescribed Natural Fires
- Wildfires
- Recreation Fires and single piles less than 10' in diameter ignited in a 24-hour period as specified by agency/tribal rules.

II. DATA TRANSMISSION SYSTEM

The data transmission system has three allowable methods:

A. The DNR Local Area Network (LAN)

B. The USFS Smoke Management System (SMS)

C. Fax Machine

The DNR Regions will collect and enter the data for State and private burning and the US Forest Service will use the SMS on the federal Data General computer system. Other participants covered by this Smoke Management Plan will enter their data into one of the three systems to be determined by the DNR and the individual participant on a case by case basis.

A. DNR LAN Data Transmission

This system will collect two categories of data:

1. Small Burns (less than 100 tons)

2. Large Burns (100 tons and greater)

Each of the two burning categories above has data collected in the field on a form. The form for small burns is the burning permit itself, and for large burns is the burning permit plus attachment "A" on pages 5 through 7.

The completed form(s) are sent to the Region office and the data is entered into the LAN. Instructions to complete the electronic data entry will be given directly to the users through training.

B. U.S. Forest Service - SMS Data Transmission

Region 6 of the U.S. Forest Service developed and will maintain the Fortran-based SMS for its Data General computer system. The SMS allows input of data at Ranger District terminals, collection and editing of data by Forest Supervisors and forwarding to the DNR by an electronic mail system. The U.S. Forest Service data is combined with the DNR data within the Resource Protection LAN. Statewide data analysis is then accomplished with the SMS-INFO computer models and other report generators.

Region 6 maintains an Operators Manual for SMS. System problems/ questions and training will be resolved by the Region 6 staff.

C. Fax Machine

If this method is used data must be sent to DNR Resource Protection Division, Smoke Management Section, which is currently at fax # (360) 902-1781.

III. TIMELINESS OF DATA INPUT

Data must be entered within five business days of:

A. The date when the burning permit was validated for burns less than 100 tons on State and private lands, or

B. The date when the burning was completed for all other burns.

IV. DATA REQUIRED TO BE COLLECTED

A. State and Private Burns Only

The following data must be collected for all burns requiring a written burning permit from the DNR:

Permit Number
Region
District
County
Shutdown Zone
Fire District Number
Section
Township
Range
Legal Subdivision
Pile type
Landowner
Fee Amount Enclosed
Calculated Consumed Tons
Validation Date
Suspension Date (if any)

B. All Burns

The data included on "Attachment A" shown on pages 5 through 7 must be collected for State and private burns that will consume 100 tons and greater in a 24-hour period, and for all burning that requires reporting by other Land Managers.

Attachment A pre-burn data must be collected for all eastside burns qualifying for the forest health exemption.

V. DATA COLLECTION - TRANSITION (August 1, 1992 until notified)

A. For data transmitted via the U.S. Forest Service SMS system, all data will be entered by the Forest or Ranger District.

B. For data that will be transmitted via the DNR LAN:

1. A copy of each permit saved during a month will be forwarded to Resource Protection via regular mail the first business day of the next month unless otherwise directed. Include "Attachment A" when required.

2. For those State and private burns greater than 100 tons that have debit accounts and wish to use the post-burn data with the SMS-INFO model value for consumption and fee assessment, the Region will forward a copy of the completed "Attachment A" by FAX to Resource Protection Division. The data will be run in the model and the value of the consumption will be posted on the LAN with three business days.

3. Beginning in calendar year 1993, all required data will be entered into the LAN at the Region Offices or office of other federal/tribal Land Managers who have chosen the use of the LAN transmission method.

BURN PLAN (ATTACHMENT A) -- 100 Tons and Over

PRE-BURN DATA

ALL BURNS

Permit Number:

Region: *(Circle One)* CES NES NWS SWS OLS SPS SES

Burn Type: *(Circle One)* B-Broadcast/Activity Fuels U-Underburn/Activity Fuels
N-Underburn/Natural Fuels P-Pile/Landings Only

Activity Fuels: Created as a result of human activity. Natural Fuels: Found "as is" in nature.

Type of Landowner: *(Circle One)* A - Forest Service F - Other Federal S - State P - Private T - Tribal

Township: _____ _____ _____ N **Range:** _____ _____ _____ E or W **Section:** _____ _____

Examples: T30N = 300N T6 1/4N = 062N T7 1/2N = 075N T6 3/4N = 067N

Elevation: _____ _____ _____ _____ Midslope and to nearest 500'

County: _____ _____ (See reverse side for county codes)

Property Owner's Name: _____

Sale Name: _____ (Optional) **Sale Number:** _____ *(Optional)*

Reason to Burn: *(Circle One)*
H - Hazard Reduction
W - Wildlife Habitat
S - Silviculture or Forest Health
R - Rare and Endangered Species
A - Abating an Existing Extreme Hazard
P - Preventing the Creation of an Extreme Hazard
T - Training Exercise
E - Eastside Forest Health Exemption

Size of Unit: _____ Acres

If Broadcast/Underburn, use exact size of unit.
If Piles/Landings, use your best estimate of area from which the Piles/Landings were accumulated.

Predominant Species: *(Circle One)*

D - Westside Douglas Fir/Hemlock/Cedar
M - Eastside Mixed Conifer (Incl. Lodgepole Pine/Larch/Ponderosa Pine)
P - Eastside Stands that are 50 percent or more Ponderosa Pine
H - Westside Hardwood Stands
J - Eastside Juniper Stands
B - Primarily Brush Fuels (E or W)
G - Primarily Grass Fuels (E or W)

PILE BURNS -- (Plus the "Landing Portion" of Broadcast/Underburns)

Pile Tons: _____ Enter the total tons of Piles/Landings that will be burned.

Landing Tons: _____ Enter 00000 if no Piles or Landings will be burned.

Pile Calculation Method: *(Circle One)* O - Ocular (Eye) Estimate A - Aerial Photograph Interpretation
S - Statistical Sample of Piles

The method used to determined piled fuel loadings (i.e., How did you do it?).

Pile Type: *(Circle One)* H- Hand Piles T - Tractor/Dozer/Machine Piles G - Grapple/Crane/Shovel Piles

BROADCAST AND UNDERBURNS ONLY

Loading Method: *(Circle One)* (How did you determine the Broadcast/Underburn fuel loading?)

P1 - PNW51 (DNR Westside - Photo Series) T - Transect
P2 - PNW52 (DNR Eastside - Photo Series) M - Other Method (Incl. other Photo Series - Requires Fire Control Approval)

Fuel Loadings in Tons Per Acre:	Diameter of Fuel in Inches	Tons/Acre (To the Nearest Whole Ton)
	0 - 1/4"	___ ___ 2
	1/4" - 1"	___ ___ ___
	1" - 3"	___ ___ ___
	3" - 9"	___ ___ ___
	9" - 20"	___ ___ ___
	20" and Greater	___ ___ ___

Duff Depth: ____ ____

The average Duff Depth across the whole unit in inches and tenths of an inch. **On-scene observation is an important measurement**, however. If Duff Depth cannot be reasonably determined, leave entry blank.

Slope: ____ ____ ____ Average percent slope of unit.

Cut Date: ____ ____ ____ ____ *(Form is "MMYY")* Month and Year unit was cut. If natural fuels (not harvested), enter "9999." If unit harvested over an extended period of time, enter date when the unit was 70 percent cut.
M M Y Y

Snow Off Date: ____ ____ *(Form is "MM")* Month snow melted off unit. If never covered with snow last winter, enter "00."

Ignition Method: *(Circle One)* A - Airplane/Helo C - Combination of Air/Hand H - Hand O - Other

"How will the Broadcast burn be lighted?"

WASHINGTON COUNTIES

01 Adams	21 Franklin	41 Lewis	61 Snohomish
03 Asotin	23 Garfield	43 Lincoln	63 Spokane
05 Benton	25 Grant	45 Mason	65 Stevens
07 Chelan	27 Grays Harbor	47 Okanogan	69 Thurston
09 Clallam	29 Island	49 Pacific	69 Wahkiakum
11 Clark	31 Jefferson	51 Pend Oreille	71 Walla Walla
13 Columbia	33 King	53 Pierce	73 Whatcom
15 Cowlitz	35 Kitsap	55 San Juan	75 Whitman
17 Douglas	37 Kittitas	57 Skagit	77 Yakima
19 Ferry	39 Klickitat	59 Skamania	

POST-BURN DATA

ALL BURNS -- For all burns (Pile, Broadcast, Underburns, etc.)

Date Burned: ____ ____ ____ ____ ____ ____
M M D D Y Y

Ignition Time: ____ ____ ____ ____ Use 24-hour clock (1 PM = 1300, etc.)
H H M M

Actual Acres Burned: _____

Use your best estimate. If Piles/Landings, estimate the acres from which the burned Piles/Landings were accumulated.

PILE BURNS -- (Plus the "Landing Portion" of Broadcast/Underburns)

Consumed Pile Tons: ____ ____ ____ (Use the percent of pre-burn estimated tonnage actually consumed - in tons)

Consumed Landing Tons: ____ ____ ____ (Use the percent of pre-burn estimated tonnage actually consumed - in tons)

BROADCAST/UNDERBURNS ONLY

Ignition Duration in Minutes: ____ ____ ____ (Time necessary to light the unit)

Weather Data: Weather Station Used: _____

If you get the weather data from one of the following:

RAWS - Enter Station Name
Fire Weather Station - Enter Station Name
(e.g., Region Office, Ranger District Office, etc.)
NWS Office - Enter Station Name
On-Site - Enter "Unit"

Days Since Rain: ____ ____

Enter the number of days since significant rainfall (i.e., 1/2 inch of rain westside or 1/4 inch rainfall eastside) occurred within a 48-hour period.

Wind Speed: ____ ____ Average surface wind speed at the time of ignition (mph)

Fuel Moistures: (At the time of ignition)

Ten Hour: ____ ____ 1000 Hour: ____ ____ (If unavailable during the "off season," leave blank: use NFDRS when available)

1000 Hour Method: *(Circle One)* N - NFDR-TH A - ADJ-TH W - Weighed (Oven Dried)

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APPENDIX 3

Tonnage Estimation Procedures

ESTIMATING GROSS FUEL LOADING AND TONS OF FUEL CONSUMED IN PRESCRIBED BURNS APPROVED METHODS

Directive: It is a requirement of this plan that only the following approved methods be used to calculate gross fuel loading of debris to be burned and tons of fuel consumed.

BROADCAST BURNS - DETERMINING GROSS WOODY FUEL LOADING - PHOTO SERIES METHOD

There are several Pacific Northwest Research Station (PNW) Photo Series available for quantifying forest residues. The photo series provide a reasonable means for estimating the tons of fuel in a unit that may be consumed by a prescribed burn. These publications contain series of photographs displaying different forest residue loading levels by size class, for areas of like timber types and cutting practices.

The photo series that will be the standard used by the Washington State Smoke Management Plan are:

USDA Forest Service General Technical Report PNW 51, 1976. Photo Series for quantifying Forest Residues in Coastal Douglas Fir-Hemlock Type and the Coastal Douglas Fir-Hardwood Type.

USDA Forest Service General Technical Report PNW 52, 1976. Photo Series for Quantifying Forest Residues in Ponderosa Pine Type, Ponderosa Pine and Associated Species Type, and Lodgepole Pine Type.

USDA Forest Service General Technical Report PNW-GTR-258, 1990. Stereo Photo Series for Quantifying Forest Residues in the Douglas Fir-Hemlock Type of the Willamette National Forest.

USDA Forest Service General Technical Report PNW-GTR-231, 1989. Stereo Photo Series for Quantifying Forest Residues in Coastal Oregon Forests: Second-Growth Douglas Fir-Western Hemlock Type, Western Hemlock-Sitka Spruce Type, and Red Alder Type.

Other photo series may be accepted for use if approved by the Department of Natural Resources, Resource Protection Division, Smoke Management Section.

Information with each photo includes measured weights, volumes and other residue data, information about the timber stand and harvest and thinning actions and fuel ratings. These photo series provide a fast and easy-to-use method for quantifying existing residues. This method, while not perfect, will provide reasonable estimates if used consistently. Experience in its use will increase the accuracy of estimates.[1] Procedures for use of the photo series to determine gross woody fuel loading are:

A. Observe each specific fuel size class of residue on the ground (for example, 3.1 to 9- inch loading).

B. Select a photo or photos that nearly match or bracket the observed fuel class.

C. Obtain the quantitative value for the characteristic being estimated from the data sheet accompanying the selected photo (or interpolate between photos).

D. These steps are repeated for each fuel size class or fuel characteristic needed.

The total gross woody fuel loading can then be calculated by summing the estimates.

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[1] USDA Forest Service Pacific Northwest Research Station, General Technical Report, PNW-STR-258, Stereo Photo Series for Quantifying Forest Residues in the Douglas Fir-Hemlock Type of the Willamette National Forest, page 6.

An example of the above procedure using the PNW-GTR-258 Stereo Photo Series would be:

Fuel Class Size	Photo	Tons/Acre
0.00 - 0.25	1-DFWH-PRE-16	2.5
0.26 - 1.0	1-DFWH-PRE-16	4.2
1.1 - 3.0	1-DFWH-PRE-13	5.9
3.1 - 9.0	1-DFWH-PRE-13	25.3
9.1 - 20.0	1-DFWH-PRE-13	2.0
20+	1-DFWH-PRE-12	0
Total gross woody fuel load per/acre		**39.9**

If the general area being inventoried has areas with obvious differences in residue loading, the user should make separate determinations for each area and then weigh and cumulate the loading for the whole area.

Note: In addition to calculating the gross woody fuel load remaining on the logging unit, the field officer must add the net woody fuel load found on the landing areas that will be burned in that logging unit. Use the technique described below for "pile burning" to accomplish this task.

BROADCAST BURNS - DETERMINING GROSS WOODY FUEL LOADING - TRANSECT METHOD

A second approved method, the basis upon which the photo series was developed, is actual field sampling of proposed units.

The procedures for inventorying downed woody material are provided in two U.S. Forest Service technical reports published by the Inter-Mountain Forest and Range Experiment Station in Ogden, Utah. The "Handbook for Inventorying Downed Woody Material" by James K. Brown (USDA General Technical Report INT-16, 1974) and the "Graphic Aids for Field Calculation of Dead, Downed Forest Fuels" by Hal E. Anderson (USDA General Technical Report INT-45, August 1978) are the reference documents to be followed when doing a planar intersect sample.

PILE BURNING - DETERMINING GROSS FUEL LOADING

To determine tonnage in units that will be (but have not yet been) piled, the transect method or photo series method as described above can be used.

If units have already been piled, or for landings on units to be broadcast burned, one of the two following methods should be used:

A. Ocular Estimate of Pile Volumes

B. Statistical Sample of Pile Volumes

These methods are described in a publication from the Pacific Northwest Research Station, Fire and Environmental Research Applications, "Guidelines For Estimating Volumes, Biomass, and Smoke Production For Piled Slash," 1996, by Colin C. Hardy. The procedures for these two methods are:

OCULAR ESTIMATE OF PILE VOLUMES

Step 1: Estimation of Piles:

This system assumes half-spherical or paraboloid-shaped piles (see Shape Codes on page 9) and three-dimensional drawings beginning on page 9. Determine, through visual inspection, the average height, width, and number of piles on the area of consideration.

When appraising a unit, many piles will be irregularly shaped. Ocularly "smooth" the lobes, ridges, and valleys into an average, paraboloid or half-spherical shape. Long logs and poles extending beyond the average boundary surface of the pile can be accounted for by increasing the height an appropriate distance.

If a significant number of piles appear to exist in each of several average height or diameter classes, group them into appropriate classes noting average width, height, and number of piles for each class. It may be helpful to scale the piles' heights, relative to a 6-foot person.

Step 2: Calculate gross pile volume for the representative pile, piles, or groups of piles. The chart on page 18 will give total pile volume for a range of pile heights and widths.

Step 3: Calculate gross pile volume for total burn area:

Calculate the volume of piles on the total burn area by multiplying the number of piles by the average volume. If piles have been grouped into several size classes, calculate the total volume for each group, then sum the volumes.

Step 4: Calculate Net Wood Pile Volume:

Net wood volume of the piles must be estimated by reducing the total volume by a factor to account for the volume of air in the piles. To determine the net wood volume, multiply the total pile volume for the area by 0.1 for piles with species content dominated by ponderosa pine, multiply the total pile volume for the area by 0.2 for all other piles. The resulting value is the net wood volume.

Step 5: Determine the Total Tons of Wood/Fuel on the Burn Area:

If piles contain 25 percent or more of one wood species, determine the average species mix for the entire area. Calculate the average wood density on the basis of the species or mix of species present. The table below contains density weights for commonly found species in the Pacific Northwest. Multiply the proper net wood volume by the corresponding density factor from the table. Total these weights and divide by 2,000 pounds to convert to total tons.

Species	Specific Gravity (dimensionless)	Density (lb/ft)
Larch	.48	30.0
Douglas Fir	.45	28.1
Hemlock	.42	26.2
Pine	.38	23.7
Alder	.37	23.1
True Fir	.37	23.1
Red Cedar	.31	19.4
Sitka Spruce	.37	23.1
Rotten	.30	18.7

Example Unit:

Unit Description

Unit size is 30 acres of grapple piles
5 piles per acre, 150 total piles
Pile Shape: Half-sphere
Average pile height 8 feet
Species mix: 75 percent Douglas-fir, 25 percent Alder

Calculations

Gross pile volume (from chart on page 14) = 1,072 cubic feet
Net wood pile volume 0.20
1,072 cu.ft. x 0.20 (wood to pile ratio) = 214 cu.ft. per pile

Wood Weight

214 x 75 percent Douglas-Fir = 161 cu.ft. x 28.1 (Density) = 4,524.1
214 x 25 percent Alder = 54 cu.ft. x 23.1 (Density) = 1,247.4
Total net wood cubic feet per pile = 5,71

Total tons per pile 5,771/2,000 = 2.89 tons per pile
Total woody tons for the unit 2.89 tons x 150 piles = 433.5 tons

STATISTICAL SAMPLE OF PILE VOLUMES

A statistical sample of the piles on a given area provides valuable information regarding the distribution of shapes, sizes, and species composition of the area. This information greatly improves the accuracy of volume estimates.

Even when measuring only a sample of piles, field measurements are time-consuming and tedious. A set of seven stylized "shape codes" are shown on page 9 and the mathematical formulas for each shape is found on pages 9 through 11. These formulas are helpful in determining the appropriate measurements to be made on a specific pile.

Step 1: Identify a randomly-chosen set of piles to be measured on a given area. The number of piles selected is dependent on the time available and on the level of accuracy desired. Roughly sketch and number the piles on a map of the area for later identification and location.

Step 2: Visit each pile and visually determine the most representative stylized shape from the seven "shape codes" or the sketches on pages 9 through 11. Illustrated on each "shape code" drawing are the dimensional measurements required by the respective geometric formula to calculate total volume.

Step 3: Measure each dimension required for the shape.

Step 4: Identify the primary species (by mass) of woody debris in the pile, identified species must account for 25 percent or more of the mass of the piles. If mixed species, note the percent of the primary species and the percent of one secondary species. This data will be used to determine the net mass of fuel in the pile.

Step 5: Calculate the gross volume for each pile using either the formulas found on pages 9 through 11, or the appropriate chart or nomograph on pages 18 through 20.

Step 6: Calculate an average volume from the sampled pile volumes and multiply by the

total number of piles in the area.

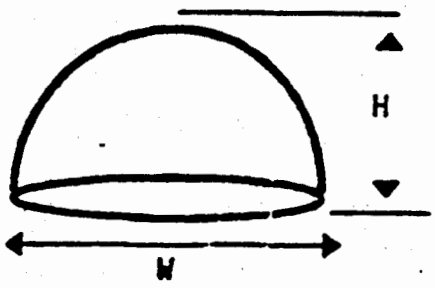
Step 7: Calculate Net Wood Pile Volume: Net wood volume of the piles must be estimated by reducing the total volume by a factor to account for the volume of air in the piles. To determine the net wood volume, multiply the total pile volume for the area by 0.1 for piles with species content dominated by ponderosa pine, multiply the total pile volume for the area by 0.2 for all other piles. The resulting value is the net wood volume.

Step 8: Determine the total tons of wood/fuel on the area of consideration.

Using the mix of species determined in step 4, calculate the average wood density on the basis of the species or mix of species. The table on page 5 contains density weight for commonly found species in the Pacific Northwest. Multiply the proper net wood volume by the corresponding density factor from the table to derive a pile-average density.

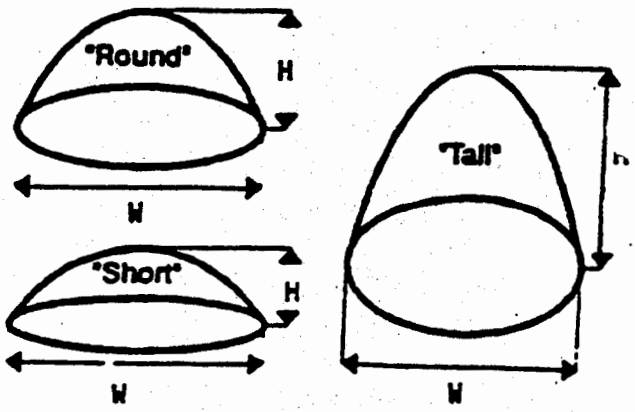
[The charts on pages 14 through 17 were created by DNR from Colin Hardy's formulas and can be used to determine consumable tons directly, for piles that are comprised of 76 percent or more of a single species.]

1. Half Section of Sphere



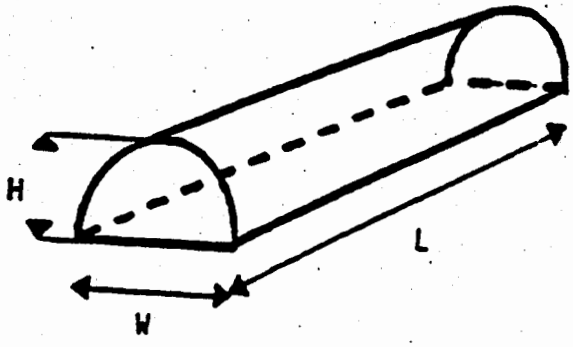
$V = .2618*W^2*H$

2. Paraboloids



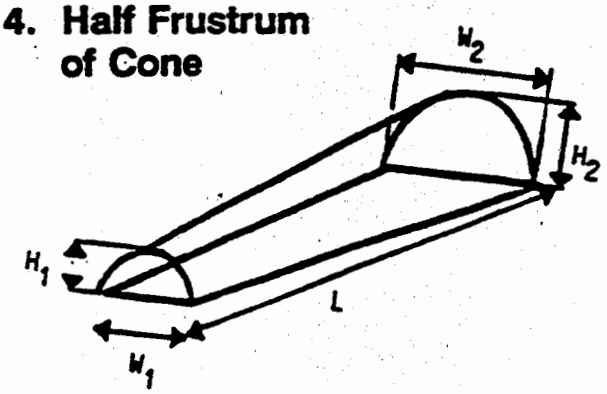
$V = .3927*H*W^2$

3. Half Cylinder



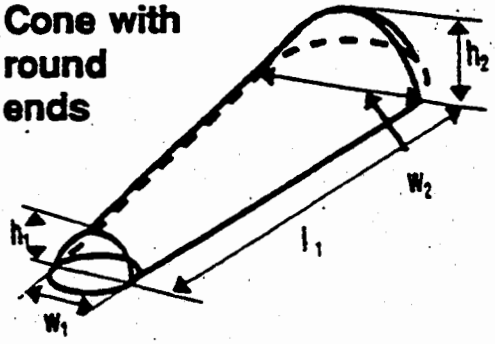
$V = .7854*W*L*H$

4. Half Frustrum of Cone

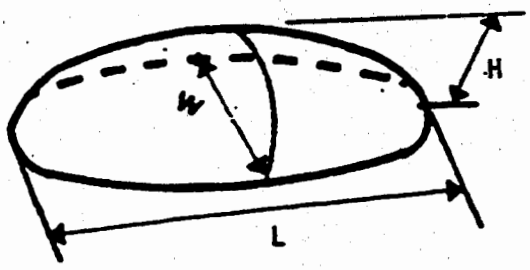


$V = .2618*L(W_1H_1+\sqrt{W_1H_1W_2H_2}+W_2H_2)$

5. Half Frustrum of Cone with round ends

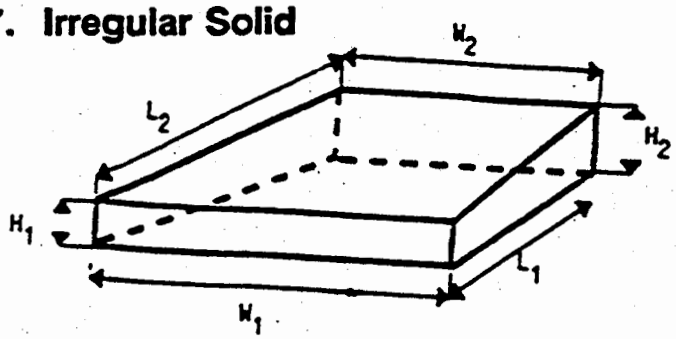


6. Half Ellipsoid



$V = .5236*W*L*H$

7. Irregular Solid



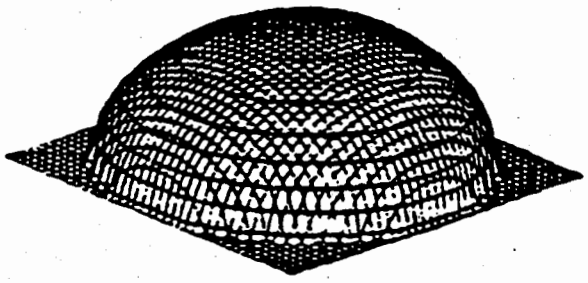
$$V = \frac{(L_1+L_2)*(W_1+W_2)*(H_1+H_2)}{8}$$

1. Half-Section of a Sphere:

Truly half of a ball, where the width is twice the height, and the sides are well and evenly rounded.

$V = \frac{2\pi H^3}{3}$ or $V = \frac{\pi HW^2}{6}$ or $V = .2618*W^3$

True Sphere Shape

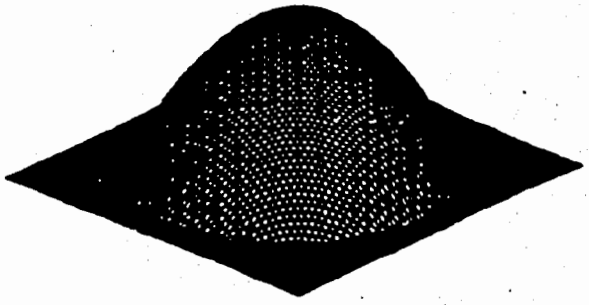


2a. Half-"Round" Paraboloid:

Pile height is same as radius (half diameter), but surface tapers in a parabola towards the top.

$V = \frac{\pi HW^2}{8}$ or $V = .3927*H*W^2$

"Round" Paraboloid Shape

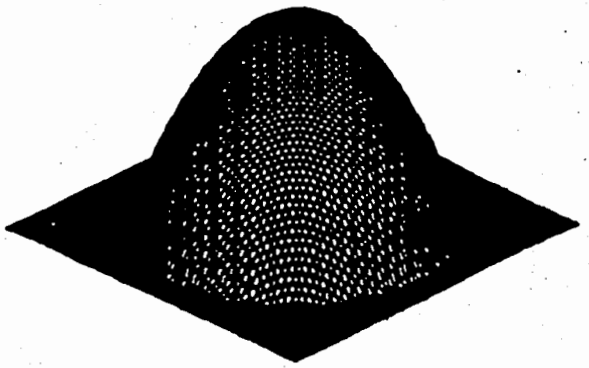


2b. Half-"Tall" Paraboloid:

Sides taper in a parabola towards the top, where the height is greater than the radius (half the width).

$V = \frac{\pi HW^2}{8}$ or $V = .3927*H*W^2$

"Tall" Paraboloid Shape

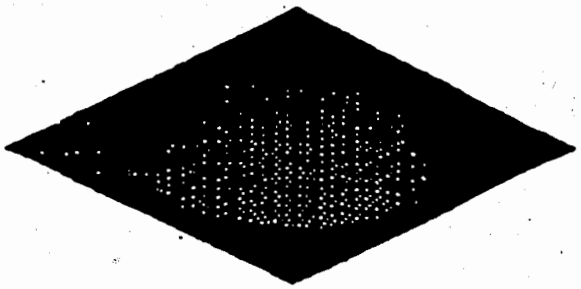


2c. Half-"Short" Paraboloid:

Pile height is less than half the radius, and the sides drop down to the base in a parabola.

$V = \frac{\pi HW^2}{8}$ or $V = .3927*H*W^2$

Flat Paraboloid Shape

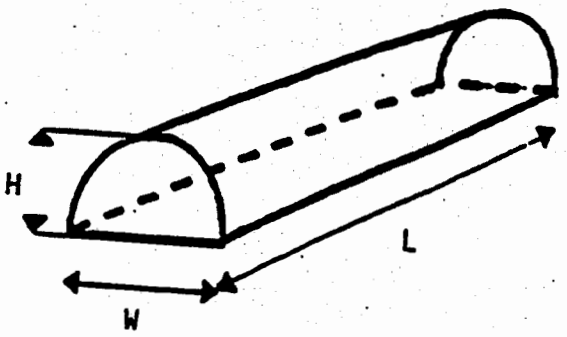


3. Half Cylinder:

Logs and debris are generally aligned in parallel. Pile shape is rounded side-to-side, with both ends of the pile approximately the same height.

$$V = \frac{\pi WLH}{4} \quad \text{or} \quad V = .7854*W*L*H$$

Half Cylinder Shape



4. Half Frustum of Cone:

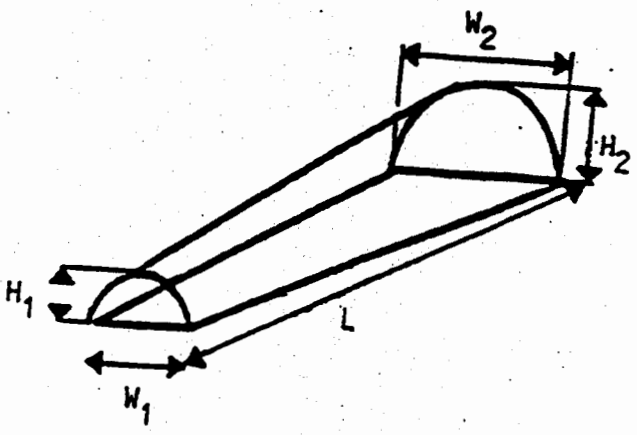
Logs and debris are generally aligned in parallel. Pile shape is rounded side-to-side, but heights of opposing ends are not equal (pile tapers).

$$V = \frac{\pi L(W_1H_1+(W_1H_1W_2H_2)^{.5}+W_2H_2)}{12}$$

or

$$V = .2618*L(W_1H_1+\sqrt{W_1H_1W_2H_2}+W_2H_2)$$

Half Frustum Cone Shape



5. Half Frustum of Cone (with Rounded Ends):

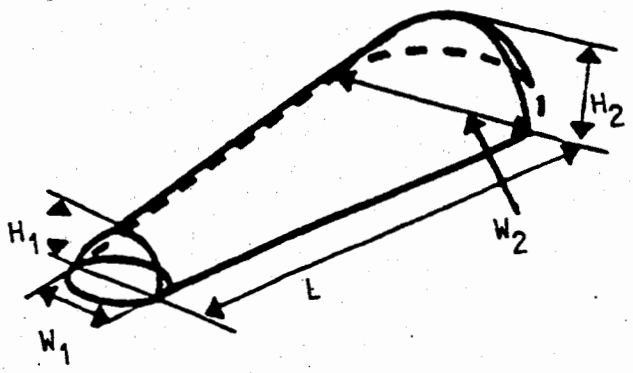
Pile shape is generally the same as #4, but the ends are rounded, and appearance is similar to half a pear.

$$V = \frac{\pi(LW_1H_1+L(W_1H_1W_2H_2)^{.5}+W_1^2H_1+LW_2H_2+W_2^2H_2)}{12}$$

or

$$V = .2618(LW_1H_1+L\sqrt{W_1H_1W_2H_2}+W_1^2H_1+LW_2H_2+W_2^2H_2)$$

Half Frustum Cone Shape
Rounded End

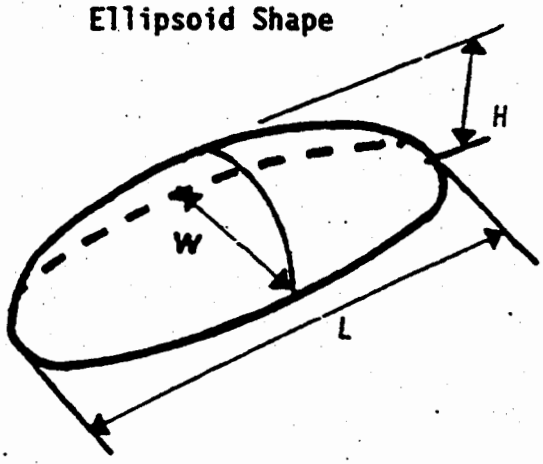


6. Half Ellipsoid:

Long, tapering pile, rounded side-to-side, with well-rounded ends. Widths of opposing ends are not equal.

$$V = \frac{\pi WLH}{6} \quad \text{or} \quad V = .5236*W*L*H$$

Ellipsoid Shape

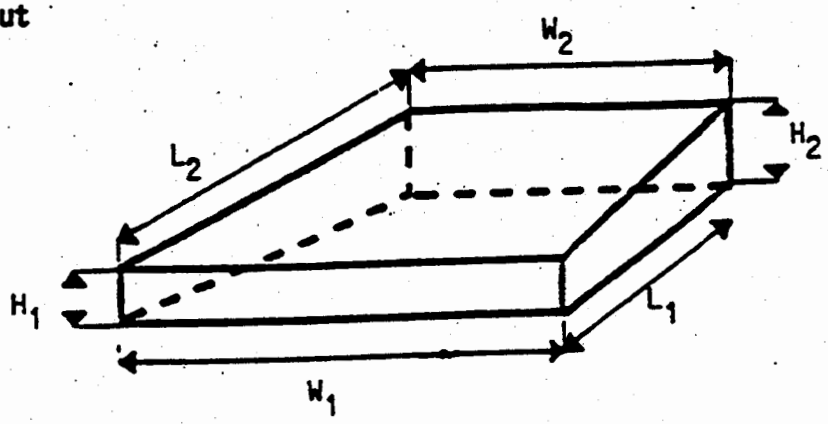


7. Irregular Solid:

Irregularly-shaped pile with straight but uneven sides. Dimensions for opposing sides are not necessarily equal. (Some landings).

$$V = \frac{(L_1+L_2)*(W_1+W_2)*(H_1+H_2)}{8}$$

Irregular Solid Shape



Douglas fir	Paraboloid shaped piles													
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7
10	0.4	0.6	0.8	0.9	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
15	0.8	1.0	2.0	2.0	3.0	3.0	3.0	4.0	4.0	5.0	5.0	5.0	6.0	6.0
20	2.0	2.0	3.0	4.0	5.0	5.0	6.0	7.0	8.0	8.0	9.0	10.0	11.0	11.0
25	2.0	4.0	5.0	6.0	7.0	8.0	9.0	11.0	12.0	13.0	14.0	15.0	16.0	18.0
30	3.0	5.0	7.0	8.0	10.0	12.0	14.0	15.0	17.0	19.0	20.0	22.0	24.0	25.0
35	5.0	7.0	9.0	11.0	14.0	16.0	18.0	21.0	23.0	25.0	28.0	30.0	32.0	34.0
40	6.0	9.0	12.0	15.0	18.0	21.0	24.0	27.0	30.0	33.0	36.0	39.0	42.0	45.0
45	8.0	11.0	15.0	19.0	23.0	27.0	30.0	34.0	38.0	42.0	46.0	49.0	53.0	57.0
50	9.0	14.0	19.0	23.0	28.0	33.0	38.0	42.0	47.0	52.0	56.0	61.0	66.0	70.0

Western hemlock	Paraboloid shaped piles													
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6
10	0.3	0.5	0.6	0.8	0.9	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
15	0.7	1.0	1.0	2.0	2.0	2.0	3.0	3.0	3.0	4.0	4.0	5.0	5.0	5.0
20	1.0	2.0	2.0	3.0	4.0	4.0	5.0	6.0	6.0	7.0	7.0	8.0	9.0	9.0
25	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.0	14.0
30	3.0	4.0	6.0	7.0	8.0	10.0	11.0	12.0	14.0	15.0	17.0	18.0	19.0	21.0
35	4.0	6.0	8.0	9.0	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	26.0	28.0
40	5.0	7.0	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	30.0	32.0	35.0	37.0
45	6.0	9.0	12.0	16.0	19.0	22.0	25.0	28.0	31.0	34.0	37.0	41.0	44.0	47.0
50	8.0	12.0	15.0	19.0	23.0	27.0	31.0	35.0	39.0	42.0	46.0	50.0	54.0	58.0

Red Alder	Paraboloid shaped piles													
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6
10	0.3	0.5	0.6	0.8	0.9	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
15	0.7	1.0	1.0	2.0	2.0	2.0	3.0	3.0	3.0	4.0	4.0	5.0	5.0	5.0
20	1.0	2.0	2.0	3.0	4.0	4.0	5.0	6.0	6.0	7.0	7.0	8.0	9.0	9.0
25	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.0	14.0
30	3.0	4.0	6.0	7.0	8.0	10.0	11.0	12.0	14.0	15.0	17.0	18.0	19.0	21.0
35	4.0	6.0	8.0	9.0	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	26.0	28.0
40	5.0	7.0	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	30.0	32.0	35.0	37.0
45	6.0	9.0	12.0	16.0	19.0	22.0	25.0	28.0	31.0	34.0	37.0	41.0	44.0	47.0
50	8.0	12.0	15.0	19.0	23.0	27.0	31.0	35.0	39.0	42.0	46.0	50.0	54.0	58.0

Red Cedar	Paraboloid shaped piles													
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	0.5	0.5
10	0.3	0.4	0.5	0.6	0.8	0.9	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0
15	0.6	0.9	1.0	1.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0
20	1.0	2.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0	8.0
25	2.0	2.0	3.0	4.0	5.0	6.0	6.0	7.0	8.0	9.0	10.0	11.0	11.0	12.0
30	2.0	3.0	5.0	6.0	7.0	8.0	9.0	10.0	12.0	13.0	14.0	15.0	16.0	17.0
35	3.0	5.0	6.0	8.0	10.0	11.0	13.0	14.0	16.0	17.0	19.0	21.0	22.0	24.0
40	4.0	6.0	8.0	10.0	12.0	15.0	17.0	19.0	21.0	23.0	25.0	27.0	29.0	31.0
45	5.0	8.0	10.0	13.0	16.0	18.0	21.0	24.0	26.0	29.0	31.0	34.0	37.0	39.0
50	6.0	10.0	13.0	16.0	19.0	23.0	26.0	29.0	32.0	36.0	39.0	42.0	45.0	49.0

Sitka Spruce	Paraboloid shaped piles													
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6
10	0.3	0.5	0.6	0.8	0.9	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
15	0.7	1.0	1.0	2.0	2.0	2.0	3.0	3.0	3.0	4.0	4.0	5.0	5.0	5.0
20	1.0	2.0	2.0	3.0	4.0	4.0	5.0	6.0	6.0	7.0	7.0	8.0	9.0	9.0
25	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.0	14.0
30	3.0	4.0	6.0	7.0	8.0	10.0	11.0	12.0	14.0	15.0	17.0	18.0	19.0	21.0
35	4.0	6.0	8.0	9.0	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	26.0	28.0
40	5.0	7.0	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	30.0	32.0	35.0	37.0
45	6.0	9.0	12.0	16.0	19.0	22.0	25.0	28.0	31.0	34.0	37.0	41.0	44.0	47.0
50	8.0	12.0	15.0	19.0	23.0	27.0	31.0	35.0	39.0	42.0	46.0	50.0	54.0	58.0

True Fir	Paraboloid shaped piles													
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.5	0.6
10	0.3	0.5	0.6	0.8	0.9	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0
15	0.7	1.0	1.0	2.0	2.0	2.0	3.0	3.0	3.0	4.0	4.0	5.0	5.0	5.0
20	1.0	2.0	2.0	3.0	4.0	4.0	5.0	6.0	6.0	7.0	7.0	8.0	9.0	9.0
25	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	13.0	14.0
30	3.0	4.0	6.0	7.0	8.0	10.0	11.0	12.0	14.0	15.0	17.0	18.0	19.0	21.0
35	4.0	6.0	8.0	9.0	11.0	13.0	15.0	17.0	19.0	21.0	23.0	25.0	26.0	28.0
40	5.0	7.0	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	30.0	32.0	35.0	37.0
45	6.0	9.0	12.0	16.0	19.0	22.0	25.0	28.0	31.0	34.0	37.0	41.0	44.0	47.0
50	8.0	12.0	15.0	19.0	23.0	27.0	31.0	35.0	39.0	42.0	46.0	50.0	54.0	58.0

ESTIMATING CONSUMABLE TONS

Pine		Paraboloid shaped piles												
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3
10	0.2	0.2	0.3	0.4	0.5	0.6	0.6	0.7	0.8	0.9	0.9	1.0	1.0	1.0
15	0.4	0.5	0.7	0.9	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0
20	0.6	0.9	1.0	2.0	2.0	2.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	5.0
25	1.0	1.0	2.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	6.0	6.0	7.0	7.0
30	1.0	2.0	3.0	4.0	4.0	5.0	6.0	6.0	7.0	8.0	9.0	9.0	10.0	11.0
35	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0	15.0
40	3.0	4.0	5.0	6.0	8.0	9.0	10.0	11.0	13.0	14.0	15.0	16.0	18.0	19.0
45	3.0	5.0	6.0	8.0	10.0	11.0	13.0	14.0	16.0	18.0	19.0	21.0	22.0	24.0
50	4.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0

Larch		Paraboloid shaped piles												
	Height													
Dia	4	6	8	10	12	14	16	18	20	22	24	26	28	30
5	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.8
10	0.4	0.6	0.8	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0	3.0
15	0.9	1.0	2.0	2.0	3.0	3.0	4.0	4.0	5.0	5.0	5.0	6.0	6.0	7.0
20	2.0	2.0	3.0	4.0	5.0	6.0	6.0	7.0	8.0	9.0	10.0	10.0	11.0	12.0
25	3.0	4.0	5.0	6.0	8.0	9.0	10.0	11.0	13.0	14.0	15.0	16.0	18.0	19.0
30	4.0	5.0	7.0	9.0	11.0	13.0	14.0	16.0	18.0	20.0	22.0	23.0	25.0	27.0
35	5.0	7.0	10.0	12.0	15.0	17.0	20.0	22.0	25.0	27.0	29.0	32.0	34.0	37.0
40	6.0	10.0	13.0	16.0	19.0	22.0	26.0	29.0	32.0	35.0	38.0	42.0	45.0	48.0
45	8.0	12.0	16.0	20.0	24.0	28.0	32.0	37.0	41.0	45.0	49.0	53.0	57.0	61.0
50	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	75.0

Spherical Piles

DO NOT USE if pile does not represent a spherical shape

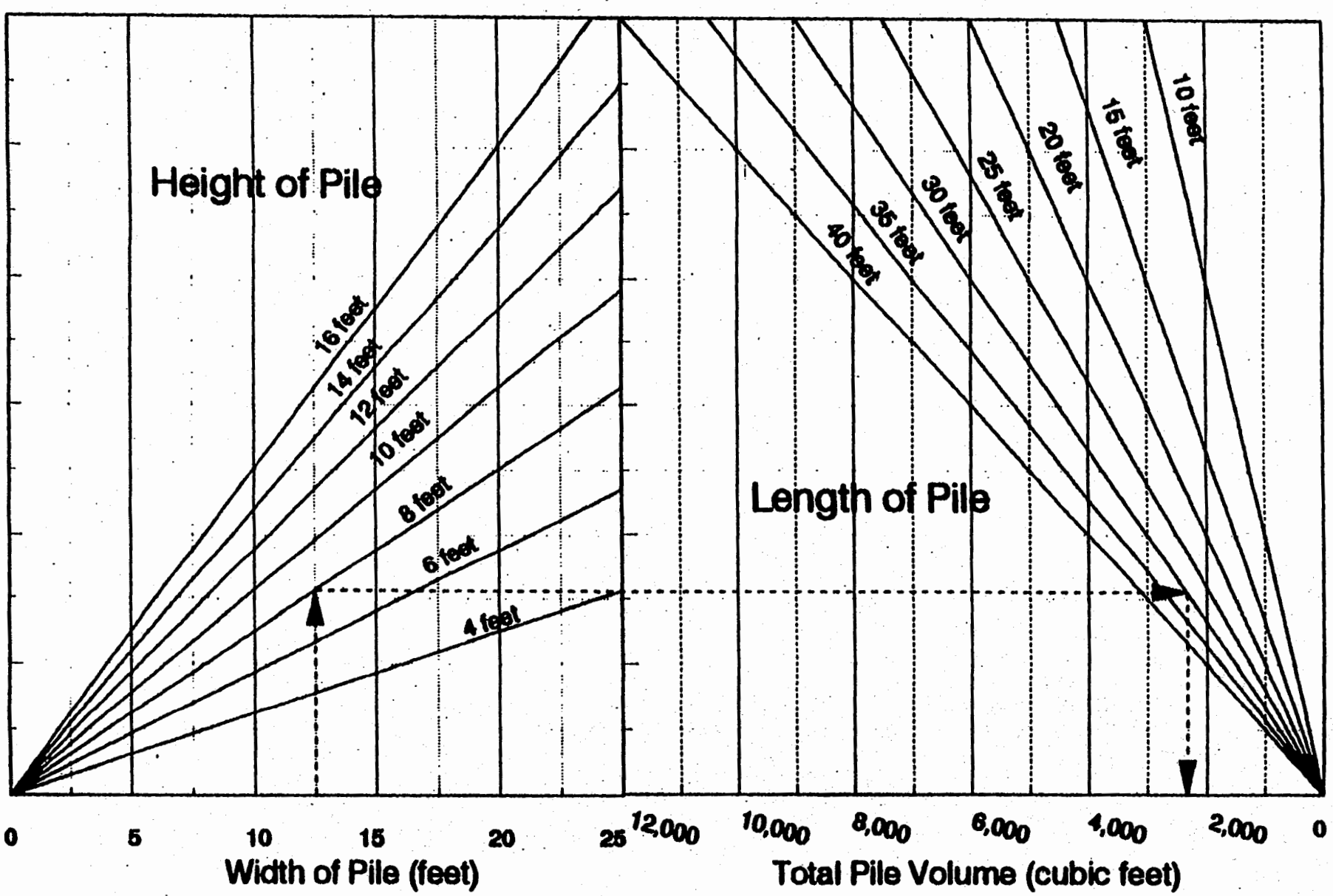
	Height													
	4	6	8	10	12	14	16	18	20	22	24	26	28	30
Species														
DF	0.3	1.0	3.0	5.0	9.0	14.0	20.0	29.0	40.0	53.0	69.0	88.0	110.0	135.0
WH	0.3	1.0	2.0	4.0	7.0	11.0	17.0	24.0	33.0	44.0	57.0	72.0	90.0	111.0
RA	0.3	1.0	2.0	4.0	7.0	11.0	17.0	24.0	33.0	44.0	57.0	72.0	90.0	111.0
SS	0.3	1.0	2.0	4.0	7.0	11.0	17.0	24.0	33.0	44.0	57.0	72.0	90.0	111.0
RC	0.2	1.0	2.0	3.0	6.0	9.0	14.0	20.0	28.0	37.0	48.0	61.0	76.0	93.0
T-Fir	0.3	1.0	2.0	4.0	7.0	11.0	17.0	24.0	33.0	44.0	57.0	72.0	90.0	111.0
Pine	0.1	0.5	1.0	2.0	4.0	6.0	9.0	12.0	17.0	22.0	29.0	37.0	46.0	57.0
Larch	0.3	1.0	3.0	5.0	9.0	15.0	22.0	31.0	43.0	57.0	74.0	94.0	117.0	144.0

Table of GROSS VOLUMES for piles with round bases (spheroids and paraboloids). If the pile surface is truly round (half of a ball), then refer to the column or row labeled "SPHERE." Use either height or width to determine volume. If pile surface tapers in a parabola, then determine the volume at the intersection of the appropriate width (rows) and height (columns).

If pile shape is "round" use SPHERE		SPHERE V V	If pile surface is "PARABOLOID" or "non-round" (flatter or taller than radius), use appropriate column-by-row Height of Pile >																
			4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
SPHERE > > >		(w or h)	134	262	452	718	1072	1527	2094	2788	3619	4601	5747	7069	8579	10290	12215	14365	16755
Width	4	17	25	31	38	44	50	57	63	69	75	82	88	94	101	107	113	119	126
of Pile	5	33	39	49	59	69	79	88	98	108	118	128	137	147	157	167	177	187	196
V	6	57	57	71	85	99	113	127	141	156	170	184	198	212	226	240	254	269	283
V	7	90	77	96	115	135	154	173	192	212	231	250	269	289	308	327	346	366	385
V	8	134	101	126	151	176	201	226	251	276	302	327	352	377	402	427	452	478	503
V	9	191	127	159	191	223	254	286	318	350	382	414	445	477	509	541	573	604	636
V	10	262	157	196	236	275	314	353	393	432	471	511	550	589	628	668	707	746	785
V	11	348	190	238	285	333	380	428	475	523	570	618	665	713	760	808	855	903	950
V	12	452	226	283	339	396	452	509	565	622	679	735	792	848	905	961	1018	1074	1131
V	13	575	265	332	398	465	531	597	664	730	796	863	929	995	1062	1128	1195	1261	1327
V	14	718	308	385	462	539	616	693	770	847	924	1001	1078	1155	1232	1308	1385	1462	1539
V	15	884	353	442	530	619	707	795	884	972	1060	1149	1237	1325	1414	1502	1590	1679	1767
V	16	1072	402	503	603	704	804	905	1005	1106	1206	1307	1407	1508	1608	1709	1810	1910	2011
V	17	1286	454	567	681	794	908	1021	1135	1248	1362	1475	1589	1702	1816	1929	2043	2156	2270
V	18	1527	509	636	763	891	1018	1145	1272	1400	1527	1654	1781	1909	2036	2163	2290	2417	2545
V	19	1796	567	709	851	992	1134	1276	1418	1559	1701	1843	1985	2126	2268	2410	2552	2694	2835
V	20	2094	628	785	942	1100	1257	1414	1571	1728	1885	2042	2199	2356	2513	2670	2827	2985	3142
V	21	2425	693	866	1039	1212	1385	1559	1732	1905	2078	2251	2425	2598	2771	2944	3117	3290	3464
V	22	2788	760	950	1140	1330	1521	1711	1901	2091	2281	2471	2661	2851	3041	3231	3421	3611	3801
V	23	3185	831	1039	1246	1454	1662	1870	2077	2285	2493	2701	2908	3116	3324	3532	3739	3947	4155
V	24	3619	905	1131	1357	1583	1810	2036	2262	2488	2714	2941	3167	3393	3619	3845	4072	4298	4524
V	25	4091	982	1227	1473	1718	1963	2209	2454	2700	2945	3191	3436	3682	3927	4172	4418	4663	4909
V	26	4601	1062	1327	1593	1858	2124	2389	2655	2920	3186	3451	3717	3982	4247	4513	4778	5044	5309
V	27	5153	1145	1431	1718	2004	2290	2576	2863	3149	3435	3722	4008	4294	4580	4867	5153	5439	5726
V	28	5747	1232	1539	1847	2155	2463	2771	3079	3387	3695	4002	4310	4618	4926	5234	5542	5850	6158
V	29	6385	1321	1651	1982	2312	2642	2972	3303	3633	3963	4293	4624	4954	5284	5614	5945	6275	6605
V	30	7069	1414	1767	2121	2474	2827	3181	3534	3888	4241	4595	4948	5301	5655	6008	6362	6715	7069

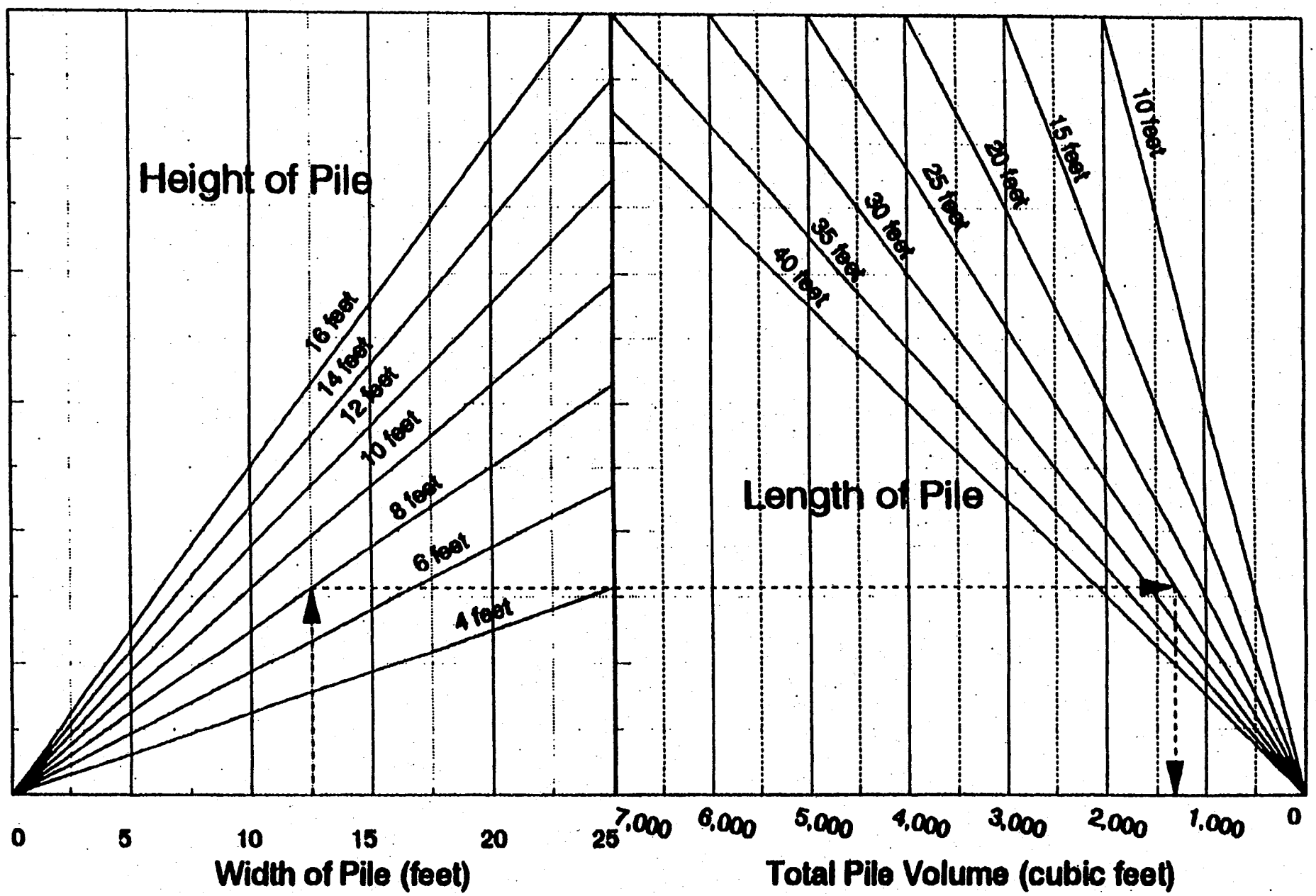
Nomagram for Total Pile Volume

Shape Code #3 -- Half Elliptical Cylinder



Nomagram for Total Pile Volume

Shape Code #6 -- Half Ellipsoid



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3-19

CALCULATION OF TONS CONSUMED FOR BROADCAST BURNING

The official method for calculating the amount of fuel consumed and resulting emissions will be by using the SMS-INFO computer model headquartered at Resource Protection Division, Smoke Management Section, and input provided by managers for each burn. A personal computer version of the "consume" model and an accompanying "Consume Users Guide" by Roger D. Ottmar, Mary M. Burns, Janet N. Hall, February 1993, that will allow individuals to calculate consumed tonnage to aid in planning is available through Resource Protection Division.

For purposes of determining a burning permit fee amount, a manual method of calculating consumption will be used along with several fixed variables assigned. Work sheets for that purpose are found beginning on page 34.

The same manual method of calculation can be used by burners for planning purposes by assigning actual variables. The procedure for manual calculation is:

Woody Fuel Consumption

The calculation of fuel consumed should utilize the graphs included in this document. The graphs were taken from the following resource materials: USFS research report, "Predicting Fuel Consumption by Fire Stages to reduce Smoke from Slash Fires," Roger D. Ottmar, and USDA, Forest Service Pacific Northwest Research Station, research report, "Improved Prediction of Fuel Consumption During Spring-Like Prescribed Burns," February, 1990.

Two options exist for estimating fuel consumption using nomographs. They represent summer-like burning conditions and spring-like burning conditions. Summer-like conditions are driven by 1000-hour fuel moisture and only calculate consumption of fuels greater than 3 inches. Fuels less than 3 inches are 100 percent consumed. Spring-like conditions are driven by 10-hour and 1000-hour fuel moisture calculating consumption of both 100-hour and 1000-hour fuels. Fuels less than 1 inch are 100 percent consumed.

To determine which set of nomographs to use determine the 10-hour fuel moisture of the unit to be burned. If the 10-hour fuel moisture is less than 18 percent then use the summer-like procedure. If the 10-hour fuel moisture is equal to or greater than 18 percent and the NFDRS 1000-hour fuel moisture is greater than 20 percent use the Spring-Like procedure.

SUMMER-LIKE PROCEDURE (Summer-Like Conditions)

Use the graph on page 29 to provide an estimate of the large (3+ inches) fuel consumption as a function of 1000-hour fuel moisture. Three alternatives are provided to determine the 1000-hour fuel moisture. It is strongly recommended that burners only use the NFDR-th hour fuel moisture or the moisture measured by weighing. Other methods are often done improperly and cause erroneous results. For fuels smaller than 3 inches, total consumption should be assumed when calculating the total woody fuel consumption. Use the procedures beginning on page 23 for calculating duff consumption.

SPRING-LIKE PROCEDURE (Spring-Like Conditions)

To determine if spring-like conditions exist for a unit to be burned, determine if average 10-hour fuel moistures are 18 percent or greater and the NFDR 1000-hour fuel moistures are greater than 20 percent. If NFDR 1000-hour fuel moisture are less than 20 percent, the calculation must use the summer-like condition. To check 10-hour fuel moisture take an average of 10 to 15 moisture meter measurements collected from across the unit in the .25-inch to 1-inch diameter fuels. The measurements should be taken from the full fuel profile and represent the different aspects that may exist.

For planning units to be burned, use the best available 10-hour fuel moisture information. Realize that accurate 10-hour fuel moistures are very critical for this system and are very site specific. When planning, the following recommendations can be used; establish representative 10-hour fuel sticks which can be conveniently weighed, track currently burned units, have personnel use moisture meters to measure 0.25 to 1 inch fuels when in the area. However, when the unit is burned on-site, actual measurements must be taken to calculate consumption to be entered into the smoke management reporting data.

Total tons consumed should be determined as follows:

A. For 1-hour and 10-hour fuels (less than 1 inch) assume 100 percent consumption.

B. For 100-hour fuels (1.0 inch to 3.0 inches) use the woody fuel consumption nomograph for 100-hour fuels, on page 27 to determine the percentage consumption (based on your measured 10-hour fuel moisture). Enter the 10-hour fuel moisture content figure on the x-axis and draw a vertical line to the curved line. Draw a horizontal line left across the graph from that point to determine the 100-hour fuel consumption in percent.

C. For 1000-hour fuels (3+ inches) use spring-like large woody fuel consumption nomograph, on page 28 to determine the 1000-hour fuel consumption, by size class, in percent.

D. Total all of the calculated per acre tonnages consumed (from steps A through C) and multiply by the unit acres. This is the total woody tons consumed.

(See example on next page.)

Example:

An example of the spring-like procedure using the tons/acre from the previous example on page 2, assuming a 10-hour fuel moisture of 20 percent, and NFDR-th fuel moisture of 29 percent and 30 acres would be:

Fuel Size Class	Tons/Acre	Estimated Percent Consumed	Tons/Acre Consumed
0.00 - 0.25"	2.5	100	2.5
0.26" - 1.0"	4.2	100	4.2
1.1" - 3.0"	5.9	70	4.1
3.1" - 9.0"	25.3	29	7.3
9.1" - 20.0"	2.0	12	0.2
20"+	0	0	0
Total	39.9		18.3

Total woody consumption for the unit 30 acres x 18.3 tons/acre + 549 tons consumed.

Then calculate duff consumption using the procedures described later.

Duff Consumption

In addition to calculating the woody fuel consumption, the duff consumption needs to be calculated on broadcast and underburns. Use the appropriate graphs on pages 30 through 33 to determine duff consumption; the graph you use depends on rainfall in the burn area. Instructions for using the graphs are as follows:

A. For westside units to be burned when there have been fewer than 25 days since a 0.5 inch or more of rain has fallen over a continuous two-day period (i.e., duff layer is moist):

   1. Use the consumption estimate (in tons/acre) of large (3+ inches) woody fuels previously calculated (see example above).

   2. Enter the large, woody fuel consumption value (tons/acre) on the x-axis of the graph on page 30 and draw a vertical line to the appropriate pre-burn duff depth. Turn left to determine duff consumption (tons/acre).

B. For westside units to be burned when there have been 25 or more days since at least 0.5 inches of rain has fallen over a continuous two-day period (i.e., duff layer is dry):

   1. Determine the diameter reduction inches of the large (3+ inches) woody fuels from the graph on page 28 or 29.

2. Enter the diameter reduction (inches) on the x-axis of the graph on page 31 and draw a vertical line to the appropriate pre-burn duff depth. Turn on the duff depth line and draw a horizontal line to the left to determine duff consumption (tons/acre).

C. For eastside units use the eastside graphs on pages 32 and 33. Using the procedures in steps 1 and 2 above, realize the critical precipitation value is 0.25 inches instead of 0.5 inches.

Note: Be sure to enter the correct variable on the correct graph based on rainfall information you are using.

The graphs on pages 27 through 33 were provided by the Pacific Northwest Research Station. The limitations of the duff consumption methodology are given in Ottmar's 1985 paper, "Predicting Duff Reduction to Reduce Smoke from Clearcut Slash Burns in Western Washington and Western Oregon."

Total Fuel Consumption

The total fuel consumption is the sum of the woody fuel consumption, both large and small fuel, and the duff consumption. The total (in tons/acre) should be multiplied by the number of acres that are being burned, or are expected to be burned, when planning units.

CALCULATION OF TONS CONSUMED FOR PILE BURNING

Pile Burning

For calculation purposes, assume that 85 percent of the net pile volume is consumed.

This assumption is validated by observations from pile consumption research and the acknowledgement of the variation of pile consumption in real life applications.

[The charts on pages 13 through 17 were created by DNR from Colin Hardy's formulas and the 85 percent consumption factor (above) to determine consumable tons directly. This only applies for piles that are comprised of 76 percent or more of a single species and are paraboloid or half-spherical shaped.]

PROCEDURE FOR USING LARGE FUEL CONSUMPTION NOMOGRAPHS FOR SPRING-LIKE AND SUMMER-LIKE PRESCRIBED BURNS

a. Determine percent consumption of the 100-hour fuels using the 100-hour fuel consumption nomograph. If 80 percent or less of the 100-hour fuels are predicted to consume (10-hour fuel moisture is 18 percent or greater), use the spring-like large fuel consumption nomograph. If greater than 80 percent of the 100-hour fuels are predicted to consume (10-hour fuel moisture content is less than 18 percent), use the summer-like large fuel consumption nomograph.

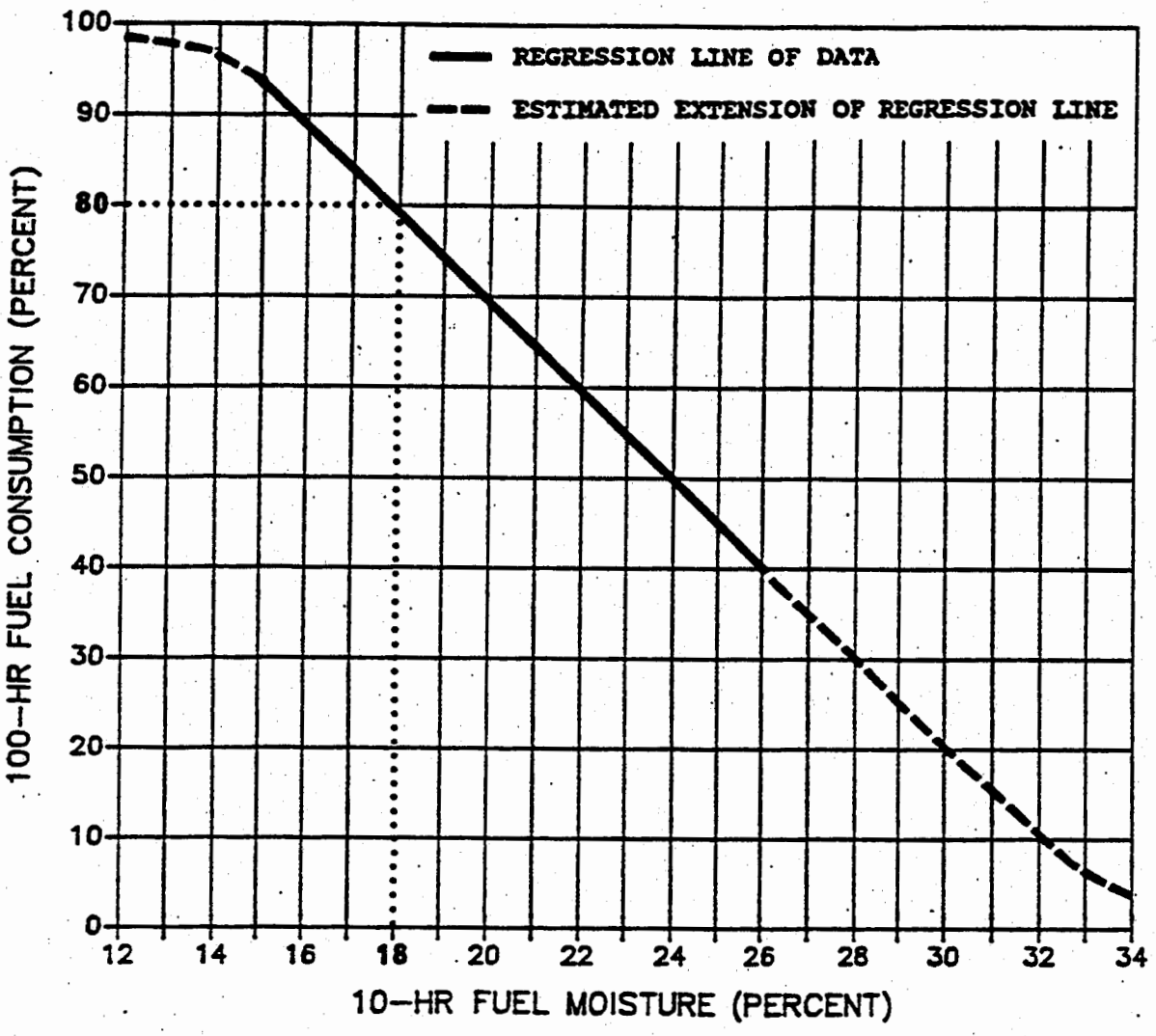
b. Determine the 1000-hour fuel moisture content (percent) for the unit determined from fuel moisture samples, National Fire Danger Rating System's 1000-hour fuel moisture model, or the Adjusted 1000-hour Fuel Moisture model.

c. Enter the 1000-hour fuel moisture (percent) on one of the fuel moisture bars corresponding to the procedure you used to determine the fuel moisture. Next, draw a vertical line to the appropriate fuel size class line. Draw a horizontal line left across the graph from that point to determine the percent consumption.

PROCEDURE FOR USING 100-HOUR FUEL CONSUMPTION NOMOGRAPHS

a. Determine an average 10-hour fuel moisture content for the unit. This can be accomplished by weighing 10-hour fuel sticks positioned in the unit or taking an average of 10 to 15 moisture meter measurements collected across the unit from 1/4 to 1-inch diameter fuels.

b. Enter the 10-hour fuel moisture content figure (percent) on the x-axis and draw a vertical line to the curved line. Draw a horizontal line left across the graph from that point to determine the 100-hour fuel consumption in percent.



Woody fuel consumption nomograph for 100-hour fuels. Dotted line represents cut-off for spring-like burn.

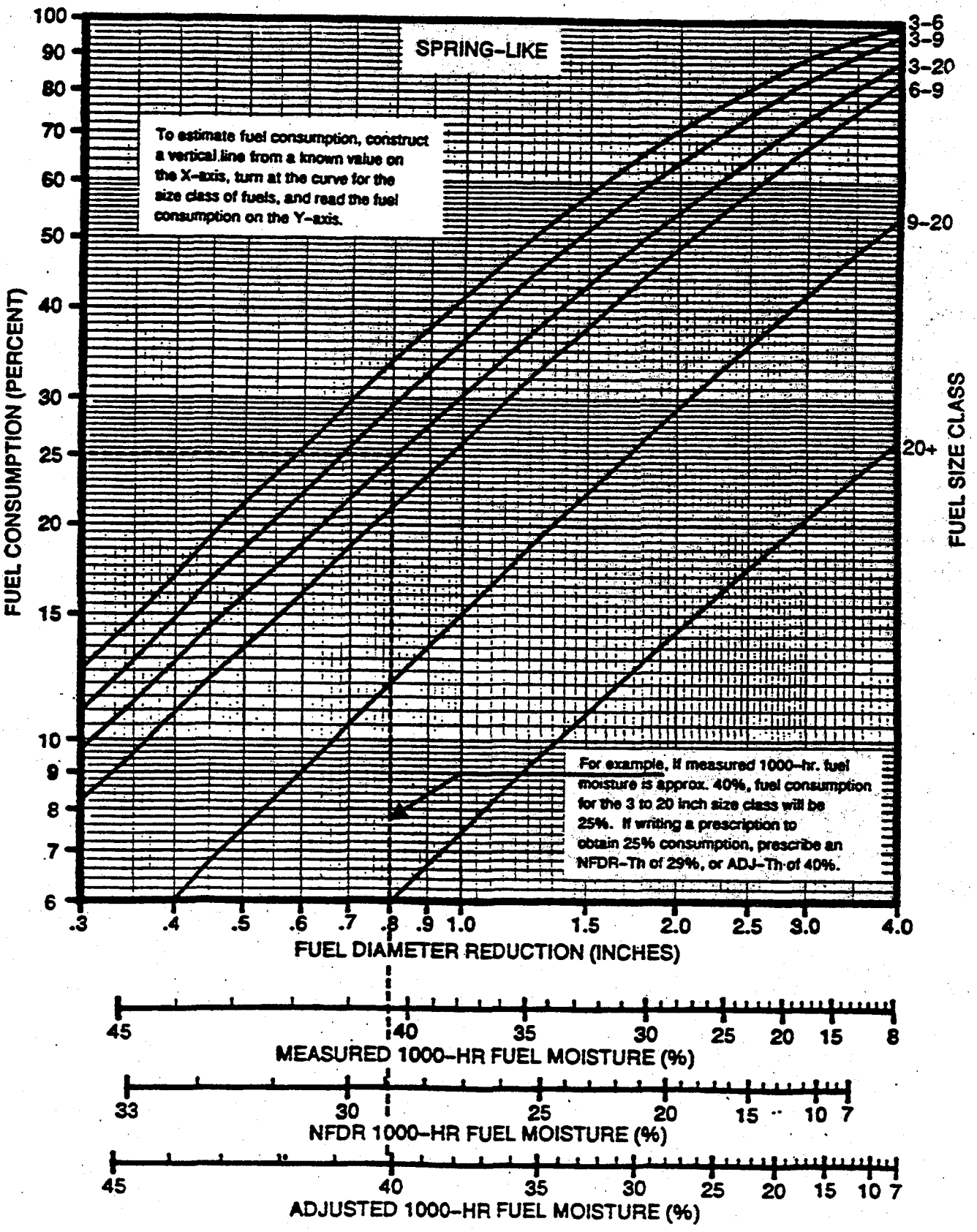


Figure 13. Large woody fuel consumption nomograph for spring-like burns.

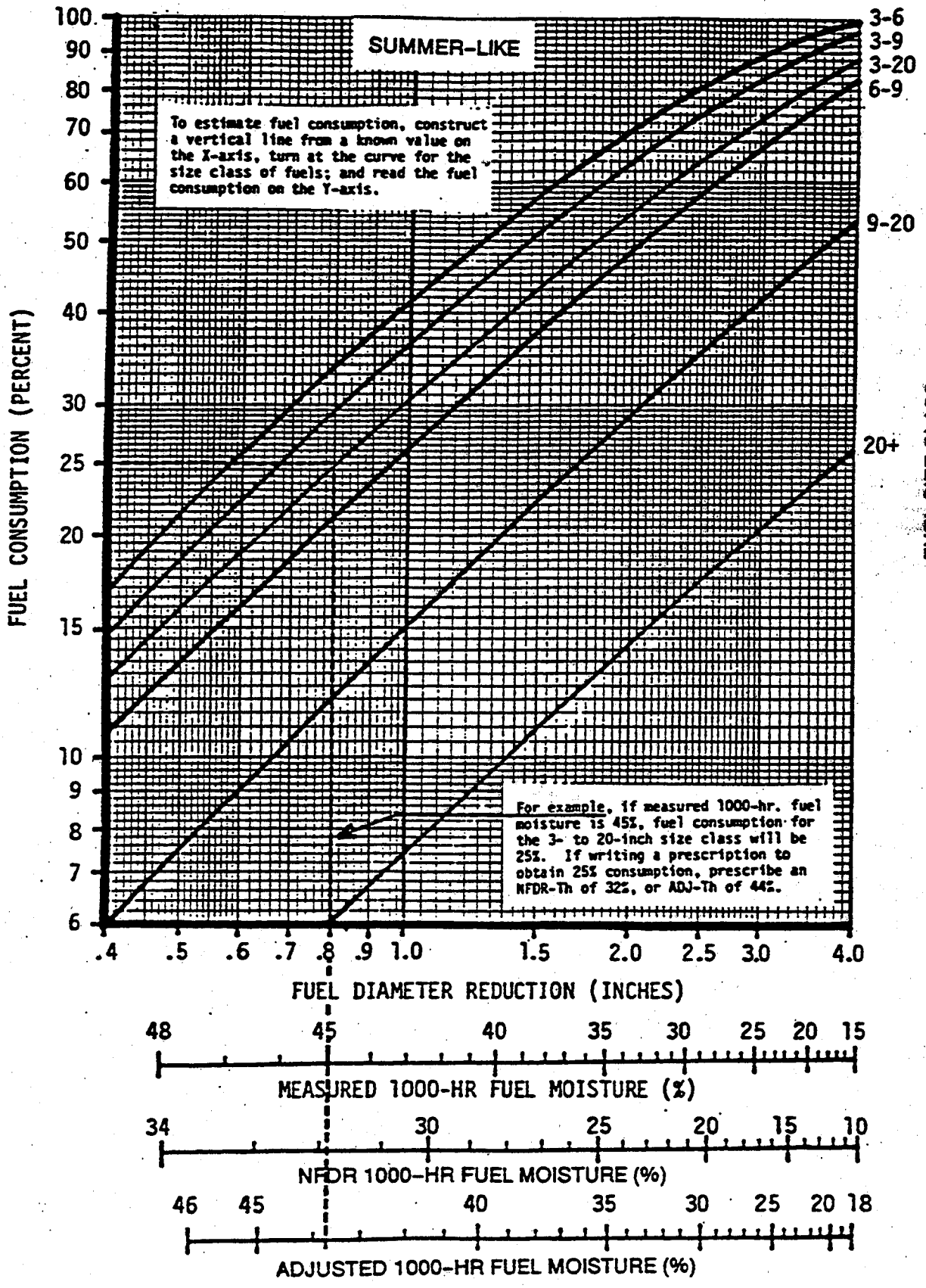
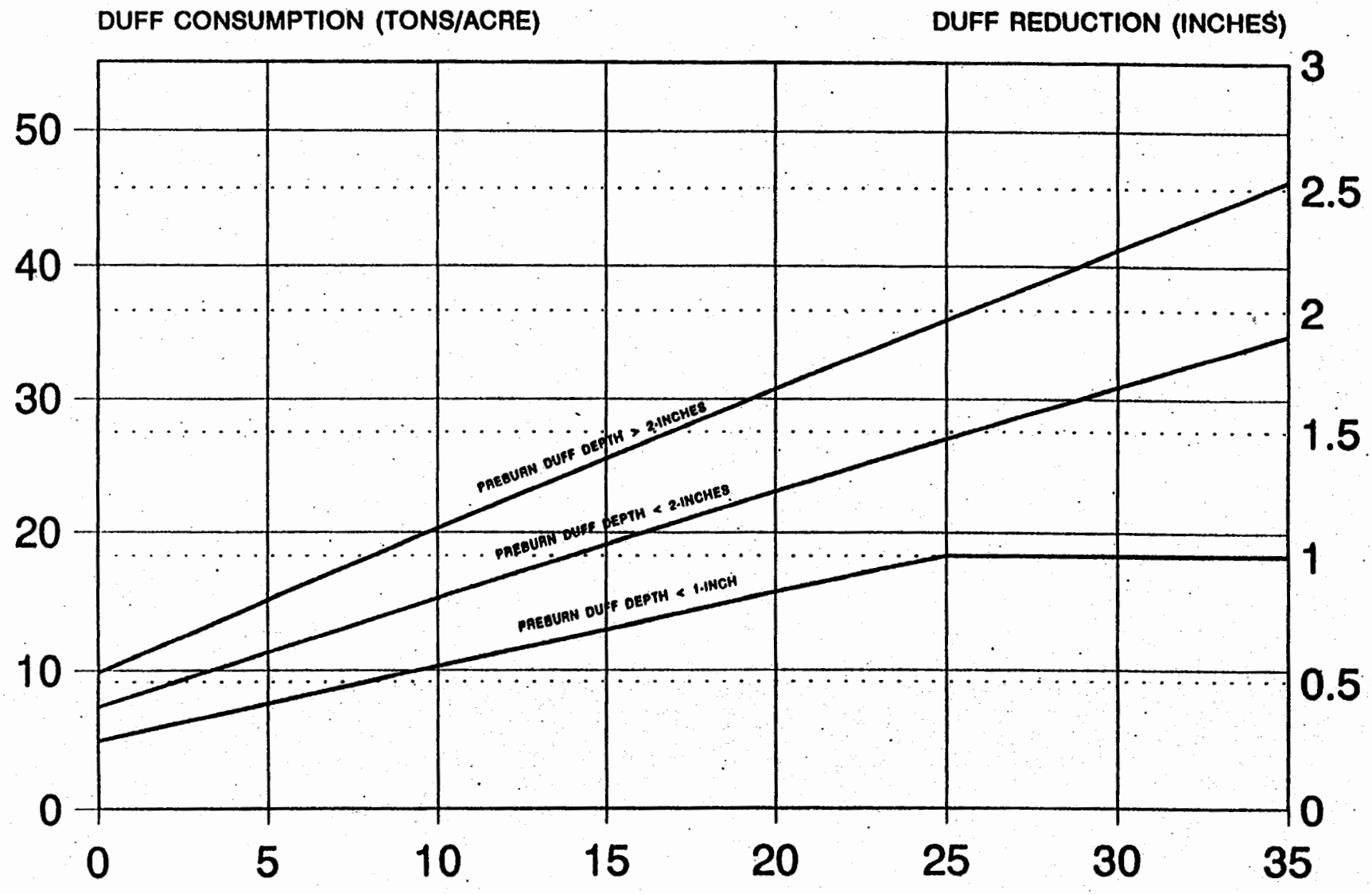


Figure 14. Large woody fuel consumption nomograph for summer-like burns.

DUFF CONSUMPTION (WESTSIDE)

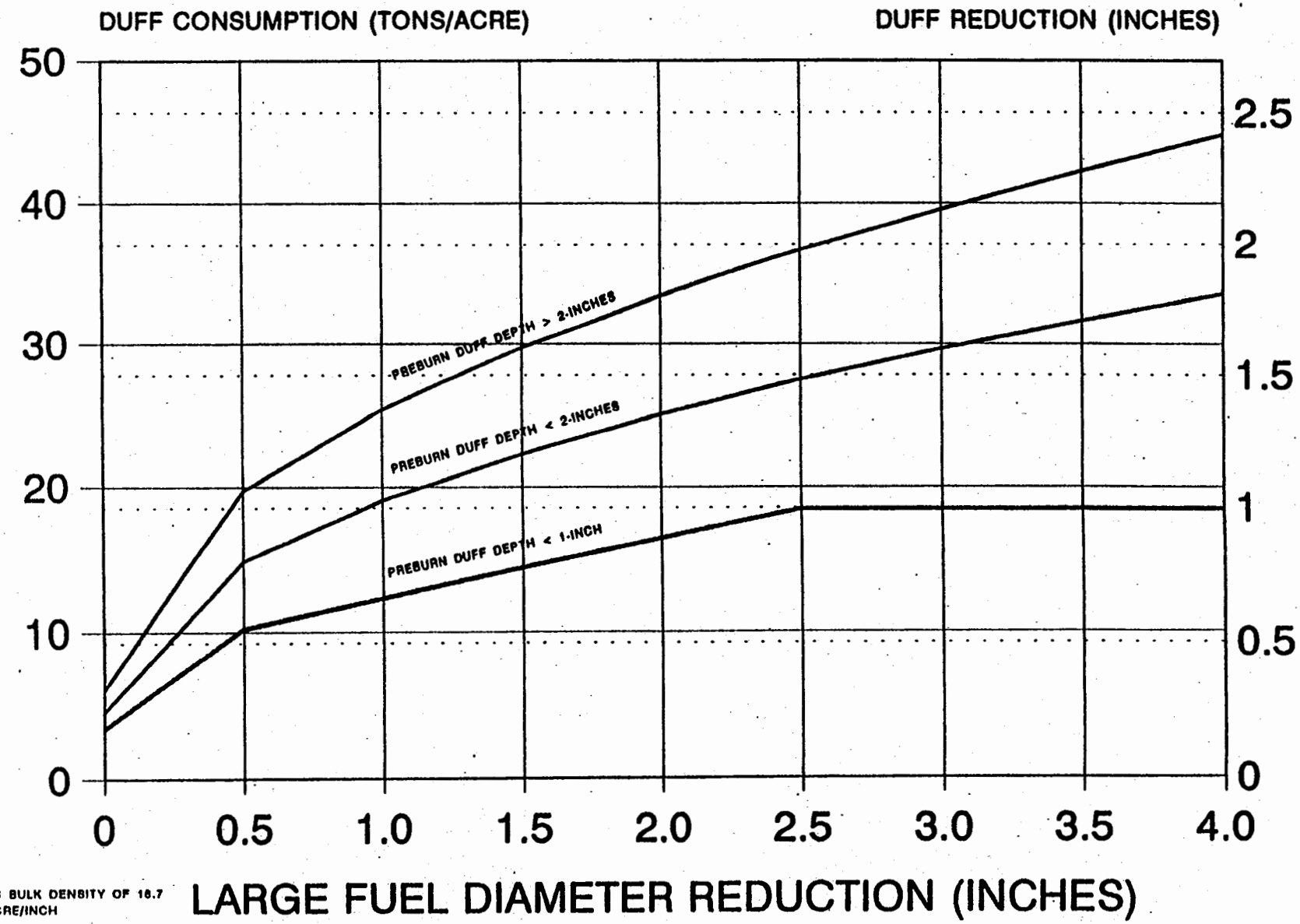
LESS THAN 25 DAYS SINCE 0.50 INCH OF RAIN



3UMES BULK DENSITY OF 18.7
VS/ACR[illegible]CH

DUFF CONSUMPTION (WESTSIDE)

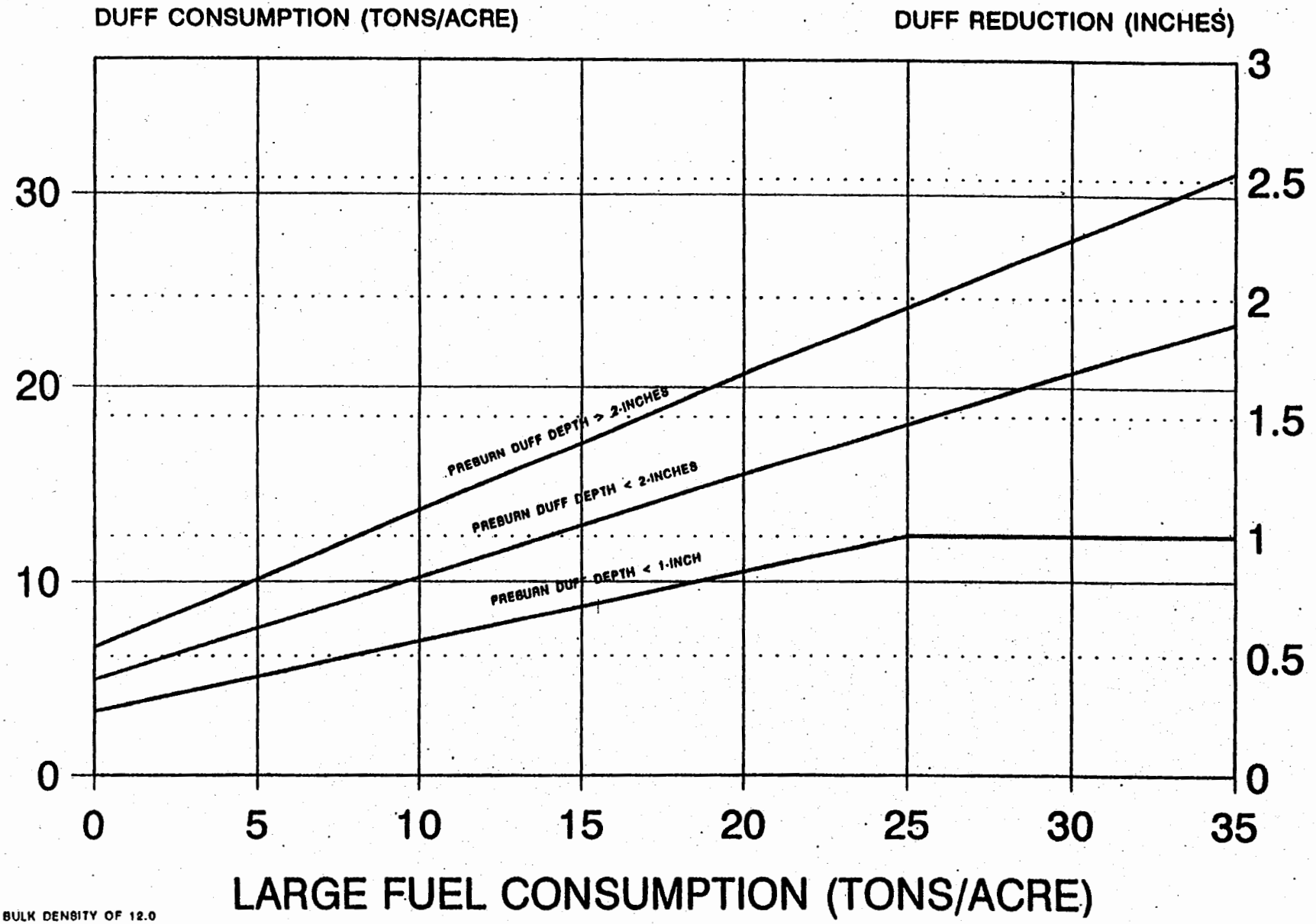
GREATER THAN 25 DAYS SINCE 0.50 INCH OF RAIN



ASSUMES BULK DENSITY OF 16.7 TONS/ACRE/INCH

DUFF CONSUMPTION (EASTSIDE)

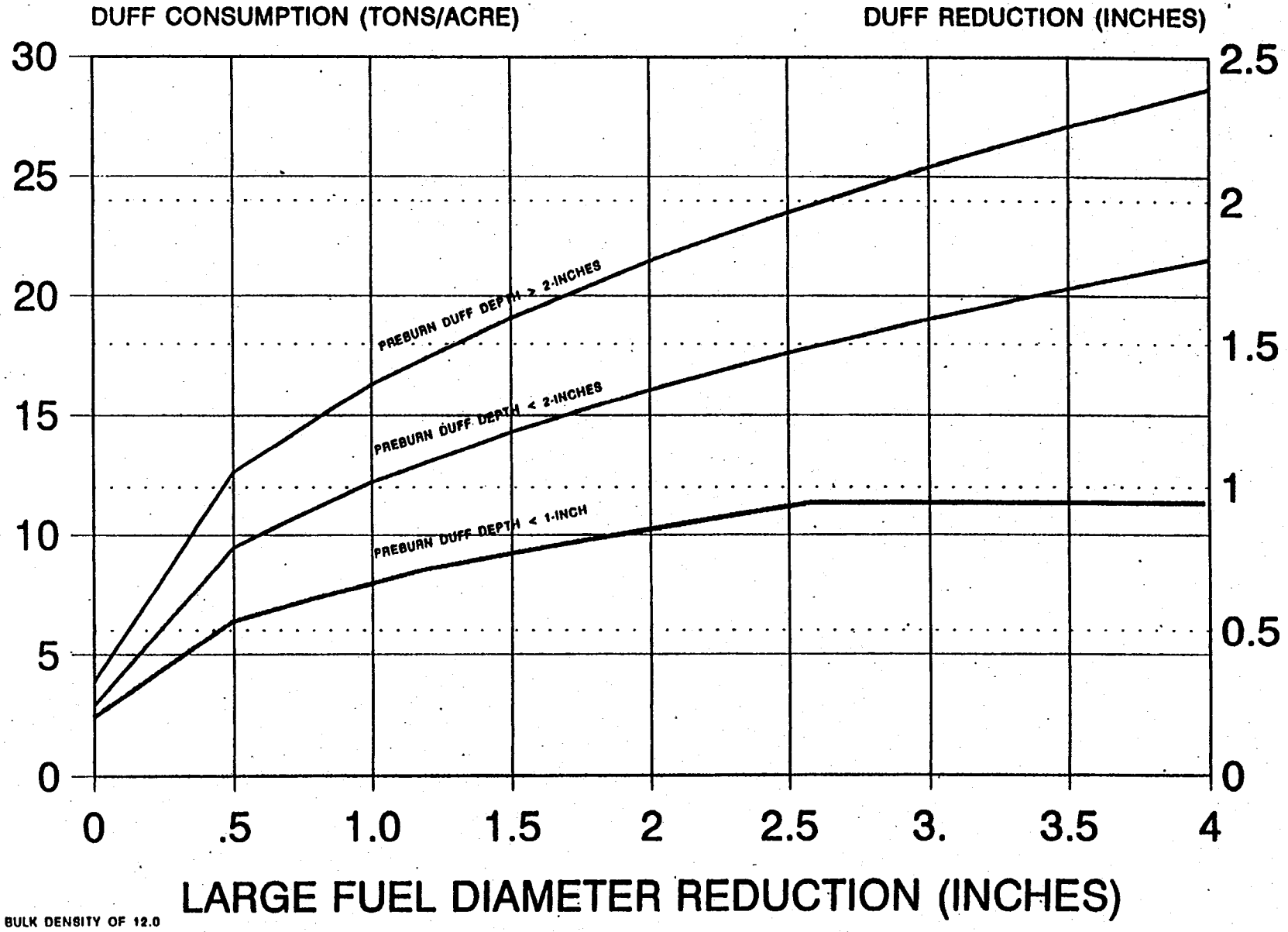
LESS THAN 25 DAYS SINCE 0.25 INCH OF RAIN



ASSUMES BULK DENSITY OF 12.0 TONS/ACRE

DUFF CONSUMPTION (EASTSIDE)

GREATER THAN 25 DAYS SINCE 0.25 INCH OF RAIN



ASSUMES BULK DENSITY OF 12.0 TONS/ACRE/INCH

BROADCAST BURN UNIT CALCULATION SHEET

PHOTO NUMBER	TONS	SIZE CLASS	CONVERSION FACTOR EAST	CONVERSION FACTOR WEST	CONSUMABLE WOODY FUEL PER ACRE OVER 3"	CONSUMABLE WOODY FUEL PER ACRE TOTAL
		1/4 1	100%	100%		
		1+ 3	100%	80%		
		3+ 9	82%	39%		
		9+ 20	40%	16%		
		20+	20%	8%		
FUEL LOAD IN TONS/ACRE					OVER 3" (1)	TOTAL (2)

DUFF CONSUMPTION TABLE

TOTAL CONSUMABLE FUELS OVER 3" (From Figure 1 Above)	DUFF CONSUMED IN TONS/ACRE EASTSIDE	WESTSIDE
5 Tons/Acre	5	12
10 Tons/Acre	7	16
15 Tons/Acre	9	20
20 Tons/Acre	11	24
25 Tons/Acre	13	28
30 Tons/Acre	13	32
35 Tons/Acre	13	36

Enter Duff Tons/Acre (From Chart Above)	(3)
Enter Total Consumable (From Figure 2 Above) Woody Fuel in Tons/Acre	(4)
Total of Lines 3 and 4	(5)
Total Acres in Unit	(6)

TOTAL CONSUMABLE FUEL ON UNIT
(Figure 5 X Figure 6)

PILE BURN UNIT

STATISTICAL SAMPLE CALCULATION SHEET

Pile No. _____ (See Attached Map for Location)

Shape Code Used _____

Primary Species Wt/Ft^3 _____

Primary Species % _____

Secondary Species Wt/Ft^3 _____

Secondary Species % _____

Sketch Pile Shape and Required Dimensions

Formula Used: _____

Calculations

Gross Pile Vol. _____ X .20 = (Net Pile Volume) = 1 _____

Pri. Species % _____ X Wt/Ft^3 _____ = 2 _____

Sec. Species % _____ X Wt/Ft^3 _____ = 3 _____

$$\frac{\text{Fig. 1 X Fig. 2 + Fig. 1 X Fig. 3}}{2000} = \text{\_\_\_\_\_ Tons (Gross Pile Wt)}$$

Gross Pile Wt X .85 = _____ (Pile Consumable Tons)

PILE BURN UNIT

STATISTICAL SAMPLE CALCULATION SHEET

Pile No. _____ (See Attached Map for Location)

Shape Code Used _____

Primary Species Wt/Ft^3 _____

Primary Species % _____

Secondary Species Wt/Ft^3 _____

Secondary Species % _____

Sketch Pile Shape and Required Dimensions

Formula Used: _____

Calculations

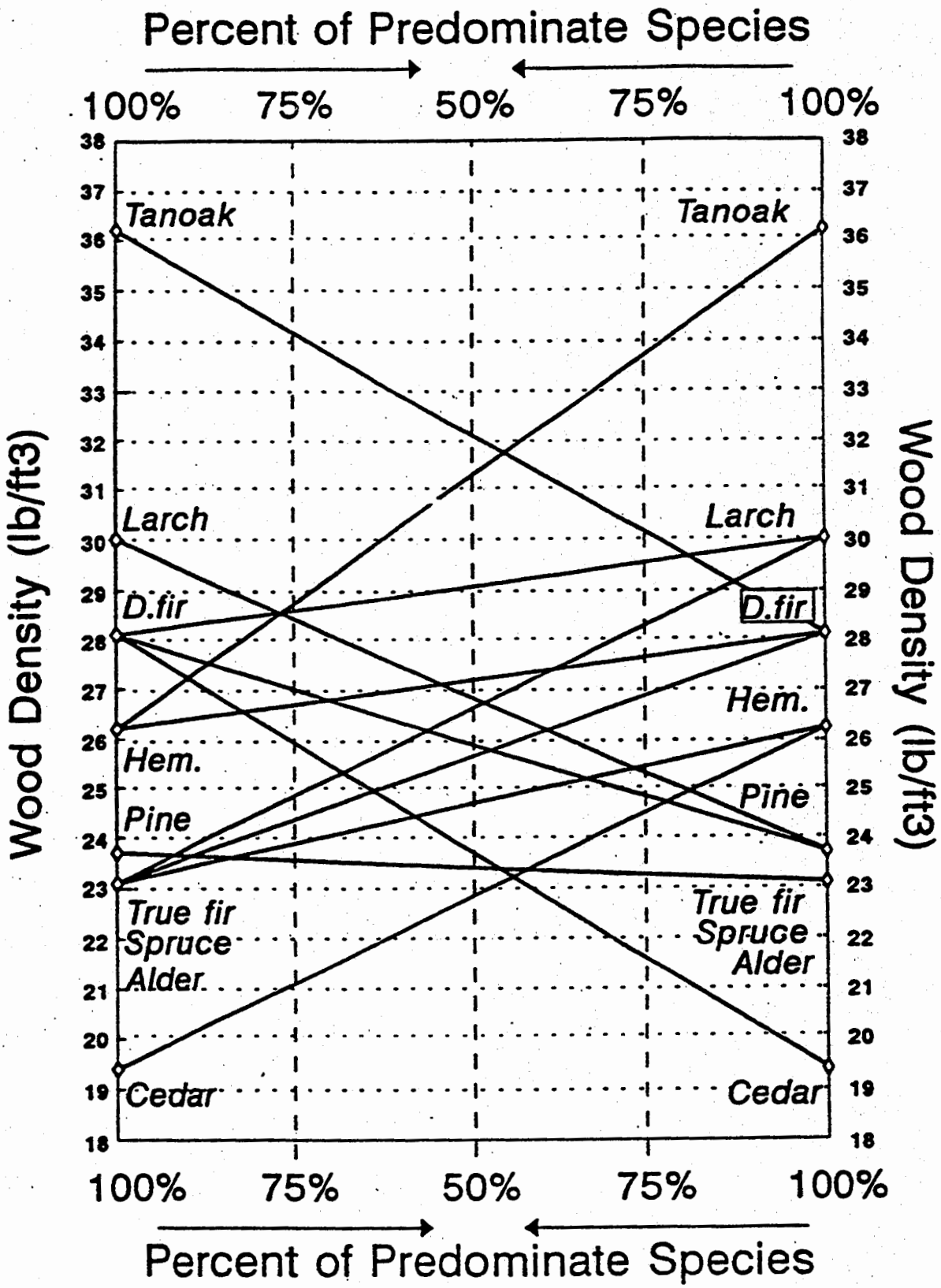
Gross Pile Vol. _____ X .20 = (Net Pile Volume) = 1 _____

Pri. Species % _____ X Wt/Ft^3 _____ = 2 _____

Sec. Species % _____ X Wt/Ft^3 _____ = 3 _____

$$\frac{\text{Fig. 1 X Fig. 2 + Fig. 1 X Fig. 3}}{2000} = \text{\_\_\_\_\_ Tons (Gross Pile Wt)}$$

Gross Pile Wt X .85 = _____ (Pile Consumable Tons)


Percent of Predominate Species
100% 75% 50% 75% 100%
Wood Density (lb/ft3)
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
Tanoak
Larch
D.fir
Hem.
Pine
True fir
Spruce
Alder.
Cedar
Tanoak
Larch
D.fir
Hem.
Pine
True fir
Spruce
Alder
Cedar
Wood Density (lb/ft3)
100% 75% 50% 75% 100%
Percent of Predominate Species

Washington State Smoke Management Plan
1996

APPENDIX 3a

STATISTICAL SAMPLE METHOD FOR BURNS UNDER 100 TONS

Background

A critical component of the Smoke Management program is an accurate emissions inventory. Data collected from previous years will be used to refine and improve data collection procedures and the quality of the emissions inventory. Analysis of the over 20,000 tonnage estimates collected on state and private burns between 1993 and 1995 reveal these facts:

Ninety percent of all burns are under 100 tons.
Burns under 100 tons account for about 40 percent of tonnage consumed.
The mean burn size is under thirty tons.
The standard deviation of the mean tonnage is 26.2 tons.

This information provides the basis do determine the minimum sample size necessary to develop an emissions inventory accurate to within ± 4 percent. The strategy to accomplish this is to sample all burns over 100 tons and enough burns under 100 tons to develop an estimate of total tonnage consumed accurate to within ± 4 percent at a 90 percent level of confidence.

Statistical analysis of under 100 ton burn permits					
Year	Number of permits	Mean tonnage estimate	Standard deviation of mean	Required sample size	Required sample Percent
1995	6847	29.0	25.5	298	4.3%
1994	6090	29.8	26.2	297	4.9%
1993	6136	30.1	26.9	307	5.0%

Conclusion

A random sample of tonnage on five percent of all under 100 ton burn permits and measurement of all over 100 ton permits will provide an acceptable estimate of emissions from silvicultural burning on a statewide basis.

Procedures

note: These Procedures are effective July 1, 1996

The DNR field administrator will:

Measure tonnage on every twentieth permit (permit numbers ending in 00, 20, 40, 60, 80) and every permit more than 100 tons. All measurements will be taken carefully using only the methods approved in appendix 3 of the smoke management plan.

Document calculations and measurements and submit the documentation to the region office with the burn permit.

The Region office will:

Maintain documentation of tonnage calculation and measurements with the burning permit file.

Enter all permits into the burning permit database.

Resource Protection Division will:

Audit 20% of measured permits each quarter.

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APPENDIX 4

Burning Permit Issuance
State and Private Lands

The following procedures apply only where the Department, or other agencies contracted to act on behalf of the Department, issue written burning permits on Department-protected lands. These procedures may be modified at any time by the Resource Protection Division Manager.

I. GENERAL OPERATING INSTRUCTIONS

A. The permittee may pay the Region office in person or by mail. Field administrators may collect fees in the exact amount by check or money order payable to the Department of Natural Resources.

B. Once the Region office receives payment in the mail or delivered in person, there will be NO REFUNDS.

C. The fee schedule listed in WAC 332-24-221 will be used to determine the fee amount of each permit.

D. Burners are required to get burn-day approval before igniting their burns.

For burns that will consume less than 100 tons in a 24-hour period, burners must call "1-800-323-BURN" and follow instructions for the area and day of their proposed burn.

For burns that will consume 100 tons or greater in a 24-hour period, Smoke Management Plan burn submittal/approval procedures will be used.

Failure to follow the "call-in" instructions or "large burn" approval process will be a violation of the conditions of an approved permit and be subject to enforcement action.

E. Separate permits are required for each individual burn site. The single exception allows multiple "landings" to be burned by a single landowner, on that landowner's ownership located within an individual Township.

(Common sense will dictate variation from this directive.) Individual piles away from loading areas are not considered landings.

Separate permits will not be granted for portions of larger logged units that are planned to be burned and/or are likely to be burned because of escape within the permit period when, in the opinion of the field administrator, the purpose of such requests is to manipulate the permit fee structure. Permits must not overlap Region boundaries.

F. Burning permits will not be used to regulate mill burners. RCW 76.04.215 "Burning Mill Wood Waste" is to be used for that purpose.

G. If burning restrictions occur due to fire danger or smoke management concerns, burning permits will be suspended, not revoked or cancelled. No new permit will be required after the suspension is lifted, but no extension of time on the expiration date will be added. No new fees will be charged.

H. Region Managers will establish standards that will allow burning permit site visit reductions commensurate with staffing allocations. Region Managers will provide a written copy to Resource Protection Division.

Region criteria must achieve the following objectives:

1. Burning permits must allow for variable burning conditions and provide a reasonable assurance that escapes and/or smoke intrusions will not occur.

2. Emission calculations must be achieved by a reliable and statistically valid process. Fuel loading estimates must be made by "qualified" persons using estimation procedures approved in Appendix 3 of this Smoke Management Plan.

I. Prior to burning, Regions will audit 5 percent of the burn sites that did not receive a site inspection. Audit results should document tonnage, estimation accuracy, and suitability of permit conditions for the site. If tonnage determined from burner supplied information varies by greater than+/- 20 percent from the Region auditor's tonnage determination, the Region must take remedial action, i.e., determine training needs, review criteria, disqualify a "qualified" estimator after consultation with Resource Protection Division. The Regions will keep copies of audits for one year from the date that the activity took place.

J. All written permits must be signed by a commissioned Forest Warden/Ranger.

II. FIELD OPERATING INSTRUCTIONS

A. General Instructions

The DNR field administrator will:

1. Write burning permits for a period of one year. The year will commence on the date payment is received by the Department.

2. Contact the applicant and determine if a field inspection is necessary, or the permit can be properly conditioned without a field inspection.

   a. If the permit is to be written without inspection, the administrator will notify the applicant to either mail in the fee or pay at the Region office.

   OR

   b. If the permit is to be written with an inspection, schedule an inspection and inform the applicant that should a permit be granted, the fee may be paid by check or money order, made payable to the Department of Natural Resources. The fee may be collected and the permit validated on site by the field administrator. The permittee may start to burn immediately, contingent on smoke management and fire district approval.

3. Condition permit applications to account for variable burning conditions throughout the permit period and to provide a reasonable assurance that escapes and/or smoke intrusions will not occur. **Conditioning must have a high emphasis on air quality protection and nuisance prevention.**

   Under favorable weather conditions, and if pre-approved by Resource Protection Division, the "additional conditions" section may be modified. In such cases, the new conditions will be attached as an addendum, to the permit, and referenced in the fire danger rating section.

4. Not approve burning if fire danger concerns, air quality protection, and other considerations found in WAC 332-24-217 have not been or cannot be adequately addressed and implemented through appropriate permit conditioning.

5. Not approve or allow any burning within air quality non-attainment areas designated by the Department of Ecology as exceeding the PM-10 and CO standard.

6. Require burn plans for all broadcast burns that have consumable tonnage of 100 tons or greater.

   Individual burn plans may also be required for smaller burns and/or each landing burning site when a "multi-landing" permit is written.

   Burn plans must be referenced on the face of the burning permit, and do become part of the permit conditions. If burn plans are attached to any permit, the "burn plan" section on the face of the permit document need not be filled out as long as the required information is presented on the burn plan.

7. Use the most current burning permit application form for all burning permits. The completed burning permit application must include:

   a. For burns that will consume greater than 100 tons per 24-hour period:

      (1) A supplemental data sheet with all necessary pre-burn data.

      (2) Provisions for gathering and submitting post-burn data to the Resource Protection Division office within two business days after ignition.

      (3) A burn plan that if referenced on the face of the burning permit application.

      (4) A completed, signed and conditioned burn permit application form.

   b. For burns that will consume less than 100 tons per 24-hour period:

      A completed, signed and conditioned burn permit application form.

8. Enforce all burning permit conditions and other burning requirements in accordance with RCW 76.04.205, WAC 332-24 and the Smoke Management Plan.

9. Inform the burner that failure to comply with rules in Chapter 332-24 WAC voids permission to burn. Any person burning without complying with Chapter 332-24 WAC is in violation of RCW 76.04.205 and Chapter 70.94 RCW. Convictions or bail forfeitures in connection with illegal burning under Chapter 332-24 WAC may result in refusal to issue further permits for a two-year period from the date of the illegal burning. The decision to refuse issuing any further permits rests with the Region.

10. Account for burn permit forms. Write "void" on any damaged or unusable forms, note on the weekly log, and send to the Region office.

B. On-Site Inspections

1. Estimate consumable tonnage on the burn site using approved procedures. (See Appendix 3)

2. Determine fee amount using the approved fee schedule.

3. Sign the completed burn permit application and initial any scratch outs or corrections. Use ink to write permits.

4. Collect the check or money order, write the check number on the permit, and validate the permit.

5. Contact the Region office and relay permit information for dispatch use.

6. Complete the burn permit log, staple any fees collected to the office copy, and mail or deliver to the Region office on the same day the permit was validated.

7. Complete the field permit tracking log and send to the Region office weekly.

C. Permits Written Off-Site

1. Conduct a brief telephone training session with the permittee. Answer any questions regarding burning regulations, safe/clean burning practices. Acquire all necessary permit information, including pile size and number of piles. Calculate tonnage from the information given. Write calculated tonnage in the appropriate place on the burning permit form before sending/giving packet to permittee (see 4. below).

2. Instruct the permittee to sign the completed permit application. Enclose all copies of the permit with attachments, PLUS payment in the envelope provided, and send to the appropriate Region office.

3. Remind the permittee that permission to burn does not occur until the permit application is validated and returned to them by the Region office. Also remind the permittee of the requirement to receive permission from the Department on the day they plan to ignite their fire(s).

4. When the permit is to be completed without a site inspection, keep the warden copy, and send or give the permittee a packet that includes:

   a. The completed permit form (plus all attachments);

b. A pre-addressed envelope to the appropriate Region office; and

c. A current debris burning handout with any appropriate inserts (prevention material, etc.).

5. Keep the fourth copy (goldenrod) of the burning permit application for the field administrator's records.

6. Make personal follow-up contact to notify the permittee of permit revocation/suspension, if required.

The landowner or landowner agent will:

1. Sign the burning permit application, enclose all copies of the application, burn plan and data sheet PLUS payment in the envelope provided, and deliver or send to the appropriate Region office to be validated.

OR

Present a check or money order, payable to the Department of Natural Resources, to the field administrator at the time of inspection. Sign the permit and comply with the conditions to burn.

2. Indicate on their permit application and/or check that they wish to open a "debit account," and have the proper amount enclosed ($1,500 minimum opening balance).

3. Indicate if payment is to be applied to an existing "debit account" and what their existing Account Number is.

III. REGION OFFICE OPERATING INSTRUCTIONS

General Duties

The Region office staff will:

A. Receive requests for burning permits from the public and pass along those that require a written permit to the field administrator using normal communication procedures.

B. Receive burning permit applications with attachments plus payment from permittee.

OR

Receive the validated permit with a check or money order attached from the field administrator.

C. Review the burning permit package for completeness and ensure that the correct payment amount has been received.

D. Consult with the field administrator who signed the permit application if any irregularities are noticed or information is missing. Arrange for the errors or omissions to be corrected.

E. Follow Region procedures to decide if too much time has passed between the field administrator's site visit and the date received in the Region office.

F. Develop a filing system to store validated permits and un-validated (but field approved) permit applications and burn plans.

G. Process fees collected using appropriate Department procedures.

H. Validate properly completed permit applications, not already validated by the field administrator, according to the procedures in Appendix 3.

I. Reconcile issued/validated permits with field log and checks received.

J. Notify field administrator and permittee that the permit is suspended if permit fee remuneration cannot be collected (bad check). Instruct field administrator to make a personal visit to permittee if notice cannot be delivered by phone.

K. Create and administer a large burner "debit account" for any burner who plans to burn more than 100 consumable tons, and desires to deposit money with the Department for use against future permit fees. The minimum opening balance for these accounts is $1,500.

L. Transmit pre-burn and post-burn data to Resource Protection Division within specified time periods.

M. Provide Resource Protection Division with the information necessary to operate the 1-800-323-BURN phone system.

IV. OTHER AGENCY OPERATING INSTRUCTIONS

General Procedures

A. Regions may amend existing fire district or other agency agreements or negotiate new agreements to contract for permit writing services. All agreements must be approved by Resource Protection.

B. Other agency personnel who issue burning permits under contract with DNR, on DNR-protected land, must possess a Forest Ranger Commission card.

C. If other agencies are contracted to issue permits on DNR protection, they must also enforce the terms of the permits under the authority of their limited "Ranger Commission" and RCW 76.04 and WAC 332-24.

D. Other agency personnel may process money for the permits they issue on DNR protection. They must use the same procedures, fee schedule, forms, handout material and mailing envelopes used by Region personnel.

Washington State Smoke Management Plan
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APPENDIX 5

Smoke Intrusion Reporting Procedures

I. RECEIVING AND PROCESSING COMPLAINTS

A. DNR Regions:

1. DNR Regions will notify Resource Protection, Public Affairs Office and Region where smoke originated (if different) immediately upon receiving smoke complaints from designated areas, if it appears that a smoke intrusion may be taking place.

2. If the smoke is also heading toward a designated area in a neighboring Region, the source Region will immediately notify the receiving Region, Resource Protection and Public Affairs of the situation.

3. All complaints will be forwarded to and handled by the source Region.

B. Resource Protection Division (PBX):

1. Complaints received from the public will be forwarded to the source Region. If the source hasn't yet been identified, mark the locations of a few reporting persons to help in that determination.

2. When transferring calls to the Region, stay on line and ask for the Region's Smoke Management person before releasing the call.

3. After office hours, record the time the call is received, caller's name, number and Region that the smoke intrusion is located in. Alert the Region standby and record the time that the standby person was contacted, on the Telephone Intrusion Report Log. **Be sure to advise callers that an investigation is taking place and that someone from the Region will contact them as soon as possible.**

4. If a Region officially declares an intrusion, record the time notified on the Telephone Intrusion Report Log and notify <u>one</u> of the following people below in the listed order:

Resource Protection Assistant Manager, Prevention
Resource Protection Manager
Resource Protection, Smoke and Fuels Manager

5. Copies of the Telephone Intrusion Report Log will be filed in the incident file for that smoke intrusion.

II. SMOKE INTRUSION REPORT

A Smoke Intrusion Report (pages 3-4) must be submitted by the Region Manager for all smoke intrusions into designated areas whenever the duration exceeds 30 minutes or for any area when the Region Manager determines the smoke impact on the public warrants submission of the report.

The purpose of the formal intrusion report is to allow a "post-incident" evaluation. The report is intended to bring out observations/conclusions/ recommendations from the Region. Resource Protection will append the meteorological evaluation upon receipt of a Region's intrusion report and forward both to the Department Supervisor.

The intrusion report is submitted to DNR Executive Management within 24 hours of the intrusion. To meet this time limit, the Regions must notify Resource Protection, Smoke Management Section, immediately and the report must be FAXed to Resource Protection at (206) 902-1781.

A summary of the number of verified smoke intrusions that occurred during a calendar year will be included in the annual Smoke Management Report.

WASHINGTON DEPARTMENT OF NATURAL RESOURCES
SMOKE MANAGEMENT PROGRAM

SMOKE INTRUSION REPORT/POST-INCIDENT ANALYSIS

COMPLETE FOR **ALL** SMOKE INTRUSIONS BELOW DESIGNATED AREA CEILING HEIGHTS WHENEVER DURATION EXCEEDS 30 MINUTES OR FOR ANY AREA WHEN THE REGIONAL MANAGER DETERMINES THE SMOKE IMPACT ON THE PUBLIC WARRANTS SUBMISSION OF THE REPORT. SUBMIT TO EXECUTIVE MANAGEMENT WITHIN 24 HOURS OF INTRUSION. ALSO SUBMIT A COPY TO RESOURCE PROTECTION (FAX: 360-902-1781). HANDWRITTEN IS ACCEPTABLE. ATTACH ADDITIONAL COMMENTS AS DESIRED.

1. REGION _____ DATE OF INTRUSION _____ TIME OF INITIAL IMPACT _____

2. DURATION (HRS)_____

3. SMOKE CONCENTRATION: ☐ Light ☐ Medium ☐ Heavy
   A. **Light** - Smoke is slightly visible but has minimum impact on air quality or overall visibility.
   B. **Medium** - Smoke has noticeable impact on visibility with minimum air quality and public health.
   C. **Heavy** - Smoke has excessive impact on visibility and air quality with potential adverse impact on public health.

4. ESTIMATED LEVEL OF GREATEST SMOKE CONCENTRATION: ☐ Surface - 1,000' ☐ 1,000-2,500'

5. TYPE OF COMPLAINTS: ☐ Health Number _____ ☐ Visibility Number _____
   ☐ Falling Material Number _____ ☐ Other Number _____

6. ESTIMATED SOURCE OF SMOKE: ☐ Slash Burn ☐ Residential Burn ☐ Field Burn ☐ Other

7. ESTIMATED LOCATION AND LANDOWNER AT SMOKE SOURCE: _____

---

8. LIST SIGNIFICANT PUBLIC CONTACT(S) IN RELATION TO INTRUSION (e.g., Industry, Political, Air Pollution Agencies, Media, etc.) - DO NOT COMPLETE FOR ROUTINE TELEPHONE SMOKE COMPLAINTS. ATTACH SEPARATE COPY OF TELEPHONE COMPLAINT LOG.

NAME	WITH	TIME	DATE

9. ATTACH A COPY OF THE BURN PLAN TO THIS REPORT AND COMPLETE THE FOLLOWING:

   A. NAME/CLASSIFICATION OF PERSON ISSUING BURNING PERMIT.

   B. WAS THE PROPERTY BURNED IN ACCORDANCE WITH THE BURN PLAN? IF NOT, LIST THE DEVIATIONS AND EXPLAIN. SPECIFICALLY ADDRESS EFFORTS/TECHNIQUES TO RAISE A COLUMN.

   C. WHAT WERE THE 10-HOUR FUEL MOISTURES AT IGNITION AND HOW WERE THE FUEL MOISTURES DETERMINED?

   D. ESTIMATE THE TIME THE PROPERTY RECEIVED ITS LAST "WETTING RAIN." (RAIN RECEIVED EARLIER THAN 4 DAYS PRIOR TO IGNITION MAY BE ESTIMATED AS "4 DAYS PLUS." WETTING RAIN IS .1 INCH OR GREATER.)

10. EVALUATE THE OBSERVED SMOKE PLUME BY COMPLETING THE FOLLOWING:

   A. DESCRIBE THE TRAJECTORY OF THE SMOKE IN TERMS OF ALTITUDE ABOVE GROUND LEVEL (AGL) AND GEOGRAPHY (E.G., SMOKE ROSE IN COLUMN TO 2,200' AGL, THEN BENT OVER TOWARDS TOWN "A." CROSSED I-5 ON THE GROUND, PASSING THROUGH TOWN "B" AND DISAPPEARED INTO THE CASCADES).

   B. IF THE SMOKE DID NOT RISE IN A COLUMN TO 3,000', EXPLAIN WHY.

11. WHAT CHANGES IN PROCEDURES/TECHNIQUES ARE NECESSARY TO PREVENT A FUTURE INTRUSION UNDER SIMILAR CONDITIONS?

SUBMITTED BY _____ DATE _____

HH-07 (10/89)

Washington State Smoke Management Plan
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APPENDIX 6

1-800 Burning Permit Phone System Procedures and Responsibilities

The purpose of the 1-800-323-BURN system is to provide the Department with a tool to start or stop all burning under 100 tons on Department-protection and federal lands included in this plan. This includes "rule" burning (except in campgrounds) and "permitted" burning. The system will satisfy the requirement to "call the Department prior to igniting any fire" found in WAC 332-24-205 (6).

The following discussion will describe the tasks and procedures necessary to operate the system. **It is important that each Region provide the required information to Resource Protection as specified.**

Resource Protection will enter the daily messages onto the system.

I. REGION RESPONSIBILITY

Determine a "script" for their region burning information message with the following information by 1630 hours daily:

A. Determine, by county, whether under 100 ton burning will be allowed or not for fire danger reasons during the next midnight to midnight period. Where Region boundaries overlap county lines, those Regions must decide which one will make the determinations for that county.

B. Provide for internal quality control checks of the daily message. If the Region perceives a problem that cannot be resolved in the region, notify the Resource Protection Communications Supervisor or Fire Regulation Coordinator to resolve them.

C. If burning will be allowed in some counties determine the "adjective class," by county, daily. This determination will be for "tomorrow" and cover the time period of midnight to midnight.

The determination of "adjective class" is necessary so that the public knows on any given day which set of burn permit conditions apply, related to the "adjective class" on their permit, for the county they are burning in.

In order to be consistent in determining "adjective class," statewide, Regions should use predicted Manning class from NFDRS to determine the appropriate adjective class for the next midnight to midnight period, as follows:

IGNITION COMPONENT	0-20	21-45	46-65	66-80	81-100
Manning Class	Adjective Class				
0 1/	0	0	0	0	0
1-, 1, 1+	L	L	L	M	M
2-, 2, 2+	L	M	M	M	H
3-, 3, 3+	M	M	H	H	V
4-, 4, 4+	H	H	V	V	E
5-, 5, 5+	H	V	V	E	E

Regions will have to use judgement in order to meld the various Manning classes for each shutdown zone into one average Manning class (hence adjective class) per county.

"Adjective class" is only being used for the benefit of the public's understanding. Its relationship to actual fire danger, as predicted by NFDRS, is closely, but not always directly, correlated. By relating "adjective class" to Manning class, there is a relationship to NFDRS predicted fire danger, and gives a rational basis upon which to make an informed and proper determination.

Regions may deviate from the chart above if conditions exist that place a Manning class close to the threshold of the next higher/lower Manning class. In those cases the Regions must exercise judgement.

D. Using the developed script, record the daily prevention messages and the appropriate adjective classes and "burn" or "no burn" messages onto the system by 1700 daily.

E. Maintain a written record of each message placed on the system suitable for entry into State legal/court records.

F.. Monitor the completed daily message for your Region, and be sure that the information is transmitted to the field administrators daily.

II. RESOURCE PROTECTION RESPONSIBILITY

A. Gather input about air pollution episodes and impaired air conditions from the Department of Ecology and enter a burn or no burn message for air quality, in the counties affected. This is the only time Resource Protection Division will be recording messages.

B. Maintain the system with vendors.

F. Monitor the system messages at least three times per week.

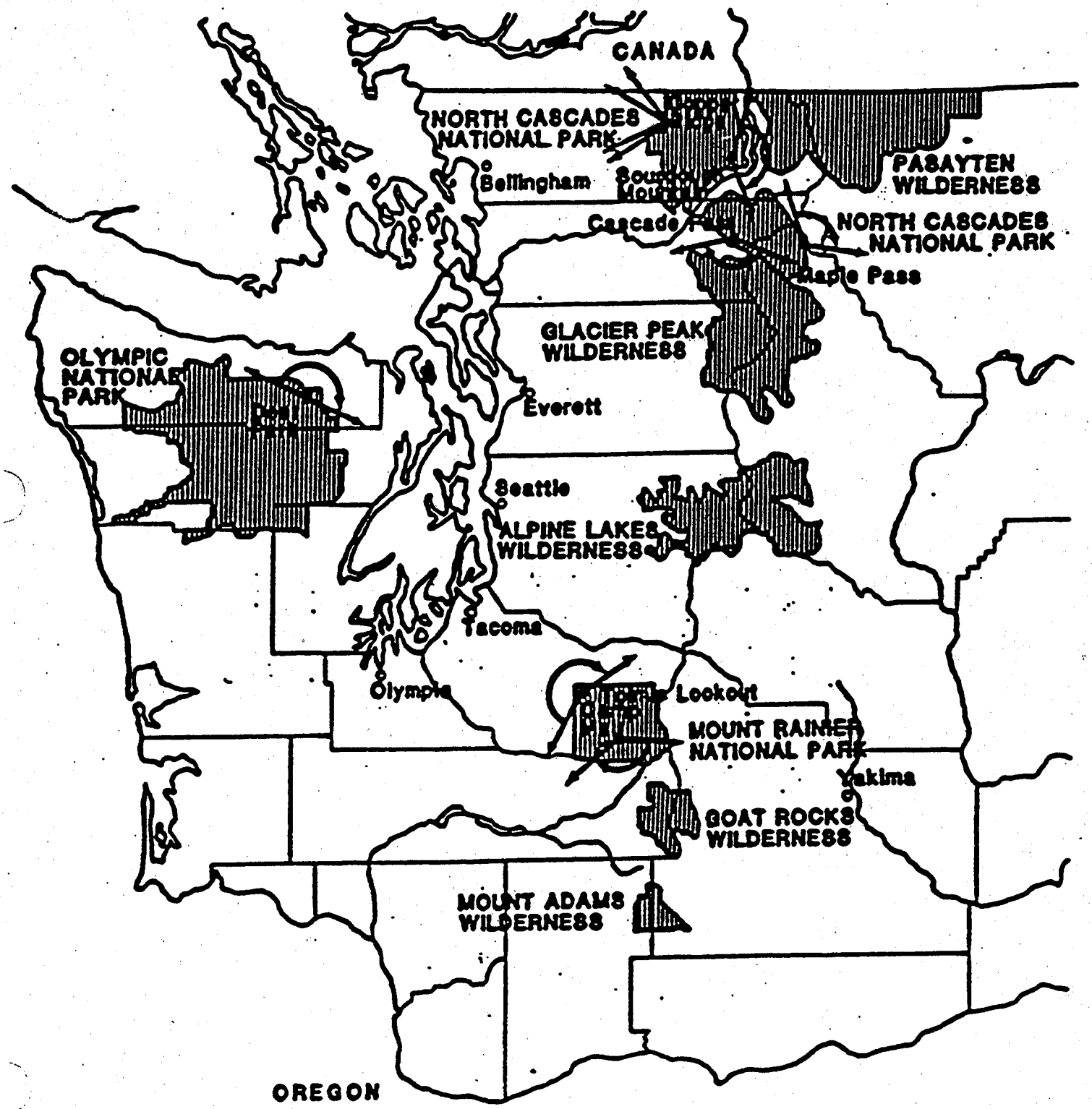
III. GENERAL

The scripts used for each Region will be based upon a Region wide message with a county by county message option when required. No subdivision smaller than a county will be used.

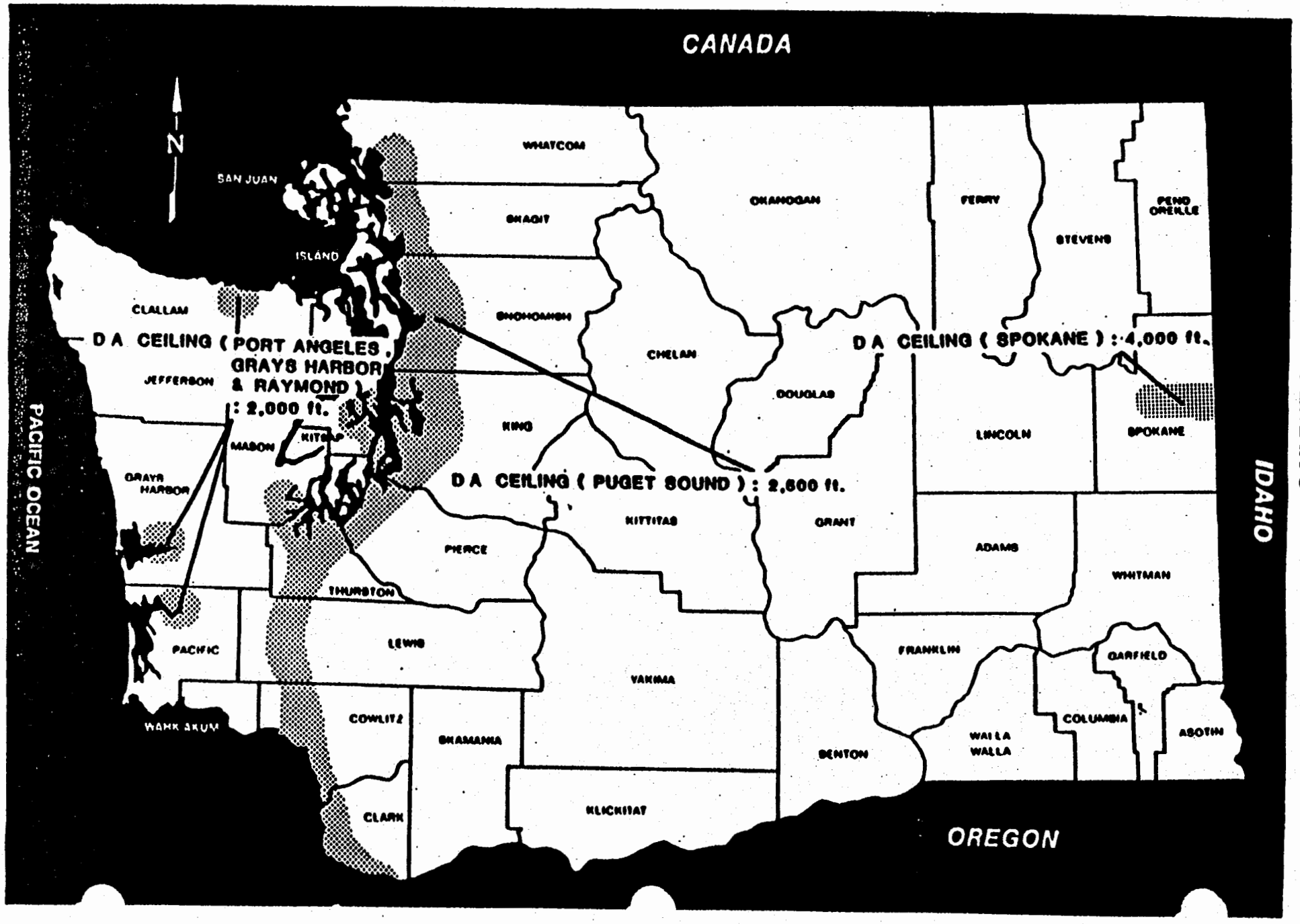
(Exceptions to this would be where distinct climate variations exist within a county and the Region desires to turn burning "on" and "off" based on that variation (e.g., east and west Clallam/Jefferson County). If this were done, a distinct and VERY EASILY identified and understood dividing line would be used to make the distinction. (We are NOT encouraging any deviation from county-by-county subdivisions; for both cost and public confusion reasons.)

APPENDIX 7

State of Washington
Federal Class I Areas



State of Washington
Designated Areas (DA) for Air Quality Control



APPENDIX 8

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APPENDIX 9

Ambient Air Quality Standards

POLLUTANT	NATIONAL		WASHINGTON STATE
	PRIMARY	SECONDARY	
Total Suspended Particulates			
Annual Geometric Mean	No Standard	No Standard	60 $\mu g/m^3$
24-Hour Average	No Standard	No Standard	150 $\mu g/m^3$
Particulate Matter (PM_{10})			
Annual Arithmetic Mean	50 $\mu g/m^3$	50 $\mu g/m^3$	50 $\mu g/m^3$
24-Hour Average[1]	150 $\mu g/m^3$	150 $\mu g/m^3$	150 $\mu g/m^3$
Particulate Matter ($PM_{2.5}$)			
Annual Arithmetic Mean	15 $\mu g/m^3$	15 $\mu g/m^3$	No Standard
24-Hour Average[2]	65 $\mu g/m^3$	65 $\mu g/m^3$	
Carbon Monoxide (CO)			
8-Hour Average	9 ppm	No Standard	9 ppm
1-Hour Average	35 ppm		35 ppm

ppm = parts per million.
$\mu g/m^3$ = micrograms per cubic meter.

[1] Based on three year average of 99th percentile.

[2] Based on three year average of 98th percentile.

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December 11, 1992

APPENDIX 10

Overview of SMS-INFO

By
Roger D. Ottmar
April 1, 1992

BACKGROUND

The Fire and Environmental Resource Applications (FERA) group is a component of the Global Environmental Protection Program, Pacific Northwest Research Station, USDA Forest Service. Through research, FERA has created knowledge about the factors that influence fuel consumption and emissions production during a prescribed burn. FERA has developed a computer program known as SMS-INFO to improve the quality of information used by policy makers in developing air quality and smoke management programs. The program will read prescribed burn records that have been electronically mailed to the State regulatory agencies and estimate the amount of fuel consumption and emissions produced by each burn.

SYSTEM CONTENT

The SMS-INFO program serves as part of the decision support system used by State regulatory agencies to implement air quality and smoke management systems. SMS-INFO will: (1) read prescribed burning records that have been electronically mailed to a State agency; (2) validate the integrity of the data; (3) generate pre-event and post-event estimates of consumption and emissions; and (4) write estimates to ASCII text files that can be imported into commercial software - such as a database management system, spreadsheet, or word processor - for further analysis and reporting by State agencies.

SCIENCE OVERVIEW

Fuel consumption and smoke emission measurements were collected from nearly 175 operational prescribed burns on Forest Service, State, and private lands in the Pacific Northwest during the 1980s. These measurements were used to develop the fuel consumption algorithms and emission factors for the flaming and smoldering combustion phases currently in SMS-INFO. The program includes algorithms to provide fuel

consumption estimates for small fuels, large fuels, uncured fuels, duff, high intensity fires and spring-like burning conditions. Emission factors (pounds of emissions per ton of fuel consumed) for Douglas Fir/Western Hemlock, coastal hardwoods, mixed conifer, pine and piled slash are contained within the program.

The small woody fuel consumption models are based on 10-hour fuel moisture content (most important variable), with adjustments for wind speed and slope. The large woody fuel consumption algorithm is based on large fuel moisture content (most important variable), with adjustments for high small fuel moisture contents, rapid ignition and uncured fuel moisture. The duff consumption algorithm is based on large fuel consumption (most important variable) and days since significant rain. The emission factors (amount of smoke per ton of fuel consumed) are based on the type of burn (partial cut, clearcut or pile). Adjustments are also made for species of fuels.

The program calculates the amount of fuel consumed by combustion stage based on weather, fuel moisture and unit information provided on the Smoke Management Report. The fuel consumed is multiplied by an emission factor to calculate total emissions produced (Figure 1).

The reader must keep in mind that the models within SMS-INFO will always be changing as new research is applied and improved models are developed. In certain cases, preliminary models are used as the best tool available at this time. This document describes the fuel consumption and emission algorithms as they currently exist in SMS-INFO.

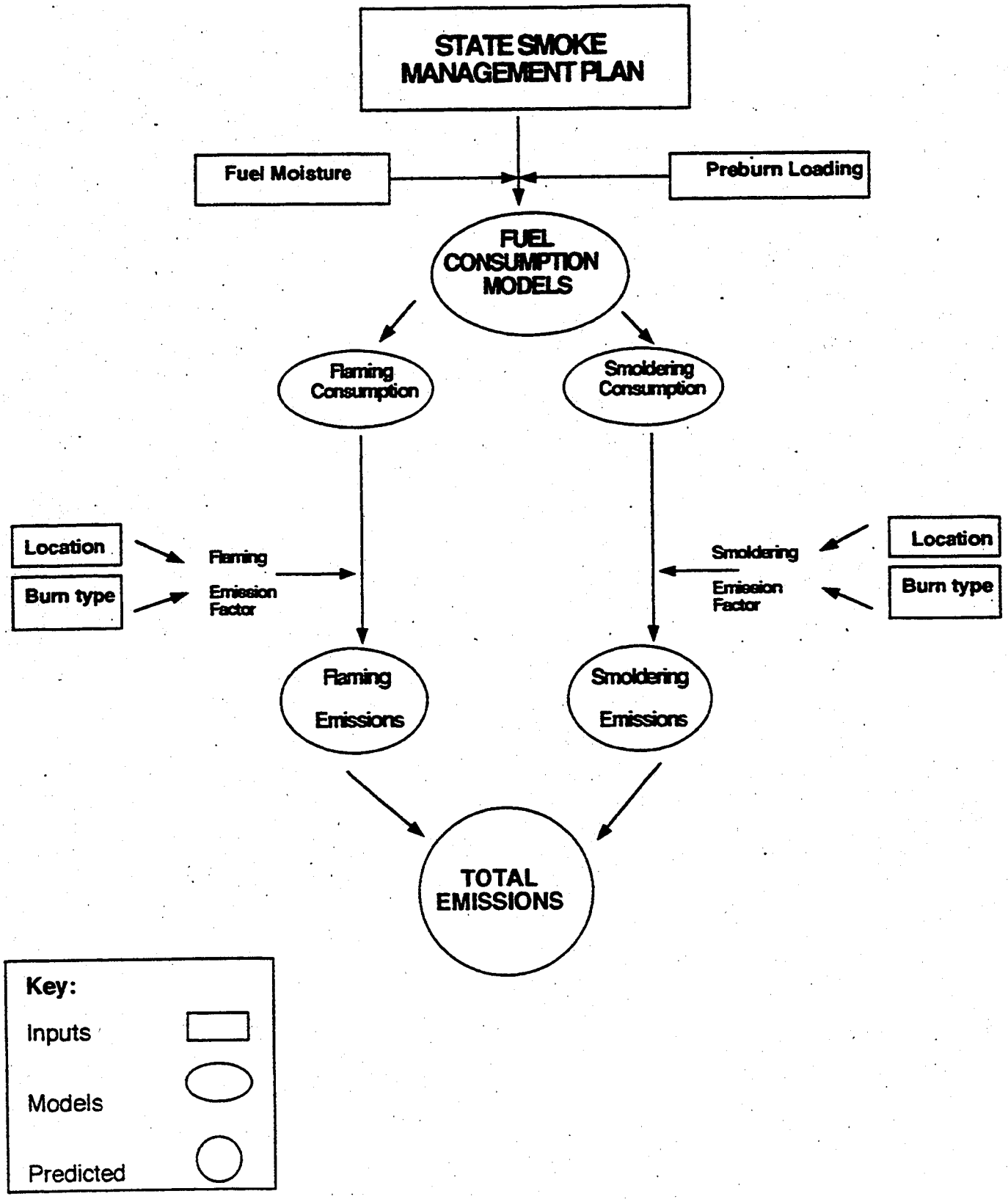
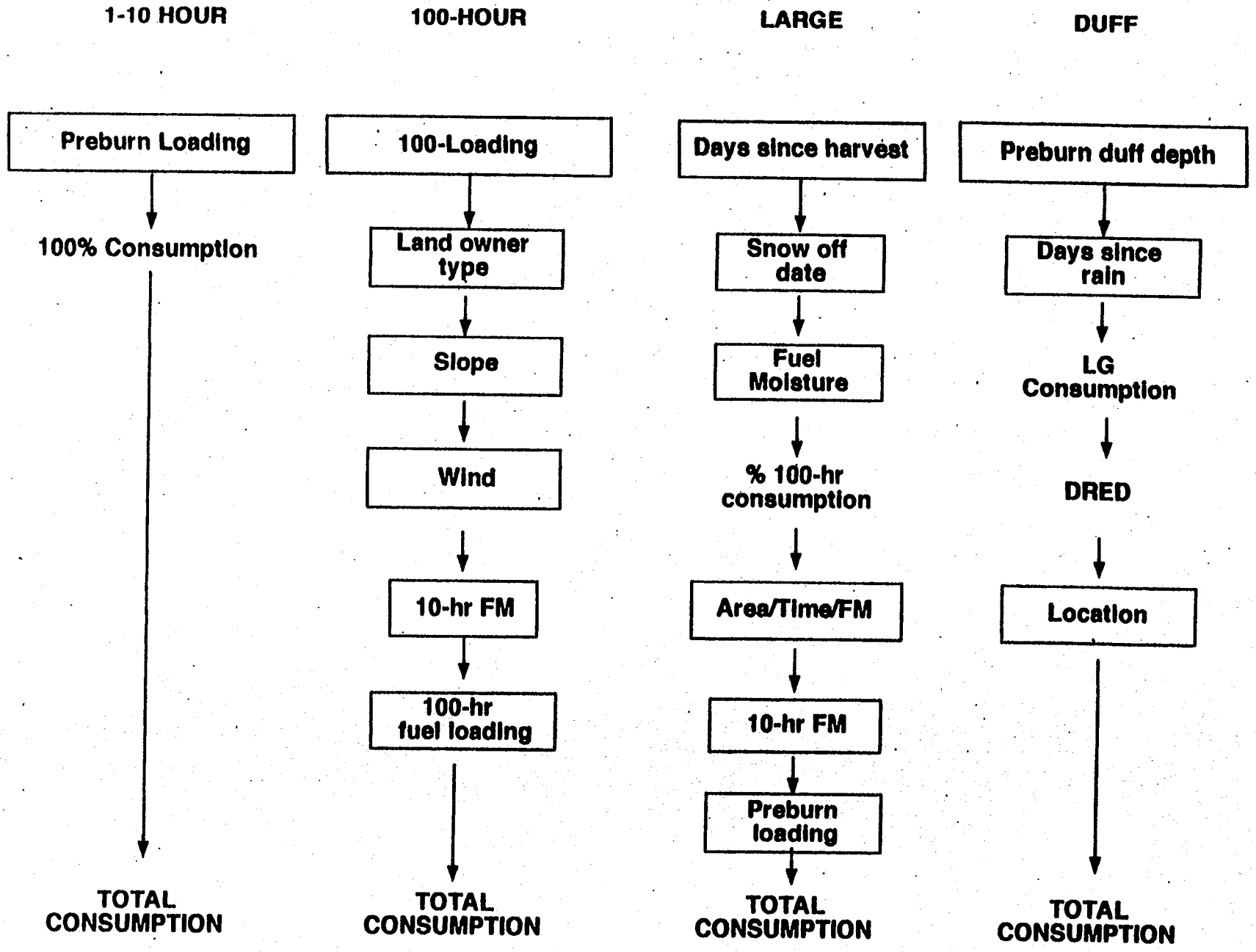
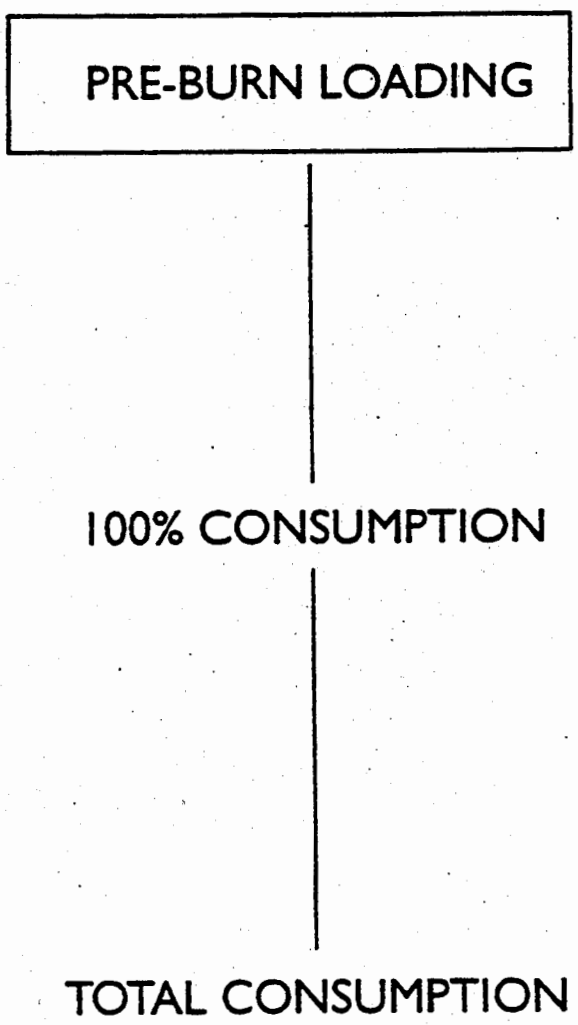


Figure 1. Simple flow diagram of SMS0-INFO

FUEL CONSUMPTION MODEL

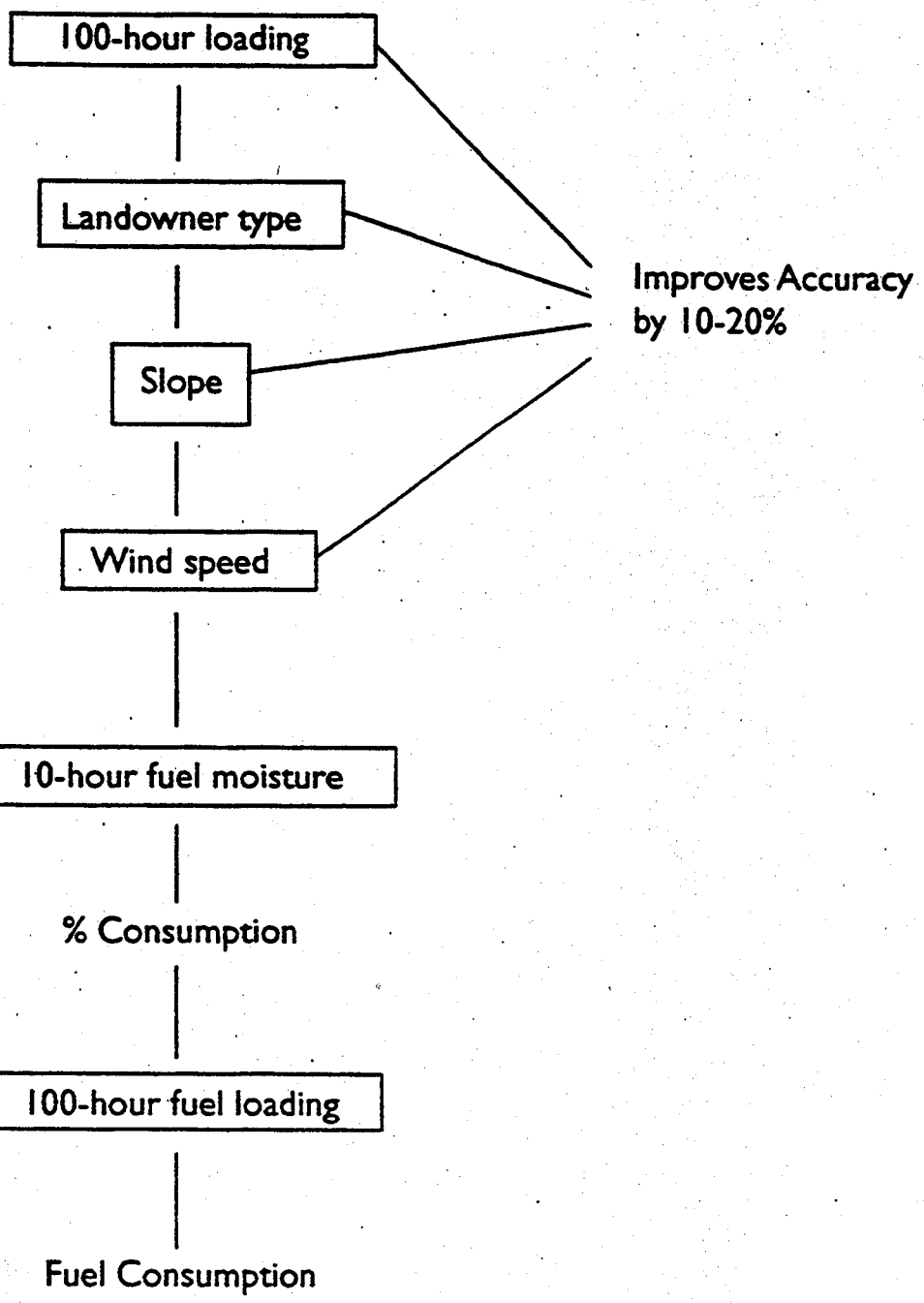


FINE FUEL CONSUMPTION
(1-hour & 10-hour)



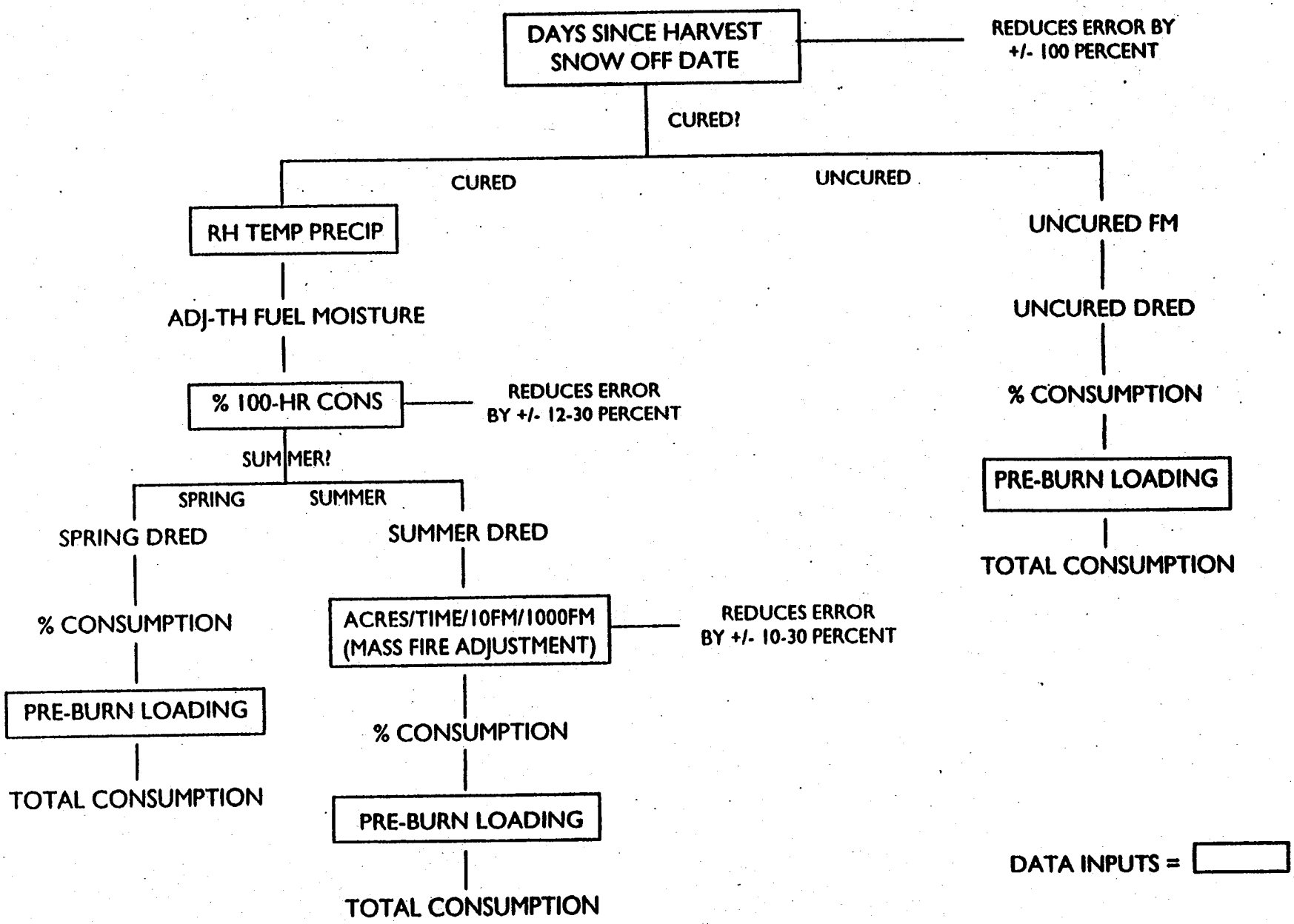
Data Input

100-HOUR FUEL CONSUMPTION

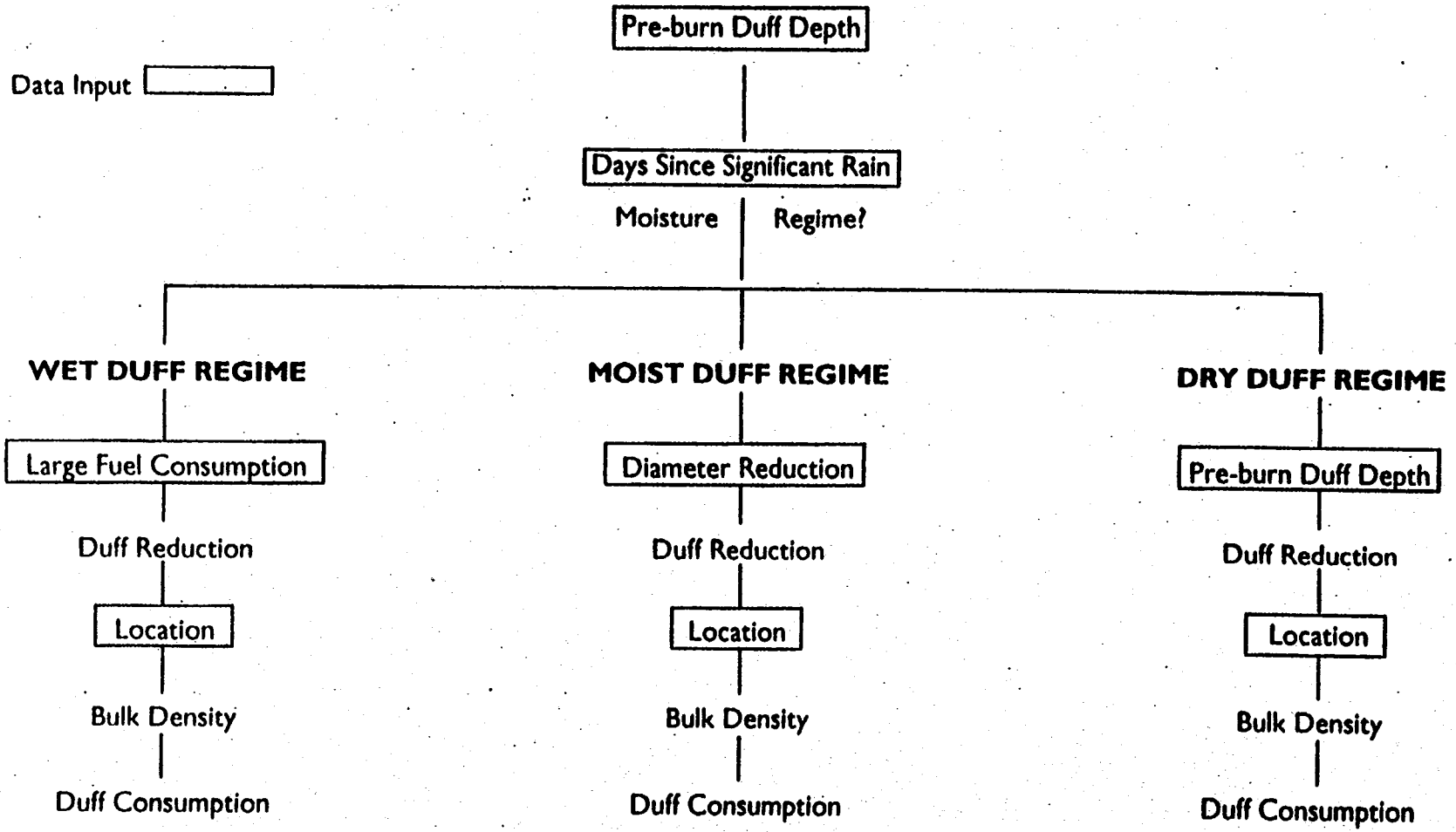


Data Input

LARGE FUEL CONSUMPTION (3-9, 9-20, 20+, ROT)



DUFF CONSUMPTION



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APPENDIX 11

Authorities

RCW 76.04 FOREST PROTECTION LAWS

The Revised Code of Washington (RCW) 76.04.205 requires that persons shall have a valid written burning permit obtained from the Department of Natural Resources to burn:

Flammable material on lands protected by the Department; or

Refuse or waste forest material on forest lands protected by the Department.

The conditions under which a permit may be issued include:

". . . burning will be done in compliance with Air Quality Standards established by Chapter 70.94 RCW."

WAC 332-24 BURNING PERMITS

Specific requirements for burning on Department protected lands are listed in the Washington Administrative Code chapter 332-24. WAC 332-24-205(13) provides that the Department may impose additional requirements for all burning on its protection through the use of written burning permits and/or the Smoke Management Plan. WAC 332-24-221(3)(a) specifies that written burning permits are not valid unless the burner agrees to follow all terms of the permit and requirements of the Smoke Management Plan.

RCW 70.94 WASHINGTON CLEAN AIR ACT

The Washington Clean Air Act, RCW 70.94.660, gives the Department of Natural Resources ". . . responsibility for issuing and regulating burning permits required by it relating to the following activities for the protection of life or property and/or for the public health, safety, and welfare:

A. Abating a forest fire hazard;

B. Prevention of a fire hazard;

C. Instruction of public officials in methods of forest firefighting;

D. Any silvicultural operation to improve the forest lands of the state; and

E. Silvicultural burning used to improve or maintain fire dependent ecosystems for rare plants or animals within State, federal and private natural area preserves, natural resource conservation areas, parks, and other wildlife areas."

The Washington Clean Air Act, RCW 70.94.665, also requires that ". . . the Department of Natural Resources shall administer a program to reduce statewide emissions from silvicultural forest burning . . ."; and that "the Department of Natural Resources shall develop a plan, based upon the existing smoke management agreement to carry out the programs as described in this section in the most efficient, cost effective manner possible."

RCW 70.94.745 states that, "It shall be the responsibility and duty of the Department of Natural Resources, Department of Ecology (DOE), Department of Agriculture, fire districts, and local air pollution control authorities to establish, through regulations, ordinances, or policy, a limited burning program for the people of this State . . ."

UNITED STATES CLEAN AIR ACT (CAA)- 42 USC 7401 ET. SEQ. - AIR POLLUTION PREVENTION AND CONTROL

42 USC 7470

This section establishes a national goal 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." Mandatory Class I federal areas were defined in 42 USC 7491 of the CAA as all international parks, all national wilderness areas and memorial parks which exceed 5,000 acres in size, and all national parks which exceed 6,000 acres in size. In the State of Washington, eight such Class I areas exist, including three national parks (North Cascades, Olympic, and Mt. Rainier) and five wilderness areas (Alpine Lake, Glacier Peak, Goat Rocks, Mount Adams, and Pasayten).

In response to the requirements of the CAA, the United States Environmental Protection Agency (EPA) promulgated its rule for visibility protection for federal Class I areas (45 CFR 80089). The rule requires states to develop programs to assure reasonable progress toward meeting the national visibility goal.

42 USC 7418

Federal agencies are subject to enforcement actions for violations of the Smoke Management Plan under 42 USC 7418 of the Clean Air Act. It states in 42 USC 7418, that "Each . . . agency . . . of the federal government . . . engaged in any activity resulting . . . in the discharge of air pollutants . . . comply with all federal, State, interstate, and local requirements. . . respecting the control and abatement of air pollution in the same manner, and to the same extent as any non governmental entity."

"The preceding shall apply to any requirement . . . including record keeping or reporting . . . permits . . . and any other requirement whatsoever . . . to pay a fee or charge . . . to defray costs of . . . air pollution regulatory program . . ."

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APPENDIX 12

Baseline Calculation and Options

I. PURPOSE

The 1990 amendments to the Washington Clean Air Act require that fire emissions be reduced from previous years' average. This appendix describes the method used to calculate the average annual fire emissions.

II. STATEMENT OF THE PROBLEM TO BE SOLVED

The Washington Clean Air Act of 1991 (WCAA) directs the Department of Natural Resources (DNR) to ". . . administer a program to reduce statewide emissions from silvicultural forest burning . . ." The Act further directs minimum annual emission reduction requirements:

A. A "20 percent reduction by December 31, 1994, which would be a "ceiling for emissions until December 31, 2000."

B. A "50 percent reduction by December 31, 2000," which would be a "ceiling for emissions thereafter."

The desired calculation determines a consistent, efficient and cost-effective technique to determine average annual emissions and determines future annual emissions from silvicultural forest burning.

III. FACTORS IN SOLVING THE PROBLEM

A. Identification of "Emissions" to be Monitored for Reductions

1. When wood is burned, the smoke is comprised of a number of particles and gases. The USDA Forest Service's (USDAFS) Pacific Northwest Forest and Range Experiment Station (PNW) analyzed the amount and composition of wood smoke from prescribed fires in the Northwest during the 1980s. Their studies established content and volume of particulate matter and gas(es) emitted into the atmosphere, per ton of vegetative matter consumed (i.e., type of wood, sage, juniper). These emission factors and standards were accepted

by the U.S. Environmental Protection Agency (EPA).

2. Of the several wood smoke emissions, particulate matter 10 microns (PM-10) and smaller in diameter is the standard for measuring emissions reduction. There are five reasons for that standard:

   a. PM-10 and smaller particles are carried by air currents up to several miles away from the immediate fire site and can have widespread impact. Particles larger than PM-10 fall back to earth, near the fire site.

   b. PM-10 and smaller particles are small enough to travel through human breathing passages to the lungs.

   c. PM-10 and smaller particles affect visibility.

   d. PM-10 and smaller particles are measured throughout Washington in an established air sampler network monitored by the Department of Ecology (DOE).

   e. PM-10 standards are established by the EPA.

B. Measuring Performance

PNW research during the 1980s led to a computer model which calculates fuel consumption from silvicultural burning and the emissions of PM-10. When emission measuring methods were evaluated, the PNW method was selected as the most practical and accurate.

C. Data Availability, Reliability, Limitations

1. Data necessary to run the PNW model was not defined during the study period and, therefore, not collected. The PNW model data requirements are primarily fuel loading, fuel moisture and duff depths.

2. During the study period, complete records for fires consuming over 100 tons of fuel were available. However, the data was incomplete because fuel loading, fuel moisture and duff depth were not collected for most burns.

3. There were no records for under 100-ton burns other than DNR's accounts of burning permits issued to private land managers and DNR-managed property.

4. To accommodate the absence of data, the following estimations were made:

   a. For over 100-ton burn records collected during the study years:

      (1) All broadcast and underburn data was used if collected.

(2) If data was not collected for broadcast and underburns, average fuel moistures were set at 10 percent for 10-hour fuels and 20 percent for 1000-hour fuels. Fuel loadings and duff depths were estimated by using the average values from the 1987 PNW biomass study.

(3) All pile and landing data was used as reported.

b. For under 100-ton data, three assumptions were made:

(1) An annual average of 8,000 permits were issued for private land managers and 550 permits for DNR-managed land. The USDAFS burned the same ratio of over 100-ton burns to under 100-ton burns as in 1993 (for which data is available). The totals were adjusted to subtract the existing records of over 100-ton burns.

(2) Two separate studies were undertaken to determine the average consumption in under 100-ton burns. Both indicated values near 50 tons, the mean of a normal distribution. Each under 100-ton burn was assigned a value of 50 tons consumed.

(3) All under 100-ton burns are assumed to be pile burns. This is considered a good assumption, since only a very small percentage of the under 100-ton burns in 1993 were broadcast or underburns.

IV. CALCULATED BASELINE VALUES

The average number of tons of PM-10 attributed to silvicultural burning emitted into Washington's atmosphere for 1985-1989 was 17,250 tons.

The following table summarizes the PNW model calculations:

BASELINE - THE AVERAGE OF 1985-1989 TOTALS
IN TONS OF PM-10

LAND MANAGER	1985	1986	1987	1988	1989	STATE AVERAGE
Private	14,407	11,663	9,922	9,655	10,336	11,196
DNR-Managed	1,448	1,436	929	496	419	946
USDA Forest Service	5,000	5,969	4,938	4,691	4,476	5,015
Nat'l Park Service	7	7	7	7	7	7
US Fish & Wildlife	21	21	21	21	21	21
US Army, Ft. Lewis	47	63	59	83	73	65
Yearly Average	20,930	19,159	15,876	14,952	15,331	17,250

V. CORRELATION WITH PRIOR SMOKE MANAGEMENT REPORTS

Smoke Management reports have been produced annually since the mid-1970s. The reports used acres burned as reported fuel consumption and total number of burns as measures of prescribed fire activity. The over 100-ton statewide data totals for 1985-1989 hand-calculated reports were compared to the output of the PNW reports.

SMOKE MANAGEMENT REPORTS (SMR)/PNW MODEL (PNW)

	NUMBER OF IGNITIONS		ACRES TREATED		CONSUMED TONS OF FUEL	
	SMR	PNW	SMR	PNW	SMR	PNW
1985	1,176	1,161	93,094	88,676	1,596,894	1,900,986
1986	1,246	1,274	84,397	83,664	1,206,685	1,904,942
1987	1,065	1,049	81,318	62,949	1,130,973	1,362,587
1988	1,172	1,197	53,772	56,704	816,703	1,162,465
1989	1,330	1,323	56,046	56,063	809,542	1,166,349

Data comparisons reveal some differences. A detailed analysis of the differences is not possible since the 1985-1987 reports were done by hand-calculation, for which there are no "draft notes" other than the published Smoke Management reports. The 1988 and 1989 records used the same original data that was used for the PNW model input. In preparing a final set of data, some new records were entered for the sake of completeness and some records were deleted when obvious errors were found and which were not revealed in earlier reports generated from the data base.

Consumed tons of fuel are not expected to be equivalent. The research conducted at PNW during the 1980s documented that the differences in fuel estimates was "too low." That conclusion resulted in the default values being used as discussed in the preceding section. As expected, the fuel consumption is higher for the PNW model.

In conclusion, the data used for the PNW model for 1985-1989 are reasonably accurate.

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APPENDIX 13

Program Cost Distribution Method

Fees that are levied by the Department to cover the costs of the Smoke Management Program are determined using the methodology developed with the assistance and endorsement of the Forest Fire Advisory Board (FFAB). The Department may deviate from this method in the future if circumstances warrant and after consultation with the FFAB.

There are three key components used to determine the proportional share of total costs that each manager group of this plan will contribute:

A. The percent of emissions that each manager group produces, based upon historical data.

B. The percent of program budget the Department expends on each group to operate the program.

C. The percent of operating costs related to smoke management vs. fire regulation.

METHOD DESCRIPTION

A. Total program costs are divided into two categories: fixed and operating.

B. The total fixed costs are then distributed between manager groups based upon the percent of emissions that each group produced based on historical data.

C. The total operating costs are distributed between manager groups based upon percent of budget expended on each group.

D. The resulting fixed costs and operating costs are added together for each manager group to derive the total weighted share of costs to be borne by that group.

E. Beginning with the total weighted share derived in (D) above for the State and private administrative group, costs are again proportioned between small burners (less than 100 tons consumed) and large burners (greater than 100 tons) using the same criterion shown in (A) through (D).

F. The operating cost that was calculated for the "less than 100 ton" sub-group is multiplied by .75 to derive the smoke management portion of those operating costs, and the operating cost that was calculated for the "greater than 100 ton" sub-group is multiplied by .25 to arrive at the smoke management portion of those operating costs.

G. Adding 100 percent of the fixed cost to the weighted operating costs derived in (F) above provides the proportion of total cost to be borne by each sub-group.

WEIGHTED PROPORTION METHODOLOGY

Cost Allocation Work Sheet
Major Burner Groups

	Fixed Costs	Operating Costs	Weighted Share of Costs
Federal/Tribal	(46%) $148,295	(6%) $ 34,387	$182,682
State/Private	(54%) $174,086	(94%) $538,735	$712,821
Total	$322,381	$573,122	$895,503

State & Private Sub-Group Calculation

	Fixed Costs	Operating Costs	Weighted Share of Costs
Burns < 100 tons	(32%) $ 55,707	(91%) $490,428 x (25%) = $122,562	$178,270 (54%)
Burns > 100 tons	(68%) $118,378	(9%) $ 48,486 x (75%) = $ 36,364	$154,742 (46%)
Total	$174,086*	($538,735*) $158,926	$333,012

General Fund would pay fire prevention related activities $379,809

Fees and permits would pay smoke management related activities $515,684

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APPENDIX 14

Alternative Debris Disposal Techniques

In this section a description and evaluation of the different alternatives for site treatment, other than prescribed burning, that we are currently aware of will be given. In most instances each of these treatments may be used alone or in conjunction with another treatment. Each alternative should be evaluated for operational limitations, soil quality, human health effects, and economics.[1] The alternatives are:

I. Alternative mechanical treatments

II. Increased utilization

III. Chemical

IV. Manual

V. No treatment

I. ALTERNATIVE MECHANICAL TREATMENTS

A. Low ground pressure tractors (cats and skidders), used for:

1. Piling

2. Forest cultivation

3. Slash orientation

Description: Crawler tractors or low ground pressure tractors outfitted with various types of blades or mowing attachments are the most commonly used methods on slopes less than 35 percent. Site preparation is most often accomplished using brush blades (blade with a rake attached) to pile unmerchantable logging material, brush and sometimes part of the top layers of soil. The action is named for the extent of the activity. For example, preparing planting spots is called scalping; plowing a strip is called furrowing or contouring. In addition there are different attachments available for realigning logging debris, crushing and grinding debris, and disking.

The advantages of low ground pressure tractors are the low costs and high efficiency of treatment. In many cases, the plant, roots and all, are removed.

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[1] A Report on "Prescribed Burning in Oregon," Paul Bell, Don Matlick, Mike Ziolko, 1990.

The disadvantages of low ground pressure tractors are: 1) intense disturbance of site with this type of equipment, particularly during site preparation, 2) most techniques are nonselective and remove non-target plants, 3) there are slope and topographic limitations and 4) there is usually some re-sprouting if the whole plant is not removed.

The following are general restrictions which apply to tractors (both rubber-tired and crawler) due to site protection and equipment limitations. Tractors are generally prohibited on slopes exceeding 35 percent, to avoid adverse impacts. Tractors are prohibited on critical soils, such as those with high compaction potential, except at designated locations where significant, adverse impacts can be avoided. In most cases, tractors are prohibited on soils with high erosion and sedimentation hazard. Tractors may be limited to operating only during certain periods in order to maintain long-term productivity of forest and range soils. Timing of operations are based on soil moisture content and soil properties in order to reduce compaction.

Average costs for these types of site preparation have been approximately $135 per acre. This will vary greatly according to circumstances and types of equipment. Some representative Forest Service costs have been:

1. Dozer with blade - $80-$100/acre
2. Ripping and piling - $75-$160/acre
3. Disking - $70-$80/acre
4. Track-Mac - $150-$250/acre

B. Track-mounted excavators:

1. Standard bucket and thumb
2. Slash grinder
3. Modified grapple

Description: Track-mounted excavator outfitted with various types of attachments for logging and site preparation, most commonly used as log loaders and shovels. Site preparation is most often accomplished using the grapples or bucket and thumb to pile logging debris or to create planting spots.

New developments include attachments which can be used to create planting spots in logging debris, road side clearing and pre-commercial thinning. These attachments accomplish this by grinding slash down to mineral soil on the desired number of planting spots per acre. In the process, the logging debris is reduced eliminating piles and the need for burning.

Another attachment which can be used for site preparation is a device similar to the grapples on a loader only modified into a clam configuration. This is a versatile accessory which can be used for site preparation, log handling, excavation and road building. Its value for site preparation is to create planting areas on a spot by spot basis, or to pile logging debris.

The advantages of track-mounted excavators are they may be used on: 1) slopes as great as 50 percent under proper conditions, 2) rough terrain, and 3) more fragile site conditions. They also create less soil disturbance. If burning is an objective, they can construct cleaner piles by being selective on the type of material that is piled. For example, a contract may specify that larger fuels be left on the ground in a natural arrangement.

Disadvantages to the track-mounted excavator are higher costs, and they may require a larger lowboy than other mechanical options do to move them into a site.

Average costs for track-mounted excavators vary greatly depending upon the type of equipment and terrain they are working on. Some average costs for piling slash are:

1. Bucket and thumb - $125-$200/acre
2. Slash grinder - $150-$250/acre
3. Modified grapple - $125-$190/acre

C. Walking excavator:

1. Standard bucket and thumb
2. Slash grinder
3. Rake (to be constructed)

Description: A walking excavator has individually operated legs and wheels which allow it to operate almost anywhere. It can work up, down, or across steep slopes. It has the capability to climb over 5-foot obstacles without touching them. It can adapt its base to rough terrain of all kinds while the operator sits in an upright position. Operating weight is 14,300 pounds distributed over two large flotation tires and two 24-inch outrigger pads for very low ground pressure. At this time, the machine operates with a selection of buckets which can be used for piling or wind-rowing debris and creating planting spots. Optional attachments are now being developed which will give the machine more versatility and make it more efficient. The attachments being considered for development include a slash grinder head, grapples and a rake.

The advantages of a walking excavator include those for track-mounted excavators in addition to the following. With the proper modification this machine can work on unlimited slopes with very minor site disturbance. It does not require a lowboy to be transported from site to site. Due to its configuration it may work in environmental sensitive areas with very light site impact.

Disadvantages to the walking excavator include its size limitation and its lack of proved production. The walking excavator has a maximum boom reach of 26 feet and currently is only available in the one size. The small size and low horsepower of this machine may adversely affect its production rates making it uneconomical to operate. At this time there are no production results to judge cost effectiveness, having not been tested.

At this time there are no treatment costs available for the walking excavator. We are in the process of setting up a local demonstration to evaluate the equipments capabilities.

D. In-unit mobile chipper:

Description: This technique involves mounting a chipper on an all-terrain vehicle which can move about a logged unit similar to skidding equipment. In addition to the chipper, a grapple loader can be added to feed the machine. Its purpose is to chip logging slash which results in a change of the arrangement and physical characteristics of the slash. Through this process, unit slash can be reduced and rearranged to provide planting spots and meet hazard abatement requirements.

The advantages of this system are to reduce slash hazard and create planting spots while being selective in treatment. The process can be accomplished with minimum site disturbance leaving soil and duff intact, unlike the piling of other ground machines. In addition, the chips can be left distributed on the site aiding in the retention of soil nutrients and soil moisture. This machine can be used to chip landing piles and road right-of-way slash for hog fuel and with additional development, clean chips may be a possibility.

Disadvantages of this system are the current high cost per acre of operation and the availability of this type of equipment. An average cost for site preparation is $350 per acre (Sunrise Tree Service).

As with all other methods, the timing of application can affect the success and efficiency of the operation when using mechanical methods. Application is usually timed to avoid sprouting of brush and high soil moisture content.

Adverse health effects using mechanical methods are that operators and other workers are in the vicinity of the equipment. Serious injuries can result if an operator loses control of the machine on steep terrain. Such accidents are uncommon among experienced operators, but they are difficult to avoid entirely. Workers can be struck by falling trees or debris thrown by the equipment while it is in operation, especially when brush cutters or mowers are being used. Minor injuries are almost certain to result from the use of mechanical equipment, however severe injuries are rare.[2]

II. INCREASED UTILIZATION

Set minimum yarding specifications (6 foot x 6 inches, etc.).

A. Chips for hog fuel

B. Chips for co-generation plants

C. Clean chips

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[2] United States Department of Agriculture, Forest Service, Pacific Northwest Region, 1988. Managing Competing and Unwanted Vegetation, Final Environmental Impact Statement.

Description: Various, opportunities exist under this option to set several different yarding specifications. They could include everything from a minimum size specification of 4 feet x 4 inches to whole tree yarding. The material is yarded into the different landings. Once the yarded unmerchantable material (YUM) is collected it may be sold as firewood, chips for hog fuel, chipped for co-generation plants or debarked and chipped for clean chips. The extent that a unit should be YUM yarded depends upon current market conditions, and/or the Land Managers objectives for the amount of logging debris which should be left to meet reforestation objectives. If the objective is to reforest without burning, the specifications would have to be set on the predicted amount of slash that will accumulate on the unit. If a determination is made that YUM yarding cannot be accomplished to the extent that reforestation is possible, the objective could be to YUM enough to reduce the amount of duff that might be consumed when burning, thus reducing emissions.

Past studies show that woody fuel consumption averaged 24 percent less on units yarded to 6 inches x 6 feet, and 44 percent less on units yarded to 4 inches x 4 feet when compared to units yarded to 8 inches x 10 feet.[3]

The advantages of intensive yarding would be to decrease the amount of burning and increase the amount of planting spots. In addition, depending on the chip market or co-generation plants, a return could be made on the biomass.

Disadvantages to this type of system are the increased landing sizes and road systems needed to support this operation and the increased expense of yarding. In addition, unstable chip prices make it difficult to predict if the increased utilization could make it pay for itself. The hog fuel and co-generation markets tend to be driven by the price of other existing energy sources.

Intensive utilization on human health effects is basically increased exposure of logging crews to the hazards inherent with logging.

According to Alex Sifford in his 1988 report on Bioenergy Conversion Opportunities, many studies have been done in the Region to determine costs of processing and delivering logging residue to energy users. A Washington study estimated the cost of getting firewood to landings in the forest. It concluded that felling, yarding and decking cost about $16 per green ton (Brown and Bergvall, 1983). Another study done by LeDoux and Adams, 1983, estimated the costs of yarding, loading and hauling residue from a Benton County site to Eugene to be about $49 per green ton. No processing costs were included. In-woods chipping would likely result in lower costs, due to more efficient hauling of the residue. A southern Oregon study determined that it would cost about $21 per green ton to fell, yard, load and haul (unprocessed) residue to a nearby mill (Brown, et al, 1985). The estimated total costs for felling, yarding and chipping hardwoods in the south coast region of Oregon were $43 to $63 per green ton in 1985 dollars (Perry).

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[3] D.V. Sandberg, paper presented to the Air Quality Panel at The Bioenergy Seminar, Portland, Oregon, May 10-11, 1984.

III. CHEMICAL (SITE PREPARATION AND RELEASE)

The use of herbicides to control vegetation.

Description: Herbicides may be used in a variety of areas to control competing and unwanted vegetation. All herbicides used must be registered by the U.S. Environmental Protection Agency. Treatments are made within the manufacturers' label restrictions and agency administrative directions. Herbicides are applied with four different techniques.

A. Aerial application, using helicopter or fixed-wing aircraft.

B. Mechanical equipment, using truck-mounted wand or boom sprayers.

C. Backpack equipment, generally a pressurized container with an agitation device.

D. Hand application by injection, daubing cut surfaces, and ground application of granular formulation.

Advantages of herbicide application is the ability to target vegetation growth patterns (periods when the target species are susceptible and the crop species is not), and the low impact to soil surfaces. In addition, aerial applications can be very cost efficient, through treatment of large acreages in a short time period. The other three alternatives have the advantage of being a highly selective treatment.

Disadvantages of herbicide treatment include:

A. Planting can be more expensive amid chemically killed brush.

B. Does not expose mineral soil necessary for natural or artificial seeding.

C. Herbicides may not be acceptable near sensitive areas.

D. Animals move about freely under sprayed brush where they are protected from predators.

E. Increased monitoring for drift and impact on water.

F. The possibility of a chemical spill.

G. Herbicides do little to control wildfire risk, they do not reduce fuel loadings.

Human health effects, in conjunction with the application of herbicides, deal with the amount of exposure the workers have in mixing and applying the herbicide, and for the public in the chance that they might be exposed during a herbicide application. The amount of adverse health effect that either of these two groups could experience would depend upon the toxicity of herbicide, concentration, and length of exposure. Generally, the human health risk is very low when herbicides are properly used.

Chemicals for site preparation and release have not been an alternative that has been available for federal agencies since 1983 due to a district court injunction. This has lead to a much greater dependency on other alternatives.

Costs for herbicide application for 1990 (Hood River County Forestry Department):

A. Aerial - $50/$60/acre

B. Ground (backpack) - $70/acre

IV. MANUAL/HAND LABOR

Description: Creating planting spots by hand, or hand piling slash. In addition, using equipment, such as power saws, to achieve release objectives. Competing brush is cut, allowing the crop tree more space and resources to grow. Hand girdling (removing a band of bark from around the stem) is occasionally done for conifer release.

The advantage of hand methods is their specificity and low impact on the soil surface. Site specific areas can be targeted. In riparian areas, and sites with sensitive plants, hand methods assure that only target species are treated.

The major disadvantages of manual methods are their lower production rates, higher costs, and re-sprouting. In addition, manual methods require extensive human exposure to potentially dangerous working conditions. Manual methods have been very ineffective in the most productive sites and with certain brush species, due to re-sprouting and high costs.

Adverse health effects of manual methods include working on steep slopes with poor footing, in dense or tall brush, and exposure to exhaust and gas vapors. Chain saws are dangerous if used unsafely. Workers also face a greater exposure to the risk of being cut and the exposure to poisonous plants, snakes and insects.

The average costs for single manual treatments have been $206 per acre for site preparation and $166 per acre for conifer release. This varies greatly by specific technique and multiple treatments are sometimes needed. Some typical costs for the different techniques have been: (USDA, Final Environmental Impact Statement, Managing Competing and Unwanted Vegetation).

A. Manual cutting (alder) - $50-$90/acre

B. Manual cutting (tan oak) - $150-$500/acre

C. Mulching (paper) - $70-$235/acre

D. Grubbing - $110-$160/acre

E. Pulling - $40-$200/acre

V. NO TREATMENT

Description: No treatment would consist of not using any of the available alternatives for site preparation after harvest. Units would be harvested and reforested either naturally or by planting.

Advantages to this alternative are lower costs, as long as successful regeneration results. In the eastern part of the State, some sites, are quite suitable for this alternative. This works well in parts of western Oregon also, depending upon the site, the competing brush and the amount of slash.

Disadvantages to this treatment, in a large part of Oregon, are the loss of trees and growth due to increased competition from brush and grasses. Heavy slash accumulations lead to increased wildfire hazards, higher planting costs, increased unfavorable animal and insect habitat.

Table 3 shows the potential impact of the different site preparation alternatives on air, soil, health and wildlife as well as the percent slope and a cost comparison.

TABLE 3

Site Preparation Alternative Evaluation

Site Prep. Method	Air Quality Impacts	Soil Quality Impacts	Max. % Slope	Cost	Health	Wildlife
Prescribed Burning	Mod	Low	Any	Mod	Low	Low
Mechanical for Burning						
Tractor	Mod	Mod	35%	Mod	Low	Low
Excavator	Mod	Mod	50%	Mod	Low	Low
Excavator*	Mod	Low	Any	High	Low	Low
Mechanical Non-Burning						
Tractor	Low	Mod	35%	Low	Low	Low
Excavator	Low	Mod	50%	Mod	Low	Low
Chipper**	Low	Mod	50%	High	Low	Low
Manual	Low	Low	Any	High	Mod	Low
Chemical	Low	Low	Any	Low	Low	Low
Utilization	Low	Low	Any	High	Low	Low

*Walking excavator
**Tractor-mounted in-unit chipper

VI. CURRENT USE OF THE ALTERNATIVE METHODS

Currently portions of all four alternatives are being used successfully to meet site preparation and release objectives under the appropriate biological and operational conditions. The exceptions are the walking excavator and co-generation, for reasons already explained.

Seven factors influence choice of site preparation methods:

A. The nature of existing ground cover.

B. Physical site factors.

C. Site preparation requirements.

D. Available manpower and equipment.

E. External constraints.

F. Environmental impacts.

G. Costs.

One or two of these may dominate and dictate a specific choice of method, but all seven should be considered before a treatment is prescribed.

A. Mechanical:

The use of machine piling, mowing, disking, and crushing can be effective on relatively gentle terrain slopes of less than 25 to 35 percent). This method is principally used for site preparation after logging or for site conversion.

Track-mounted excavators are currently in use on slopes of 50 percent or less. The machine is being used to pile, mow and scalp for planting spots. This method is principally used for site preparation after logging.

B. Manual:

Hand felling, girdling, grubbing, pulling, and scalping have proven effective when applied in the appropriate circumstances. For the USFS, manual release methods have become increasingly important since the 1983 U.S. District Court injunction on herbicide use within the Pacific Northwest Region. Manual methods have been most effectively used in moderately severe competition vegetation types.

C. Herbicides:

Herbicides are currently being utilized in reforestation programs statewide. Herbicide need and effectiveness is greatest where competing vegetation is a major factor limiting reforestation. Determining chemical treatment requires consideration of several factors: the most effective herbicide or combination of herbicides, the rate or amount of active ingredient to be applied, season of application and type of equipment to be used.

D. Intensive Utilization:

Currently intensive utilization is being used in some areas where equipment exists for mechanized processing on unit landings. Operations which operate whole tree processors that manufacture logs on the landings are shipping logs down to a 2-inch top. This material is then being processed into chips or hog fuel. Intensive utilization, on a broad scale, is already occurring. The amount of fiber removed from harvest areas is significantly more than it was in the past.

E. Combinations of Methods:

Several combinations of all of the above methods, including burning, are being used to effectively meet silvicultural objectives:

1. Machine piling of logging residues and fuels, followed by burning of the piles.

2. Machine crushing or chaining, followed by broadcast burning.

3. Aerial herbicide use to desiccate or kill vegetation, followed in two to six months by broadcast burning.

4. Hand felling of hardwoods or large woody shrubs, followed by burning.

5. Hand felling and daubing of cut surfaces with systemic herbicides.

6. Hand cutting of large stems and injection of a systemic herbicide for translocation to the root system and aerial parts of the plant.

7. Intensive yarding of logging residue and aerial application of herbicides.

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APPENDIX 15

Related Laws

I. WASHINGTON FOREST PROTECTION LAWS; RCW 76.04 (Applicable Sections)

BURNING PERMITS

RCW 76.04.205 Burning permits. (1) Except in certain areas designated by the department or as permitted under rules adopted by the department, a person shall have a valid written burning permit obtained from the department to burn:

(a) Any flammable material on any lands under the protection of the department; or

(b) Refuse or waste forest material on forest lands protected by the department.

(2) To be valid a permit must be signed by both the department and the permittee. Conditions may be imposed in the permit for the protection of life, property, or air quality and [the department] may suspend or revoke the permits when conditions warrant. A permit shall be effective only under the conditions and for the period stated therein. Signing of the permit shall indicate the permittee's agreement to and acceptance of the conditions of the permit.

(3) The department may inspect or cause to be inspected the area involved and may issue a burning permit if:

(a) All requirements relating to fire fighting equipment, the work to be done, and precautions to be taken before commencing the burning have been met;

(b) No unreasonable danger will result; and

(c) Burning will be done in compliance with air quality standards established by chapter 70.94 RCW.

(4) The department, authorized employees thereof, or any warden or ranger may refuse, revoke, or postpone the use of permits to burn when necessary for the safety of adjacent property or when necessary in their judgment to prevent air pollution as provided in chapter 70.94 RCW. [1986 c 100 REWRITE 17.]

II. WASHINGTON CLEAN AIR ACT; RCW 70.94 (Applicable Sections)

RCW 70.94.011 Declaration of public policies and purpose. It is declared to be the public policy to preserve, protect, and enhance the air quality for current and future generations. Air is an essential resource that must be protected from harmful levels of pollution. Improving air quality is a matter of statewide concern and is in the public interest. It is the intent of this chapter to secure and maintain levels of air quality that protect human health and safety, including the most sensitive members of the population, to comply with the requirements of the federal clean air act, to prevent injury to plant, animal life, and property, to foster the comfort and convenience of Washington's inhabitants, to promote the economic and social development of the state, and to facilitate the enjoyment of the natural attractions of the state.

It is further the intent of this chapter to protect the public welfare, to preserve visibility, to protect scenic, aesthetic, historic, and cultural values, and to prevent air pollution problems that interfere with the enjoyment of life, property, or natural attractions.

Because of the extent of the air pollution problem the legislature finds it necessary to return areas with poor air quality to levels adequate to protect health and the environment as expeditiously as possible but no later than December 31, 1995. Further, it is the intent of this chapter to prevent any areas of the state with acceptable air quality from reaching air contaminant levels that are not protective of human health and the environment.

The legislature recognizes that air pollution control projects may affect other environmental media. In selecting air pollution control strategies state and local agencies shall support those strategies that lessen the negative environmental impact of the project on all environmental media, including air, water, and land.

The legislature further recognizes that energy efficiency and energy conservation can help to reduce air pollution and shall therefore be considered when making decisions on air pollution control strategies and projects.

It is the policy of the state that the costs of protecting the air resource and operating state and local air pollution control programs shall be shared as equitably as possible among all sources whose emissions cause air pollution.

It is also declared as public policy that regional air pollution control programs are to be encouraged and supported to the extent practicable as essential instruments for the securing and maintenance of appropriate levels of air quality.

To these ends it is the purpose of this chapter to safeguard the public interest through an intensive, progressive, and coordinated statewide program of air pollution prevention and control, to provide for an appropriate distribution of responsibilities, and to encourage coordination and cooperation between the state, regional, and local units of government, to improve cooperation between state and federal government, public and private organizations, and the concerned individual, as well as to provide for the use of all known, available, and reasonable methods to reduce, prevent, and control air pollution.

The legislature recognizes that the problems and effects of air pollution cross political boundaries, are frequently regional or inter-jurisdictional in nature, and are dependent upon the existence of human activity in areas having common topography and weather conditions conducive to the buildup of air contaminants. In addition, the legislature recognizes that air pollution levels are aggravated and compounded by increased population, and its consequences. These changes often result in increasingly serious problems for the public and the environment.

The legislature further recognizes that air emissions from thousands of small individual sources are major contributors to air pollution in many regions of the state. As the population of a region grows, small sources may contribute an increasing proportion of that region's total air emissions. It is declared to be the policy of the state to achieve significant reductions in emissions from those small sources whose aggregate emissions constitute a significant contribution to air pollution in a particular region.

It is the intent of the legislature that air pollution goals be incorporated in the missions and actions of state agencies.

[1991 c 199 REWRITE 102; 1973 1st ex.s. c 193 REWRITE 1; 1969 ex.s. c 168 REWRITE 1; 1967 c 238 REWRITE 1.]

NOTES:

Finding--1991 c 199: "The legislature finds that ambient air pollution is the most serious environmental threat in Washington state. Air pollution causes significant harm to human health; damages the environment, including trees, crops, and animals; causes deterioration of equipment and materials; contributes to water pollution; and degrades the quality of life.

Over three million residents of Washington state live where air pollution levels are considered unhealthful. Of all toxic chemicals released into the environment more than half enter our breathing air. Citizens of Washington state spend hundreds of millions of dollars annually to offset health, environmental, and material damage caused by air pollution. The legislature considers such air pollution levels, costs, and damages to be unacceptable.

It is the intent of this act that the implementation of programs and regulations to control air pollution shall be the primary responsibility of the department of ecology and local air pollution control authorities." [1991 c 199 REWRITE 101.]

Alternative fuel and solar powered vehicles--1991 c 199: "The department of ecology shall contract with Western Washington University for the biennium ending June 30, 1993, for research and development of alternative fuel and solar powered vehicles. A report on the progress of such research shall be presented to the standing environmental committees and the department by January 1, 1994." [1991 c 199 REWRITE 230.]

RCW 70.94.660 Burning permits for abating or prevention of forest fire hazards, management of ecosystems, instruction or silvicultural operations--Issuance. (1) The department of natural resources shall have the responsibility for issuing and regulating burning permits required by it relating to the following activities for the protection of life or property and/or for the public health, safety, and welfare:

(a) Abating a forest fire hazard;

(b) Prevention of a fire hazard;

(c) Instruction of public officials in methods of forest fire fighting;

(d) Any silvicultural operation to improve the forest lands of the state; and

(e) Silvicultural burning used to improve or maintain fire dependent ecosystems for rare plants or animals within state, federal, and private natural area preserves, natural resource conservation areas, parks, and other wildlife areas.

(2) The department of natural resources shall not retain such authority, but it shall be the responsibility of the appropriate fire protection agency for permitting and regulating outdoor burning on lands where the department of natural resources does not have fire protection responsibility.

(3) Permit fees shall be assessed for silvicultural burning under the jurisdiction of the department of natural resources and collected by the department of natural resources as provided for in this section. All fees shall be deposited in the air pollution control account, created in RCW 70.94.015. The legislature shall appropriate to the department of natural resources funds from the air pollution control account to enforce and administer the program under RCW 70.94.665 and 70.94.660, 70.94.670, and 70.94.690. Fees shall be set by rule by the department of natural resources at the level necessary to cover the costs of the program after receiving recommendations on such fees from the public and the forest fire advisory board established by RCW 76.04.145. [1991 c 199 REWRITE 404; 1971 ex.s. c 232 REWRITE 2.]

RCW 70.94.665 Silvicultural forest burning--Reduce state-wide emissions--Exemption--Monitoring program. (1) The department of natural resources shall administer a program to reduce state-wide emissions from silvicultural forest burning so as to achieve the following minimum objectives:

(a) Twenty percent reduction by December 31, 1994 providing a ceiling for emissions until December 31, 2000; and

(b) Fifty percent reduction by December 31, 2000 providing a ceiling for emissions thereafter.

Reductions shall be calculated from the average annual emissions level from calendar years 1985 to 1989, using the same methodology for both reduction and base year calculations.

(2) The department of natural resources, within twelve months after May 15, 1991, shall develop a plan, based upon the existing smoke management agreement to carry out the programs as described in this section in the most efficient, cost-effective manner possible. The plan shall be developed in consultation with the department of ecology, public and private landowners engaged in silvicultural forest burning, and representatives of the public.

The plan shall recognize the variations in silvicultural forest burning including, but not limited to, a landowner's responsibility to abate an extreme fire hazard under chapter 76.04 RCW and other objectives of burning, including abating and preventing a fire hazard, geographic region, climate, elevation and slope, proximity to populated areas, and diversity of land ownership. The plan shall establish priorities that the department of natural resources shall use to allocate allowable emissions, including but not limited to, silvicultural burning used to improve or maintain fire dependent ecosystems for rare plants or animals within state, federal, and private natural area preserves, natural resource conservation areas, parks, and other wildlife areas. The plan shall also recognize the real costs of the emissions program and recommend equitable fees to cover the costs of the program.

The emission reductions in this section are to apply to all forest lands including those owned and managed by the United States. If the United States does not participate in implementing the plan, the departments of natural resources and ecology shall use all appropriate and available methods or enforcement powers to ensure participation.

The plan shall include a tracking system designed to measure the degree of progress toward the emission reductions goals set in this section. The department of natural resources shall report annually to the department of ecology and the legislature on the status of the plan, emission reductions and progress toward meeting the objectives specified in this section, and the goals of this chapter and chapter 76.04 RCW.

(3) If the December 31, 1994, emission reductions targets in this section are not met, the department of natural resources, in consultation with the department of ecology, shall use its authority granted in this chapter and chapter 76.04 RCW to immediately limit emissions from such burning to the 1994 target levels and limit silvicultural forest burning in subsequent years to achieve equal annual incremental reductions so as to achieve the December 31, 2000, target level. If, as a result of the program established in this section, the emission reductions are met in 1994, but are not met by December 31, 2000, the department of natural resources in consultation with the department of ecology shall immediately limit silvicultural forest burning to reduce emissions from such burning to the December 31, 2000, target level in all subsequent years.

(4) Emissions from silvicultural burning in eastern Washington that is conducted for the

purpose of restoring forest health or preventing the additional deterioration of forest health are exempt from the reduction targets and calculations in this section if the following conditions are met:

(a) The landowner submits a written request to the department identifying the location of the proposed burning and the nature of the forest health problem to be corrected. The request shall include a brief description of alternatives to silvicultural burning and reasons why the landowner believes the alternatives not to be appropriate.

(b) The department determines that the proposed silvicultural burning operation is being conducted to restore forest health or prevent additional deterioration to forest health; meets the requirements of the state smoke management plan to protect public health, visibility, and the environment; and will not be conducted during an air pollution episode or during periods of impaired air quality in the vicinity of the proposed burn.

(c) Upon approval of the request by the department and before burning, the landowner is encouraged to notify the public in the vicinity of the burn of the general location and approximate time of ignition.

(5) The department of ecology may conduct a limited, seasonal ambient air quality monitoring program to measure the effects of forest health burning conducted under subsection (4) of this section. The monitoring program may be developed in consultation with the department of natural resources, private and public forest landowners, academic experts in forest health issues, and the general public. [1995 c 143 § 1; 1991 c 199 § 403.].

RCW 70.94.670 Burning permits for abating or prevention of forest fire hazards, management of ecosystems, instruction or silvicultural operations--Conditions for issuance and use of permits--Air quality standards to be met--Alternate methods to lessen forest debris. The department of natural resources in granting burning permits for fires for the purposes set forth in RCW 70.94.660 shall condition the issuance and use of such permits to comply with air quality standards established by the department of ecology after full consultation with the department of natural resources. Such burning shall not cause the state air quality standards to be exceeded in the ambient air up to two thousand feet above ground level over critical areas designated by the department of ecology, otherwise subject to air pollution from other sources. Air quality standards shall be established and published by the department of ecology which shall also establish a procedure for advising the department of natural resources when and where air contaminant levels exceed or threaten to exceed the ambient air standards over such critical areas. The air quality shall be quantitatively measured by the department of ecology or the appropriate local air pollution control authority at established monitoring stations over such designated areas. Further, such permitted burning shall not cause damage to public health or the environment. All permits issued under this section shall be subject to all applicable fees, permitting, penalty, and enforcement provisions of this chapter. The department of natural resources shall set forth smoke dispersal objectives designed consistent with this section to minimize any air pollution from such burning and the procedures necessary to meet those objectives.

The department of natural resources shall encourage more intense utilization in logging and alternative silviculture practices to reduce the need for burning. The department of natural resources shall, whenever practical, encourage landowners to develop and use alternative acceptable disposal methods subject to the following priorities: (1) Slash production

minimization, (2) slash utilization, (3) non-burning disposal, (4) silvicultural burning. Such alternative methods shall be evaluated as to the relative impact on air, water, and land pollution, public health, and their financial feasibility.

The department of natural resources shall not issue burning permits and shall revoke previously issued permits at any time in any area where the department of ecology or local board has declared a stage of impaired air quality as defined in RCW 70.94.473. [1991 c 199 REWRITE 405; 1971 ex.s. c 232 REWRITE 3.]

NOTES:

Finding--1991 c 199: See note following RCW 70.94.011.

RCW 70.94.690 Cooperation between department of natural resources and state, local, or regional air pollution authorities--Withholding of permits. In the regulation of outdoor burning not included in RCW 70.94.660 requiring permits from the department of natural resources, said department and the state, local, or regional air pollution control authorities will cooperate in regulating such burning so as to minimize insofar as possible duplicate inspections and separate permits while still accomplishing the objectives and responsibilities of the respective agencies. The department of natural resources shall include any local authority's burning regulations with permits issued where applicable pursuant to RCW 70.94.740* through 70.94.775. The department shall develop agreements with all local authorities to coordinate regulations.

Permits shall be withheld by the department of natural resources when so requested by the department of ecology if a forecast, alert, warning, or emergency condition exists as defined in the episode criteria of the department of ecology. [1991 c 199 REWRITE 406; 1971 ex.s. c 232 REWRITE 5.]
NOTES:

*Reviser's note: RCW 70.94.740 was repealed by 1991 c 199 REWRITE 718.

Finding--1991 c 199: See note following RCW 70.94.011.

RCW 70.94.700 Rules and regulations. The department of natural resources and the department of ecology may adopt rules and regulations necessary to implement their respective responsibilities under the provisions of RCW 70.94.650 through 70.94.700. [1971 ex.s. c 232 REWRITE 6.]

RCW 70.94.743 Outdoor burning--Areas where prohibited--Use for management of storm or flood-related debris--Silvicultural burning. (1) Consistent with the policy of the state to reduce outdoor burning to the greatest extent practical:

(a) Outdoor burning shall not be allowed in any area of the state where federal or state

ambient air quality standards are exceeded for pollutants emitted by outdoor burning.

(b) Outdoor burning shall not be allowed in any urban growth area as defined by RCW 36.70A.030, or any city of the state having a population greater than ten thousand people if such cities are threatened to exceed state or federal air quality standards, and alternative disposal practices consistent with good solid waste management are reasonably available or practices eliminating production of organic refuse are reasonably available. In no event shall such burning be allowed after December 31, 2000.

(c) Notwithstanding any other provision of this section, outdoor burning may be allowed for the exclusive purpose of managing storm or flood-related debris. The decision to allow burning shall be made by the entity with permitting jurisdiction as determined under RCW 70.94.660 or 70.94.755. If outdoor burning is allowed in areas subject to (a) or (b) of this subsection, a permit shall be required, and a fee may be collected to cover the expenses of administering and enforcing the permit. All conditions and restrictions pursuant to RCW 70.94.750(1) and 70.94.775 apply to outdoor burning allowed under this section.

(2) "Outdoor burning" means the combustion of material of any type in an open fire or in an outdoor container without providing for the control of combustion or the control of emissions from the combustion.

(3) This section shall not apply to silvicultural burning used to improve or maintain fire dependent ecosystems for rare plants or animals within state, federal, and private natural area preserves, natural resource conservation areas, parks, and other wildlife areas. [1997 c 225 § 1; 1991 c 199 § 402.]

NOTES:

Finding--1991 c 199: See note following RCW 70.94.011.

RCW 70.94.745 Limited outdoor burning--Program--Exceptions. (1) It shall be the responsibility and duty of the department of natural resources, department of ecology, department of agriculture, fire districts, and local air pollution control authorities to establish, through regulations, ordinances, or policy, a limited burning permit program.

(2) The permit program shall apply to residential and land clearing burning in the following areas:

(a) In the nonurban areas of any county with an unincorporated population of greater than fifty thousand; and

(b) In any city and urban growth area that is not otherwise prohibited from burning pursuant to RCW 70.94.743.

(3) The permit program shall apply only to land clearing burning in the nonurban areas of any county with an unincorporated population of less than fifty thousand.

(4) The permit program may be limited to a general permit by rule, or by verbal, written, or electronic approval by the permitting entity.

(5) Notwithstanding any other provision of this section, neither a permit nor the payment of a fee shall be required for outdoor burning for the purpose of disposal of tumbleweeds blown by wind. Such burning shall not be conducted during an air pollution episode or any stage of impaired air quality declared under *RCW 70.94.714. This subsection (5) shall only apply within counties with a population less than two hundred fifty thousand.

(6) Burning shall be prohibited in an area when an alternate technology or method of

disposing of the organic refuse is available, reasonably economical, and less harmful to the environment. It is the policy of this state to foster and encourage development of alternate methods or technology for disposing of or reducing the amount of organic refuse.

(7) Incidental agricultural burning must be allowed without applying for any permit and without the payment of any fee if:

(a) The burning is incidental to commercial agricultural activities;

(b) The operator notifies the local fire department within the area where the burning is to be conducted;

(c) The burning does not occur during an air pollution episode or any stage of impaired air quality declared under RCW 70.94.715; and

(d) Only the following items are burned:

(I) Orchard prunings;

(ii) Organic debris along fence lines or irrigation or drainage ditches; or

(iii) Organic debris blown by wind.

(8) As used in this section, "nonurban areas" are unincorporated areas within a county that is not designated as an urban growth area under chapter 36.70A RCW.

(9) Nothing in this section shall require fire districts to enforce air quality requirements related to outdoor burning, unless the fire district enters into an agreement with the department of ecology, department of natural resources, a local air pollution control authority, or other appropriate entity to provide such enforcement. [1995 c 206 § 1; 1991 c 199 § 401; 1972 ex.s. c 136§ 2.]

RCW 70.94.750 Limited outdoor burning--Permits issued by political subdivisions--Types of fires permitted. The following outdoor fires described in this section may be burned subject to the provisions of this chapter and also subject to city ordinances, county resolutions, rules of fire districts and laws, and rules enforced by the department of natural resources if a permit has been issued by a fire protection agency, county, or conservation district:

(1) Fires consisting of leaves, clippings, prunings and other yard and gardening refuse originating on lands immediately adjacent and in close proximity to a human dwelling and burned on such lands by the property owner or his or her designee.

(2) Fires consisting of residue of a natural character such as trees, stumps, shrubbery or other natural vegetation arising from land clearing projects or agricultural pursuits for pest or disease control; provided the fires described in this subsection may be prohibited in those areas having a general population density of one thousand or more persons per square mile. [1991 c 199 REWRITE 412; 1972 ex.s. c 136 REWRITE 3.]

NOTES:

Finding--1991 c 199: See note following RCW 70.94.011.

RCW 70.94.775 Outdoor burning--Fires prohibited--Exceptions. No person shall cause or allow any outdoor fire:

(1) Containing garbage, dead animals, asphalt, petroleum products, paints, rubber

products, plastics, or any substance other than natural vegetation that normally emits dense smoke or obnoxious odors. Agricultural heating devices that otherwise meet the requirements of this chapter shall not be considered outdoor fires under this section;

(2) During a forecast, alert, warning or emergency condition as defined in RCW 70.94.715 or impaired air quality condition as defined in RCW 70.94.473. [1991 c 199 REWRITE 410; 1974 ex.s. c 164 REWRITE 1; 1973 2nd ex.s. c 11 REWRITE 1; 1973 1st ex.s. c 193 REWRITE 9.]

NOTES:

Finding--1991 c 199: See note following RCW 70.94.011.

III. DNR BURNING PERMIT REGULATIONS; WAC 332-24 (ENTIRE CHAPTER)

WAC 332-24-201 BURNING PERMIT PROGRAM--REQUIREMENTS AND EXCEPTIONS. Under authority granted in RCW 76.04.015 and 76.04.205, the following regulation is hereby promulgated:

(1) The department is responsible, by law, for the granting of burning permits for burning on lands it protects; and

(2) The department administers the protection of air quality as provided in chapter 70.94 RCW resulting from burning on lands under its protection; and

(3) The department has determined that the effects of such burning on life, property and air quality are of year-round effect; therefore

(4) Throughout the year, outdoor fire is prohibited on lands protected by the department where forest protection assessment is being, or is subject to being, assessed unless:

(a) A written burning permit is obtained from the department and the requirements of WAC 332-24-205 and 332-24-221 are followed; or

(b) Burning meets the regulations outlined in WAC 332-24-205 and 332-24-211.

(5) This chapter applies to all burning on lands protected by the department. It does not apply to agricultural burning as defined in WAC 173-425-030(1) nor to open burning as defined in WAC 173-425-030(2).

WAC 332-24-205 General rules--minimum requirements for all burning. The following rules apply to all burning regulated by the department.

(1) The department reserves the right to restrict, regulate, refuse, revoke or postpone outdoor fires under RCW 76.04.205 and 76.04.315, and chapter 70.94 RCW due to adverse fire weather or to prevent restriction of visibility, excessive air pollution or a nuisance.

(2) Burning shall not be allowed within non-attainment areas of the state as established by Washington department of ecology for particulate matter ten microns or less or carbon monoxide, except for:

(a) Fires for improving and maintaining fire dependent ecosystems; or

(b) Fires for training wildland fire fighters; or

(c) Fires set for a defined research project; or

(d) Military training exercises; or

(e) Where exempted by local or state air pollution control agencies.

(3) Burning shall not be allowed inside urban growth areas as designated under growth management plans, or in cities of greater than ten thousand population as follows:

(a) In urban growth areas where reasonable alternatives exist.

(b) In cities with a population of ten thousand or more as established by the office of financial management.

(I) That exceed or threaten to exceed federal or state ambient air quality standards; and

(ii) Where reasonable alternatives to outdoor burning exist, in accordance with WAC 173-425-090.

(c) After December 31, 2000, burning shall not be allowed in urban growth areas or cities with a population of ten thousand or more.

(4) No fires shall be ignited when:

(a) The department of ecology has declared an air pollution episode for the geographic area pursuant to chapter 173-435 WAC; or

(b) The department of ecology or a local air pollution control authority has declared impaired air quality for the geographic area in which the burning is to be done.

(5) A person responsible for a burn at the time an episode or impaired air quality is called pursuant to chapter 173-425 WAC, shall extinguish the fire by:

(a) Withholding fuel from the burn;

(b) Allowing the fire to burn down; and

(c) Aggressively putting out the fire until there is no visible smoke, unless otherwise allowed by the department.

(6) Prior to lighting, the person doing the burning must telephone the department, and obtain any special instructions for the day and location of the proposed burn. Those instructions thereupon become part of the conditions of burning.

(7) The fire must not include rubber products, plastic products, asphalt, garbage, dead animals, petroleum products, paints, or any similar prohibited materials that emit dense smoke or create offensive odors when burned, pursuant to RCW 70.94.775(1).

(8) If the fire creates a nuisance from smoke or flying ash, it must be extinguished. For purposes of this section, a nuisance exists when emissions from any open fire cause physical discomfort or health problems to people residing in the vicinity of the burning or physical damage to property.

(9) Burning within the department's fire protection areas shall not:

(a) Cause visibility to be obscured on public roads and highways by the smoke from such fires; or

(b) Endanger life or property through negligent spread of fire or pollutants.

(10) A person capable of extinguishing the fire must attend the fire at all times and the fire must be completely extinguished before being left unattended.

(11) No fires are to be within fifty feet of structures, or within five hundred feet of forest slash without a written burning permit.

(12) The landowner or landowner's designated representative's written permission must be obtained before kindling a fire on the land of another.

(13) The department reserves the authority to provide waivers, exceptions, and/or to impose additional requirements through the use of written burning permits and the smoke management plan.

WAC 332-24-211 Specific rules for small fires not requiring a written burning permit. In addition to WAC 332-24-205, the following rules shall apply to burning regulated by the department that does not require a written burning permit. A written burning permit is not required from the department under the following conditions:

(1) In certain geographic areas of the state as designated by the department in subsections (3) of this section and when the requirements of subsections (4), (5), and (6) of this section are met; or

(2) When the fire is:

(a) Contained within a campfire pit, approved by the department, located in a state, county, municipal, or other campground;

(b) Contained within a camp stove or barbecue;

(c) A hand-built pile no larger than four feet in diameter that is being used exclusively for recreational purposes; and

(d) Situated on bare soil, gravel bars, beaches, green field, or other similar areas free of flammable material for a sufficient distance adequate to prevent the escape of fires.

(3) A fire that does not require a written permit has established size limitations based on time of year and the county within which the burning occurs.

(a) From July 1 to October 15 individual pile size in all counties shall be limited to no larger than four feet, except pile size in Clallam and Jefferson counties is limited to ten feet.

(b) From October 16 through June 30 individual pile size in all counties is limited to ten feet; except pile size is limited to four feet in Island, King, Kitsap, Mason, Pierce, San Juan, and Spokane counties.

(4) A serviceable shovel and a minimum of five gallons of water must be within the immediate vicinity of the fire. A bucket is acceptable if the outdoor fire is adjacent to an accessible body of water. A charged garden hose or other adequate water supply may be substituted for the five gallon water requirement.

(5) Only one pile may be burned at any one time and each pile must be extinguished before lighting another.

(6) Burning must be done during periods of calm to very light winds. Burning when wind will scatter loose flammable materials, such as dry leaves and clippings, is prohibited.

WAC 332-24-217 Burning permit requirements--penalty. Failure to comply with the rules in chapter 332-24 WAC voids permission to burn. Any person burning without complying with chapter 332-24 WAC is in violation of RCW 76.04.205 and chapter 70.94 RCW. Convictions or bail forfeitures in connection with illegal burning under chapter 332-24 WAC may result in refusal to issue further permits for a two-year period from the date of the illegal burning. In addition to any other fines and penalties that may be imposed, the department may charge and recover costs from the person responsible for any response to control or extinguish an illegal fire caused in part or in whole by negligent acts or omissions.

WAC 332-24-221 Specific rules for burning that requires a written burning permit. Persons not able to meet the requirements of WAC 332-24-205 and 332-24-211 must apply for a written burning permit through the department. In addition to the rules outlined in WAC 332-24-205, the following are additional requirements for written permits:

(1) Written burning permits will be in effect for one year from the validation date, unless suspended or revoked.

(2) Fees for written burning permits will be charged and collected pursuant to chapter 70.94 RCW and shall be twenty-four dollars and seventy-five cents for under one hundred tons of consumable debris; and for burns one hundred tons of consumable debris and greater as follows:

Consumable Debris	Fee Schedule
100 - 500 tons	$ 123
501 - 1,000 tons	379
1,001 - 1,500 tons	631
1,501 - 2,000 tons	885
2,001 - 2,500 tons	1,138
2,501 - 3,000 tons	1,392
3,001 - 3,500 tons	1,643
3,501 - 4,000 tons	1,897
4,001 - 4,500 tons	2,151
4,501 - 5,000 tons	2,404
5,001 - 5,500 tons	2,658
5,501 - 6,000 tons	2,911
6,001 - 6,500 tons	3,166
6,501 - 7,000 tons	3,419
7,001 - 7,500 tons	3,673
7,501 - 8,000 tons	3,936
8,001 - 8,500 tons	4,180
8,501 - 9,000 tons	4,433
9,001 - 9,500 tons	4,688
9,501 - 10,000 tons	4,939

Consumable Debris	Fee Schedule
10,001 + tons	5,193

For purposes of this section, consumable debris is the amount of debris that the department determines will be consumed by the proposed burning.

(3) Written burning permits are not considered valid unless all of the following conditions apply:

(a) The written permit has been signed by the applicant agreeing to follow all requirements of chapter 332-24 WAC, the smoke management plan in effect at the time of the burning, and any additional terms and conditions specified by the department in writing; and

(b) The required permit fee has been secured or paid according to approved department procedures; and

(c) The person doing the burning has the permit in possession while burning and is complying with all terms and conditions of such permit, the smoke management plan in effect at the time of the burning, and all applicable portions of chapter 332-24 WAC.

(4) Permits are written only for the burn site and fuel quantity that is presented at the time of the inspection. Addition of fuel, or changing the burn site after the site inspection has been made, is prohibited unless a new inspection is made and an added permit fee is paid, if required.

WAC 332-24-271 Fires for improving and maintaining fire dependent ecosystems.

(1) All burning to improve and maintain fire dependent ecosystems within Conservation Areas and Natural Area Preserves shall be accomplished under a burning plan that has been approved by the department's land and water conservation division and fire control division managers. The burning plan must be a part of a total management plan approved by the land and water conservation division.

(2) Burning for this purpose may be allowed inside non-attainment areas, or urban growth areas.

(3) Burning for this purpose shall not be allowed during periods of air pollution episodes or air quality impairment called under chapter 173-425 WAC.

IV. DEPARTMENT OF ECOLOGY BURNING REGULATIONS; WAC 173-425 (ENTIRE CHAPTER)

WAC 173-425-010 Purpose. This chapter promulgated under chapter 70.94 RCW, the Washington Clean Air Act, authorizes the department of ecology to implement the provisions of that act. This rule establishes controls for open burning in the state in order to:

(1) Reduce open burning to the greatest extent practical by eliminating it in:

(a) Areas that exceed ambient air quality standards for PM-10 and/or carbon monoxide; and

(b) Urban growth areas or cities with a population of 10,000 or more by December 31, 2000;

(2) For areas where open burning is allowed, establish a limited burning program, including procedures by which open burning may be conducted;

(3) Encourage the development and use of alternate methods of debris disposal.

WAC 173-425-020 Applicability. (1) No outdoor burning shall occur during a declared period of impaired air quality.

(2) Except as described in subsection (1) of this section and WAC 173-425-050, this chapter applies to all forms of outdoor burning in the state except:

(a) Silvicultural burning (governed by chapter 332-24 WAC).

(b) Agricultural burning (governed by chapter 173-430 WAC).

(c) Recreational fires as defined in WAC 173-425-030(12).

(d) Ceremonial fires as defined in WAC 173-425-030(2).

(e) Burning to improve and maintain fire dependent ecosystems (pursuant to chapter 332-24 WAC).

(3) A local air authority, fire protection authority, county, or conservation district may enforce its own controls that are stricter than those set forth in this chapter.

WAC 173-425-030 Definitions. The definitions of terms contained in chapter 173-400 WAC are incorporated by reference. Unless a different meaning is clearly required by context, the following words and phrases as used in this chapter shall have the following meanings:

(1) "Agricultural burning" means burning of vegetative debris from an agricultural operation necessary for disease or pest control, necessary for crop propagation and/or crop rotation, or where identified as a best management practice by the agricultural burning practices and research task force established in RCW 70.94.650 or other authoritative source on agricultural practices.

(2) "Ceremonial fire" means a fire associated with a Native American ceremony or ritual.

(3) "Department" means department of ecology.

(4) "Episode" means a period when a forecast, alert, warning, or emergency air pollution stage is declared, as stated in chapter 173-435 WAC.

(5) "Impaired air quality" means a condition declared by the department or a local air authority in accordance with the following criteria:

(a) Meteorological conditions are conducive to an accumulation of air contamination concurrent with:

(I) Particulate that is ten micron and smaller in diameter (PM-10) at or above an ambient level of seventy-five micrograms per cubic meter measured on a twenty-four-hour average; or

(ii) Carbon monoxide at an ambient level of eight parts of contaminant per million parts of air by volume (ppm) measured on an eight-hour average.

(b) Air quality that threatens to exceed other limits established by the department or a local air authority.

(6) "Local air authority" means an air pollution control authority activated pursuant to chapter 70.94 RCW that has jurisdiction over the subject source.

(7) "Nonattainment area" means a clearly delineated geographic area which has

been designated by the Environmental Protection Agency and promulgated as exceeding a national ambient air quality standard or standards for one or more of the criteria pollutants, which includes carbon monoxide, fine particulate matter (PM-10), sulfur dioxide, ozone, and nitrogen dioxide.

(8) "Nuisance" means an emission of smoke or other emissions from any open fire that unreasonably interferes with the use and enjoyment of the property deposited on.

(9) "Open burning" means all forms of outdoor burning except those listed as exempt in WAC 173-425-020.

(10) "Outdoor burning" means the combustion of material of any type in an open fire or in an outdoor container without providing for the control of combustion or the control of emissions from the combustion.

(11) "Reasonable alternatives" means disposal alternatives to open burning that cost less than eight dollars fifty cents per cubic yard. After July 1993, this amount shall be adjusted periodically by department policy.

(12) "Recreational fire" means barbecues and campfires, using charcoal, natural gas, propane, or natural wood which occur in designated areas or on private property. Fires used for debris disposal purposes are not considered recreational fires.

(13) "Silvicultural burning" means burning on any land the department of natural resources protects per RCW 70.94.030(13), 70.94.660, 70.94.690, and pursuant to chapter 76.04 RCW.

(14) "Urban growth area" means an area defined by RCW 36.70A.030.

WAC 173-425-040 Prohibited materials. (1) Except as provided in WAC 173-425-020(2), the following materials shall not be burned in any outdoor fire: Garbage, dead animals, asphalt, petroleum products, paints, rubber products, plastics, paper (other than what is necessary to start a fire), cardboard, treated wood, construction debris, metal or any substance (other than natural vegetation) which when burned releases toxic emission, dense smoke, or odors.

(2) Prohibited materials may be burned in certain circumstances:

(a) Diseased animals and infested material. When ordered by a duly authorized health officer and authorized by the department or local air authority, diseased animals and other infested material may be burned, as required, to keep the infestation from spreading.

(b) Dangerous material. When ordered by a fire protection authority and when authorized by the department or local air authority, fires to dispose of materials presenting a danger to life, property, or public welfare may be burned, if no approved practical alternate method of disposal is available.

WAC 173-425-050 Curtailment during episodes or impaired air quality. (1) No outdoor fire shall be ignited:

(a) Whenever the department declares an air pollution episode for the geographical area pursuant to chapter 173-435 WAC; or

(b) Whenever the department or a local air authority declares impaired air quality for the geographical area.

(2) A person responsible for an outdoor fire at the time an episode or impaired air quality is declared shall extinguish that fire. Outdoor burning conducted under the

auspices of the department of natural resources for the purpose of burning forest slash pursuant to RCW 70.94.660 through 70.94.670 shall be extinguished by withholding new fuel and allowing the fire to burn down.

(3) Smoke visible from all types of outdoor burning, except silvicultural burning, after a time period of three hours has elapsed from the time of declaration of the episode or impaired air quality shall constitute prima facie evidence of unlawful outdoor burning.

(4) For department of natural resource silvicultural burning, smoke visible from outdoor burning after a time period of ten hours has elapsed from the time of declaration of the episode or impaired air quality shall constitute prima facie evidence of unlawful outdoor burning.

WAC 173-425-060 Open burning program for the state. (1) General requirements:

(a) All burning requires a permit as covered in WAC 173-425-070.

(b) Permits shall not be issued, and thus open burning is not allowed, in areas where reasonable alternatives are available. Within ninety days of the effective date, the department shall develop uniform procedures for determining costs of alternatives to open burning.

(c) A fire protection authority may declare a fire hazard in areas where burning is banned and in areas where burning is allowed. If open burning is determined the most appropriate manner to abate the fire hazard, the request must be reviewed and permitted by the local air authority. Permits issued under this section shall provide that:

(I) Prohibited material shall not be burned in any fire;

(ii) No open burning shall be done during a declared period of impaired air quality;

(iii) No reasonable alternative is available.

(d) No open burning shall be allowed in areas that exceed federal or state ambient air quality standards. Such areas shall be defined as carbon monoxide and/or PM-10 nonattainment area, unless otherwise determined pursuant to subsection (2)(a) of this section.

(2) Additional requirements for nonattainment areas.

(a) Phase-out approach. A local air authority may petition the department to use a phase-out approach in portions of a federally designated nonattainment area for carbon monoxide and/or PM-10. The phase-out approach will focus on how to achieve the Washington Clean Air Act goals and eliminate burning in areas that exceed the standards. The department will review and determine if the petition should be approved. The department may partially approve petitions or approve petitions with conditions based on consideration of the following factors:

(I) Population and population density.

(ii) The ability of the air quality in the region to support open burning based upon geographical and meteorological conditions.

(iii) The presence of a permitting program.

(iv) The extent to which reasonable alternatives to open burning are being developed through solid waste management plans and the schedule for the availability of such reasonable alternatives.

(v) Other factors deemed appropriate by the local air authorities.

(b) Petition evaluation. The petition to use a phase-out approach is due to the department no later than one month after the effective date of this rule. A ban is not effective in areas identified in the petition until after the department makes a ruling on the petition. Upon receiving the petition, the department shall review and make a determination within thirty days. For all federally designated nonattainment areas, open burning shall be banned by the applicable attainment date.

(c) Permits. The department or local air authority may issue permits in banned areas for the following activities:

(I) Fire fighting instruction. Local air authorities or the department may issue permits for fire training fires, pursuant to guidelines and rules of the department of ecology.

(ii) Specific forms. The department or the local air authorities may permit, with conditions, fires set that are part of a defined research project, weed abatement, and smoke training as part of a military training exercise.

(d) Responding to open burning calls. Each affected county shall identify a fire marshal or other appropriate county official for field response and to document open burning complaints or violations using appropriate field notices. In areas where the county has no jurisdiction, the department or the local air authorities will negotiate with the appropriate local agency on field response.

(3) Additional requirements for urban growth areas and cities with a population of ten thousand or more.

(a) Open burning will be banned when reasonable alternatives are available, no later than the end of the year 2000.

(b) Until open burning is banned, it is allowed subject to the permitting provisions of this chapter.

(c) When open burning is banned, the provisions in subsection (2) of this section apply.

WAC 173-425-070 Open burning permit requirements. (1) Permit program. For areas where burning is allowed, the department, local air authorities, fire protection authorities, conservation districts, or counties may issue permits. Those issuing permits are responsible for field response to open burning complaints. Within ninety days of the effective date, the department shall develop minimum standards for a field response program, which addresses training, staffing, funding, and any other elements deemed appropriate by the department.

(2) Permit program development and assistance.

(a) The department shall provide assistance for implementing a permitting program, including minimum standards which address training, staffing, funding, and any other elements deemed appropriate by the department.

(b) The department shall develop a model permit program and provide guidance on starting and implementing permit programs.

(c) In selecting a permit program, the options range from the minimum - a general rule burn, as described in subsection (5) of this section - to a written permit. A permit program must be in place eight months after the department issues guidelines. If at that

time no agreement is reached, the area becomes a no-burn area and falls under the restrictions of WAC 173-425-060(2). The department will conduct a joint public hearing with the conservation districts, local air authorities, counties, and fire districts. The purpose of the hearing is to inform the public that no agreement has been reached.

(d) The department or the local air authorities shall coordinate with the agencies listed in subsection (1) of this section to determine the type of permitting program appropriate for the area.

(3) Fees. The department or the local air authority may charge a fee to cover the administrative cost of a permit program. Fire districts, counties, and conservation districts issuing open burning permits may collect a fee to cover administrative costs. (RCW 70.94.780)

(4) Additional restrictions. The local air authorities and the department pay restrict conditions for burning under this section. Burning conditions may include, but are not limited to, restricting burning in sensitive areas per chapter 173-440 WAC, restricting the time period for burning, restricting permissible hours of burning,

imposing requirements for good combustion practice, and restricting burning to specified weather conditions.

(5) General rule burn permits. For areas of the state where burning is allowed, agencies listed in subsection (1) of this section may use a general permit by rule. This section provides a minimum (general rule burn) permit. Persons not able to meet all of the requirements (a) through (I) of this subsection must apply for and receive a written permit. General rule burn permits under this section may be used for the following number of days per year: 1992-1995 - twenty-one days/year; 1995-1998 - fourteen days/year; 1998-2000 - seven days/year; after 2000 - seven days/year. Failure to comply with all the requirements of (a) through (I) of this subsection voids the general rule burn permit and the person burning is subject to the penalty provisions of WAC 173-425-100. A person burning under this section must follow these requirements and any additional restrictions, including those established by cities, counties, or fire protection authorities:

(a) The fire must not include prohibited materials listed in WAC 173-425-040, except what paper is necessary to start the fire.

(b) A person capable of extinguishing the fire must attend it at all times and the fire must be extinguished before leaving it.

(c) No fires are to be within fifty feet of structures.

(d) The pile must not be larger than four feet by four feet by three feet.

(e) Only one pile at a time may be burned, and each pile must be extinguished before lighting another.

(f) No outdoor fire is permitted in or within five hundred feet of forest slash without a written burning permit.

(g) Either the designated permitting authority must be called to confirm burning conditions for each day or current information on burning conditions must be obtained from another designated source.

(h) If the fire creates a nuisance, it must be extinguished.

(I) Permission from a landowner, or owner's designated representative, must be obtained before starting an open fire.

WAC 173-425-080 Violations. (1) The local air authority or department may issue a notice of violation to the person responsible for the fire under any of the following:

(a) Conditions of a permit issued under this chapter are violated;

(b) Any open fire is ignited where, under this chapter, such fires are prohibited or where a permit is required and has not been obtained;

(c) Prohibited materials are burned in an open fire;

(d) Any open fire is ignited when a condition of impaired air quality or air pollution episode stage is declared;

(e) Any ignited open fire that is not extinguished when a condition of impaired air quality or air pollution episode is declared;

(f) The fire causes emissions detrimental to health;

(g) The fire causes emissions that unreasonably interfere with property use and enjoyment.

(2) A fire protection authority called to respond to, control, or extinguish an illegal or out-of-control fire may charge and recover from the person responsible for the fire the costs of its response and control action.

WAC 173-425-090 Local air authority may issue variance. Local air authorities may adopt variance procedures in their rules. Variance procedures properly adopted comply with this regulation and satisfy the requirement of department review required by RCW 70.94.181. The department, at its discretion, may review variance petitions.

WAC 173-425-100 Penalties. Any violation of this chapter may be subject to any penalty or other remedy authorized in chapter 70.94 RCW.

WAC 173-425-110 Severability. The provisions of this regulation are severable. If any provision is held invalid, the application of such provision to other circumstances and the remainder of the regulation shall not be affected.

Washington State Smoke Management Plan
(Revised 1995)

APPENDIX 16

Procedure for Exempting Eastside Forest Health Burns From the Requirement for Emission Reduction

Nearly one hundred years of fire suppression has had unintended consequences for eastern Washington forests. Natural low intensity ground fires that once occurred at 5- to 15-year intervals on drier sites have been effectively excluded from the ecosystem. These fires kept forest fuel levels low and favored open stands of fire-resistant seral species like ponderosa pine and larch over more shade tolerant climax species like Douglas fir and grand fir. This has resulted in a large scale conversion of eastern Washington forests to dense stands of trees that are not fire-resistant and are highly susceptible to catastrophic loss by insects, disease and wildfire.

The Washington Legislature has recognized that fire must be reintroduced into these areas to reduce the risk of catastrophic loss over the long term. In 1995, the Legislature amended the Clean Air Act to exempt "emissions from silvicultural burning in eastern Washington that is conducted for the purpose of restoring forest health or preventing the additional deterioration of forest health" from the reduction targets of the Clean Air Act. The Legislature clearly does not want the emissions ceiling of the Clean Air Act to be an obstacle to restoring forest health.

The following procedures describe:

How to identify burning which may qualify for exemption from the emission reduction targets for forest health reasons.

How to request an exemption from the emission reduction targets for a burn.

The process DNR Regions will use to review requests for exemption from the emissions reduction targets.

I. FOREST HEALTH CONDITIONS WHICH MAY QUALIFY FOR EXEMPTION

A. Species Composition - Control species composition to favor the creation and maintenance of stands of fire-resistant seral tree species over climax species.

B. Stand Density - Control of stand density to favor more open fire-resistant and healthy stands over dense, overstocked stands subject to drought stress, insect and

disease infestation and high intensity fire.

C. Natural Fuels Build-Up - Control of fuels build-up due to natural processes and not a direct result of management activities.

D. Insect and Disease - Control or prevention of insect or disease outbreaks.

E. Restore Natural Processes - Correct the interruption of natural ecological process caused by the exclusion of fire in fire-dependent ecosystems.

II. TYPES OF BURNING QUALIFYING FOR EXEMPTION

A. Underburning.

B. Prescribed stand replacement fire not directly associated with a timber harvest.

C. Burning conducted as part of a project designed for forest health and not primarily as a commercial activity.

D. Burning of piled ponderosa pine slash created between January and June to prevent bark beetle outbreaks when no alternatives are available.

III. ALTERNATIVES TO FOREST HEALTH BURNING

Fire is not the only appropriate method of restoring forest health in every situation. Often, stands are so dense and fuel loads are so high that fire is not an option.

Biomass removal instead of, or in combination with burning are effective in decreasing smoke emissions by reducing fuel loading and decreasing the need for burning.

Mechanical treatments such as thinning reduce the need for burning and allow for better control of emissions when burning is used.

Timing of harvest to avoid creating concentrations of ponderosa pine slash during January through June is effective in preventing bark beetle outbreaks.

Alternatives to burning provide opportunities for improving forest health by reducing fuel loading and creating opportunities to reintroduce fire into the ecosystem.

IV. SUBMITTING REQUESTS FOR EXEMPTION

Requests for exemption are voluntary. No landowner will be required to request an exemption as a condition of granting a burn permit. Disapproval of a request for

exemption will not invalidate a burn permit.

A. The request for exemption shall consist of a written statement from the landowner covering the following elements:

1. Legal description of the proposed burn.

2. A description of the health situation, forest health objectives and treatments schedule.

3. A brief description of the alternatives to silvicultural burning that could achieve the desired objective.

4. Reasons why the landowner does not believe alternatives to burning are appropriate in this situation.

Requests for exemption should be submitted with the burning permit application. **Requests for exemption will not be accepted after burning is completed.**

V. REVIEW AND APPROVAL OF REQUESTS BY DNR

A. General Instructions

The DNR Region will:

1. Review all private and federal requests for exemption. The request approval will be based on the DNR's determination that the burning is being conducted to restore forest health or prevent additional deterioration to forest health (according to guidelines).

2. Determine if the proposed burning qualifies as a forest health burn.

Generally, requests for exemption should **not** be approved if:

(a) the project will burn primarily fuels created by a recent commercial timber harvest, even if the burning will correct a forest health condition listed in section I;

(b) the burn is being conducted for site preparation;

(c) the burn is being conducted to abate an extreme fire hazard as defined in WAC 332-24-650; or

(d) The burn is conducted primarily to enhance wildlife habitat with no corresponding forest health benefit.

These are all valid reasons to burn. They are not primarily to restore forest health or prevent additional deterioration to forest health and are not entitled to the exemption.

The burn permit will be evaluated separately from the request for exemption. Exempted burns must meet all the requirements of the Smoke Management Plan to protect public health, visibility and the environment. **The approval of the burn permit will not depend on approval of the request for exemption.**

3. Notify the landowner of the approval or disapproval of the request for exemption.

4. Develop a filing system for exemption requests and a method for referencing requests for exemption to burn plans.

5. Assure that the data reporting procedures described in Appendix 2 are followed and that the burn is correctly coded as a forest health exemption burn.

6. Conduct an audit of a representative sample of federal forest health burning exemption requests.

B. Specific Instructions for U.S. Forest Service Burns

1. Prescribed fire projects funded by a majority of BD funds will not be exempt from the emissions cap.

   Note: BD funds are funds withheld from timber sale receipts to treat fuels created by harvest activities.

2. The exemption will be determined through planning documents that will indicate forest health exemptions.

3. The U.S. Forest Service will indicate the projects that are exempt through the current SMS data input system. If the project meets the guidelines for exempt status, a forest health burning designation would be indicated as the "reason for burning" in the Pre-Burn Data.

4. Projects designated for exempt status may be chosen at random by DNR for validation of exempt status. The U.S. Forest Service will be requested to provide the documentation that indicated the reason for the designation.

C. Audit

Burning conducted by federal landowners may not receive on site inspections by DNR before burning. A representative sample of federal burns requesting the exemption will be audited to assure compliance with these procedures. The audit will include the following elements:

Review of the request for exemption and any supporting documents for conformity with these procedures;

Site inspection to determine that the identified health problem exists and that burning will improve forest health or prevent additional deterioration of forest health;

A determination that the burn does or does not meet the criteria for exemption.

If the auditor determines that the exemption does not apply to a burn the exemption for the burn will be rescinded.

If the audit reveals that the landowner has systematically inappropriately applied the exemption, the landowner's total exempted burning emissions will be adjusted by the proportion of the audited burns that have the exemption rescinded.

Examples:

1. The landowner requests the exemption for forty burns. Ten are audited. One request for exemption is determined to be invalid. The exemption is rescinded for that one burn.

2. The landowner requests the exemption for forty burns. Ten are audited. Three requests for exemption are determined to be invalid. It appears the landowner has inappropriately applied the exemption. Thirty percent of the audited burns are not entitled to the exemption. The total exempted emissions are reduced by 30 percent.

VI. PUBLIC NOTIFICATION

Acceptance of forest health burning will depend on educating the public about the reasons for forest health burning and notifying the local community when forest health burning is to occur. Upon approval of the request by the DNR and before burning, the landowner is encouraged to notify the public in the vicinity of the burn of the general location and approximate time of ignition.

VII. ANNUAL REVIEW

The success and credibility of the Smoke Management Plan depends on the responsible and justifiable use of the forest health burning exemption. Interested members of the Smoke Management Plan Advisory Committee will meet annually to review the previous year's forest health burning and to evaluate the success of these guidelines in meeting the intent of the legislation.

Washington State Smoke Management Plan
(Revised 1998)

APPENDIX 17

Effect of Guidelines for Estimating Volume, Biomass, and Smoke Production for Piled Slash (PNW-GTR-364) on the Emissions Baseline

Background

The Guidelines for Estimating Volume, Biomass, and Smoke Production for Piled Slash (PNW-GTR-364) published in February 1996, contains a significant change in procedure for estimating volume of piled ponderosa pine slash. Piles of ponderosa pine were found to have a ratio of solid wood to volume ratio of 10 percent. The smoke management procedures implemented in February 1993 use a packing ratio of 20 percent for all species. Applying the new guidelines will result in calculated particulate emissions being reduced by half for piled ponderosa pine slash.

This appendix estimates the impact of applying the new data on the emissions inventory and the silvicultural burning emissions baseline and documents the decision not to adjust the emissions baseline.

Impact on Baseline

Applying the new ratio to the baseline would reduce the baseline by 2 percent, from 17,365 to 16,969 tons of PM 10.

	Total	*Tons pine*	*Est. tons*	*Adj. tons*		*Adj. Total*	
	PM 10	*pile burns*	*pine pile burns*	*pine pile*	*Adj. Pine*	*PM 10*	
Year	*Tons*	*over 100 tons*	*under 100 tons*	*burns*	*PM 10*	*tons*	*% change*
1985	*21308*	*32774*	*16879*	*24826*	*261*	*21047*	*-1.2%*
1986	*19257*	*47328*	*24374*	*35851*	*376*	*18881*	*-2.0%*
1987	*15976*	*46251*	*23819*	*35035*	*368*	*15608*	*-2.3%*
1988	*14953*	*45325*	*23342*	*34334*	*361*	*14592*	*-2.4%*
1989	*15329*	*76758*	*39530*	*58144*	*611*	*14718*	*-4.0%*
Average	*17365*				*395*	*16969*	*-2.4%*

Impact on Historical Inventory

Burning piled ponderosa pine slash has not decreased as much as burning in other forest types. Consequently, burning pine slash represents an increasing proportion of total burning. Applying the new packing ratio will reduce total inventoried emissions by at lest 5% from 1990 forward.

	Total	*Tons pine*	*Est. tons*	*Adj. tons*		*Adj. Total*	
	PM 10	*pile burns*	*pine pile burns*	*pine pile*	*Adj. Pine*	*PM 10*	
Year	*Tons*	*over 100 tons*	*under 100 tons*	*burns*	*PM 10*	*tons*	*% change*
1985	*21308*	*32774*	*16879*	*24826*	*261*	*21047*	*-1.2%*
1986	19257	47328	24374	35851	376	18881	-2.0%
1987	15976	46251	23819	35035	368	15608	-2.3%
1988	14953	45325	23342	34334	361	14592	-2.4%
1989	15329	76758	39530	58144	611	14718	-4.0%
1990	12475	130041	66971	98506	1034	11441	-8.3%
1991	11130	75900	39089	57494	604	10526	-5.4%
1992	9392	74950	38599	56775	596	8796	-6.3%
1993	7912	74000		37000	389	7524	-4.9%
1994	5673	52000		26000	273	5400	-4.8%
1995	6382	73714		36857	387	5995	-6.1%
1996	5956	62857		31429	330	5626	-5.5%

Summary

Applying the new ratio to the 1985 - 1989 baseline years would not change the baseline significantly, only about 2 percent. Ponderosa pine slash was a much smaller part of total emissions in the 1980's than later years. Ponderosa pine slash is likely to represent a larger proportion of burning in the future. We will implement the new procedures to improve the accuracy of our inventory in the future. Adjusting the baseline and the confusion that might create is not warranted.

Low risk areas will be at least 1,000 feet above major valley bottoms. This will be approximately 1,500 feet elevation in the west slopes of the Cascades, and 3,000 feet elevation in eastern Washington.

Implementation

The low risk area designations will be applied beginning January 1, 1999.

DNR Regions will provide Resource Protection Division with maps of the low risk areas by January 1, 1999.

Resource Protection Division will help with mapping by providing meteorological expertise on request from the regions.

Washington State Smoke Management Plan
1997

APPENDIX 18

CRITERIA FOR DEFINING LOW RISK AREAS

Background

The threshold for a large burn requiring smoke management approval has been set at 100 tons since the first smoke management plan was developed in 1970. Over time this threshold has proven to be adequate for broadcast burns. The 100-ton threshold has had some unintended consequences for pile burning. Landowners can burn large acreages of piles in less than 100 ton segments over many days without smoke management approval. This is not possible with most broadcast burning because they are usually greater than 100 tons and units cannot usually be segmented. The result of segmenting pile burn units is that a unit that would have been burned in one day with the smoke dispersed in one day may be burned over several days with local smoke impacts lasting for days. Segmenting also leads to an increased risk of wildfires when the piles being burned are next to unburned piles in the same unit.

When the 100-ton threshold was established, most large burns were broadcast burns. Pile burning produces less emissions per ton of debris than broadcast burning. In terms of PM_{10} particulate emissions, a pile burn produces only 38% as much PM_{10} per ton of fuel as a broadcast burn[1].

The practice of segmenting pile burn units creates administrative problems for DNR. Currently a landowner may burn as many under 100-ton segments at one time as they wish, while larger burns may only be burned with smoke management approval. The result is that more burning may occur when large burns are disapproved than when a large burn is approved. Additionally, it is not practical for DNR to track where and when each of these small segments are burning on any given day. In some remote areas pile burns up to 300 tons have negligible impact and are virtually always approved. In these areas the smoke management approval process represents an unnecessary regulatory requirement.

Purpose

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[1]Source: Compilation of Air Pollutant Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources.

The purpose of this procedure is to define low risk areas where the threshold of burning requiring smoke management approval can be set to 300 tons of piled debris per landowner within a DNR district.

Low risk areas are remote areas, and areas generally above the inversion a different threshold for large burns will be applied. In these areas a private landowner may burn up to 300 tons of piled debris total per day on their ownership within a DNR district without smoke management approval subject to the conditions of their written burn permit or restrictions recorded on the toll-free burn information line. On federal lands, a land manager may burn up to 300 tons of piled debris total per day within a ranger district without smoke management approval subject to restrictions recorded on the toll-free burn information line.

DNR Regions will define the low risk areas using the criteria described in this appendix.

In all other areas the threshold for large burns requiring smoke management approval will remain at 100 tons per burn.

Goals

The Goals of this procedure are to:

Reduce the incentive to divide pile burns into under 100-ton segments,

Obtain better control of the amount of burning occurring in an airshed under less than optimal conditions,

Eliminate an unnecessary regulatory requirement.

Criteria

These criteria are general guidelines for defining remote areas where the threshold may be raised to 300 tons per ownership. Regions are expected to use their judgement and local knowledge when mapping low risk areas.

West of Interstate 5:

Low risk areas will be at least five miles from the nearest community.

East of Interstate 5:

APPENDIX B

NEW SOURCE REVIEW REGULATIONS

- *WAC 173 – 400 –110*
  New source review (NSR)
  [Submitted to EPA except for section (1). While the entire rule is provided here, the State of Washington is requesting EPA approval of the rule except for section (1).]

- *WAC 173 – 400 – 112*
  Requirements for new sources in nonattainment areas
  [Approved by EPA as part of the Washington State SIP except for section (8). Approval of section (8) is not being requested.]

- *WAC 173 – 400 – 113*
  Requirements for new sources in attainment or unclassifiable areas
  [Approved by EPA as part of the Washington State SIP except for section (5). Approval of section (5) is not being requested.]

PREVENTION OF SIGNIFICANT DETERIORATION

- *WAC 173-400-141*
  Prevention of significant deterioration (PSD)
  [Approved by EPA as part of a delegated program except for Nitrogen Oxides which require a joint permit by the state and EPA.]

WAC 173-400-110
New source review (NSR).

(1) Applicability. This section, WAC 173-400-112 and 173-400-113 apply state-wide except where an authority has adopted and is implementing its own new source review regulation and those regulations are incorporated into the state implementation plan.
(2) Projects subject to NSR. A notice of construction application must be filed by the owner or operator and an order of approval issued by ecology or an authority prior to the establishment of any new source, except for those sources exempt under subsection (4) or (5) of this section.
For purposes of this section "establishment" shall mean to begin actual construction, as that term is defined in WAC 173-400-030(9), and "new source" shall include any modification to an existing stationary source, as defined in WAC 173-400-030(44).
Notwithstanding any other subsection of this section, a notice of construction application must be filed and an order of approval issued by ecology or an authority prior to establishment of any of the following new sources:
(a) Any project that qualifies as construction, reconstruction or modification of an affected facility, within the meaning of 40 CFR Part 60 (New Source Performance Standards) (except Part AAA, Wood stoves);
(b) Any project that qualifies as a new or modified source within the meaning of 40 CFR 61.02 (except for asbestos demolition and renovation projects subject to 40 CFR 61.145);
(c) Any project that qualifies as a new source within the meaning of 40 CFR 63.2 (National Emission Standards for Hazardous Air Pollutants);
(d) Any project that qualifies as a major stationary source, as defined in WAC 173-400-030(41), or a major modification, as defined in WAC 173-400-030(40);
(e) Any project that requires an increase in a plant-wide cap or unit specific emission limit.
(3) New source review of a modification shall be limited to the emission unit or units proposed to be added to an existing source or modified and the air contaminants whose emissions would increase as a result of the modification.
(4) **Emission unit and activity exemptions.**
Except as provided in subsection (2) of this section, establishment of a new emission unit that falls within one of the categories listed below is exempt from new source review.

Modification of any emission unit listed below is exempt from new source review, provided that the modified unit continues to fall within one of the listed categories. The installation or modification of a unit exempt under this subsection does not require the filing of a Notice of Construction Application.

(a) Maintenance/construction:

(i) Cleaning and sweeping of streets and paved surfaces;

(ii) Concrete application, and installation;

(iii) Dredging wet spoils handling and placement;

(iv) Paving application and maintenance, excluding asphalt plants;

(v) Plant maintenance and upkeep activities (grounds keeping, general repairs, routine house keeping, routine plant painting, welding, cutting, brazing, soldering, plumbing, retarring roofs, etc.);

(vi) Plumbing installation, plumbing protective coating application and maintenance activities;

(vii) Roofing application;

(viii) Insulation application and maintenance, excluding products for resale;

(ix) Janitorial services and consumer use of janitorial products.

(b) Storage tanks:

Note: It can be difficult to determine requirements for storage tanks. Ecology strongly recommends that an owner or operator contact ecology or the authority to determine the exemption status of storage tanks prior to their installation.

(i) Lubricating oil storage tanks except those facilities that are wholesale or retail distributors of lubricating oils;

(ii) Polymer tanks and storage devices and associated pumping and handling equipment, used for solids dewatering and flocculation;

(iii) Storage tanks, reservoirs, pumping and handling equipment of any size containing soaps, vegetable oil, grease, animal fat, and nonvolatile aqueous salt solutions;

(iv) Process and white water storage tanks;

(v) Operation, loading and unloading of storage tanks and storage vessels, with lids or other appropriate closure and less than 260 gallon capacity (35 cft);

(vi) Operation, loading and unloading of storage tanks, = 1100 gallon capacity, with lids or other appropriate closure, not for use with materials containing toxic air pollutants, as defined in chapter 173-460 WAC, max. VP 550 mm Hg @21°C;

(vii) Operation, loading and unloading storage of butane, propane, or liquefied petroleum gas with a vessel capacity less than 40,000 gallons;

(viii) Tanks, vessels and pumping equipment, with lids or other appropriate closure for storage or dispensing of aqueous solutions of inorganic salts, bases and acids.

(c) A project with combined aggregate heat inputs of combustion units, ≤ all of the following:

(i) ≤ 500,000 Btu/hr using coal with = 0.5% sulfur or other fuels with ≤ 0.5% sulfur;
(ii) ≤ 500,000 Btu/hr used oil, per the requirements of RCW 70.94.610;
(iii) ≤ 400,000 Btu/hr wood waste or paper;
(iv) < 1,000,000 Btu/hr using kerosene, #1, or #2 fuel oil and with ≤ 0.05% sulfur;
(v) ≤ 4,000,000 Btu/hr using natural gas, propane, or LPG.
(d) Material handling:
(i) Continuous digester chip feeders;
(ii) Grain elevators not licensed as warehouses or dealers by either the Washington state department of agriculture or the U.S. Department of Agriculture;
(iii) Storage and handling of water based lubricants for metal working where organic content of the lubricant is ≤ 10%;
(iv) Equipment used exclusively to pump, load, unload, or store high boiling point organic material in tanks less than one million gallon, material with initial atmospheric boiling point not less than 150°C or vapor pressure not more than 5 mm Hg @21°C, with lids or other appropriate closure.
(e) Water treatment:
(i) Septic sewer systems, not including active wastewater treatment facilities;
(ii) NPDES permitted ponds and lagoons used solely for the purpose of settling suspended solids and skimming of oil and grease;
(iii) De-aeration (oxygen scavenging) of water where toxic air pollutants as defined in chapter 173-460 WAC are not emitted;
(iv) Process water filtration system and demineralizer vents;
(v) Sewer manholes, junction boxes, sumps and lift stations associated with wastewater treatment systems;
(vi) Demineralizer tanks;
(vii) Alum tanks;
(viii) Clean water condensate tanks.
(f) Environmental chambers and laboratory equipment:
(i) Environmental chambers and humidity chambers not using toxic air pollutant gases, as regulated under chapter 173-460 WAC;
(ii) Gas cabinets using only gases that are not toxic air pollutants regulated under chapter 173-460 WAC;
(iii) Installation or modification of a single laboratory fume hood;
(iv) Laboratory calibration and maintenance equipment.
(g) Monitoring/quality assurance/testing:
(i) Equipment and instrumentation used for quality control/assurance or inspection purpose;
(ii) Hydraulic and hydrostatic testing equipment;

(iii) Sample gathering, preparation and management;

(iv) Vents from continuous emission monitors and other analyzers.

(h) Miscellaneous:

(i) Single-family residences and duplexes;

(ii) Plastic pipe welding;

(iii) Primary agricultural production activities including soil preparation, planting, fertilizing, weed and pest control, and harvesting;

(iv) Comfort air conditioning;

(v) Flares used to indicate danger to the public;

(vi) Natural and forced air vents and stacks for bathroom/toilet activities;

(vii) Personal care activities;

(viii) Recreational fireplaces including the use of barbecues, campfires, and ceremonial fires;

(ix) Tobacco smoking rooms and areas;

(x) Noncommercial smokehouses;

(xi) Blacksmith forges for single forges;

(xii) Vehicle maintenance activities, not including vehicle surface coating;

(xiii) Vehicle or equipment washing (see (c) of this subsection for threshold for boilers);

(xiv) Wax application;

(xv) Oxygen, nitrogen, or rare gas extraction and liquefaction equipment not including internal and external combustion equipment;

(xvi) Ozone generators and ozonation equipment;

(xvii) Solar simulators;

(xviii) Ultraviolet curing processes, to the extent that toxic air pollutant gases as defined in chapter 173-460 WAC are not emitted;

(xix) Electrical circuit breakers, transformers, or switching equipment installation or operation;

(xx) Pulse capacitors;

(xxi) Pneumatically operated equipment, including tools and hand held applicator equipment for hot melt adhesives;

(xxii) Fire suppression equipment;

(xxiii) Recovery boiler blow-down tank;

(xxiv) Screw press vents;

(xxv) Drop hammers or hydraulic presses for forging or metal working;

(xxvi) Production of foundry sand molds, unheated and using binders less than 0.25% free phenol by sand weight;

(xxvii) Kraft lime mud storage tanks and process vessels;

(xxviii) Lime grits washers, filters and handling;

(xxix) Lime mud filtrate tanks;

(xxx) Lime mud water;

(xxxi) Stock cleaning and pressurized pulp washing down process of the brown stock washer;
(xxxii) Natural gas pressure regulator vents, excluding venting at oil and gas production facilities and transportation marketing facilities;
(xxxiii) Nontoxic air pollutant, as defined in chapter 173-460 WAC, solvent cleaners less than 10 square feet air-vapor interface with solvent vapor pressure not more than 30 mm Hg @21°C;
(xxxiv) Surface coating, aqueous solution or suspension containing ≤ 1% (by weight) VOCs, and/or toxic air pollutants as defined in chapter 173-460 WAC;
(xxxv) Cleaning and stripping activities and equipment using solutions having ≤ 1% VOCs (by weight); on metallic substances, acid solutions are not exempt;
(xxxvi) Dip coating operations, using materials less than 1% VOCs (by weight)
and/or toxic air pollutants as defined in chapter 173-460 WAC.
(5) **Exemptions based on emissions thresholds.**
(a) Except as provided in subsection (2) of this section and in this subsection:
(i) A new emissions unit that has a potential to emit below each of the threshold levels listed in the table contained in (d) of this subsection is exempt from new source review provided that the conditions of (b) of this subsection are met.
(ii) A modification to an existing emissions unit that increases the unit's actual emissions by less than each of the threshold levels listed in the table contained in (d) of this subsection is exempt from new source review provided that the conditions of (b) of this subsection are met.
(b) The owner or operator seeking to exempt a project from new source review under this section shall notify, and upon request, file a brief project summary with ecology or the authority prior to beginning actual construction on the project. If ecology or the authority determine that the project will have more than a de Minimus impact on air quality, ecology or the authority may require the filing of a notice of construction application. Ecology or the authority may require the owner or operator to demonstrate that the emissions increase from the new emissions unit is smaller than all of the thresholds listed below.
(c) The owner/operator may begin actual construction on the project thirty-one days after ecology or the authority receive the summary, unless ecology or the authority notifies the owner/operator within thirty days that the proposed new source requires a notice of construction application.

(d) **Exemption threshold table:**

POLLUTANT	THRESHOLD LEVEL (TONS PER YEAR)
(a) Total Suspended Particulates	1.25
(b) PM10	0.75
(c) Sulfur Oxides	2.0
(d) Nitrogen Oxides	2.0
(e) Volatile Organic Compounds, total	2.0
(f) Carbon Monoxide	5.0
(g) Lead	0.005
(h) Ozone Depleting Substances in Aggregate (the sum of Class I and/or Class II substances as defined in FCAA Title VI and 40 CFR Part 82)	1.0
(i) Toxic Air Pollutants	As specified in chapter 173-460 WAC.

6) **Completeness determination.** Within thirty days of receipt of a notice of construction application, ecology or the authority shall either notify the applicant in writing that the application is complete or notify the applicant in writing of all additional information necessary, based upon review of information already supplied, to complete the application. For a project subject to PSD review under WAC 173-400-141 a completeness determination includes a determination that the application provides all information required to conduct PSD review.

(7) **Final determination.**

(a) Within sixty days of receipt of a complete application, ecology or the authority shall either issue a final decision on the application or, for those projects subject to public notice, initiate notice and comment procedures under WAC 173-400-171 on a proposed decision, followed as promptly as possible by a final decision.

(b) A person seeking approval to construct or modify a source that requires an operating permit may elect to integrate review of the operating permit application or amendment required under RCW 70.94.161 and the notice of construction application required by this section. A notice of construction application designated for integrated review shall be processed in accordance with operating permit program procedures and deadlines.

(c) Every final determination on a notice of construction application shall be reviewed and signed prior to issuance by a professional engineer or staff under the direct supervision of a professional engineer in the employ of ecology or the authority.

(d) If the new source is a major stationary source or the change is a major modification, ecology or the authority shall submit any control technology determination included in a final order of approval to the RACT/BACT/LAER clearinghouse maintained by EPA.

(8) **Appeals.** An order of approval, any conditions contained in an order of approval, or the denial of a notice of construction application may be appealed to the pollution control hearings board as provided in chapter 43.21B RCW. Ecology or the authority shall promptly mail copies of each order approving or denying a notice of construction application to the applicant and to any other party who submitted timely comments on the application, along with a notice advising parties of their rights of appeal to the Pollution Control Hearings Board and, where applicable, to the EPA Environmental Appeals Board.

(9) **Portable sources.** For portable sources which locate temporarily at particular sites, the owner(s) or operator(s) shall be allowed to operate at the temporary location without filing a notice of construction application, providing that the owner(s) or operator(s) notifies ecology or the authority of intent to operate at the new location at least thirty days prior to starting the operation, and supplies sufficient information to enable ecology or the authority to determine that the operation will comply with the emission standards for a new source, and will not cause a violation of applicable ambient air quality standards and, if in a nonattainment area, will not interfere with scheduled attainment of ambient standards. The permission to operate shall be for a limited period of time (one year or less) and ecology or the authority may set specific conditions for operation during that period. A temporary source shall be required to comply with all applicable emission standards.

(10) **Construction time limitations.** Approval to construct or modify a stationary source shall become invalid if construction is not commenced within eighteen months after receipt of such approval, if construction is discontinued for a period of eighteen months or more, or if construction is not completed within a reasonable time. Ecology or the authority may extend the eighteen-month period upon a satisfactory showing that an extension is justified. This provision does not apply to the time period between construction of the approved phases of a phased construction project. Each phase must commence construction within eighteen months of the projected and approved commencement date.

(11) **Change of conditions.**

(a) The owner or operator may request, at any time, a change in conditions of an approval order and ecology or the authority may approve such a request provided ecology or the authority finds that:

(i) The change in conditions will not cause the air contaminant source to exceed an emissions standard;
(ii) No ambient air quality standard or PSD increment will be exceeded as a result of the change;
(iii) The change will not adversely impact the ability of ecology or the authority to determine compliance with an emissions standard; and
(iv) The revised order will continue to require BACT, as defined at the time of the original approval, for each new source approved by the order except where the Federal Clean Air Act requires LAER.
(b) Actions taken under this subsection are subject to the public involvement provisions of WAC 173-400-171.
(c) This rule does not prescribe the exact form such requests must take. However, if the request is filed as a notice of construction application, that application shall be acted upon using the timelines found in subsections (6) and (7) of this section. The fee schedule found in WAC 173-400-116 shall also apply to requests filed as notice of construction applications.

[Statutory Authority: RCW 70.94.860, 70.94.510 and 70.94.331. 98-15-129 (Order 98-04), § 173-400-110, filed 7/21/98, effective 8/21/98. Statutory Authority: RCW 70.94.152. 98-01-183 (Order 96-01), § 173-400-110, filed 12/23/97, effective 1/23/98. Statutory Authority: Chapter 70.94 RCW. 93-18-007 (Order 93-03), § 173-400-110, filed 8/20/93, effective 9/20/93; 91-05-064 (Order 90-06), § 173-400-110, filed 2/19/91, effective 3/22/91. Statutory Authority: Chapters 43.21A and 70.94 RCW. 83-09-036 Order DE 83-13), § 173-400-110, filed 4/15/83. Statutory Authority: RCW 70.94.331, 70.94.510, and 70.94.785. 81-03-002 (Order DE 80-53), § 173-400-110, filed 1/8/81. Statutory Authority: RCW 70.94.331. 80-11-059 (Order DE 80-14), § 173-400-110, filed 8/20/80. Statutory Authority: RCW 43.21A.080 and 70.94.331. 79-06-012 (Order DE 78-21), § 173-400-110, filed 5/8/79; Order DE 76-38, § 173-400-110, filed 12/21/76. Formerly WAC 18-04-110.]

WAC 173-400-112
Requirements for new sources in nonattainment areas.

Ecology or an authority reviewing an application to establish a new source or modification in a nonattainment area, shall issue an order of approval, which order shall contain such conditions as are reasonably necessary to assure the maintenance of compliance with this chapter, if they determine that the proposed project satisfies each of the following requirements:
(1) The proposed new source or modification will comply with all applicable new source performance standards, national emission standards for hazardous air pollutants, emission standards adopted under chapter 70.94 RCW and, for sources regulated by an authority, the applicable emission standards of that authority.
(2) The proposed new source will employ BACT for all air contaminants, except that if the new source is a major stationary source or the proposed modification is a major modification it will achieve LAER for the contaminants for which the area has been designated nonattainment and for which the proposed new source or modification is major.
(3) The proposed new source will not cause any ambient air quality standard to be exceeded, will not violate the requirements for reasonable further progress established by the state implementation plan and will comply with WAC 173-400-113(3) for all contaminants for which the area has not been designated nonattainment.
(4) If the proposed new source is a major stationary source or the proposed modification is a major modification, ecology or the authority has determined, based on review of an analysis performed by the source of alternative sites, sizes, production processes, and environmental control techniques, that the benefits of the project significantly outweigh the environmental and social costs imposed as a result of its location, construction, or modification.
(5) If the proposed new source or the proposed modification is major for the contaminant for which the area is designated nonattainment, allowable emissions from the proposed new source or modification of that contaminant are offset by reductions in actual emissions from existing sources in the nonattainment area. Emission offsets must be sufficient to ensure that total allowable emissions from existing major stationary sources in the nonattainment area, new or modified sources which are not major stationary sources, and the proposed new or modified source will be less than total actual emissions from existing sources

(prior to submittal of the application) so as to represent (when considered together with the nonattainment provisions of section 172 of the FCAA) reasonable further progress. All offsetting emission reductions must satisfy the following requirements:
(a) The proposed new level of allowable emissions of the source or emission unit(s) providing the reduction must be less than the current level of actual emissions of that source or emissions unit(s). No emission reduction can be credited for actual emissions which exceed the current allowable emissions of the source or emissions unit(s) providing the reduction. Emission reductions imposed by local, state, or federal regulations, regulatory orders, or permits cannot be credited.
(b) The emission reductions must provide for a net air quality benefit. For marginal ozone nonattainment areas, the total emissions of volatile organic compounds or total emissions of nitrogen oxides are reduced by a ratio of 1.1 to 1 for the area in which the new source is located. For any other nonattainment area, the emissions offsets must provide a positive net air quality benefit in the nonattainment area. Determinations on whether emissions offsets provide a positive net air quality benefit will be made in accordance with the guidelines contained in 40 CFR 51 Appendix S.
(c) If the offsets are provided by another source, the reductions in emissions from that source must be federally enforceable by the time the new or modified source commences operation. The new source may not commence operation before the date such reductions are actually achieved. An emission reduction credit issued under WAC 173-400-131 may be used to satisfy some or all of the offset requirements of this subsection.
(6) If the proposed new source is a major stationary source or the proposed modification is a major modification, the owner or operator has demonstrated that all major stationary sources owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in Washington are subject to emission limitations and are in compliance, or on a schedule for compliance, with all applicable emission limitations and standards under the Federal Clean Air Act, including all rules contained in an EPA-approved state implementation plan.
(7) If the proposed new source is a major stationary source or the proposed modification is a major modification for the purposes of the PSD program described in WAC 173-400-141, it meets the requirements of that program for all contaminants for which the area has not been designated nonattainment.
(8) If the proposed new source or modification will emit any toxic air pollutants regulated under chapter 173-460 WAC, the source meets all applicable requirements of that chapter.

(9) If the proposed new source is a major stationary source or the proposed modification is a major modification, ecology or the authority has complied with the visibility protection review requirements of 40 CFR 52.28(c) through (e) except for (c)(4)(i), (g), and (h), as in effect on March 3, 1993, and determined that the project meets the criteria set forth in 40 CFR 52.28(g). For purposes of this subsection, definitions referenced in 40 CFR 52.28(b) are incorporated by reference, except that the term "visibility protection area" means any Class I area, and terms defined in WAC 173-400-030 shall have the meanings defined in that section. References in 40 CFR 52.28 to "the Administrator" shall mean the agency (either ecology or the authority) processing the notice of construction application.

[Statutory Authority: Chapter 70.94 RCW. 93-18-007 (Order 93-03), §173-400-112, filed 8/20/93, effective 9/20/93.]

WAC 173-400-113
Requirements for new sources in attainment or unclassifiable areas.

Ecology or an authority reviewing an application to establish a new source or modification in an area that is in attainment or unclassifiable for any air contaminant the new source would emit and that is in attainment or unclassifiable for ozone if the proposed new or modified source would emit VOCs or NOX, shall issue an order of approval, which order shall contain such conditions as are reasonably necessary to assure the maintenance of compliance with this chapter, if they determine that the proposed project satisfies all of the following requirements:
(1) The proposed new source or modification will comply with all applicable new source performance standards, national emission standards for hazardous air pollutants, emission standards adopted under chapter 70.94 RCW and, for sources regulated by an authority, the applicable emission standards of that authority.
(2) The proposed new source or modification will employ BACT for all pollutants not previously emitted or whose emissions would increase as a result of the new source or modification.
(3) Allowable emissions from the proposed new source or modification will not delay the attainment date for an area not in attainment nor cause or contribute to a violation of any ambient air quality standard. This requirement will be considered to be met if the projected impact of the allowable emissions from the proposed new source or the projected impact of the increase in allowable emissions from the proposed modification at any location within a nonattainment area does not exceed the following levels for the pollutant(s) for which the area has been designated nonattainment:

Pollutant	Annual Average	24-Hour Average	8-Hour Average	3-Hour Average	1-Hour Average
CO-	-	0.5 mg/m^3		-	2 mg/m^3
SO_2	1.0 $\mu g/m^3$	5 $\mu g/m^3$	-	25 $\mu g/m^3$	30 $\mu g/m^3$
PM_{10}	1.0 $\mu g/m^3$	5 $\mu g/m^3$	-	-	-
NO_2	1.0 $\mu g/m^3$	-	-	-	-

An offsetting emission reduction may be used to satisfy some or all of the requirements of this subsection.
(4) If the proposed new source is a major stationary source or the proposed modification is a major modification for purposes of the

PSD program described in WAC 173-400-141, it meets all applicable requirements of that chapter.
(5) If the proposed new source or the proposed modification will emit any toxic air pollutants regulated under chapter 173-460 WAC, the source meets all applicable requirements of that program.
(6) If, within the meaning of the PSD program described in WAC 173-400-141, the proposed new source is a major stationary source or the proposed modification is a major modification, ecology or the authority has complied with the visibility protection review requirements of 40 CFR 52.27(d) through (f), as in effect on March 3, 1993, and has determined that the source would not cause an adverse impact upon visibility. References in 40 CFR 52.27 to "the Administrator" shall mean the agency (either ecology or the authority) processing the notice of construction application.

[Statutory Authority: Chapter 70.94 RCW. 93-18-007 (Order 93-03), §173-400-113, filed 8/20/93, effective 9/20/93.]

WAC 173-400-141
Prevention of significant deterioration (PSD).

Section 40 CFR 52.21, Subparts (b), (c), (d), (e), (f), (g), (h), (i), (j), (k), (l), (m), (n), (o), (p), (r), (t), (v), and (w), Prevention of Significant Deterioration of Air Quality, as in effect on March 1, 1996, are incorporated by reference with the following additions and modifications:
(1) Construction of "administrator." In 40 CFR 52.21 (b)(17), federally enforceable, (f)(l)(v), (f)(3), and (f)(4)(i), exclusions from increment consumption, (g), redesignation, (1) and (2), air quality models, (p)(2), federal land manager, and (t), disputed permits or redesignations, the word "administrator" shall be construed in its original meaning. In 40 CFR 52.21 (b)(3)(iii) administrator shall mean both the administrator of EPA and the director of ecology.
(2) Contemporaneous. Subpart 40 CFR 52.21 (b)(3)(ii) is changed to read: "An increase or decrease in actual emissions is contemporaneous with the increase from the particular change only if it occurs between the date ten years before construction on the particular change commences and the date that the increase from the particular change occurs. If a decrease occurred more than one year prior to the date of submittal of the notice of construction application for the particular change it can only be credited if the decrease has been documented by an emission reduction credit."
(3) Public participation. Subpart 40 CFR 51.166(q) public participation, as in effect March 1, 1996, is hereby incorporated by reference except that in 40 CFR 51.166 (q)(2)(iv), the phrase "specified time period" shall mean thirty days and the word "administrator" shall mean the EPA administrator.
(4) Section 40 CFR 51.166 Subpart (p)(1) Sources Impacting Federal Class I areas - additional requirements - Notice to EPA, as in effect on March 1, 1996, is herein incorporated by reference.
(5) Secondary emissions. Subpart 40 CFR 52.21 (b)(18) is changed to read:
Emissions which would occur as a result of the construction or operation of a major stationary source or major modification, but do not come from the major stationary source or major modification itself. For the purpose of this section, secondary emissions must be specific, well defined, quantifiable, and impact the same general area as the stationary source or modification which causes the secondary emissions. Secondary emissions may include, but are not limited to:
(a) Emissions from ships or trains coming to or from the new or

modified stationary source; and
(b) Emissions from any offsite support facility which would not otherwise be constructed or increase its emissions as a result of the construction or operation of the major stationary source or major modification.
(6) Significant. The definition of "significant" in 40 CFR 52.21 (b)(23) is changed to exclude from the list of pollutants which may trigger PSD review any pollutant listed under FCAA § 112.
[Statutory Authority: Chapter 70.94 RCW. 96-19-054 (Order 94-35), § 173-400-141, filed 9/13/96, effective 10/14/96; 93-18-007 (Order 93-03), § 173-400-141, filed 8/20/93, effective 9/20/93; 91-05-064 (Order 90-06), § 173-400-141, filed 2/19/91, effective 3/22/91.]

APPENDIX C

BART REGULATION

- *WAC 173 –400 – 151*
  Retrofit requirements for visibility protection
  [Approved by EPA as part of the Washington State SIP]

WAC 173-400-151
Retrofit requirements for visibility protection.

(1) Determination of best available retrofit technology (BART). Ecology shall identify and analyze each source which may reasonably be anticipated to cause or contribute to impairment of visibility in any mandatory Class I area in Washington and any adjacent state and to determine BART for the contaminant of concern and those additional air pollution control technologies that are to be required to reduce impairment from the source.
(2) Initially defined BART. The owner(s) or operator(s) of any source(s) to which significant visibility impairment of a mandatory Class I area is reasonably attributable shall apply BART for each contaminant contributing to visibility impairment that is emitted at more than 250 tons per year. Each source for which BART is required must install and operate BART as expeditiously as possible, but in no case later than five years after the conditions are included in a regulatory order.
(3) Future definitions of BART. The owner(s) or operator(s) of any source(s) to which significant visibility impairment of a mandatory Class I area is reasonably attributable shall apply BART as new technology becomes available for a contaminant if:
(a) The source emits more than 250 tons per year of the contaminant; and,
(b) The controls representing BART have not previously been required in this section.
(4) Appeal. Any source owner or operator required by this section to install, operate, and maintain BART, may apply to the EPA administrator for an exception from that requirement pursuant to 40 CFR 51.303.

[Statutory Authority: Chapter 70.94 RCW. 91-05-064 (Order 90-06), § 173-400-151, filed 2/19/91, effective 3/22/91.]

APPENDIX D

RACT ORDER FOR CENTRALIA POWER PLANT

- *SWAPCA 97 – 2057R1*
  Regulatory Order to Establish RACT Emission Limits and Order of Approval
- *SWAPCA 99 – 2187*
  Stay of Project Milestone in RACT Order SWAPCA 97 – 2057R1

IN THE MATTER OF COMPLIANCE WITH RCW	)	
70.94 AND THE GENERAL REGULATIONS FOR	)	SWAPCA 97-2057R1
AIR POLLUTION SOURCES OF THE SOUTHWEST	)	REGULATORY ORDER TO
AIR POLLUTION CONTROL AUTHORITY	)	ESTABLISH RACT
Centralia Plant RESPONDENT	)	EMISSION LIMITS AND
PacifiCorp, et. al.	)	ORDER OF APPROVAL
Centralia, Washington	)	

INTRODUCTION

1. Under RCW 70.94.154 of the Washington Clean Air Act, "reasonably available control technology" or "RACT" is required for all existing sources in Washington. All sources are required to achieve the lowest emission limit that the source or source category is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. See RCW 70.94.154(1). In setting RACT, SWAPCA is required to consider the following factors: (1) the impact of the source upon air quality, (2) the availability of additional controls, (3) the emission reduction to be achieved by additional controls, (4) the impact of additional controls on air quality, and (5) the capital and operating costs of the additional controls. See RCW 70.94.030(19).

2. An important consideration in SWAPCA's determination of source-specific RACT for the Centralia Plant's sulfur dioxide (SO_2) emissions is Centralia Plant's agreement to achieve certain significant reductions in emissions of sulfur dioxide, which are discussed below in Item 7. Because the Centralia Plant has already agreed as part of the CDM process to accept these emission reductions once required in a Regulatory Order, it is not

necessary for SWAPCA to assess whether a less stringent SO_2 emission limit will meet the requirements for RACT. Instead, in the RACT determination for SO_2 as provided in the Technical Support Document, SWAPCA has considered whether RACT requires a more stringent emission limit than the CDM target solution.

3. The Washington State legislature's decision to grant certain tax relief to the Centralia Plant has changed the economic feasibility determination analysis under RACT that would otherwise apply to this or similar sources. Thus, RACT for the Centralia Plant's SO_2 emission limit may not be easily transferred to other sources or source categories.

4. In addition to determining RACT for sulfur dioxide emissions, SWAPCA has also determined RACT emission limits for nitrogen oxides, particulate matter, and carbon monoxide.

5. SWAPCA has considered visibility impairment in Mount Rainier National Park and other Class I areas. While no formal BART determination has been made, SWAPCA has considered the federal "best available retrofit technology" (BART) guidelines for large coal-fired power plants, and specifically how the RACT emission limits compare with the new source performance standards (NSPS) (40 CFR 60.40a, Subpart Da).

REGULATORY BACKGROUND

RACT Order SWAPCA 95-1787

6. SWAPCA issued RACT Order SWAPCA 95-1787 in August 1995 establishing plant-wide SO_2 emission limits of 1.1 pounds per million Btu (lb/MBtu), annual average and 55,000 tons/yr. Comments from the National Park Service and USDA Forest Service concerning BART prompted on-going discussions about additional SO_2 reductions. The 1995 RACT Order was withdrawn in September 1996 to facilitate another review of RACT and to

determine whether the collaborative decision making (CDM) target solution exceeds emission limits consistent with RACT.

CDM Target Solution

7. A collaborative decision making (CDM) process during 1996 led to agreement among the Centralia Plant owners, federal land managers, and regulatory agencies to seek further emission reductions. The outcome of this process was a proposal to limit SO_2 emissions to no more than 10,000 tons/yr after December 31, 2002 and install NO_x controls. In addition, proposed criteria were developed for: (a) Current Standards - Hourly Concentrations; (b) Operating Conditions with Controls - Good Operating Practices, Scrubber Outages, Unit Startup/Shutdown, Emissions Accounting, and Modifications; (c) Emission Limits - Control System Deadline, Hourly Concentrations in 2002, Hourly Concentration 2003 Onward, Annual Limit, and Bypass Stacks; (d) Monitoring and Reporting - CEMs, Compliance Data, Interim Compliance, Compliance Evaluation, Data Availability, and Reporting Frequency; and (e) Exceedances and Penalties - Hourly Exceedance, Annual Exceedance, Excess Emission, Definition of Violation, and General Enforcement and Allowance Forfeiture. Documentation from the CDM group collaborative process is provided in Appendix B of the Technical Support Document.

LEGAL AUTHORITY

8. RCW 70.94.154 specifies that all sources in Washington State are required to meet emission limitations consistent with RACT. SWAPCA may issue a Regulatory Order to define emission limitations that constitute RACT and require compliance with such emission limitations. RACT means the lowest emission limit that a particular source or source category is capable of meeting by the application of control technology that is

reasonably available considering technological feasibility and economic feasibility (SWAPCA 400-030(68)).

9. Regulations have been established for the control of air pollutants emitted to the ambient air. Regulations applicable to the Centralia Plant which have been considered in establishing RACT emission limits and control requirements include, but are not limited to, the following regulations, codes or requirements. These items establish minimally acceptable emission limits that could be allowed for existing facilities. More stringent limits may be established in this Order consistent with implementation of RACT:

a. Title 40 Code of Federal Regulations (CFR) Part 60.40 et seq. (Subpart D) "Standards of Performance for Fossil-Fuel-Fired Steam Generators" applies to each steam generating unit of more than 250 million Btu per hour heat input for which construction commenced after August 17, 1971. This regulation does not apply to the Centralia Plant because construction of the Centralia Plant commenced in 1968. SWAPCA approved construction of the Centralia Plant in a letter dated November 7, 1969.

b. Title 40 Code of Federal Regulations (CFR) Part 60.40a et seq. (Subpart Da) "Standards of Performance for Electric Utility Steam Generating Units for Which Construction Is Commenced After September 18, 1978" applies to each steam generating unit of more than 250 million Btu per hour heat input for which construction commenced after September 18, 1978. This regulation does not apply to the Centralia Plant because construction of the Centralia Plant commenced in 1968 and has not since been modified. SWAPCA approved construction of the Centralia Plant in a letter dated November 7, 1969.

c. WAC 173-400-151 "Retrofit Requirements for Visibility Protection" requires the owner or operator of any source to which significant visibility impairment of a mandatory Class I area is reasonably attributable, to apply BART for each contaminant contributing to visibility impairment that is emitted at more than 250 tons per year.

d. WAC 173-470 "Ambient Air Quality Standards for Particulate Matter" establishes ambient air quality standards for total suspended particulate matter and for particulate matter smaller than 10 microns (PM_{10}), which may not be exceeded more than one day per year.

e. WAC 173-474 "Ambient Air Quality Standards for Sulfur Oxides" established ambient air quality standards for sulfur oxides, measured as sulfur dioxide (SO_2), of 0.4 parts per million (1-hour average) and 0.1 parts per million (24-hour average) which may not be exceeded more than once in a one-year period, and 0.25 parts per million (1-hour average) which may not be exceeded more than twice in a consecutive seven-day period.

f. WAC 173-475 "Ambient Air Quality Standards for Carbon Monoxide, Ozone, and Nitrogen Dioxide" establishes an ambient air quality standard of 0.05 part per million (ppm), annual arithmetic mean for nitrogen dioxide; an ambient air quality standard of 0.12 ppm, one hour average, for ozone; and ambient air quality standards of 9.0 ppm, eight hour average, and 35.0 ppm, one hour average, for carbon monoxide.

g. SWAPCA 400-040 "General Standards for Maximum Emissions" Section 6 requires that no person shall cause or permit the emission of a gas containing

sulfur dioxide from any emission unit in excess of 1000 ppm $dry_{v/v}$ corrected to 7% O_2 or 12% CO_2 average for any consecutive 60 minutes.

h. SWAPCA 400-091 "Voluntary Limits on Emissions" requires that SWAPCA establish enforceable limits on emissions or limitations on potential to emit upon request by a source to an amount agreed to by the owner or operator and SWAPCA. SWAPCA shall issue a Regulatory Order to reduce that source's potential to emit whereby the terms and conditions of such Order shall be federally enforceable. Such Order shall be subject to public notice and comment.

i. SWAPCA 400-114 "Requirements for Replacement or Substantial Alteration of Emission Control Technology at an Existing Stationary Source" requires that the owner/operator of a source submit a Notice of Construction application to SWAPCA and that an Order of Approval/Regulatory Order be issued prior to making the replacement or alteration. For projects not otherwise reviewable under SWAPCA 400-110, SWAPCA may require the owner or operator to employ RACT. SWAPCA 400-114 applies to fuel modifications strictly for control of emissions, as well as to the installation of pollution control equipment.

REGULATORY FINDINGS

Emission Units

10. SWAPCA evaluated all emission units at the Centralia Plant to determine those units that should be considered for inclusion in a RACT evaluation. There were eight emission units identified as major plant components. In addition, the Title V application further identified four additional emission units. These four additional emission units were identified to be insignificant emission units in accordance with Title V requirements. Based on the RACT criteria of RCW 70.94.154 and RCW 70.94.030, only the main

boilers (Boilers #1 and #2) were determined to be of significant nature such that a RACT evaluation and establishment of RACT emission limits would be practicable at this time. The full evaluation of the emission units are documented in the Technical Support Document in Section 2.2.

Pollutants Deemed to be of Concern

11. SWAPCA evaluated certain pollutants to determine whether they are "of concern" and whether it would be practicable to set RACT emission limits for them at this time. SWAPCA evaluated each of the criteria pollutants (sulfur dioxide, particulate matter, oxides of nitrogen, and carbon monoxide) to determine if they qualified as contaminants of concern for the Centralia Plant. Ozone was not directly evaluated because it is not a pollutant directly emitted by the Centralia Plant, however, ozone was evaluated as a byproduct of oxides of nitrogen and volatile organic compounds. In addition volatile organic compounds, hazardous air pollutants (HAPs) and toxic air pollutants (TAPs), and carbon dioxide were evaluated. Lead was not evaluated separately as a criteria pollutant but was considered under the category of hazardous air pollutant. SWAPCA applied criteria contained in RCW 70.94.154 and RCW 70.94.030 to each pollutant to arrive at a conclusion of which pollutants should be evaluated for RACT. Only those pollutants emitted from the emission units of concern that were identified above were evaluated. The pollutants of concern for which a RACT determination was deemed to be practicable are: sulfur dioxide, oxides of nitrogen, particulate matter and carbon monoxide. The full evaluation of the pollutants of concern are documented in the Technical Support Document in Section 2.3.

SWAPCA's Discretion to Not Determine RACT Where Not Practicable

12. Volatile organic compounds, hazardous air pollutants and toxic air pollutants, and carbon dioxide were determined to not be subject to RACT for the Centralia Plant based on individual factors explained in the Technical Support Document. The hazardous air pollutants were found to be insignificant (not of concern) or determined to not be practicable to have a RACT emission limit established at this time. One hazardous air pollutant, mercury (Hg), was determined to be potentially of concern and was evaluated in more detail than the other hazardous air pollutants. The U.S. EPA is currently evaluating mercury emissions from all power plants to establish the need for maximum achievable control technology (MACT) controls. Because the concentration of mercury emissions from the Centralia Plant are significantly below the Washington State established acceptable source impact level (ASIL) of WAC 173-460 and the fact that mercury is being considered for a federal MACT standard, mercury is not yet a pollutant of concern. Therefore, establishment of a RACT emission limit for mercury was not considered to be practicable at this time.

Basis for Order

13. This Order, in part, is issued in accordance with SWAPCA 400-091, upon request by the Respondent, to limit the potential to emit from the auxiliary boiler. The emission limitation is based on establishing an annual total fuel consumption limit for the auxiliary boiler of 600,000 gallons per year and AP-42 emission factors.

14. This Order, in part, is issued in accordance with SWAPCA 400-114(2)(a) requiring installation of RACT and is deemed to meet the requirements of SWAPCA 400-114(3) for Notice of Construction submittal and approval of replacement or substantial alteration of emission control technology at an existing stationary source. Respondent shall notify

SWAPCA of the selected control technology upon its final selection. Any additional monitoring and operating requirements necessary to ensure continuous compliance with applicable requirements shall be incorporated into the Title V permit at the time of its issuance or renewal, as appropriate.

RACT and BART Findings

15. SWAPCA finds that the 10,000 tons per year emission limit for SO_2 required in this Order meets or exceeds the requirement for an SO_2 RACT emission limit for the Centralia Plant.

16. SWAPCA finds that a 0.30 lb/MBtu, annual average, both units combined, emission limit for oxides of nitrogen, a 0.010 gr/dscf and 20% opacity emission limits for particulate matter, and 200 ppm, annual average, both units combined, emission limit for carbon monoxide, are levels of emissions that can be achieved by the Centralia Plant by application of RACT control technology, thereby establishing RACT emission limits as provided under RCW 70.94.154.

17. SWAPCA finds that, while no formal BART determination has been made, based on the requirements in this Order and documentation in the Technical Support Document, the emission limits in this RACT Order represent BART under 40 CFR 51 Subpart P, WAC 173-400-151 and SWAPCA 400-151 for emissions of sulfur dioxide, particulate matter and nitrogen oxides by meeting the BART requirements for those pollutants.

NOW HAVING CONSIDERED THIS MATTER AND BEING DULY ADVISED, IT IS HEREBY ORDERED:

SULFUR DIOXIDE

18. THAT, unless otherwise provided below, no later than January 1, 2003 total SO_2 emissions from units #1 and #2, the auxiliary boiler (as described in Item 45), and other emission points throughout the facility, combined, shall not exceed 10,000 tons/yr in any rolling 12-month period. The determination of annual emissions shall be based on a rolling monthly calculation from the recorded hourly SO_2 emissions used for Acid Rain Program compliance evaluation. An annual average shall be computed for the preceding 12-month period which ends with each month of the quarter, to be reported quarterly by the end of the month following the end of the calendar quarter.

19. THAT, the selected SO_2 emission control technology shall be operational no later than December 31, 2001 for one of the Plant units, and shall be operational no later than December 31, 2002 for the other Plant unit. However, if the selected SO_2 emission control method is fuel supply modification or a post-combustion control system applied to only one of the two units, neither of the units, or no controls, the emission limit for the entire Plant shall be effective after December 31, 2001.

20. THAT, the annual SO_2 exhaust gas emissions, during and after installation of control technology according to the schedule in Item 19 above, shall not exceed the following:

a. 7,500 tons per year, annual average, for the controlled unit including any bypass, and no annual limit for the uncontrolled unit, if discharged through separate stacks (flues), effective only in calendar year 2002;

b. 10,000 tons per year, annual average, for all exhaust gases discharged through a new flue (and bypass for the controlled unit) if this flue is to be common for both

units once control technology is applied to both units. The exhaust stream to which this limit applies consists of emissions from the first controlled unit for the entire year of 2002 and emissions from the second controlled unit for only that portion of the year 2002 that the second unit is in startup testing and discharges its exhaust through the new common flue. Compliance evaluation periods that span startup of the second unit shall use the monthly emissions calculated by the appropriate accounting method for each month;

c. 10,000 tons per year, annual average, both units combined, if both units have control technology installed (operational) by December 31, 2001, effective in calendar year 2002 and beyond;

d. 10,000 tons per year, annual average, both units combined, both units controlled, one or two stacks, effective in calendar year 2003 and beyond;

e. The Centralia Plant shall, within its operation and maintenance constraints, use all best efforts to preferentially load the unit first equipped with SO_2 emission control technology when the Plant is operating at less than maximum capacity from December 31, 2001 through December 30, 2002. Daily generation records for both units will be made available during calendar year 2002 to assess the relative loading of the scrubbed and unscrubbed units.

21. THAT, from January 1, 2002 onward, the SO_2 exhaust gas concentration from units to which emission reduction technology has been applied, according to the schedule in Item 19 above, shall not exceed the following short-term levels:

a. 250 ppm, 1-hour average measured on a dry basis corrected to 7% O_2 for the controlled unit(s); 1000 ppm, 1-hour average measured on a dry basis corrected to 7% O_2 for the uncontrolled unit for only 2002;

b. During planned or forced outages of the SO_2 emission control technology and during startups and/or shutdowns of a unit as defined in Section 25 below, if the selected SO_2 emission control technology cannot operate, the following alternative emission levels measured on a dry basis corrected to 7% O_2 shall apply:

(i) 1000 ppm, 1-hour average, if the exhaust gas from each unit is discharged through separate flues which are independently monitored;

(ii) If the exhaust gases from both units are discharged through a new common flue in which only a combined exhaust mixture may be monitored, then the following outage and startup/shutdown levels shall apply:

(a) In 2002, 1000 ppm, 1-hour average; and

(b) In 2003 and onward, 750 ppm, 1-hour average if the outage or startup/shutdown condition exists for only one unit, and 1000 ppm, 1-hour average if the condition exists for both units concurrently;

c. If the exhaust gases from both units are discharged through a new common flue, during startup testing of the second unit's SO_2 emission control technology, SO_2 concentrations shall not exceed 750 ppm, 1-hour average, only in 2002.

22. THAT, prior to compliance with the SO_2 emission limit in Item 18 above, neither Unit #1 nor Unit #2 shall exceed for any fixed hour at any time while fuel is being supplied to the unit, an SO_2 stack concentration of 1000 ppm, 1-hour average, dry basis corrected to 7% O_2 as provided in SWAPCA 400-040(6).

23. THAT, the duration of a forced outage of the SO_2 emission control technology shall be minimized by returning the emission control system to operation as soon as practicable. A planned outage is defined as one that is scheduled in advance regardless of the length of the planning horizon. All other unanticipated system outages are defined to be forced.

The Centralia Plant is responsible for demonstrating that a forced outage which occurs while the plant continues to operate is unavoidable and is being managed to minimize emissions as provided in SWAPCA 400-107. Emission control system outages shall be reported to SWAPCA by telephone during the current business day or no later than the next business morning; a message may be left on an automatic answering machine outside normal business hours. A written report may be requested by SWAPCA, and shall be required for any forced outage longer than 72 hours. For outages exceeding 72 hours, the plant shall consider available means to reduce emissions of SO_2, including, but not limited to, a reduction in electrical output, use of reduced sulfur content coal, or taking one or both units off line. Planned emission control system outages shall be conducted to the maximum extent possible during daily or weekly plant load reduction periods. No planned emission control system outages shall occur during the period of June 15 through September 15 except when the plant is completely off line and no fuel is burned.

24. THAT, all SO_2 emissions during startup, shutdown, equipment out of service, and upset conditions shall be included in the summation of emissions to determine compliance with the annual (12 month) emissions limit of 10,000 tpy.

25. THAT, during startup and shutdown of the Centralia Plant units (for normal operations or planned outages), emissions control equipment shall be operated to minimize overall emissions, except to the extent equipment operation will cause degradation of its long-term performance. Exceedances of the normal operation hourly SO_2 (250 ppm) and opacity limitations (20%) are excused under SWAPCA 400-107 during startup and shutdown when the electrostatic precipitators (ESPs) and SO_2 emission control system(s) are out of service. The shutdown period begins when the ESP temperature drops to 220°F, the critical ESP de-energize temperature. When the critical temperature is

attained, first the SO_2 control system, and then the ESPs are taken out of service. For periods when all fuel is out of the boiler, SO_2 emissions shall be assumed to be zero. The startup period begins when fuel is introduced into a boiler with the intent of raising its temperature to operating conditions. The ESPs are energized when they reach operational temperature, or 220°F. The SO_2 control system(s) is(are) placed in service following ESP stabilization. The startup period ends when the earlier of the two operating events below occurs:

a. Opacity in the gas path downstream of the ESPs has stabilized below 10% for 30 minutes (five consecutive 6-minute periods); or

b. 8 hours have elapsed after the startup unit is synchronized to be electrically on-line.

26. THAT, during equipment out of service and upsets (including forced outages), emissions in excess of the 250 ppm hourly SO_2 limitation are excused from the hourly limit provided they meet the burden of proof regarding unavoidable conditions that lead to excess emissions in accordance with SWAPCA 400-107. Centralia Plant shall record equipment out of service and upset conditions in the operation log for periodic inspection by SWAPCA. For periods when all fuel is out of the boiler, SO_2 emissions shall be assumed to be zero.

27. THAT, the compliance determination methodology for SO_2 emissions shall be as follows:

a. SO_2 emissions from each unit, if emitted through separate flues, shall be measured by an SO_2 monitor and the diluent (O_2 or CO_2) monitor, which are continuous emission monitors (CEM) installed and operated to meet the requirements of 40 CFR Part 75. Hourly (over a fixed clock hour, e.g., 1:00 p.m. to 1:59 p.m.) SO_2 averages shall be calculated by the CEM. Compliance with the hourly SO_2

limitations shall be determined from the CEM data, collected in compliance with 40 CFR Part 75 separately for Centralia Plant Units #1 and #2 from separate flues, or a combined flue, if applicable.

b. Compliance with the annual emission limit in tons per year shall be determined at the end of each calendar quarter from tons of SO_2 emitted during the three 12-month periods ending in that quarter. Emissions shall be calculated using the methodology in 40 CFR 75 for the Acid Rain Program. If prior to June 2000, the U.S. Environmental Protection Agency has not resolved the discrepancy that exists in calculating tons of SO_2 between the current 40 CFR Part 75 and coal burned methodologies, the Centralia Plant may propose to SWAPCA, for review and modification of this provision, alternative monitoring and compliance evaluation methods that more accurately represent true emissions.

c. The minimum data availability requirements of 40 CFR 75.20 to 75.34 shall be met. Periods of CEM malfunctions shall be subject to SWAPCA 400-105(5)(h) which exempts the Centralia Plant from monitoring and reporting requirements if SWAPCA determines that the CEM malfunction was unavoidable. When determining compliance with the SO_2 limitations for monitor out-of-service periods of four hours or less in duration, the average of the hour before and the hour following a monitor out-of-service period, in accordance with 40 CFR 75.33(b)(1)(i) shall be used. Because the missing data substitution procedures for 40 CFR 75.30 to 75.34 may require the use of emission values that do not represent actual emissions, alternative data may be used for missing data periods. When determining compliance with SO_2 limitations for monitor out-of-service periods greater than four hours, data from the on-line coal analyzer operated by

the Centralia Mining Company, the as-burned coal analyses conducted by Centralia Plant, and emission control system operating data shall be evaluated. The data or combination of data, that best represents actual emissions shall be used to determine compliance with the SO_2 limitations. Stack test data may be used, if available and approved by SWAPCA.

d. Quarterly reports for Centralia Plant Units #1 and #2 shall be submitted to SWAPCA by the end of the month following the end of each calendar quarter. Each report shall include, but not be limited to, the following:

(1) Hourly concentrations of SO_2 in ppm, dry basis corrected to 7% O_2;

(2) Tons of SO_2 emitted from all relevant stacks (plus any extreme emergency bypasses through the old stacks) for each 12-month period, ending with the last day of each month in the quarter;

(3) Complete 40 CFR Part 75 quarterly report on disk may be submitted under separate cover;

(4) During 2002, daily megawatt generation from each boiler to allow confirmation of loading priority of the boilers.

28. THAT, exceedances and violations of short-term and annual emissions limitations shall be defined as described below:

a. An exceedance of the hourly limitation (250 ppm and 1000 ppm) is defined as any fixed hour (e.g., 1:00 p.m. to 1:59 p.m.) with SO_2 concentration over the limitations as defined and determined under Items 21 and 22 above;

b. Exceedance of the hourly SO_2 limitations in Items 21 and 22 above shall be subject to SWAPCA 400-107. The Centralia Plant shall have the burden of proof demonstrating unavoidable conditions that lead to excess emission in accordance

with SWAPCA 400-107. Excess emissions shall be reported to SWAPCA by telephone during the current business day or next business morning; a message may be left on an automatic answering machine outside normal business hours. A written report may be required by SWAPCA if determined necessary. Violations and penalties for exceedances of the hourly limits shall be determined in accordance with SWAPCA 400-230 and RCW 70.94;

c. An exceedance of the annual limitation is one 12-month period exceeding the tons/year SO_2 limitations as defined and determined under Items 18, 19, and 20 above. All hourly SO_2 emission data for startup, shutdown, upset and forced or planned emission control system outage periods shall be included in the calculations of the annual tons of SO_2 emitted;

d. Except as provided herein, each exceedance of the annual (rolling 12-month) emission limitation shall constitute a continuing violation for the days in the last month of the 12-month (annual) period. Each day of violation shall be treated equally and be subject to penalty as allowed by law at the time of the non-compliance. The Centralia Plant may calculate 365-day emission summations ending on each day in the last month of the 12-month period to reduce the number of violation days subject to penalty. If adequately demonstrated, the number of violation days shall not include the number of 365-day periods ending within the last month of the exceedance period for which the emissions summation did not exceed the annual limit;

e. SWAPCA retains the authority to take enforcement action in response to deficiencies in plant operation and maintenance, equipment performance, or any

other matter not explicitly identified in Items 25 and 26, consistent with SWAPCA 400 General Regulations for Air Pollution Sources;

f. In addition to penalties that may be assessed under statutory and regulatory authorities, beginning in calendar year 2002, the Centralia Plant shall forfeit ownership of SO_2 allowances to SWAPCA equal to 1.5 times the quantity of emissions in excess of the 10,000 ton annual limit calculated on a calendar year basis.

29. THAT, if the selected emission control technology includes construction of a new stack(s) with one or two flues, the existing stack for each unit may remain for bypass situations provided that certified CEMs are maintained in the existing stacks. If there are no certified functioning CEMs in the existing stacks, these stacks shall only be used during extreme emergency conditions, provided that a separate bypass duct around the SO_2 emission control technology is not constructed into the new stack. Examples of emergency conditions are interruption of the exhaust gas flow path through that unit's scrubber vessel, or other situations with the potential to result in personal injury or severe damage to the boiler, emission control systems, or new stack. Any bypass that is not monitored by a certified functional CEM is considered an upset condition and shall be reported to SWAPCA during the current business day or by the next business morning and shall be documented to SWAPCA within 5 days of the occurrence. All SO_2 emissions discharged from a bypass stack shall be included in the calculation of emissions for determining compliance with the annual limit.

OXIDES OF NITROGEN

30. THAT, the annual average (calendar year) emission rate for NO_x shall not exceed 0.30 lb/MBtu, both units averaged together, for those hours when a unit's generating load is 360 MW gross or greater. (This annual average emission rate is calculated as the combined arithmetic sum of hourly emission rates for each unit when each unit's generating load is 360 MW gross, or greater, divided by the combined sum of the number of hours that each unit operated at 360 MW, or greater, during the calendar year.) For all operating hours, emissions of NO_x shall not exceed 0.35 lb NO_x/MBtu annual average (calendar year), both units averaged together. These emission limits shall be subject to the schedule in Items 31 and 32. All other provisions including compliance demonstration shall be consistent with the Acid Rain Program provisions.

31. THAT, the selected NO_x emission control technology shall be operational no later than December 31, 2001 for the first unit and December 31, 2002 for the second unit.

32. THAT, the NO_x exhaust gas emission rate during installation of control technology according to the schedule in Item 31 above, shall not exceed the following:

a. 0.31 lb/MBtu annual average for the controlled unit for all hours when the unit generating load is 360 MW gross or above, 0.36 lb/MBtu annual average for all operating hours for the controlled unit, 0.45 lb/MBtu annual average for the uncontrolled unit, if discharged through separate stacks, effective only in calendar year 2002;

b. 0.40 lb/MBtu, annual average, both units combined, if the exhaust gases from both units (one unit controlled, one unit not controlled) are discharged through a new common flue, effective only in calendar year 2002;

c. If both units have SO_2 control technology installed by December 31, 2001, the emission limits in Item 30 shall be effective in calendar year 2002 and beyond;

d. The emission limits in Item 30 shall be effective in calendar year 2003 and beyond.

33. THAT, for good cause, SWAPCA may, at its discretion and after meeting any public involvement requirements under SWAPCA 400-171 and any other applicable law or regulation, modify the NO_x emissions limitations of this Order. Good cause may include, for example, higher NO_x emissions than predicted by the manufacturer in the RACT submittal when operated in accordance with good industry practices or excessive boiler waterwall tube corrosion resulting from the installation and operation of the low NO_x modifications. All causes resulting from installation of Level III low NO_x technology shall be documented to SWAPCA no later than December 31, 2006, except excessive boiler waterwall tube corrosion which shall be documented to SWAPCA no later than December 31, 2008. A request to modify the NO_x conditions of this Order shall include an explanation of the reasons why the RACT NO_x emissions limits established in this Order cannot be met, why the reasons for such modification were beyond the control of the Centralia Plant, identification of any special operating conditions that may be the sole or principle reason for a modification, and what efforts were taken within the timelines specified above to avoid and/or mitigate the need for a modification. Nothing in this section shall be construed to limit SWAPCA's authority to revise this Order pursuant to Item 59 of this Order.

PARTICULATE MATTER

34. THAT, emissions of front half particulate matter shall not exceed 0.010 gr/dscf (Method 5, or equivalent, front half only), as corrected to 7% O_2, evaluated once per year for each stack (flue) by source testing effective after December 31, 2001.

35. THAT, compliance with the grain loading limit shall be based on an annual stack test using EPA Method 5, or equivalent. The test method selected shall be consistent with the SO_2 control technology selected and shall be appropriate for the stack conditions existing for the selected SO_2 control technology (i.e., wet or dry stack and maximum temperature). Only the front half catch shall be used for compliance demonstration with this limit, however, the backhalf catch should continue to be performed to provide an indication of total (condensible and non-condensible) particulate matter emitted from the plant.

36. THAT, the opacity of emissions shall be based on the continuous opacity monitoring system (COMS) if stack conditions allow accurate particulate matter readings without being adversely affected by moisture. Opacity shall not exceed 20% based on a 6-minute average, except for one 6-minute period per hour of not more than 27% opacity. See 40 CFR 60.42a(b). In addition, visible emissions as determined by a Certified Observer shall not exceed 20% opacity for more than 3 minutes in any one hour period as provided in SWAPCA 400-040(1). Both standards for opacity determination apply. If moisture is present in the gas stream to the extent that it interferes with the COMS providing accurate opacity data, then visual observations using EPA Method 9 shall be performed a minimum of once per quarter to demonstrate compliance.

37. THAT, the particulate matter and opacity emission limits shall apply at all times but are excused for startup and shutdown, and may be excused for periods of malfunction or

upset consistent with SWAPCA 400-107. In addition, opacity exceedances shall be allowed during periods of manual precipitator rapping and are excused under SWAPCA 400-107(5). Such opacity exceedances shall be reported to SWAPCA no later than the next business day and shall be noted in the quarterly report.

38. THAT, during startup and shutdown of the Centralia Plant boilers for planned or forced unit outages, emissions control equipment shall be operated to minimize overall emissions, except to the extent equipment operation will cause degradation of its long-term performance. Exceedances of the normal operation particulate matter and opacity limitations are excused under WAC 173-400-107(4) and SWAPCA 400-107(4) during startup and shutdown when the electrostatic precipitators (ESPs) and SO_2 emission control system(s) are out of service. The shutdown period begins when the ESP temperature drops to the critical ESP de-energize temperature, 220°F. When the critical temperature is attained, first the SO_2 control system, and then the ESPs are taken out of service. The startup period begins when fuel is introduced into a boiler with the intent of raising its temperature to operating conditions. The ESPs are energized when they reach operational temperature. The SO_2 control system(s) is(are) placed in service following ESP stabilization. The startup period ends when the earlier of the two operating events below occurs:

a. Opacity in the gas path downstream of both ESPs has stabilized below 10% for 30 minutes (five consecutive 6-minute periods); or

b. 8 hours have elapsed after the startup unit is synchronized to be electrically on-line.

CARBON MONOXIDE

39. THAT, emissions of carbon monoxide shall not exceed 200 ppm on an annual average (calendar year), combined. This emission limit is effective after December 31, 2001.

40. THAT, compliance with the carbon monoxide emission concentration limit shall be determined annually using existing plant operating data to identify average CO concentrations. For information purposes, year-to-date average carbon monoxide concentrations shall be calculated and reported quarterly. Plant operating data collected by the CO monitors shall be validated once per year, for each stack (flue), by source testing, using EPA Method 10, to confirm the representativeness of the CO monitor data.

PROJECT MILESTONES

41. THAT, to the extent applicable to the control technology selected, the following project milestones shall be met through reporting of progress to SWAPCA:

a. Demonstration of initial progress to install SO_2 air pollution control facilities shall be submitted by November 1, 1998. Initial progress may include, but is not limited to: engineering work, agreements to proceed with construction, contracts to purchase or contracts for construction of air pollution control facilities.

b. A procurement contract for the first unit SO_2 emission control system(s) shall be awarded no later than March 31, 1999.

c. Commencement of physical onsite construction activity for the first unit SO_2 emission control system(s) shall commence no later than August 31, 1999.

d. A procurement contract for the second unit SO_2 emission control system(s) shall be awarded no later than March 31, 2000.

e. Commencement of physical onsite construction activity for the second unit SO_2 emission control system(s) shall commence no later than August 31, 2000.

f. Commencement of startup testing of SO_2 control equipment for the first unit shall occur no later than October 31, 2001 and the second unit by no later than October 31, 2002. Startup testing is considered to be the initiation of flue gas through the SO_2 control system.

g. The SO_2 control system shall be installed and fully operational for the first unit no later than December 31, 2001 and for the second unit no later than December 31, 2002.

h. A procurement contract for the first unit NO_x emission control system(s) shall be awarded no later than October 31, 2000. The second unit NO_x emission control system(s) shall be awarded no later than October 31, 2001.

i. Commencement of physical onsite construction activity for the first unit NO_x emission control system(s) shall commence no later than August 31, 2001. Commencement of physical onsite construction activity for the second unit NO_x emission control system(s) shall commence no later than August 31, 2002.

j. NO_x control equipment startup testing shall be commenced no later than October 31, 2001 and October 31, 2002, for the first and second units, respectively.

k. The NO_x controls shall be installed and fully operational for the first unit no later than December 31, 2001 and for the second unit no later than December 31, 2002.

RECORDKEEPING AND REPORTING

42. THAT, a comprehensive test plan shall be submitted to SWAPCA for review and approval at least five business days prior to performance of any periodic testing beyond CEMS monitoring required in this Order. SWAPCA shall be notified at least three days in advance of any testing so that personnel may be present during testing. A minimum of three test runs shall be performed at a minimum of 500 MW gross to establish that

collected data is representative of normal operation. Compliance shall be determined by averaging the results of individual test runs. The results of required emissions testing shall be provided to SWAPCA by no later than 45 days following completion of testing. All gaseous emissions shall, as a minimum, be reported in parts per million by volume, pounds per hour, and pounds per million Btu of heat input. Emissions data shall be reported as corrected to 7% O_2. The test report shall include a summary of operating conditions for each test run to include, as a minimum: (1) estimated heat input into furnace (MBtu/hr), (2) estimated fuel consumption rate (lb/hr), (3) air discharge flowrate in dry standard cubic feet, (4) exhaust temperature of emissions out the stack, (5) estimated sulfur content of coal, (6) estimated SO_2 reduction in percent, as a result of controls, and (7) unit load in megawatts on an hourly basis. Initial source testing of the SO_2 control system shall be completed no later than 90 days after demonstration of successful operation of that SO_2 technology.

43. THAT, Respondent shall submit quarterly emission reports by no later than the end of the month following the end of each calendar quarter of the calendar year. These reports shall contain, as a minimum, the following information:

a. Total gallons of fuel oil burned in each boiler (Boiler #1, Boiler #2 and auxiliary boiler) and certification of sulfur content in fuel oil;

b. Information required under 40 CFR 75;

c. CEMS/DAHS data for NO_x and SO_2 corrected to the units of measure and averaging times, including rolling averages, consistent with the emission limits established by this Order and applicable federal requirements. The date, time and measured oxygen content in percent shall be provided for each reported hourly value;

d. Quarterly average CO concentrations for each boiler;

e. Quarterly opacity excess emissions over 20%, if opacity monitoring is possible under stack conditions, otherwise report results of quarterly Method 9 test;

f. Year to date totals for SO_2 emissions and average NO_x emission rate for Units #1 and #2 under all operating conditions; and

g. Estimated monthly average fuel heating values (Btu/lb) for coal burned in Boiler #1 and Boiler #2 to assist with periodic compliance checks.

HSB 1257 TAX ABATEMENT REQUIREMENTS

44. THAT, Respondent shall report progress to SWAPCA on meeting the requirements of House Substitute Bill (HSB) 1257 annually by June 1 of each year during the construction period of the SO_2 control equipment (both units) and then monthly after the SO_2 control equipment is operational. Such report shall contain sufficient data and/or documentation to demonstrate compliance with HSB 1257 for tax abatement purposes.

VOLUNTARY EMISSION LIMIT

45. THAT, the total annual fuel oil combusted in the auxiliary boiler shall not exceed 600,000 gallons per year. Consumption shall be reported quarterly to SWAPCA. The auxiliary boiler shall have a separate fuel meter to monitor the total amount of fuel it consumes in that boiler. Emissions of SO_2 from the auxiliary boiler shall be included in the 10,000 tons per year emission limit of Item 18. Emissions shall be calculated based on fuel consumption and fuel sulfur content.

GENERAL PROVISIONS

46. THAT, the owners of the Centralia Plant shall have sole discretion to select the control technology which complies with the emission limitations herein specified.

47. THAT, any physical changes of the boilers and draft systems, including fans for the purpose of installing NO_x and SO_2 emissions control equipment, will not trigger New Source Performance Standards (NSPS) or BACT/PSD under New Source Review as a modification per 40 CFR 60.14(e), WAC 173-400-110, or SWAPCA 400-110. Any physical changes associated with the installation of pollution controls to meet the emission limitations of this Order shall not be major modifications because such changes are exempted for electric utility boilers in 40 CFR 52.21(b)(2)(iii)(h) from the Prevention of Significant Deterioration (PSD) program under WAC 173-400-141, SWAPCA 400-141, and 40 CFR 51 Subpart I and 40 CFR 52.21.

48. THAT, at all times, including periods of startup, shutdown, and malfunction, the plant shall, to the extent practicable, maintain and operate air pollution control equipment in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on information available to SWAPCA which may include, but is not limited to, monitoring results, review of operating and maintenance procedures and records, and inspection of the source.

49. THAT, the emission limits and conditions of this Order supersede all previously issued Regulatory Orders including SWAPCA 90-934E.

50. THAT, the Centralia Plant shall submit an annual emission inventory to SWAPCA in accordance with SWAPCA 400-105.

51. THAT, this RACT Regulatory Order is subject to SWAPCA's authority to review and revise this Order pursuant to RCW 70.94.153 and 70.94.154 and shall not limit SWAPCA's authority under RCW 70.94 or other applicable federal and state laws and regulations.

52. THAT, if any provision of this Regulatory Order shall be declared invalid by any court of competent jurisdiction, all unaffected provisions shall remain in effect and be enforceable.

53. THAT, for the purpose of ensuring compliance with this Regulatory Order, duly authorized representatives of the Southwest Air Pollution Control Authority shall be permitted access to Respondent's premises and the facilities being constructed, owned, operated and/or maintained by Respondent during regular business hours for the purpose of inspecting said facilities. These inspections are required to determine the status of compliance with the terms of this Regulatory Order.

54. THAT, the provisions, terms and conditions of this Regulatory Order shall be deemed to bind Respondent, its officers, directors, agents, servants, employees, successors and assigns, and all persons, firms and corporations under or for it.

55. THAT, the requirements of this Order shall survive any transfer of ownership of the Centralia Plant or any portion thereof.

56. THAT, this Order does not supersede requirements of other agencies with jurisdiction and further, this Order does not relieve Respondent of any requirements of any other governmental agency. In addition to this Order, Respondent may be required to obtain other permits or approvals from other Agencies with jurisdiction.

57. THAT, compliance with this Order and its requirements does not relieve the Respondent from responsibility of compliance with Southwest Air Pollution Control Authority General Regulations for Air Pollution Sources, RCW 70.94, WAC Title 173 or any other applicable air contaminant emission control requirements, nor from the resulting liabilities and/or legal remedies for failure to comply.

58. THAT, the Centralia Plant shall provide annual written certification that the requirements of this Regulatory Order have been met. Certification of truth, accuracy and completeness shall be provided by a responsible official, as defined in WAC 173-401 "Operating Permit Regulation", and shall be submitted with each report. This certification shall state that, "based on the information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate and complete."

59. THAT, for good cause shown, SWAPCA may, in its discretion and after meeting any public involvement requirements under SWAPCA 400-171 and any other applicable law or regulation, modify or stay the project milestones, effective dates, or Order. A request to modify or stay the project milestones, effective dates, or Order should include an explanation of the reasons why the current project milestones, effective dates, or Order cannot be met, whether the reasons for the modification or stay were beyond the control of the Centralia Plant, what efforts were taken to avoid and/or mitigate the need for a modification or stay, and a proposed schedule that can be met.

60. THAT, this Order, once signed and issued, may be appealed pursuant to RCW 43.21B.230. An appeal must be filed with the Pollution Control Hearings Board (PCHB) at PO Box 40903, Olympia, WA 98504-0903, and shall be served on SWAPCA within thirty (30) days from the date of the notice of this Order. This Order may also be appealed as provided in SWAPCA 400-250.

DATED this 26th day of February, 1998.

EXPIRES: 08-4- 98

Reviewed by: Paul T. Mairose

Paul T. Mairose, P.E.

Chief Engineer

Approved by: Robert D. Elliott

Robert D. Elliott

Executive Director

Southwest Air Pollution Control Authority

IN THE MATTER OF COMPLIANCE WITH RCW		)	
70.94 AND THE GENERAL REGULATIONS FOR		)	SWAPCA 99-2187
AIR POLLUTION SOURCES OF THE SOUTHWEST		)	STAY OF PROJECT MILESTONE
AIR POLLUTION CONTROL AUTHORITY		)	IN RACT ORDER
Centralia Plant	RESPONDENT	)	SWAPCA 97-2057R1
PacifiCorp, et. al.		)	
Centralia, Washington		)	

BACKGROUND

1. It is the policy and purpose of the Southwest Air Pollution Control Authority (SWAPCA) to control the emission of air contaminants from sources within the jurisdiction of the Authority, to prevent violations of Federal and State Ambient Air Quality Standards, to provide for uniform administration and enforcement of the General Regulations for Air Pollution Sources (SWAPCA 400), and to carry out the requirements and purpose of Chapter 70.94 RCW, the Washington Clean Air Act.

2. Under RCW 70.94.154 of the Washington Clean Air Act, "reasonably available control technology" or "RACT" is required for all existing sources in Washington. All sources are required to achieve the lowest emission limit that the source or source category is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. See RCW 70.94.154(1). In setting RACT, SWAPCA is required to consider the following factors: (1) the impact of the source upon air quality, (2) the availability of additional controls, (3) the emission reduction to be achieved by additional controls, (4) the impact of additional controls on

air quality, and (5) the capital and operating costs of the additional controls. See RCW 70.94.030(19).

3. SWAPCA issued RACT Order SWAPCA 97-2057R1 on February 26, 1998 establishing, in part, a 10,000 ton per year (tpy) SO_2 emission limit, rolling 12 month average, a 0.30 lb/mmBtu NO_x emission limit, annual average both units together, a 0.10 gr/dscf PM emission limit, and a 200 ppm CO emission limit, annual average calendar year.

4. An important consideration in SWAPCA's determination of source-specific RACT for the Centralia Plant's sulfur dioxide (SO_2) emissions is Centralia Plant's agreement to achieve certain significant reductions in emissions of sulfur dioxide. Because the Respondent had already agreed to accept the proposed Collaborative Decision Making (CDM) group SO_2 emission reductions once required in a Regulatory Order, it was not necessary for SWAPCA to assess whether a less stringent SO_2 emission limit will meet the requirements for RACT. Instead, in the RACT determination for SO_2 as provided in the Technical Support Document, SWAPCA considered whether RACT requires a more stringent emission limit than the CDM target solution and concluded that the CDM target solution meets or exceeds RACT for SO_2 emissions.

5. Although SWAPCA has determined that the SO_2 emission limits established in the RACT Order SWAPCA 97-2057R1 meet or exceed RACT for the Centralia Plant, SWAPCA must emphasize the unique circumstances of that determination. The Centralia Plant is the largest source of SO_2 emissions in the state of Washington. The Centralia Plant has already agreed to an SO_2 emission limit of 10,000 tons per year. The SO_2 emission limit for the Centralia Plant has received unprecedented attention and review by numerous federal, state, and local agencies, as well as considerable public attention. The Washington State legislature's decision under Substitute House Bill 1257 (SHB 1257) to

grant certain tax relief to the Centralia Plant has changed the economic feasibility determination analysis under RACT that would otherwise apply to this or similar sources.

6. One of the requirements in SHB 1257, Section 6(2)(b), requires the Owners to make a demonstration to the Washington Department of Ecology that the Owners have made reasonable initial progress to install air pollution control facilities to meet applicable regulatory requirements. SWAPCA received delegation from the Department of Ecology in a delegation letter dated December 10, 1998, for SWAPCA to make the determination of reasonable progress and report to the Washington Department of Revenue through the Department of Ecology. Anticipating this delegation, SWAPCA included project milestones in Paragraph 41 of the RACT Order to be able to assess whether reasonable progress was being achieved by the Owners. This paragraph also established dates for each of the identified milestones.

7. In a letter dated July 23, 1998, the Respondent requested a nine month stay of the compliance schedule in RACT Order SWAPCA 97-2057R1. On October 15, 1998, the SWAPCA Board of Directors decided to defer action on this stay request until a later date. As an interim measure, the Respondent requested in a letter dated December 23, 1998, to modify the stay request and asked that the SWAPCA Board of Directors approve a 60-day stay of the March 31, 1999 Project Milestone date for award of a procurement contract for the first SO_2 emission control device to avoid the need for the nine-month stay if the appeal of the RACT Order is resolved before the end of the 60 days.

8. SHB 1257, Section 10(2), states that, by June 1st of each year starting on January 1, 1999 during construction of the air pollution control facilities and during the verification period required in sections 4(2)(d) and 6(2)(d) of SHB 1257, the Department of Ecology and

now delegated to SWAPCA, shall make an assessment regarding the reasonable progress of the pollution control facilities.

APPLICABLE REGULATIONS

9. RCW 70.94.154 provides that RACT as defined in RCW 70.94.030 is required for existing sources except as otherwise provided in RCW 70.94.331(9).

10. Revised Code of Washington (RCW) 70.94.141 (3) provides SWAPCA the authority to issue such Orders as may be necessary to effectuate the purposes of this Chapter and enforce the same by all appropriate administrative and judicial proceedings subject to the rights of appeal as provided in Chapter 62, Laws of 1970 ex. sess.

REGULATORY FINDINGS

11. SHB 1257, Section 10(2) states that by June 1st of each year starting on January 1, 1999 during construction of the air pollution control facilities and during the verification period required in sections 4(2)(d) and 6(2)(d) of SHB 1257, the Department of Ecology and now delegated to SWAPCA, shall make an assessment regarding reasonable progress of the pollution control facilities.

12. A 60-day stay of the March 31, 1999 milestone will still allow a determination of reasonable progress to be made by SWAPCA by June 1, 1999 as set forth in SHB 1257.

13. Public notice on the stay request was provided and a formal hearing was held on January 7, 1999 by the Board of Directors of SWAPCA to rule on this stay request. By majority vote, the Board of Directors approved a stay request of the March 31, 1999 project milestone until May 31, 1999.

REGULATORY CONCLUSIONS

NOW HAVING CONSIDERED THIS MATTER AND BEING DULY ADVISED, IT IS HEREBY ORDERED:

14. THAT, paragraph 41 item b. of RACT Order SWAPCA 97-2057R1, is modified to reflect that a procurement contract for the first unit SO_2 emission control system(s) shall be awarded no later than May 31, 1999.

15. THAT, compliance with this Order of Approval and its requirements does not relieve the Respondent from responsibility of compliance with Southwest Air Pollution Control Authority General Regulations for Air Pollution Sources, any previously issued Regulatory Orders, RCW 70.94, WAC Title 173 or any other applicable air contaminant emission control requirements, nor from the resulting liabilities and/or legal remedies for failure to comply.

16. THAT, if any provision of this Order is held to be invalid, all unaffected provisions of this Order shall remain in effect and be enforceable.

17. THAT, for the purpose of ensuring compliance with the applicable federal, state and local requirements, the Southwest Air Pollution Control Authority retains authority to impose additional requirements on this source, as necessary.

18. THAT, the requirements of this Regulatory Order shall survive any transfer of ownership of the source or any portion thereof.

DATED this 1 st day of February, 1999

Reviewed by: Paul T Mairose

Paul T. Mairose, P.E.

Chief Engineer

Authorized by: Robert D. Elliott

Robert D. Elliott

Executive Director

Southwest Air Pollution Control Authority