

**EMISSION REDUCTION TECHNIQUES  
FOR AGRICULTURAL BURNING  
AND WILDLAND FIRE:**

**A GUIDE TO THE FINAL WORK PRODUCTS**

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## **BACKGROUND**

### Request for Proposal

The WRAP issues a RFP on December 11, 2002, entitled “Emission Reduction Techniques for Agricultural Burning and Wildland Fire.” In the RFP, the following background for the RFP is provided:

“The WRAP AEG Policy focuses on minimizing fire emission increases through the control of emissions on all fire project where feasible. Control of fire emissions means utilizing methods that result in a reduction of the total amount of emissions generated from each fire project. Control of fire emissions is accomplished by using emission reduction techniques (ERT) methods proven to reduce fire emissions. ERTs include biomass utilization prior to burning, increasing combustion efficiency, and others. The AEG Policy also provides that the use of ERTs to achieve annual emission goals is subject to economic, safety, technical, and environmental feasibility criteria and land use goals.

For purposes of AEG, ERTs are not non-burning alternatives, which are techniques that replaces fire as a means to achieve a particular land management objective. At this time, methods exist for tracking and calculating the emissions averted from the use of ERTs for a broad array of vegetation types.

Emission reductions that are achieved through the use of ERTs are calculated on a project-specific basis, otherwise referred to as the operational phase of the fire project.

The WRAP recognizes a need for a more comprehensive guide for estimating potential emission reductions achieved through the use of ERTs for agricultural and wildland burning. The WRAP Fire Emissions Joint Forum (FEJF) has tasked the Emission Reductions Techniques Task Team with developing guidance that will support state and tribal use of ERTs for reducing emissions.

The FEJF’s Emissions Reduction Techniques Task Team issuing this RFP for a bibliography and summary table on ERTs for agricultural burning and wildland fire in support of its guidance development process.”

### Scope and Limitations of the Project

Based on the RFP, the kickoff meeting, and subsequent conversations with the WRAP leads on the project, it was confirmed that the project:

- Would limit its search to techniques that affect (reduce) emissions while still utilizing burning.
- Would not consider alternatives that did not include burning (i.e., strictly non-burning alternatives).
- Would report the information from the reports. The only data manipulation would be to convert data into common units (i.e., lbs of emissions per ton of fuel

burned). This means that the project would not calculate emission reductions even when report's information allows calculating such data.

- Would attempt to find data from countries other than the United States.
- Would use the emission reduction techniques described in Chapter 8 of the 2001 Smoke Management Guide, but would not be bound to reporting on only those ERTs. These ERTs are listed in Table 1.

Table 1. Emission Reduction Technique Categories

<b>Emission Reduction Technique</b>
Reduce Area Burned - Burn Concentrations
Reduce Area Burned - Isolate Fuels
Reduce Area Burned - Mosaic Burning
Reduce Fuel Load - Mechanical Removal
Reduce Fuel Load - Mechanical Processing
Reduce Fuel Load - Firewood Sales
Reduce Fuel Load - Biomass for Electric Generation
Reduce Fuel Load - Biomass Utilization
Reduce Fuel Load - Ungulates
Reduce Fuel Production - Chemical Treatments
Reduce Fuel Production - Site Conversion
Reduce Fuel Production - Land Use Change
Reduce Fuel Consumed - High Moisture in Large Woody Fuels
Reduce Fuel Consumed - Moist litter and/or duff
Reduce Fuel Consumed - Burn Before Precipitation
Reduce Fuel Consumed - Burn Before Large Fuel Cures
Burn Before New Fuels Appear - Before Litter Fall
Burn Before New Fuels Appear - Before Green-up
Increase Combustion Efficiency - Burn Piles or Windrows
Increase Combustion Efficiency - Backing Fires
Increase Combustion Efficiency - Dry Conditions
Increase Combustion Efficiency - Rapid Mop-up
Increase Combustion Efficiency - Aerial Ignition/Mass Ignition
Increase Combustion Efficiency - Air Curtain Incinerators
Redistribute Emissions - Burn when Dispersion is Good
Redistribute Emissions - Share the Airshed
Redistribute Emissions - Avoid Sensitive Areas
Redistribute Emissions - Burn Smaller Units
Redistribute Emissions - Burn More Frequently

## METHODOLOGY FOR GATHERING DATA

We used three basic sources to obtain references for inclusion in this project. These are:

1. Internet searches
2. Contacts
3. InHouse resources

### Internet Searches

References were obtained from conducting an Internet search. Appendix A details the websites searched and summarizes the results of those searches. The following summarize the Internet search performed for this project.

A. Keyword searches performed (and variations thereof):

- agricultural burning
- agricultural burning bibliography
- fire bibliography
- field burning
- wildland fire
- prescribed burning
- fire publications

B. Accessed over 80 Internet sites:

- Federal/US
- State
- Canadian
- Other
- 38 with “no lists”
- Academic publications

C. Sites included, but are not limited to:

- BLM
- Bureau of Indian Affairs
- US EPA
- Joint Fire Science Program
- US Forest Service
- USGS
- State (Air, Natural Resource, Environmental, and Forestry Departments)

D. Agencies represented include:

- Farm Bureaus
- State agencies (ag, forestry, air, environment) and STAPPA/ALAPCO
- University departments
- Extension services
- Private/commercial groups (e.g., Plum Creek Timber Company, Oregon Seed Council)

PNW Research Station  
Rocky Mountain Research Station

E. States covered include:

AK	IO	NE	WA
AR	KS	NM	WY
AZ	LA	NV	
CA	MN	OK	
CO	OR	FL	
MO	SC	HI	
MT	SD	ID	
ND	TX	UT	

### Contacts

Appendix B presents the list of approximately 300 contacts that we developed for this project. We contacted at least 93 of these people (as indicated by the date contacted column). For those indicated at not being contacted, there are two main reasons why:

1. A message was left and was never returned.
2. Someone else suggested a better contact and thus the original contact was not contacted.

### InHouse Resources

As stated in the work plan, we had conducted an annotated bibliography in the mid-1980s on agricultural burning in the United States. For that project, we had obtained references that discussed emission reduction techniques and presented emission estimates for the burning of agricultural residues. We used as many of those references as were applicable to the current effort.

### Methodology Caveat

Many of the references found using the above methodology were generated during the 1970s and 1980s, a period of known high activity in the field of emission reduction techniques. It is possible that, despite our best efforts, there are more recent studies that would provide updated information to those included in this report or would provide additional information not found in any of the references included in this report.

## PROCEDURES FOR USING REFERENCES AND CHECKING DATA ENTRY

### Reference Review

We reviewed each reference in a simple two step process as follows:

- Step 1. Does the reference deal with an ERT for either agricultural residues or wildland fuels? If no, then it was not used. If yes, then proceed to Step 2. Appendix C contains a list of references reviewed, but not used.
- Step 2. Does the reference contain information on emission factors, emission reductions, or resources effects? If the reference did not contain information on any of these three items, it was not used. If it contained information on at least one of the three items, it was used.

### Data Entry

Once a reference was determined to contain information relevant to this project, we entered information into one database for the annotated bibliography information and into a separate database for the emission factor and emission reduction information (i.e., the summary tables).

### Data Entry Checks

Once all of the data were entered, we performed the following data checks:

1. We had a third-party (inhouse person who did not enter any of the data) review the emissions and emission reduction data in the database against the original reference. This check included: (1) finding the data in the original source material, (2) verifying the numerical values, and (3) verifying the units associated with the numerical values. Where entry errors were found, these were corrected.
2. We had a third-party review the emission factors to verify the units and to convert the units to a lbs of emissions per ton of residue/fuel where possible.
3. For the annotated bibliography, we had a third-party review the entries against the original references.
4. We had a third-party review the fuel type entered with the original references to check accuracy and to create consistency in the naming scheme. The same person did the same check for accuracy and naming scheme consistency for the entered emission reduction technique.

## WORK PRODUCTS

### Annotated Bibliography

The annotated bibliography contains 65 references. The same structure is used for each reference. The items included are as follows:

Author. This field identifies the author of the reference. If there are multiple authors, then the author listed first is shown in this field.

Additional Authors: This field identifies any additional authors to the reference.

Title: The field identifies the title of the reference.

Date of Publication: This field identifies when the reference was published.

Date of Study: This field identifies when the study was conducted that is reported in the reference, as applicable. Frequently, the study is conducted at a different time than when the reference is published.

URL Address: If known, this field contains a link to where an electronic version of the reference can be obtained.

Publication Reference: Where applicable and known, this field contains information on the publication in which the reference is found or additional information on the reference to help the user locate the reference.

Annotation: This field presents a summary of information found in the reference, focusing on the type of fuels, emission reduction techniques, types of pollutants, whether emission factors or emission reductions are presented, and the level of emission reductions.

This field also notes, as applicable, if a copy of the report is not available (has not been obtained for this effort) and whether the reference is referenced in another entry in the bibliography.

Agricultural or Wildland: This field identifies whether the reference covers agricultural fuels (Agricultural) or Wildland fuels (Wildland) or both (Agricultural and Wildland).

Emission Factors, Emission Reductions, Resource Effects: These blocks indicate by the presence of a check mark whether the reference presents information on emission factors, emission reductions, or resource effects or any combination thereof.

Type of Fuel(s): This field presents a summary of fuel types covered by the reference for which emission factors, emission reductions, or resource effects are presented.

Baseline/Type of ERTs: This field identifies the type of emission reduction techniques covered by the reference for which emission factors, emission reductions, or resource effects are presented. Many references report these data for “baseline” burns; that is, burns that do not

address any specific emission reduction technique. In such instances, the term “baseline” is used. In many instances, a “baseline” burn is a heading fire, but this may not be true in all cases.

Variables: This field identifies the types of variables noted in the reference that are associated with the reported emission factors and emission reductions. The most common variable is moisture. A variable listed in this field does not mean that the reference evaluated the effect of that variable on emission factors or emission reductions, but that at a minimum reported information on the variable.

Time of year burn performed: This field identifies, where available, the time of year that a burn was conducted. Many references do not report this. In addition, this information is not applicable to studies conducted in burning towers (e.g., at the University of California, Riverside).

Location of burn: This field identifies, where available, the location of the burn. For some references, this is very specific. For most references, it is a geographic area.

Annotated Author Designation: This field identifies the abbreviated author designation that allows the user to go between the annotated bibliography and the summary tables and their indices. This takes the form of the author’s last name followed by a number in parentheses. If there is no number after the author’s name, this indicates that only one reference is associated with that particular author (as the primary author listed in the Author field).

## Indices

To help access information in the summary tables (which are described below), two indices were prepared, one for agricultural residues and one for wildland fuels. The sample of part of the Agricultural Fuels index is shown in Appendix E. Both indices are set up with the same information:

Fuel Type: This field shows the type of fuel being burned.

Emission Reduction Technique: This field shows that types of emission reduction technique(s) for each fuel type for which either emission factors or emission reductions or both are found in the summary tables.

Annotated Authors: This field identifies the reference(s) that contain the data on each fuel type and emission reduction technique combination. If more than one reference has information on a particular combination, then multiple references are shown. The references are indicated by using the annotated author designation, which was discussed above.

## Summary Tables

Four summary tables were prepared, two for agricultural residues and two for wildland fuels. For each fuel type category, one table presents information on emission reductions and the other table presents information on emission factors. Appendix F presents part of one of the emission reduction summary table and Appendix G presents part of one of the emission factors summary table to illustrate the layout.

Each table is initially laid out sorted by fuel type and then by emission reduction technique. Users may wish to sort by emission reduction technique or by annotated author. As the tables are in Excel®, users will be able to use Excel® to conduct these sorts simply and quickly using the basic Data/Sort commands in the program. Please note that while the data are entered into Excel®, they are not entered as “data” but as “text” and therefore can not be used directly in calculations.

The tables are set up in such a manner that each row represents either values associated with a single burn or with average values associated with multiple burns for a particular fuel type and emission reduction technique combination from a single reference. Some reports provide data for the flaming phase, the smoldering phase, and then for the total burn. In these instances, the tables contain three rows.

The following columns are in each of the tables, with the only difference being that the emission reduction table values represent percent reductions and the emission factors table values represent pounds of emissions per ton of fuel burned (unless otherwise shown).

Fuel Type: This column identifies the type of fuel being burned.

ERT: This column identifies the type of emission reduction technique. In some instances, additional information is provided to help the user better understand the values being reported (for example, where the value is associated with the flaming phase or the smoldering phase) or the help differentiate between similar runs (e.g., moisture content).

“Pollutant” Columns: After the ERT column is a series of columns identifying the pollutant for which at least one value is reported. In some instances, the column represents a specific pollutant and in other cases a group of pollutants.

Location of study: In this column, the location of the burn, where available, is identified. For some references, this is very specific. For most references, it is a geographic area. This is the same as “location of burn” in the Annotated Bibliography.

Time of Year: This column identifies the time of year, where available, that the burn was conducted. This is the same as “Time of Year Burn Performed” under Annotated Bibliography. NOTE: This column is not shown in the example in Appendix F.

Total Number of Burns: If a reference conducted multiple burns of the same fuel type and emission reduction technique combination, this column shows how many of these burns were conducted. NOTE: This column is not shown in the example in Appendix F.

Burn Number: If a reference conducted multiple burns of the same fuel type and emission reduction technique combination, this column shows which of the multiple burns the data in the row comes from. For example, if 8 test runs were conducted for a particular fuel type and ERT combination and this row contained the data from run number 6, then this column would show a “6” for that row. NOTE: This column is not shown in the example in Appendix F.

Date of Study: This column identifies when the study was conducted that is reported in the reference, as applicable. This is the same as “Date of Study” under Annotated Bibliography.

Annotated Author: This column identifies the reference(s) that contain the data on each fuel type and emission reduction technique combination. As each row contains information on a specific fuel type and emission reduction technique from a single study, only one annotated author designation is shown for each row.

Reliability: This column presents a subjective assessment of the reliability of the data reported in the reference.

Replication potential: The column presents a subjective assessment of the replication potential of data in the reference.

Citation frequency: This column presents an assessment of the frequency with which the reference is cited in other literature and references. This assessment was based on identifying cross-references within the references gathered under this project and on a subjective assessment on how frequently an individual reference was cited through the literature search.



## APPENDIX A. SUMMARY OF INTERNET SEARCH

All websites were searched for the following terms:

- agricultural burning
- agricultural burning bibliography
- fire bibliography
- field burning
- wildland fire
- prescribed burning
- fire publications

Also, the publications and/or research section of each website were checked for related materials.

### FEDERAL AGENCIES

**Bureau of Indian Affairs Wildland Fire Management**, <http://www.bianifc.org/>

RETRIEVED: “Fire Management Program Analysis Handbook.”

[http://www.bianifc.org/planning/fmpa\\_hb2003/FMPA\\_Handbook/FMPA-Handbook-Final\\_2003-01-31.doc](http://www.bianifc.org/planning/fmpa_hb2003/FMPA_Handbook/FMPA-Handbook-Final_2003-01-31.doc)

RETRIEVED: “Wildland Fire and Aviation Program Management and Operations Guide 2003.”

<http://www.bianifc.org/operations/documents/opsguide/opsguide.html>

RETRIEVED: “Duff Moisture Meter – A New Tool for Today’s Fire Manager.”

<http://www.bianifc.org/fuels/docs/duffmm.pdf>

**Bureau of Land Management, Fire and Aviation**, <http://www.blm.gov/fna/index.htm>

RETRIEVED: “Federal Wildland Fire Policy.”

<http://www.fs.fed.us/land/wdfire.htm>

RETRIEVED: “Fire Management Plans.”

<http://www.blm.gov/nhp/efoia/or/fy2000/ib/b2000-260.htm>

RETRIEVED: “Prescribed Burning as a Restoration Tool.”

<http://www.blm.gov/nstc/resourcenotes/rn56.html>

**Environmental Protection Agency**, <http://www.epa.gov>

RETRIEVED: “Strategy for Agricultural Burning in EPA Region 10.”

<http://yosemite.epa.gov/R10/AIRPAGE.NSF/1887fc8b0c8f2ace8825648f00528583/700cccf160771f0f8825697b00723a61?OpenDocument>

RETRIEVED: “Evaluation of emissions from the open burning of land-clearing debris.”  
(includes references)

<http://www.epa.gov/ttn/catc/dir1/debris.pdf>

RETRIEVED: Peterson and Leenhouts. “What Wildland Fire Conditions Minimize Emissions and Hazardous Air Pollutants and Can Land Management Goals Still be Met?” (DRAFT)  
<http://www.epa.gov/ttn/faca/pbdirs/append-a.pdf>

RETRIEVED: “13.1: Wildfires and Prescribed Burning” (includes emissions factors discussion and references).  
<http://www.epa.gov/ttn/chief/ap42/ch13/final/c13s01.pdf>

RETRIEVED: “Prescribed Burning Background Document.”  
<http://www.epa.gov/cgi-bin/claritgw> (search for title to retrieve)

**Fire Emissions Joint Forum**, <http://www.wrapair.org/forums/fejf/index.html>

RETRIEVED:  
“Nonburning Manual.”  
[http://www.wrapair.org/forums/fejf/documents/altwild/nonburning\\_manual.pdf](http://www.wrapair.org/forums/fejf/documents/altwild/nonburning_manual.pdf)

RETRIEVED:  
"Non-Burning Management Alternatives on Agricultural Lands in the Western United States"  
[http://www.wrapair.org/forums/fejf/documents/task4/WRAP\\_Non-Burning.ZIP](http://www.wrapair.org/forums/fejf/documents/task4/WRAP_Non-Burning.ZIP)

RETRIEVED:  
“Draft of Final Report: 1996 Fire Emission Inventory”  
[http://www.wrapair.org/forums/fejf/documents/emissions/FEJF1996EIReport\\_021208.PDF](http://www.wrapair.org/forums/fejf/documents/emissions/FEJF1996EIReport_021208.PDF)

RETRIEVED:  
“Integrated Assessment Update and 2018 Emissions Inventory for Prescribed Fire, Wildfire, and Agricultural Burning”  
[http://www.wrapair.org/forums/fejf/documents/emissions/WGA\\_2018EI\\_Draft.pdf](http://www.wrapair.org/forums/fejf/documents/emissions/WGA_2018EI_Draft.pdf)

RETRIEVED:  
Revised Draft Report - "Development of Emissions Inventory Methods for Fire" USEPA-RTP  
[http://www.wrapair.org/forums/fejf/documents/task7/Fire\\_report\\_rev.PDF](http://www.wrapair.org/forums/fejf/documents/task7/Fire_report_rev.PDF)

RETRIEVED: Numerous FEJF Contacts -

**Fire Sciences Lab** - <http://firelab.org/>  
RETRIEVED: “Fire Behavior Project – Publications List by Author.”  
<http://firelab.org/fbp/fb5yrauthor.htm>

RETRIEVED: “Fire Effects Project: Publications List by Author.”  
<http://firelab.org/fep/fe5yrauthor.htm>

**Joint Fire Science Program** (encompasses US Dept. of Interior and USDA Forest Service),  
<http://jfsp.nifc.gov/>

RETRIEVED: “JFSP Business Summary.” (includes comprehensive list of 2003 JFSP research)

[http://jfsp.nifc.gov/2003business\\_summary.pdf](http://jfsp.nifc.gov/2003business_summary.pdf)

RETRIEVED: “1998 JFSP Projects.”

<http://jfsp.nifc.gov/98proj.htm>

RETRIEVED: “1999 JFSP Projects.”

<http://jfsp.nifc.gov/99proj.htm>

RETRIEVED: Fiedler, et al. “A Strategic Assessment of Fire Hazard in Montana.”

[http://www.nifc.gov/joint\\_fire\\_sci/ummontanarpt.pdf](http://www.nifc.gov/joint_fire_sci/ummontanarpt.pdf)

RETRIEVED: Fiedler, et al. “A Strategic Assessment of Fire Hazard in New Mexico.”

<http://jfsp.nifc.gov/NMreport.pdf>

RETRIEVED: “Proceedings from the Joint Fire Science Conference and Workshop.” (List of contributed papers)

<http://jfsp.nifc.gov/conferenceproc/TableofContents6.html>

**National Park Service Fire and Aviation** - <http://www.nps.gov/fire/>

Many specific documents regarding fires in National Parks are available. Nothing retrieved due to specificity of projects to National Parks – can retrieve if necessary)

**National Wildfire Coordinating Group**, <http://www.nwcg.gov/>

RETRIEVED “Fire Effects Guide.” (includes many references)

<http://www.nwcg.gov/pms/RxFire/FEG.pdf>

**US Forest Service**, [www.fs.fed.us/](http://www.fs.fed.us/)

RETRIEVED: “Fire Chemistry: Biographical List of Publications Authored by RMRS-4405 Staff with Full Abstracts.”

[http://www.fs.fed.us/rm/main/labs/miss\\_fire/rmrs4404\\_ab.html](http://www.fs.fed.us/rm/main/labs/miss_fire/rmrs4404_ab.html)

RETRIEVED: “Economic Aspects of Forest Management on Public Lands.”

<http://www.fs.fed.us/rm/missoula/4802/> Bibliography at

<http://www.fs.fed.us/rm/missoula/4802/page35.html>

RETRIEVED: Kapler, et al, RMRS-GTR-42, vol.1 “Wildland fire in ecosystems: effects of fire on fauna.”

[http://www.fs.fed.us/rm/pubs/rmrs\\_gtr42\\_1.html](http://www.fs.fed.us/rm/pubs/rmrs_gtr42_1.html)

RETRIEVED: Sandberg et al, RMRS-GTR-42, vol.5 “Wildland fire in ecosystems: effects of fire on air.”

[http://www.fs.fed.us/rm/pubs/rmrs\\_gtr42\\_5.html](http://www.fs.fed.us/rm/pubs/rmrs_gtr42_5.html)

RETRIEVED: Brown, et al. RMRS-GTR-42, vol. 2. “Wildland fire in ecosystems: effects of fire on flora.”

[http://www.fs.fed.us/rm/pubs/rmrs\\_gtr42\\_2.html](http://www.fs.fed.us/rm/pubs/rmrs_gtr42_2.html)

RETRIEVED: “Mill Creek Timber: References.”  
<http://www.fs.fed.us/r6/siskiyou/planning/millcreek/chapter5.pdf>

RETRIEVED: “Research and Development” (Searchable list of USFS documents)  
<http://www.srs.fs.usda.gov/pubs/index.htm>

RETRIEVED: “Fire and Aquatic Ecosystems Reference List.”  
[http://www.fs.fed.us/rm/boise/teams/fisheries/fire/fire\\_aquatic\\_bib080702.pdf](http://www.fs.fed.us/rm/boise/teams/fisheries/fire/fire_aquatic_bib080702.pdf)

RETRIEVED: “Fire and Research Applications Team (FERA) Publications.”\  
<http://www.fs.fed.us/pnw/fera/pubs.html>

**US Geological Survey**, [www.usgs.gov/](http://www.usgs.gov/) and <http://firescience.cr.usgs.gov>  
RETRIEVED: “Fire in North American Wetland Ecosystems and Fire-Wildlife Relations: An Annotated Bibliography.” (Searchable, on-line fire bibliography of 942 citations from 1935-1987)  
<http://www.npwrc.usgs.gov/resource/literatr/firewild/firewild.htm>

RETRIEVED: Martin, Deborah. “Bibliography of Reports and Journal Articles Dealing with Fire Science by Scientists of the U.S. Geological Survey”  
[http://firescience.cr.usgs.gov/images/bib\\_doc.pdf](http://firescience.cr.usgs.gov/images/bib_doc.pdf)

RETRIEVED: Higgins, et al, “Prescribed Burning Guidelines in the Northern Great Plains” (Includes references).  
<http://www.npwrc.usgs.gov/resource/tools/burning/burning.htm>

RETRIEVED: Willson and Stubbendiek, “Fire Effects on Four Growth Stages of Smooth Brome.” (Literature Cited)  
<http://www.npwrc.usgs.gov/resource/othrdata/brominer/brominer.htm>  
References at:  
<http://www.npwrc.usgs.gov/resource/othrdata/brominer/lit.htm>

RETRIEVED: “U.S. Geological Survey and Wildland Fire.” (Abstracts for various posters)  
[http://firescience.cr.usgs.gov/html/abs\\_poster2002.html](http://firescience.cr.usgs.gov/html/abs_poster2002.html)

## STATE AGENCIES

**California Air Resources Board (CARB)**, [www.arb.ca.gov](http://www.arb.ca.gov)  
RETRIEVED: Darley, Ellis. “Emission Factors from Burning Agricultural Wastes Collected in California.”  
<ftp://ftp.arb.ca.gov/carbis/research/apr/past/arb-4-011.pdf>

RETRIEVED: Darley, Ellis “Hydrocarbon Characterization of Agricultural Waste Burning.”  
<ftp://ftp.arb.ca.gov/carbis/research/apr/past/a7-068-30.pdf>

RETRIEVED: “Progress Report on the Phase Down of Rice Straw Burning in the Sacramento Valley Air Basin.”

<http://www.arb.ca.gov/smp/rice/phsdown/rice0200.pdf>

RETRIEVED: Moss, et al. “The Economic Impacts of Alternatives to Open-Field Burning of Agricultural Residues.”

<http://www.arb.ca.gov/research/abstracts/a132-121.htm#Executive>

RETRIEVED: “Research Note” (on paper on economic alternatives to agricultural burning)

<http://www.arb.ca.gov/research/resnotes/notes/95-16.htm>

RETRIEVED: Hsieh, et al. “Potential Health Hazards Associated with Particulate Matter Released from Rice Straw Burning.”

<http://www.arb.ca.gov/research/abstracts/a8-093-31.htm#Executive>

RETRIEVED: Jenkins, BM. “Atmospherics Pollutant Emissions Factors from Open Burning of Agricultural and Forest Biomass by Wind Tunnel Simulations.”

<http://www.arb.ca.gov/research/abstracts/a932-126.htm#Vol>

RETRIEVED: Jenkins, B. M. “Determination of Emissions From Open Burning of Agricultural and Forestry Wastes: Phase II.”

<http://www.arb.ca.gov/research/abstracts/a932-126.htm#Vol>

**California Department of Forestry and Fire Protection**, <http://www.fire.ca.gov/php/index.php>

RETRIEVED: “1995 California Fire Plan.”

<http://www.fire.ca.gov/FireEmergencyResponse/FirePlan/toc.html>

**Colorado State Forest Service**, <http://www.colostate.edu/Depts/CSFS/home.html>

RETRIEVED: “Colorado Wildfire Mitigation Plan.”

<http://csfd.springsgov.com/wildfiremitigation.pdf>

**Florida Division of Forestry, Forest Protection Bureau**, <http://flame.fl-dof.com/>

RETRIEVED: “Literature Cited: Florida Scrub.”

[http://verobeach.fws.gov/Communities/scrub/scrub\\_lit\\_cited.htm](http://verobeach.fws.gov/Communities/scrub/scrub_lit_cited.htm)

RETRIEVED: Koehler, John. “The Use of Prescribed Burning as a Wildfire Prevention Tool.”

<http://flame.fl-dof.com/Env/koehler.html>

RETRIEVED: Reinhardt, et al. “Smoke Exposure Among Firefighters at Prescribed Burns in the Pacific Northwest.”

<http://flame.fl-dof.com/pdf/exposure.pdf>

**Georgia Forestry Commission**, <http://www.gfc.state.ga.us/>

RETRIEVED: Paul, et al. “Weather Conditions Associated with Understory Prescribed Burning in South Georgia.”

<http://www.gfc.state.ga.us/Publications/Educational/WoodUtilization/GFRP46.pdf>

RETRIEVED: Johansen, R.W. "Prescribed Burning with Spot Fires in the Georgia Coastal Plain."

<http://www.gfc.state.ga.us/Publications/Educational/WoodUtilization/GFRP49.pdf>

RETRIEVED: Johansen, Ragnar. "Ignition Patterns & Prescribed Fire Behavior in Southern Pine Stands."

<http://www.gfc.state.ga.us/Publications/Educational/WoodUtilization/GFRP72.pdf>

**Hawaii Division of Forestry and Wildlife**, <http://www.dofaw.net/>

RETRIEVED: "Hawaii Greenhouse Gas Inventory." (includes agricultural burning references)

<http://www.state.hi.us/dbedt/ert/ghg/>

**Indiana Division of Forestry**, <http://www.state.in.us/dnr/forestry/index.html>

RETRIEVED: "Natural Revegetation." (Fact Sheet)

<http://www.in.gov/dnr/fishwild/hunt/revege.pdf>

**Mississippi Forestry Commission**, <http://www.mfc.state.ms.us/>

RETRIEVED: "Managing Your Forest Acreage for both Timber and Wildlife." (summary of forestry practices)

<http://www.mfc.state.ms.us/pdf/pub88.pdf>

**Montana Department of Natural Resources - Fire Operations**, <http://www.dnrc.state.mt.us/>

RETRIEVED: "Example Burn Plan Addressing Air Resource Impacts from Prescribed Fire Smoke." (Includes short list of references on prescribed burning).

[http://www.deq.state.mt.us/ppa/rpp/EXAMPLE%20\\_BURN%20\\_PLAN.pdf](http://www.deq.state.mt.us/ppa/rpp/EXAMPLE%20_BURN%20_PLAN.pdf)

**New Mexico Forestry Division**, <http://www.emnrd.state.nm.us/forestry/>

Search led to LINKS to:

**New Mexico BLM** <http://www.nm.blm.gov/fire/fire.html>

RETRIEVED: "Federal Wildland Fire Policy" (includes short list of references)

<http://www.fs.fed.us/land/wdfire.htm>

RETRIEVED: "USGS Wildland Fire Workshop." (1997)

<http://www.usgs.gov/themes/firerept.pdf>

**USDA Forest Service Pacific Southwest Research Station, Riverside Forest Fire Laboratory**, <http://met.rfl.psw.fs.fed.us>

RETRIEVED: "Meteorology Research."

<http://met.rfl.psw.fs.fed.us/met/Pubs.html>

**Ohio Department of Natural Resources, Division of Forestry**,

<http://www.dnr.state.oh.us/forestry/>

RETRIEVED: Link to **International Association of Wildland Fire**, [www.iawfonline.org/](http://www.iawfonline.org/)

**Texas Forest Service**, <http://texasforestsERVICE.tamu.edu/> & <http://www.tnrcc.state.tx.us>  
RETRIEVED: “Outdoor Burning in Texas.”  
<http://www.tnrcc.state.tx.us/admin/topdoc/rg/049.pdf>

RETRIEVED: Allen, David. “Emissions Inventory Associated with Forest, Grassland, and Agricultural Burning During the Texas Air Quality Study.”  
<http://www.harc.edu/harc/Projects/AirQuality/Projects/Status/Files/H3TexasFireEmissions.pdf>

RETRIEVED: Allen, David. “Inventory of Air Pollutant Emissions Associated with Forest, Grassland and Agricultural Burning in Texas.”  
<http://www.utexas.edu/research/ceer/airquality/>

**Virginia Department of Forestry**, <http://www.dof.state.va.us/>  
“Virginia’s Smoke Management Guidelines.”  
<http://www.dof.state.va.us/resources/fire-prescribed-fire-smoke-mgmt.pdf>

**Washington Department of Natural Resources**, <http://www.wa.gov/redirectDNR/splash.html>  
RETRIEVED: “Alternative to Burning Goat Grass Control.” (research proposal)  
[http://www.ecy.wa.gov/programs/air/aginfo/research\\_pdf\\_files/alternative\\_toburningforgoatgrasscontrol.pdf](http://www.ecy.wa.gov/programs/air/aginfo/research_pdf_files/alternative_toburningforgoatgrasscontrol.pdf)

RETRIEVED: “Strip Tillage, Stubble Burning Alternative.”  
[http://www.ecy.wa.gov/programs/air/aginfo/research\\_pdf\\_files/strip\\_tillage\\_stubble\\_burning\\_alternative.pdf](http://www.ecy.wa.gov/programs/air/aginfo/research_pdf_files/strip_tillage_stubble_burning_alternative.pdf)

RETRIEVED: “1998 Wilkes Project Research Data.”  
[http://www.ecy.wa.gov/programs/air/aginfo/research\\_pdf\\_files/wilke\\_project.pdf](http://www.ecy.wa.gov/programs/air/aginfo/research_pdf_files/wilke_project.pdf)

RETRIEVED: “Publication Summary: Farming for Cleaner Air: Pulling Together to Make Progress.” (retrieved reference).  
<http://www.ecy.wa.gov/biblio/99207.html>

RETRIEVED: “Estimates of Costs and Benefits of the Rule to Certify Alternatives to Grass Field Burning.”  
<http://www.ecy.wa.gov/biblio/98208.html>

RETRIEVED: “Agricultural Links.”  
<http://www.ecy.wa.gov/programs/air/aginfo/otheraglinks.html>

## **CANADIAN AGENCIES**

**Canadian Forest Service**, [http://www.nrcan.gc.ca/cfs-scfc/science/PRF/theme4\\_e.html](http://www.nrcan.gc.ca/cfs-scfc/science/PRF/theme4_e.html)  
RETRIEVED: “PRF Research and Data – Fire Ecology.” (contains references to long bibliographies of fire research done at the Petawawa National Forestry Institute)  
[http://www.nrcan.gc.ca/cfs-scfc/science/PRF/theme4\\_e.html](http://www.nrcan.gc.ca/cfs-scfc/science/PRF/theme4_e.html)

NRCAN, <http://www.nrcan-rncan.gc.ca/inter/index.html>  
RETRIEVED: “Fighting Wildland Fire with Technology.”  
<http://fms.nofc.cfs.nrcan.gc.ca/temp/docs/firetech.pdf>  
(site requires a password – user name: “nofc” password: “nofc”)

## MISCELANEOUS

**National Association of State Foresters**, <http://www.stateforesters.org/>  
RETRIEVED: “Cost Containment on Large Fires: Efficient Utilization of Wildland Fire Suppression Resources.”  
[http://www.stateforesters.org/reports/Costs\\_Containment.html](http://www.stateforesters.org/reports/Costs_Containment.html)

**National Fire Protection Agency**, <http://www.nfpa.org/>  
RETRIEVED: “LINKS.”  
<http://www.nfpa.org/Research/fireresources/forestwildfire/forestwildfire.asp>

## GENERAL WEB SEARCH (Google)

**Aldo Leopold Wilderness Institute**, <http://leopold.wilderness.net/>  
RETRIEVED: “Wildland Fire Websites of Interest.”  
<http://leopold.wilderness.net/research/fire/websites.htm>

**California Association for Fire Ecology**, <http://www.ice.ucdavis.edu/cafe/>  
RETRIEVED: “CAFE Searchable Annotated Wildfire Bibliography.”  
[http://www.ice.ucdavis.edu/cafe/tab\\_info\\_biblio.html](http://www.ice.ucdavis.edu/cafe/tab_info_biblio.html)

**Eugene District Office, BLM**, <http://www.edo.or.blm.gov/>  
RETRIEVED: “Integrated Natural Fuels Strategy: Annotated Bibliography.”  
[http://www.edo.or.blm.gov/infms/pdfs/INFMS\\_annotatedbibliography.pdf](http://www.edo.or.blm.gov/infms/pdfs/INFMS_annotatedbibliography.pdf)

**Fire Ecology**, <http://www.fire-ecology.org/policy.html>  
RETRIEVED: “Federal Wildland Fire Policy - Chapter 4: Appendices, Appendix A: Bibliography.”  
[http://www.fire-ecology.org/policy/Federal%20Wildland%20Fire%20Policy\\_files/firepolicy\\_app\\_a&b.pdf](http://www.fire-ecology.org/policy/Federal%20Wildland%20Fire%20Policy_files/firepolicy_app_a&b.pdf)

**Forest Research Extension Partnership**, <http://www.forrex.org/home/home.asp>  
RETRIEVED: “Prescribed and Wildfire Bibliography.”  
<http://www.forrex.org/programs/wmbibs/PrescribedAndWildfire.pdf>

**Greater Yellowstone Coalition**, <http://www.greateryellowstone.org/>  
RETRIEVED: “Living with Fire in Greater Yellowstone.” (Bibliography)  
[http://www.greateryellowstone.org/fire\\_bibliography.html](http://www.greateryellowstone.org/fire_bibliography.html)

**Houston Advanced Research Center, Center for Energy and Environmental Resources,**  
<http://www.harc.edu/>

RETRIEVED: “Emissions Inventory Associated with Forest, Grassland, and Agricultural Burning during the Texas Air Quality Study.”

<http://www.harc.edu/harc/Projects/AirQuality/Projects/Status/Files/H3TexasFireEmissions.pdf>

**International Fire Network,** <http://www.csu.edu.au/firenet/>

RETRIEVED: “Bibliography of Australian Fire Research.” (Searchable; commonly known as “FireNet”)

<http://www.csu.edu.au/firenet/biblio.html>

(must gain access to search)

**Minnesota Fire Safety Center,** <http://www.firecenter.mnscu.edu/>

RETRIEVED: “Bibliography of Wildland Fire, Wildfire, Forest Fire Resources in the Fire/EMS/Safety Library.”

<http://www.firecenter.mnscu.edu/Library/publications/BibliographyWildlandwcover.pdf>

**National Rural Fire Authority** (New Zealand), <http://nrfa.fire.org.nz>

RETRIEVED: “Wildfire Threat Analysis Bibliography.”

<http://nrfa.fire.org.nz/projects/wta/analysisreport/AppendixE.PDF>

**Natural Hazard Center, University of Colorado at Boulder,**

<http://www.colorado.edu/hazards/>

RETRIEVED: “New Wildfire Publications Received by the Natural Hazards Center in 1995.”

<http://www.colorado.edu/hazards/bib/bib95.html>

RETRIEVED: “New Wildfire Publications Received by the Natural Hazards Center in 1996.”

<http://www.colorado.edu/hazards/bib/bib96.html>

RETRIEVED: “New Wildfire Publications Received by the Natural Hazards Center in 1997.”

<http://www.colorado.edu/hazards/bib/bib97/wildfire.html>

RETRIEVED: “New Wildfire Publications Received by the Natural Hazards Center in 1998.”

<http://www.colorado.edu/hazards/bib/bib98/wildfire.html>

RETRIEVED: “New Publications on Wildfire Received by the Natural Hazards Center in 1999.”

<http://www.colorado.edu/hazards/bib/bib99/wildfire.html>

**Oregon State University,** [www.oregonstate.edu](http://www.oregonstate.edu)

RETRIEVED: “GIS Applications in Wildfire Management: An Annotated Bibliography.”

<http://oregonstate.edu/~carrellj/GIS.htm>

**Southern Utah Fuel Management Demonstration Project,**

<http://www.firelab.org/fep/research/sufm/home.htm>

RETRIEVED: “Southern Utah Fuel Management Demonstration Project - Literature Cited.”

<http://www.firelab.org/fep/research/sufm/studyplan/lit.htm>

**Western Regional Biomass Energy Program,** [www.westbioenergy.org/](http://www.westbioenergy.org/)

RETRIEVED: “References.” (on rice burning)  
[www.westbioenergy.org/ricestraw/references.html](http://www.westbioenergy.org/ricestraw/references.html)

## ACADEMIC PUBLICATIONS

A search of **Science Direct** for the term “agricultural burning” yielded a number of articles related to the topic, including entries from the following Journals:

Environmental Science and Technology  
The Science of the Total Environment  
Atmospheric Environment  
Energy Conversion and Management  
Forest Ecology and Management  
Water Science and Technology  
Global Change Science  
Environment International

A search of **ProQuest** for the term “agricultural burning” an article related to the topic, including an entry from the following Journal:

Science

A search of **InfoTrac - One File** for the terms “agricultural burning” yielded an article related to the topic, including an entry from the following Journal:

Chest

A search of the **Journal of Atmospheric Chemistry** produced one article on biomass and agricultural product burning.

A search of **Climate Change** produced one article on biomass and agricultural product burning.

A search of the **International Journal of Plant a Soil** produced one article discussing slash and burn technique and its effect on tropical soils.

A search of the **Journal of the Air & Waste Management Association** yielded an article discussing the effects of agricultural burning in a rural Brazilian town.

The on-line catalog of Duke University was searched for the terms agricultural burning, prescribed burn, wildland fire, and field burning. A number of bibliographic records were attained. These resources will be attained from Duke University libraries in the future.

## SITES AT WHICH WE FOUND NO RELATED BIBLIOGRAPHIES OR ARTICLES

### FEDERAL AGENCIES

Federal Emergency Management Administration, <http://www.fema.gov/>  
Fish and Wildlife Service, <http://www.fws.gov/>  
National Interagency Fire Center, <http://www.nifc.gov>  
National Oceanic and Atmospheric Administration, <http://www.noaa.gov/>  
United States Fire Administration, <http://www.usfa.fema.gov/>

### STATE AGENCIES

Alabama Forestry Commission, <http://www.forestry.state.al.us/>  
Alaska Division of Forestry, <http://www.dnr.state.ak.us/>  
Arkansas Forestry Commission, <http://www.forestry.state.ar.us/>  
Arizona State Land Department, <http://www.land.state.az.us/>  
Delaware Department of Agriculture Forest Service,  
<http://www.state.de.us/deptagri/forestry/index.htm>  
Idaho Department of Lands, <http://www2.state.id.us/lands/index.htm>  
Illinois Division of Forest Resources, <http://dnr.state.il.us/>  
Iowa Department of Natural Resources, Forestry Division, <http://www.state.ia.us/forestry/>  
Kansas Forest Service, <http://www.kansasforests.org/>  
Louisiana Department of Agriculture and Forestry, Office of Forestry,  
<http://www.ldaf.state.la.us/>  
Maine Forest Service, <http://www.state.me.us/doc/mfs/mfshome.htm>  
Maryland Forest Service, <http://www.dnr.state.md.us/forests/>  
Massachusetts Division of Forests and Parks, Bureau of Forestry,  
<http://www.state.ma.us/dem/programs/forestry/index.htm>  
Michigan Wildland Fire Protection, <http://www.michigan.gov/dnr>  
Minnesota Department of Natural Resources, Division of Forestry,  
<http://www.dnr.state.mn.us/forestry/index.html>  
Missouri Department of Conservation, <http://www.conservation.state.mo.us/>  
Nevada Division of Forestry, <http://dcnr.nv.gov/>  
State of Nebraska - Fire Control Section, <http://www.nfs.unl.edu/firemain.htm>  
New Hampshire Division of Forests and Lands, <http://www.nhdfl.org/>  
New Jersey Division of Parks and Forestry,  
<http://www.state.nj.us/dep/forestry/parknj/divhome.htm>  
New York Division of Lands and Forests, <http://www.dec.state.ny.us/website/dlf/index.html>  
North Carolina Division of Forest Resources, <http://www.dfr.state.nc.us/>  
North Dakota Forest Service, <http://www.ndsu.nodak.edu/ndsu/lbakken/forest/>  
Oklahoma Forestry Service, <http://www.oklaosf.state.ok.us/~okag/forhome.html>  
Oregon Department of Forestry, <http://www.odf.state.or.us/>  
Pennsylvania Bureau of Forestry, <http://www.dcnr.state.pa.us/>  
Rhode Island Division of Forest Environment, <http://www.state.ri.us/>  
South Carolina Forestry Commission, <http://www.state.sc.us/forest/>  
State of South Dakota Division of Resource Conservation and Forestry,  
<http://www.state.sd.us/doa/forestry/index2.htm>  
Tennessee Division of Forestry, <http://www.state.tn.us/agriculture/forestry/>

**Utah Division of Forestry, Fire and State Lands,**

<http://www.nr.utah.gov/SLF/SLFHOMe.HTM>

**Vermont Department of Forestry, Parks and Recreation,**

<http://www.state.vt.us/anr/fpr/index.htm>

**Wisconsin Department of Natural Resources Forestry Program,**

<http://www.dnr.state.wi.us/org/land/forestry>

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## APPENDIX B. LIST OF CONTACTS

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Aalbers	Steve	Oregon Department of Environmental Quality, Air Quality Division	OR	(503) 229-6798	aalbers.steven@deq.state.or.us	yes
Achtemeier	Gary	US Forest Service, Southern Research Station	US	(706) 559-4239		
Aeschliman	John	Pacific Northwest Direct Seed Association	US	(509) 397-3118	jeaesc@colfax.com	
Alexis	Andy	California Air Resources Board	CA	(916) 323-1085	aalexis@arb.ca.gov	yes
Allard	Doug	Santa Barbara County Air Pollution Control District	CA	(805) 961-8853	allardd@sbcapcd.org	
Allen	Art	Yuma County Farm Bureau	AZ	(928) 782-7319		
Anderson	Bruce	University of Nebraska Extension	NE	(402) 472-6237		
Appersell	Pat	Oregon Department of Agriculture	OR	(503) 986-4794		
ARIZONA D of AG		Arizona Department of Agriculture	AZ	(602) 542-4373		yes
ARIZONA EXTENSION		University of Arizona Extension	AZ	(520) 621-7205		yes
ARKANSAS EXTENSION 1		Bumpers College Extension	AR	(479) 575-2252	dbcafls@uark.edu	
Babbit	Ronald	Rocky Mountain Research Station (USDA)	US	(406) 329-4817	rbabbit@fs.fed.us	yes
Barr	W. Larry	South Carolina Forestry Commission	SC	(803) 896-8856	lbarr@forestry.state.sc.us	yes
Bernards	Frances	Utah Department of Environmental Quality, Division of Air Quality	UT	(801) 536-0051	fbernard@utah.gov	yes
Beyer	John	USDA Natural Resource Conservation Service	US	(559) 252-2191 x110		
Bidwell	Terrence	Oklahoma State Extension	OK	(405) 744-6421	tgb@soilwater.agr.okstate.edu.	
Birdsall	Stephen	Imperial County Air Pollution Control District	CA	disconnected	agcom@imperialcounty.net	
Blais	Gary	US EPA, Office of Air Quality Planning and Standards	US	(919) 541-3223	blais.gary@epa.gov	yes

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Bodaker	Rick	South Dakota Department of Environment and Natural Resources	SD	(605) 773-6706		
Bode	Richard	California Air Resources Board, Research Division	CA	(916) 323-8413		
Borck	Gretchen	Washington Association of Wheat Growers	WA	(509) 659-0610 x11		
Borel	Carrie	LSU Cooperative Extension	LA	(225) 578-2544	cborel@agctr.lsu.edu	
Bovee	Gary	Tehama County Air Pollution Control District	CA	(530) 527-3717	tehapcd@snowcrest.net	
Boyer	Dean	Washington Farm Bureau	WA	(360) 357-9975	dboyer@wsfb.com	yes
Brenner	Jim	Florida Division of Forestry	FL	(850) 488-6480	brennej@doacs.state.fl.us	
Britton	Carlton	Texas Tech Range & Wildlife Department	TX	(806) 742-2842		
Brown	Christin	Nebraska Department. of Agriculture	NE	(402) 471-2341		
Brown	Jackie	Southwest Clean Air Agency	WA	(360) 574-3058	jackie@swcleanair.org	
Bryant	Fred	Texas A&M Kingsville	TX	(361) 593-4025	Fred.Bryant@tamuk.edu	
Burton	John	University of Nevada Extension	NV	(775) 784-7070	burtonj@unce.unr.edu	
Byers	John	Oregon Department of Agriculture	OR	(503) 986-4718		
CAL		Central Valley Region Extension	CA	wrong phone number		
CALIFORNIA D of AG		California Dept. of Food and Agriculture	CA	(916) 654-0462		
Campbell	Colleen	Colorado Dept. of Public Health and the Env't.	CO	(303) 692-3224	rccampbe@smtpgate.dphe.state.co.us	
Carlile	Lyle	Bureau of Indian Affairs, National Interagency Fire Center	US	(208) 387-5640	lyle_carlile@nifc.gov	yes
Carney	Bill	LSU Cooperative Extension	LA	(225) 388-6998	bcarney@agctr.lsu.edu	
Carrington	Fred	Texas Forest Service	TX	(936) 639-8100	fcarrington@tfs.tamu.edu	
Cassmassi	Joe	South Coast Air Quality Management District	CA	(909) 396-3155	jcassamassi@aqmd.gov	
Chaney	David	University of California, Davis; Sustainable Agricultural Research and Education Program	CA	(530) 754-8551	dechaney@ucdavis.edu	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Chastain	Tom	Oregon State University	OR	disconnected	Thomas.G.Chastain@orst.edu	
Claiborn	Candice	Washington State University	WA		claiborn@wsu.edu	
Clark	Bob	National Interagency Fire Center, Joint Fire Science Program	US	(208) 387-5349	bob_clark@nifc.blm.gov	yes
Claus	Gary	Oregon Farm Bureau	OR	(503) 399-1701, ext. 313	gary@oregonfb.org	yes
Clovis	Linda	North Idaho Farmers Association	ID	(208) 666-0612	info@northidahofarmers.org	yes
Coefield	John	Montana Department of Environmental Quality, Air Quality Program	MT	(406) 444-5272	jcoefield@state.mt.us	yes
Conard	Susan	US Forest Service/Joint Fire SP	US	(703) 605-5255	sconard@fs.fed.us	yes
Conway	David	Mariposa County Air Pollution Control District	CA	(209) 966-2220	air@yosemite.net	
Core	John	Core Environmental Consulting	OR	(503) 297-7117	kx7yt@attbi.com	yes
Corey	Richard	California Air Resources Board, Research Division	CA	(916) 322-7077		
Covell	Norman	Sacramento Metro Air Quality Management District	CA	(916) 874-4802	ncovell@airwquality.org	
Craig	Chuck	Oregon Department of Agriculture	OR	(503) 986-4556, 4552	ccraig@oda.state.or.us	
Cripps	Colleen	Nevada Division of Environmental Protection	NV	(775) 687-4670	ccripps@ndep.carson-city.nv.us	
Crow	David	San Joaquin Valley United Air Pollution Control District	CA	(559) 230-6036	david.crow@valleyair.org	
Crumbaker	Jo	Maricopa County Bureau of Air Poll. Control	AZ	(602) 506-6010	jcrumbak@mail.maricopa.gov	
Cunha, Jr.	Manuel	Nisei Farmers League	CA	(559) 251-8468		
Dornbush	David	Boeing - Air and Waste Management Association, Pacific Northwest Conference Chair	WA	(206) 544-0399	david.j.dornbush@boeing.com	yes
Downey	Scott	EPA Region 10, Office of Air Quality	US	(206) 553-0682	downey.scott@epa.gov	
Downing	Bob	Maricopa County Environmental Services	AZ	(602) 506-6883	bdowning@mail.maricopa.gov	yes
Duncan	Angela	Nebraska Department of Environmental Quality, Air Quality Division	NE	(402) 471-2189		

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Dykzeul	Mike	Oregon Forestry Industries Council	OR	(503) 371-2942	mike@ofic.com	yes
Eblen	Patrice	North Dakota Department of Agriculture	ND	(701) 328-4757	peblen@state.nd.us	
Eddington	Steve	Arkansas Farm Bureau	AR	(501) 228-1383	steve.eddington@arfb.com	
Elliot	Mark	San Luis Obispo County Air Poll. Control District	CA	(805) 781-5912		yes
Ely	Sandra	New Mexico Environmental Department, Air Quality Bureau	NM	(505) 955-8091	sandra_ely@nmenv.state.nm.us	yes
Engstrom	Susan	Sacramento Metropolitan Air Quality Management District	CA	(916) 874-4815	sengstrom@airquality.org	
Eppersel	Pat	Oregon Department of Agriculture	OR	(503) 986-4701		
Erickson	Jim	Intertribal Timber Council	WA	(509) 633-1067	jjbros@cuonlineow.com	yes
Evenson	Mike	Northwest Air Pollution Authority	WA	(360) 428-1617		
Fenenga	Jay	South Dakota Department of Environmental and Natural Resources	SD	(605) 773-3151	jay.fenenga@state.sd.us	
Ferguson	Sue	US Forest Service	US	(206)732-7828	sferguson@fs.fed.us	
Field	Kent	Ventura County Air Control District	CA	(805) 662-6960		
Fife	Les	Sacramento Air Quality Management District	CA	(530) 668-1559		
Finneran	Brian	Oregon Department of Environmental Quality	OR	(503) 229-6278	finneran.brian@deq.state.or.us	
Fish	Jeanette	Maricopa County Farm Bureau	AZ	(602) 437-1330		yes
Fitch	Mark	Arizona Smoke Management Program	AZ	(602) 771-2374	Fitch.mark@ev.state.az.us	yes
Fitzsimmons	Catherine	Iowa Department of Natural Resources, Air Quality	IO	(515) 281-8034		
Flocchini	Robert	University of California, Davis	CA	(530) 752-1018	rgflocchini@ucdavis.edu	
Flores	Terry	Benton County Clean Air Authority	WA	(509) 943-3396	tflo@bcaa.net	yes
Foster	Kurt	Yuma Fire Department	AZ	disconnected		
Fox	Doug	Colorado State University	CO	(970) 491-3983		
Fryxell	Charles	Antelope Valley Air Pollution Control District	CA	(661) 723-8070	cfryxell@mdaqmd.ca.gov	yes
Fuhriman	Gary	Idaho Farm Bureau	ID	(208) 232-7914	gfuhriman@idahofb.org	
Gabrielson	Donald	Pinal County Air Quality Control District	AZ	(520) 868-6929	don.gabrielson@co.pinal.az.us	
Gaffney	Patrick	California Air Resources Board	CA	(916) 322-7303	pgaffney@arb.ca.gov	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Garvey	Ellen	Bay Area Air Pollution Control District	CA	(415) 749-4970	egarvey@baaqmd.gov	
Geier	Melissa	Pima County Department of Environmental Quality	AZ	(520) 740-3340	mgeier@deq.co.pima.az.us	
Gentiluomo	Patti	Oregon Department of Agriculture	OR	(503) 986-4701		
George	Larry	Florida Department of Env. Protection	FL	(850) 488-1344		
George	Mike	Arizona Department of Environmental Quality, Air Quality Division	AZ	disconnected	MG1@ev.state.az.us	
Gibson	Rick	University of Arizona Cooperative	AZ	(520) 836-5221 x. 227	gibsonrd@ag.arizona.edu	
Good	Alice	University of Nevada Extension	NV	(775) 784-7070	gooda@unce.unr.edu	yes
Goodenow	Dennis	California Air Resources Board	CA	(916) 324-7591	dgoodeno@arb.ca.gov	
Goodrich	Kerry	Natural Resources Conservation Service	UT	(801) 524-4568		
Goodrick	Scott	US Forest Service, Southern Research Station	US	(706) 559-4239		
Gordon	Ray	Miami-Dade Department of Environmental Resources	FL	(305) 372-6924		
Grant	Genevieve	New Mexico Environmental Department, Air Quality Bureau	NM	(505) 955-8070	genevieve_grant@nmenv.state.nm.us	yes
Graves	John	Bureua of Indian Affairs/Arizona Smoke Management Program	AZ	(602) 771-2277	jfg@ev.state.az.us	
Graves	Elvis	US Environmental Protection Agency	US	(919) 541-5436	graves.elvis@epa.gov	yes
Greene	Larry	Yolo-Solano County Air Pollution Control District	CA	(530) 757-3656	lgreene@ysaqmd.org	
Gribovicz	Lee	Wyoming Department of Environmental Quality, Air Quality Division	WY	(307) 332-6755	lgribo@state.wy.us	
Grimaldi	Richard	Pima County Department of Environmental Quality	AZ	(520) 740-3332	rgrimald@deq.co.pima.az.us	
Gruenig	Bob	National Tribal Environmental Council	NM	(505) 242-2175	bgruenig@ntec.org	
Habeck	Bob	Montana Department of Environmental Quality	MT	(406) 444-7305	bhabeck@state.mt.us	yes
Haddow	Dennis	US Fish and Wildlife Service	US	(303) 969-2091	dennis.haddow@nps.gov	
Halprin	Lyra	University of California Extension	CA	(503) 752-3664	lhalprin@ucdavis.edu	
Hamilton	Wayne	Texas A&M Range Department	TX	(979) 845-2755	wt-hamilton@tamu.edu	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Hansen	Mary	Walla Walla County	WA	(509) 456-2926		
Hao	Weimin	Missoula Fire Chem Group	US	(406) 329-4838		
Harrison	John	Utah State University Extension	UT	(435) 797-3396	jdh@cc.usu.edu	yes
Hartinger	Barbara	South Dakota State University Extension	SD	(605) 688-4650		yes
Hartnett	David	Konza Prairie Biology Station (KSU)	KS	(785) 587-0441	dchart@ksu.edu	
Harwell	Phil	Texas Natural Resources Conservation Commission	TX	(512) 239-1517	pharwell@tnrcc.state.tx.us	yes
Harwood	Tony	Confederated Salish and Kootenai Tribal Forestry		(406) 883-5758	csktfire@ronan.net	
Held	Michael	South Dakota Farm Bureau	SD	(605) 353-8051	sdfb@basec.net	yes
Henderson	Don	Nevada Division of Agriculture	NV	(775) 684-5333		
Higgins	Ken	South Dakota Wildlife and Fisheries Science Department	SD	(605) 688-4779		
Hilbruner	Mike	Fire and Aviation Management	WO	(202) 205-1487	mhilbruner@fs.fed.us	
Hill	Rod	Northern Sierra Air Pollution Control District	CA	(530) 274-9360	nsaqmd@nccn.net	
Hinman	Herb	Washington State University	WA	(509) 335-2855	hinman@wsu.edu	
Hirami	Patti	US Department of Agriculture, Washington Office	US	(202) 205-1498	phirami@fs.fed.us	yes
Hirrel	Suzanne	University of Arkansas Extension	AR	(501) 671-2000		yes
Holman	John	University of Idaho	ID	(208) 885-5041	jholman@uidaho.edu	
Howard	Jerry	Calaveras County Air Pollution Control District	CA	(209) 754-6504	jhoward@co.calaveras.ca.us	yes
Inouye	Dan	Washoe County District Health Department, Air Quality Management Division	NV	(775) 784-7214	dinouye@mail.co.washoe.nv.us	yes
IOWA FB		Iowa Farm Bureau	IO	(515) 225-5400		
Isom	Roger	California Cotton Ginners and Growers Association	CA	(559) 252-0684	roger@ccgga.org	yes
Jacks	Clint	Oregon State University	OR	541-475-3808		yes
Jackson	Sam	Nevada Department of Environmental Protection	NV	(775) 687-9358		

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Jenkins	Bryan	University of California, Davis	CA	(530) 752-1422	BMJenkins@ucdavis.edu	yes
Johnson	Dan	WESTAR	US	(503) 387-1660 ext. 8	djohnson@westar.org	
Johnston	Ralph	Lane Regional Air Pollution Authority	OR	(541) 726-2514 x. 213	metman@lrapa.org	yes
Johnston	Bill	Washington State University, Crop Science Department	WA	(509) 335-3620		yes
Jones	Richard	Columbia County	WA	(509) 3824542		
Kaderly	Shelley	STAPPA/ALAPCO	NE	(402) 471-2189	shelley.kaderly@ndeq.state.ne.us	yes
KANSAS		Kansas State Extension	KS	(785) 532-5790		
KANSAS D of AG		Kansas Department of Agriculture	KS	(785) 296-1500	ksag@kda.state.ks.us	yes
Kauper	Ross	Lake County Air Quality Management District	CA	(707) 263-7000		
Kazemnia	Rana	Arizona Department of Environmental Quality	AZ	(800) 234-5677	kazemnia.rana@ev.state.az.us	
Kihara	Susan	Hawaii Department of Health, Clean Air Branch	HI	(808) 586-4200		
King	Cynthia	California Farm Bureau	CA	(916) 446-4647		
Knight	J. Miles	South Carolina Forestry Commission	SC	(803) 896-8844	mknight@forestry.state.sc.us	
Kordzi	Joe	US EPA Region 6	US	(214) 665-7186	kordzi.joe@epa.gov	yes
Kramer	Ursula	Pima County Department of Environmental Quality	AZ	(520) 740-3340	ukramer@deq.co.pima.az.us	
Krepps	Bob	National Association of State Foresters	US	(202) 624-5415	nasf@sso.org	yes
Krug	Charles	Colusa County Air Pollution Control District	CA	(530) 458-0590		
Kuehn	Scott	Plum Creek Timber Company	MT	(406) 542-3273	skuehn@plumcreek.com	yes
Kussow	Michael	Shasta County Air Pollution Control District	CA	(530) 225-5674	mkussow@co.shasta.ca.us	
Lahm	Pete	US Forestry Service	AZ	(602) 207-2356		yes
Lamb	Brian	Great Basin Unified Air Pollution Control District	CA	(760) 872-8211	greatbasin@qnet.com	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Laur	Michele	US EPA, Office of Air Quality Planning and Standards	US	(919) 541-5256	laur.michele@epa.gov	yes
Lawton	Ann	Alaska Department of Environmental Conservation	AK	(907) 269-3066	ann_lawton@envircon.state.ak.us	yes
Lee	Barbara	Northern Sonoma County Air Pollution Control District	CA	(707) 433-5911	nsc@sonic.net	
LeMunyon	Jerry	National Resource Conservation Service	TX	(817) 509-3216		
List	Alan	Lovelock Valley Farmers Smoke Management Committee	NV	(775) 273-2197	nlist1@listranch.lovelock.nv.us	yes
Little	Jim	Oregon Department of Agriculture	OR	503/986-4700	jlittle@oda.state.or.us	
Lockamy	Terry	Texas A&M Extension - Westlico	TX	(956) 968-5581		
Lorenzen	Arndt	California Air Resources Board - Meteorology	CA	(916) 322-6014		
Louisell	Mike	Washington State Department of Agriculture	WA	(360) 902-1813		yes
MacMurray	Mike	Texas Department of Agriculture	TX	(512) 463-7476		yes
Magliano	Karen	California Air Resources Board	CA	(916) 322-7137	kmaglian@arb.ca.gov	
Mahaffey	Larry	Bureau of Land Management, Division of Fire and Aviation Policy and Management	US	(208) 387-5160	larry_mahaffey@nifc.blm.gov	
Malm	Bill	National Park Service	US	(970) 491-8292		
Martinez	Jose	San Joaquin Valley United Air Pollution Control District	CA	(559) 230-5975	jose.martinez@valleyair.org	
Maxwell	Bill	Pima County Department of Environmental Quality	AZ	(520) 740-3340	bmaxwell@deq.co.pima.az.us	
McClure	Steve`	Union County Commissioner	OR	(541) 963-1001		
McConkey	Bobbie	Jefferson County Smoke Management Program	OR	(541) 475-7274	bmc@madras.net	yes
McCool	Don	US Department of Agriculture	US	(509) 335-1347	dkmccool@wsu.edu	yes
McDonald	Chuck	Division of Air Quality, Department of Public Health	ND	(701) 328-5188	cmcdonal@state.nd.us	
McDowell	Pat	Oklahoma Department of Agriculture, Food, and Forestry	OK	(405) 522-6158		
McEachron	Melissa	Washington Department of Ecology	WA	(360) 407-6860		yes

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
McGaugh	Genie	Ventura County Air Pollution Control District	CA	(805) 645-1425	genie@vcapcd.org	yes
McGuire	Andy	Washington State Extension	WA	(509) 754-2011 x. 413	amcguire@coopext.cahe.wsu.edu	yes
McKenzie	Donald	University of Washington	WA	(206) 732-7824	dmck@u.washington.edu; donaldmckenzie@fs.fed.us	yes
McNeill	Dave	Utah Department of Environmental Quality, Division of Air Quality	UT	(801) 536-4037	dmcneill@deq.state.ut.us	
Mcnerly	Michael	California Air Resources Board	CA	(916) 322-6950	mmcnerly@arb.ca.gov	
McPherson	Janet	Kansas Farm Bureau	KS	(785) 587-6000		yes
Miller	Melanie	Bureau of Land Management, Division of Fire and Aviation Policy and Management	US	(406) 829-6940, 6941	miller@nifc.blm.gov; melaniemiller@fs.fed.us	yes
MINNESOTA		University of Minnesota Extension	MN	(612) 624-1222		yes
MINNESOTA D of AG		Minnesota Department of Agriculture	MN	(800) 967-2474	webinfo@mda.state.mn.us	
MINNESOTA FB		Minnesota Farm Bureau	MN	(651) 905-2100		
MISSOURI		Lincoln University of Missouri	MO	(573) 681-5543		
MISSOURI FB		Missouri Farm Bureau	MO	(573) 893-1400	momail@mofb.com	
Moore	Tom	Arizona Department of Environmental Quality	AZ	(602) 207-2353	ctm@ev.state.az.us	
Moreo	Joe	Modoc County Air Pollution Control District	CA	(530) 233-6419	modocag@hdo.net	
Morgan	Jon	El Dorado County, Environmental Management Department	CA	(530) 621-6662	jmorgan@co.el-dorado.ca.us	
Mount	Dana	North Dakota Health Department, Environmental Chief's Office	ND	(701) 328-5202	dmount@state.nd.us	
Murray	Glenn	University of Idaho (retired)	ID	(888) 884-3246		
Musick	Brad	New Mexico Environmental Department, Air Quality Bureau	NM	(505) 827-0335	brad_musick@nmenv.state.nm.us	
Myers	Ron	US EPA, Office of Air Quality Planning and Standards	US	(919) 541-5407	myers.ron@epa.gov	
Naylor	Michael	Clark County Health District, Air Pollution Control Dist.	NV	number not in service	mnaylor@cchd.org	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Nazemi	Mike	South Coast Air Quality Management District	CA	(909) 396-3187	mnazemi@aqmd.gov	
Nelson	Dave	Oregon Seed Council	OR	(503) 986-4556	dlnassoc@aol.com	yes
Newhall	Bob	Utah State University Extension	UT	(435) 797-2183	bobn@ext.usu.edu	yes
Nielson	Carol	Utah Department of Environmental Quality	UT	(801) 536-4074	Cnielson@deq.state.ut.us	
Nishikawa	Todd	Placer County Air Pollution Control District	CA	(530) 889-7135	placerapcd@foothill.net	
Nolph	Sean	Washington Department of Ecology	WA	(509) 329-3453	snol461@ecy.wa.gov	
NORTH DAKOTA		North Dakota State University Extension Service	ND	(701) 328-4507		
NORTH DAKOTA FB		North Dakota Farm Bureau	ND	(701) 298-2200		
Olson	Dan	Wyoming Department of Environmental Quality, Air Quality Division	WY	(307) 777-7391	dolson@state.wy.us	
OREGON		Oregon State Extension	OR	(541) 737-1000		yes
O'Shaughnessy	Julie	Northwest Air Pollution Authority	WA	(360) 428-1617 x210		yes
Otterson	Sally	Washington State Department of Ecology, Air Quality	WA	(360) 407-6806	sott461@ecy.wa.gov	
Ottmar	Roger	Pacific Northwest Research Station (USDA)	US	(206) 732-7826	rottmar@fs.fed.us	yes
Oulrey	Bruce	California Air Resources Board	CA	(916) 322-6155	boulrey@arb.ca.gov	yes
Owensby	Clinton	Kansas State University	KS	(785) 532-7232		
Pace	Tom	US EPA, Office of Air Quality Planning and Standards	US	(919) 541-5634	pace.tom@epa.gov	
Pan	Bill	Washington State University, Crop and Soils Department	WA	(509) 335-3611	wlpan@wsu.edu	
Parnell	Calvin	Texas A & M Extension	TX	(979) 845-3985	c-parnell@tamu.edu	yes
Paxson	Thomas	Kern County Air Pollution Control District	CA	(661) 862-5250	kcapcd@co.kern.ca.us	yes
Payne	Curtis	Nevada Division of Environmental Protection	NV	(775) 687-4670 x. 3083	cpayne@ndep.carson-city.nv.us	
Pellah	Theresa	Arizona Smoke Management Program	AZ	(602) 771-2375	tap@ev.state.az.us	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Peltier	Randy	Southwest Clean Air Agency	WA	(360) 574-3058	randy@swcleanair.org	yes
Penner	Jay	Washingto Association of Wheat Growers	WA	(509) 337-6381	penner@innw.net	yes
Perry	Patty	Umatilla County Department of Resources	OR	(541) 276-6249	pattyp@uma1.co.umatilla.or.us	
Pfeifer	Grant	Washington Department of Ecology	WA	(509) 329-3469	gpfe461@ecy.wa.gov	yes
Phillips	Henry	South Carolina Department of Health	SC	(803) 898-3260		
Pitty	Don	Texas Farm Bureau	TX	(254) 772-3030		
Potter	Darla	Wyoming Department of Environmental Quality	WY	(307) 777-7346	dpotte@state.wy.us	yes
Price	Charles	Colusa County Air Pollution Control District	CA	(530) 458-0590	hak@mako.com	yes
Quentin	Doug	Monterey Bay Unified Air Pollution Control District	CA	(831) 647-9411	dquetin@mbuapcd.org	
Quinn	Robert	Eastern Washington University	WA	(509) 359-7050	rquinn@ewu.edu	
Quinton	Wes	Utah Farm Bureau	UT	(801) 233-3010	wquinton@fbfs.com	yes
Rathbun	David	Yuma Fire Department	AZ	disconnected		
Redline	Dan	Idaho Department of Environmental Quality	ID	(208) 769-1422	dredline@deq.state.id.us	yes
Remer	Greg	Nevada Division of Environmental Protection	NV	(775) 687-4670	gremer@ndep.carson-city.nv.us	
Reynolds	Scott	South Carolina Department of Health	SC	(803) 896-0903		
Reynolds	Robert	Lake County Air Pollution Control District	CA	(707) 263-7000	bobr@pacific.net	
Riebau	Al	US Forest Service, Air Quality Research Program	US	(202) 205-1316		
Riley	Diane	Idaho Department of Environmental Quality	ID	(208) 373-0214	driley@deq.state.id.us	yes
Rodger	Rob	Benton County Clean Air Authority	WA	(509) 943-3396	rrod@bcaa.net	yes
Roeden	Amy	STAPPA/ALAPCO	US	(202) 624-7864	4clnair@sso.org	yes
Roemer	Tom	San Luis Obispo County Air Pollution Control District	CA	(805) 781-5912	troemer@apcd@co.slo.dst.ca.us	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Roessler	Jim	Bureau of Indian Affairs, Rocky Mountain Regional Office	US	(406) 247-7949		
Romano	Ed	Glenn County Air Pollution Control District	CA	(530) 934-6500	gcraig@maxinet.com	yes
Rowdabaugh	Kirk	State Foresters - Arizona State Land Department	AZ	(602) 255-4059	kirkrowdabaugh@azstatefire.org	
Rowland	Ron	Iowa Department of Agriculture and Land Stewardship	IO	(515) 281-8619	ron.rowland@idals.state.ia.us	yes
Sandberg	David "Sam"	Pacific Northwest Research Station (USFS)	US	(541) 750-7265	dsandberg@fs.fed.us	
Sandman	Bill	Tuolumne County Air Pollution Control District	CA	(209) 533-5693	tuolapcd@mlode.com	yes
Sauerhaft	Beth	Natural Resources Conservation Service	US	(202) 720-8578	Beth.Sauerhaft@usda.gov	yes
Schaaf	Mark	Air Sciences (Consulting)	US	(503) 525-9394	mschaaf@airsci.com	yes
Schirman	Roland	Washington State Cooperative Extension	WA	(509) 382-4741	ce6107@coopext.cahe.wsu.edu	yes
Schneider	Neil	Arizona Farm Bureau	AZ	(602) 659-7008	neilschneider@azfb.org	
Sedlacek	Randy	Arizona Department of Environmental Quality, Air Quality Division	AZ	disconnected	rfs@ev.state.az.us	
Settle	Mark	Iowa State University Extension	IO	(515) 294-9530	msettle@iastate.edu	yes
Shaver	Pat	Natural Resources Conservation Service	US	(541) 737-7355	patrick.shaver@oregonstate.edu	yes
Shaw	Nancy	US Department of Agriculture	US	(208) 373-4360	nshaw@fs.fed.us	
Shiers	Joyce	Iowa College of Agriculture	IO	(515) 294-2518		
Simpson	Julie	Nez Perce Tribe	ID	(208) 843-7375	julies@nezperce.org	
Skelton	Eric	Spokane County Air Pollution Control Authority	WA	(509) 477-4727, ext. 121		yes
Smith	Kenneth	Lassen County Air Pollution Control District	CA	(530) 251-8110	lassenag@psln.com	
Sommerville	Richard	San Diego Air Pollution Control District	CA	(858) 650-4500	rsommeha@co.san-diego.ca.us	
SOUTH DAKOTA D of AG		South Dakota Department of Agriculture	SD	(605) 773-3375	agmail@state.sd.us	

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Speckert	Steven	Feather River Air Pollution Control District	CA	(530) 634-7659	apco@yuba.org	
Spencer	Bob	Idaho Department of Agriculture	ID	(208) 332-8613		
Stegall	Butch	Louisiana Department of Agriculture and Forestry	LA	(225) 925-3770	butch_s@ldaf.state.la.us	yes
Stephans	William	Siskiyou County Air Pollution Control District	CA	(530) 841-4029	wstephans@siskiyou.co.ca.us	
Stoken	Jeffrey	Oregon Department of Environmental Quality	OR	(503) 229-5506		
Strauss	Ted	San Joaquin Valley United Air Pollution Control District	CA	(559) 230-5967	ted.strauss@valleyair.org	
Stringer	Don	Miami-Dade Fire Rescue	FL	(305) 971-8800		
Stubbendieck	Cheryl	Nebraska Farm Bureau	NE	(402) 421-4405	cheryls@nefb.com	
Suarez-Murias	Tina	California Air Resources Board	CA	(916) 323-1495	csuarezm@arb.ca.gov	
Terezinski	Bob	North Coast Unified Air Pollution Control District	CA	(707) 443-3093	ncuaqmd@northcoast.com	yes
Thill	Don	University of Idaho	ID	(208) 882-7020		
Thornburg	Curt	Idaho Department of Agriculture	ID	(208) 322-8623	cthornbu@agri.state.id.us	yes
Trujillo	Rita	New Mexico Environmental Department	NM	(505) 955-8024		
UTAH D of AG		Utah Department of Agriculture and Forestry	UT	(801) 538-7100		yes
Van Haren	Frank	Washington Department of Ecology	WA	(360) 407-6870		
Van Slyke	Steve	Puget Sound Clean Air	WA	(206) 689-4052	stevev@psc Cleanair.org	
Van Tassel	Larry	University of Idaho	ID	(208) 885-7869	larryv@uidaho.edu	
Vernon	Laura	Utah Department of Agriculture	UT	(801) 536-4484		
Vita	Gilbert	South Coast Air Quality Management District	CA	(909) 396-3403	gvita@aqmd.gov	
Wallerstein	Barry	South Coast Air Quality Management District	CA	(909) 396-2100	bwallerstein@aqmd.gov	
Walsh	Dan	Montana Department of Environmental Quality	MT		dwalsh@state.mt.us	
Warren	Dan	Albuquerque Environmental Health Department, Air Pollution Control	NM	(505) 768-2637	dwarren@cabq.gov	yes

Last Name	First Name	Agency/Organization	State or US	Telephone Number	Email Address	Contacted?
Weir	Scott	Kansas Department of Health and Environment	KS	(785) 296-1544		yes
Whalen	Stephanie	Hawaii Agriculture Research Center	HI	(808) 486-5310	Swhalen@harc-hspa.com	yes
White	Larry	Texas A&M Range Department	TX	(409) 845-2755	ld-white@tamu.edu	
Wiest	Stuart	USDA, Agricultural Research Service	WA	(541) 278-4381		yes
Williams	Gail	Butte County Air Pollution Control District	CA	(530) 891-2882	apco@butteair.dcsi.net	yes
Williams	Cinda	University of Idaho Extension	ID	(208) 885-7499	cindaw@uidaho.edu	yes
Williams	Wayne	Texas A&M Extension	TX	(979) 845-4759	wr-williams@tamu.edu	yes
Wilson	Chuck	University of Arkansas	AK	(870) 673-2661		
Wilson	Karen	Sacramento Metropolitan Air Quality Management District	CA	(916) 874-4814	kwilson@airquality.org	
Wolbach	Dean	Mendocino County Air Pollution Control District	CA	(707) 463-4354	mcaqmd.co.mendocino.ca.us	yes
Wood	Karen	Washington Natural Resource Department	WA	(509) 329-3520		
Woodford	Phyllis	Colorado Department of Public Health and the Environment	CO	(303) 692-3221	phyllis.woodford@state.co.us	
Wright	George	South Coast Air Quality Management District	CA	(909) 396-3005	gwright@aqmd.gov	
Wysocki	Don	Columbia Basin Agricultural Research Center (OSU)	OR	(541) 278-4396	Donald.Wysocki@oregonstate.edu	
Yokelson	Bob	University of Montana Missoula, Department of Chemistry	MT	(406) 329-4812	byok@selway.umt.edu	
Young	Bill	Oregon State Extension	OR	(541) 737-5859		
Young	Lisa	Hawaii Department of Health, Clean Air Branch	HI	(808) 586-4200		yes
Zemke	Ruth	Imbler Rural Fire Protection Dist.	OR	(541) 534-6625		
Zimmerman	Tom	National Park Service/Joint Fire SP	US	(208) 387-5215	tom_zimmerman@nps.gov	yes

## APPENDIX C. LIST OF REFERENCES REVIEWED BUT NOT USED

Author	Additional Authors	Title	Date of Publication	Comments
Air Sciences, Inc		1996 Fire Emissions Inventory - draft	2002	
Air Sciences, Inc		Integrated Assessment Update and 2018 Emissions Inventory for Prescribed Fire, Wildfire, and Agricultural Burning	2002	
Allen, David	A. Katamreddy, V. Junquera, J. Decabooter	Emissions Inventory Associated with Forest, Grassland, and Ag. Burning in Texas During the 2000 TX. Air Study	2002	
Ammann	R. Blaisdell, M. Lipsett, S.L. Stone, and S. Therriault	Wildfire Smoke: A Guide for Public Health Officials	2001	
Barbour, R. James	R.D. Fight, G.A. Christensen, G.L. Pinjuv, V. Nagubadi	Assessing the Need, Costs, and Potential Benefits of Prescribed Fire and Mechanical Treatments to Reduce Fire Hazard in Montana and New Mexico	2001	
Bates, Earl M.		Smoke Management in the Willamette Valley in OSU Research on Field Burning, 1974	1974	
Battye, William	Rebecca Battye	Development of Emissions Inventory Methods for Wildland Fire	February, 2002	This paper describes methods of inventory emissions for wildland fire. Past, current and future attempts and creating emissions inventories for wildland fire are discussed.
Bauer, Barbara	S. Walsh and R. Battye	Agricultural Burning Smoke Management Program Survey	2001	
Baumann, Suzanne	S.M. Roe and K.B. Thesing	Gathering Open Burning Activity Information and Limitations of the EIIP Preferred Methodology		
Bell, Paul	D. Matlick and M. Ziolk	A Report on Prescribed Burning in Oregon	1990	
Brockett	Biggs and Van Wilgen	A Patch Mosaic Burning System for Conservation Areas in Southern Africa Savannas	2001	
Brown, James K.	J.K. Smith	Wildland Fire in Ecosystems: Effects of Fire on Flora	2000	
Bucon, Harry W.	J. F. Macko and H.J. Taback	Volatile Organic Compound (VOC) Species Data Manual	1978	

Burt, L.A.	M.E. Wirth	Economics of Grass Seed Production in the Inland Pacific Northwest	1976	
California Air Resources Board		1980 Crop Report Agricultural Burning (data-acres of waste burned tons of waste burned, tons of PM, tons of HC, tons of CO)	1980	
California Research Task Group		Agricultural Solid Waste Disposal and Management in California	1973	This is a report on the magnitude of solid waste management and disposal problems associated with California agriculture It discusses present and future studies.
Canadian Forest Service		Fighting Wildland Fire with Technology		
Chilcote, D.O.	H.W. Youngberg	Field Burning Techniques and Alternatives in OSU Research on Field Burning, 1974	1974	
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Cleaves, David A.	J. Martinez, T. K. Haines	Influences on Prescribed Burning Activity and Costs in the National Forest System	2000	
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Conklin, Frank	H. Stoevener	An Inquiry into Means for Evaluating Gains and Losses Associated with Changes in Air Quality in Oregon's Willamette Valley in the Private and Public Sectors	1977	
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Cross, T.L.	R. Mason	Field Sanitation Costs For Willamette Valley Grass Seed Producers	1994	
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EPA		Wildfires and Prescribed Burning and Emissions Factors		

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ERG/WRAP		Summary of Crop Production, Agricultural Burning, and Non-Burning Alternatives in the United States	2001	
Ferguson, S.A.	J. Peterson and A. Acheson	Automated, Real-Time Predictions of Cumulative Smoke Impacts From Prescribed Forest and Agricultural Fires	2001	This paper discusses the development of a model to predict real-time cumulative smoke emissions and impacts from prescribed forest and agricultural fires.
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Ferguson, S.A.	C.C. Hardy	Modeling Smoldering Emissions from Prescribed Broadcast Burns in the Pacific Northwest	1994	
Ferguson, Sue A.	J.E. Ruthford, S.J. McKay, D. Wright, D. Wright, R. Ottmar	Measuring Moisture Dynamics to Predict Fire Severity in Longleaf Pine Forests	2002	
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Hardison, Jonh R.		Justification for Burning Grass Fields	1964	
Hardy, Colin	R. Burgan, R. Ottmar and J. Deeming	A Database for Spatial Assessments of the Fire Characteristics, Fuel Profiles, and PM10 Emissions	unknown	
Harrison, Halstead	C.C. Hardy	Plume Rise from Prescribed Fires: Model and Data	1992	Describes a semi-empirical model that predicts plume height as a function of time. Model is based observation of smoke plume, meterological data, and fuel mixture and ignition protocols.

Hawaiian Commercial & Sugar Company		Cane Burning: Questions and Answers		This is a question and answer sheet produced by HC&S to notify the public that HC&S complies with regulations, and is searching for non-burn alternatives to sugar cane burning.
Hester, Norman E.		Field and Slash Burning Particulate Characterization	1979	
Hrynchuk		1999 Report to the Legislature : Progress report on the phase-down of rice straw burning in the Sacramento Valley Air Basin	1999	
Hsieh	Seiber and Fisher	Potential Health Hazards Associated with Particulate Matter Released from Rice Straw Burnings	1981	
Huff, Mark H.	R.D. Ottmar, E. Alvarado, R.E. Vihnanek, J.F. Lehmkul, P.F. Hessburg, and R. L. Everett	Historical and Current Forest Landscapes in Eastern Oregon and Washington: Part II: Linking Vegetation Characteristics	1995	Paper examines changes in vegetation in Eastern OR and WA over the past 50 years. It seeks to determine changes in fire behavior, influence of management practices on fire behavior and smoke production, and tradeoffs for managed fire, wildfire, and forest.
Jenkins, B.M.	S.Q. Turn and R.B. Williams	Atmospheric Emissions from Agricultural Burning in California: Determination of Burn Fractions, Distribution Factors, and Crop-specific Contributions	1992	The purpose of this study was to determine, more accurately, the proportion of the crop residue burned in a given season of the year. Then this information would be used to refine methods for calculating allowable atmospheric emissions from power-generation.
Jenkins, Bryan	Daniel Chang, Otto Raabe	Development of Test Procedures to Determine Emissions from Open Burning of Agricultural and Forestry Wastes (abstract only)	January, 1990	
Jenkins, Bryan	and others	Emission Factors for Polycyclic Aromatic Hydrocarbons from Biomass Burning	1996	
Johansen, Ragnar W.		Prescribed Burning with Spot Fires in the Georgia Coastal Plain	1984	
Johnston, W.J.	M.D. Schaaf	GSCSSA Progress Reports FY00: Quantifying Emissions from Kentucky Bluegrass Field Burning	2000	
Johnston, W.J.		Alternatives to Open-field Burning for Bluegrass Seed Production: Report to Washington State	1996	

Johnston, William	Mark Schaaf	Quantifying Emissions from Kentucky Field Grass Burning	forthcoming	
Lamb, J.		Stubble Burning	2002	This paper, presented at a Scottish EPA board meeting, briefly covers the magnitude of stubble burning in Scotland, lack of regulations regarding stubble burning, and health effects of such burning.
Lee, W.O.		Field Burning Effects on Weed Control in Grass SeedCrops in OSU Research on Field Burning, 1974	1974	
Leenhouts, Bill		Assessment of Biomass Burning in the Conterminous United States	1998	This study compares present biomass burning with that from the pre-industrial era to discuss atmospheric, climatic, social and ecological system effects from the decrease in are burned, biomass consumed, and emissions produced.
Lutes, Christopher C.	P.H. Kariher	Evaluation of Emissions From the Open Burning of Land - Clearing Debris Final Report		
Lyon, Jack	M.H. Fuff, R.G. Hooper, E.S. Telfer, D.S. Schreiner, J.K. Smith	Wildland Fire in Ecosystems: Effects of Fire on Fauna	2000	
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Mclver, James D.	L. Starr	Environmental Effects of Postfire Logging: Literature Review and Annotated Bibliography	2000	
McMahon, Charles K		Characterization of Forest Fuels, Fires and Emissions	1983	
Miles, Thomas R.	F.G. Odell	A Program to Eliminate or Reduce Smoke From Burning Fields After Grass Seed Harvest	1976	Report discusses a smoke management plan with emphasis on field burning machines and future design concepts of these machines.

Miss. Department of Wildlife, Fisheries and Parks	Virginia Division of Forestry and Mississippi Forestry Commission	Managing Your Forest Acreage For Both Timber and Wildlife	1996	
Mobley et al.		Southern Forestry Smoke Management Guidebook	1976	
Moss, Steven J.	D. Mitchell, R.McCann, and T. Bayh	The Economic Impacts of Alternatives to Open-Field Burning of Agricultural Residue	1993	This is an investigation of the economic implications of policies limiting the ability of almond, rice, walnut, and wheat growers to burn their crop residues.
National Association of State Foresters	Forest Fire Protection Committee	Costs on Containment of Large Fires: Efficient Utilization of Wildland Fire Suppression Resources		
National Wildfire Coordinating Group		Prescribed Fire Complexity Rating System Guide	2002	
NWCG Fire Use Working Team		Fire Effects Guide	2001	
O'Connell, Sean K.		1980 Annual Report on Field Burning (Presented to the Oregon Joint Legislative Committee on Trade and Economic Development)	1980	
Oregon		Oregon Field Burning – Smoke Management Program Operational Guidelines	1981	
Oregon Department of Environmental Quality		Field Burning Report	1980	
Oregon State University Extension Service		Burning Grass Seed Fields In Oregon's Willamette Valley: The Search For Solutions	1989	
Ottmar, Roger		Prescribed Fire Versus Wildfire: What are the Tradeoffs?	1992	Paper discusses prescribed vs. wildfires. It states total emissions on units treated with broadcast burning were 59% less than emissions on untreated units.

Ottmar, Roger D.	C.S. Wright	Characterizing Fuels in Treated Areas	2002	This paper describes the development of a national system, Fuel Characteristic Classification, for fuel identification and assessment to accurately depict all fuelbeds.
Ottmar, Roger D.	R. Vihnanek and E. Alvarado	Forest Health Assessment: Air Quality Tradeoffs	1993	This is an air quality assessment that estimates smoke production over time for 6 river basins in Oregon and Washington. It was found that emissions of PM10 changed significantly over time due to a vegetation type and density shift over time. Wildfires
Ottmar, Roger D.	S.N. Little and J. Ohmann	Predicting Duff Reduction to Reduce Smoke From Clearcut Slash Burns in Western Washington and Western Oregon	1985	This study of duff reduction produced two equations for estimating duff reduction based on preburn loading and weather variables.
Ottmar, Roger D.	E. Alvarado and P.F. Hessburg	Linking Recent Historical and Current Forest Vegetation Patterns to Smoke and Crown Fire in the Interior Columbia River	1996	This study compares fuel loading, modeled smoke production, and crown fire from 1930 to 1993 based on vegetative attributes in the Interior Columbia River Basin. Vegetative attributes were used to characterize fuel loading and model PM 10 production and c
Paul, James T.	C.S. Barnes and J.C> Turner, Jr.	Weather Conditions Associated with Understory Prescribed Burning in South Georgia	1983	
Paysen, Timothy E.		Fire in Western Shrubland, Woodland, and Grassland Ecosystems	2000	
Peterson, J.	B. Leenhouts	What Wildland Fire Conditions Minimize Emissions and Hazardous Air Pollutants and Can Land Managements Goals Stiil	2003	A discussion of wildland conditions and techniques to minimize pollutant emissions by decreasing wildland and prescribed emissions.
Peterson, Janice L.		Air Quality, Smoke Management, and Prescribed Fire	1990	Techniques for Smoke management as well as emission reduction by reducing fuel loading, fuel consumption, and emission factor are presented.
Peterson, Janice L.		Development of a PM-10 Emissions Inventory from Prescribed Fire in the United States During 1989	1991	This report documents the development of a prescribed fire emissions inventory for each of the 50 states for 1989.

Peterson, Janice L.		Emission Inventories	2001	A discussion of the need for emission inventories including what is needed to develop inventories, agencies' need for information, etc.
Peterson, Janice L.		The Future of Prescribed Fire and Air Quality		This paper addresses the need to perform research to determine actual effects of prescribed smoke to make sure that regulatory decisions are based on fact rather than perceptions. It also discusses health effects, permitting, and smoke/emission modeling.
Philpot, C.W.	C.W. George, A.D. Blakely, G.M. Johnson, W.H. Wallace, Jr.	The Effect of Two Flame Retardants on Particulate And Residue Production	1972	
Reinhardt	Ottmar	Smoke Exposures at Western Wildfires	2000	
Reinhardt	Ottmar and Hanneman	Smoke Exposure Among Firefighters at Prescribed Burns in the Pacific North West	2000	
Reinhardt, Elizabeth D.	R. E. Keane and J.K. Brown	Modeling Fire Effects	1999	
Riebau, Allen	D. Fox	The New Smoke Management	2001	This is a discussion of new smoke management plans for forest and agricultural burning as a result of EPA regulations for management of PM2.5, tropospheric ozone, and regional haze.
Ryan, Greg		100 Acre Burn Study	1993	
Sandberg, D.V.	J. Peterson	A Source Strength Model for Prescribed Fire in Coniferous Logging Slash	1984	
Sandberg, David V.	R.D. Ottmar and G.H. Cushon	Characterizing Fuels in the 21st Century	2001	This paper discusses the development of a national system of fuel characteristics classification wherein quantitative fuel characteristics and probable fire parameters can be determined for a specific fuel bed.

Sandberg, David V.	C.C. Hardy, R.D. Ottmar, J.A.K. Snell, A.L. Acheson, J.L. Peterson, P. Seamon, P. Lahm and D. Wade	National Strategic Plan: Modeling and Data Systems for Wildland Fire and Air Quality	1999	
Sandberg, David V.		Sharing the Slash Burning Decision: Air Resource Management		Discussion of the need for cooperation between forest and air quality managers and researchers to improve research and technology on air quality issues related to slash burning.
Sandberg, David V.		Research Leads to Less Smoke From Prescribed Fires	1983	This is a discussion of some of the current research and future research, as of 1983, to evaluate the effectiveness of techniques for reducing emissions from prescribed fires. The need for an overall strategy for reducing emissions is also addressed.
Sandberg, David V.	R.D. Ottmar, J.L. Peterson, J. Core	Wildland Fire in Ecosystems: Effects of Fire on Air	2002	
Sapsis, David B.	J. B. Kauffman	Fuel Consumption and Fire Behavior Associated with Prescribed Fires in Sagebrush Ecosystems	1991	
Scarborough, James	N. Clinton, R. Pu, and P. Gong	Creating a Statewide Spatially and Temporally Allocated Agricultural Burning Emissions Inventory Using Consistent Emission Factors		
Skelton, ERIC	STAPPA / ALAPCO	Agricultural Burning Issues in Eastern Washington and Northern Idaho: STAPPA / ALAPCO Spring 01 Meeting	2001	
South Coast Resource Conservation and Development		PM10 Dust Control Practices Fact Sheet: Crop Residue Management		
STAPPA / ALAPCO Agriculture Committee		Agriculture - Air Quality Issues State and Local Survey	2001	

TPI Associates, Inc.		A Proposal to the Oregon Department of Agriculture For A Mobile Combustion and Sanitation System		
US Department of Interior Bureau of Indian Affairs	National Interagency Fire Center Division of Forestry Branch of Fire Management	Fire Management Program Analysis Handbook	2003	
USGS		USGS Wildland Fire Workshop	1997	
Van Tassell, Larry W.		Assessment of Non-Thermal Bluegrass Seed Production	2002	
Vihnanek, Robert E.	Ottmar, Roger D.	When Logged Units Burn in a Wildfire, Does Slash Treatment Mitigate Effects?	1993	
Wade, Dale D.		Prescribed Fire and Smoke Management in the South: Conference Proceedings	1984	
Ward, Darold		Smoke Emissions from Biomass Burning	1995	This paper provides information on experiments performed in tropical regions to reduce the uncertainty of contribution of biomass burning to the buildup of greenhouse gasses in the atmosphere.
Washington State Department of Ecology		Status Report on Alternative Uses for Grass Straw	1999	
Washington State University	Department of Ecology Air Quality Program	Estimates of the Cost and Benefits of the Rule to Certify Alternatives to Grass Field Burning		
Washington State University	Oregon State University, University of Idaho, USDA Agricultural Research Service	Grass Seed Cropping Systems for a Sustainable Agriculture: Progress Reports FY97	1997	

Washington State University	Oregon State University, University of Idaho, USDA Agricultural Research Service	Grass Seed Cropping Systems for a Sustainable Agriculture: Progress Reports FY98	1998	
Washington State University	Oregon State University, University of Idaho, USDA Agricultural Research Service	Grass Seed Cropping Systems for a Sustainable Agriculture: Progress Reports FY99	1999	
Washington State University	Oregon State University, University of Idaho, USDA Agricultural Research Service	Grass Seed Cropping Systems for a Sustainable Agriculture: Progress Reports FY2000	2000	
Washington State University	Oregon State University, University of Idaho, USDA Agricultural Research Service	Grass Seed Cropping Systems for a Sustainable Agriculture: Progress Reports FY2001	2001	
Washington State University	Oregon State University, University of Idaho, USDA Agricultural Research Service	Grass Seed Cropping Systems for a Sustainable Agriculture: Progress Reports FY2002	2002	
WRAP	Fire Emissions Joint Forum Basic Smoke Management Task Team	Wildland Fire: Elements of a Basic Smoke Management Program - draft	2001	
WRAP		Non-Burning Alternatives on Agricultural Land in Western U.S., Volumes I and II	2002	

Yamate, G.	et al	An Inventory of Emissions from Forest Wildfires, Forest Managed Burns, and Agricultural and Development of Emission Factors for Estimating Atmospheric Emissions From Forest Fires	1975	
Yevich, Rosemarie	J. A. Logan	An Assessment of Biofuel Use and Burning of Agricultural Waste in the Developing World	2002	
Zimmerman, Thomas G.	D.L. Bunnell	Wildland and Prescribed Fire Management Policy : Implementation Procedures Reference Guide	1998	This paper was designed for wildland management officials to provide standard procedures and to guide in the implementation of 1995 federal wildland management policy.



## APPENDIX D. SAMPLE ANNOTATED BIBLIOGRAPHY ENTRY

**Final Annotated Bibliography**

Author	Date of Publication	Original Research <input checked="" type="checkbox"/>
Boubel, Richard	July 1969	Compilation <input type="checkbox"/>
Additional Authors	Date study was performed	Other <input type="checkbox"/>
Ellis Darley, Edward Schuck	1965	
Title	URL Address	
Emissions from Burning Grass Stubble and Straw	unknown	
	Publication Reference	
	Journal of Air Pollution Control Association, Vol. 19, No. 7, pgs 497-500.	
Annotation		
<p>Samples of various grass straws and stubble residue for the important grass species from the Willamette Valley of Oregon were burned in the laboratory burning tower at the University of California at Riverside. Complete analyses were determined for gaseous and particulate emissions. Emission values were compared with those obtained from field studies (see Boubel 2) and found to be similar.</p> <p>NOTE: Same results also reported in "Summary of Atmospheric Emission Data from Grass Field Burning Tests," Agricultural Field Burning in the Willamette Valley, Air Resources Center, Oregon State University, January 1969.</p>		

Record: 1 of 51

**Final Annotated Bibliography**

NOTE: Same results also reported in "Summary of Atmospheric Emission Data from Grass Field Burning Tests," Agricultural Field Burning in the Willamette Valley, Air Resources Center, Oregon State University, January 1969.

Agricultural or Wildland

Emissions Factors       Emission Reductions       Resource Effects

Type of Fuel(s)      Baseline/Type of ERT(s)      Variables

          

Time of year burn performed      Location of burn      Annotated Author Designation

          

Record:        of 51

## APPENDIX E. SAMPLE INDEX PAGE

<b>Agricultural Residues (by fuel type)</b>		
Fuel type	Emission Reduction Techniques	Annotated Authors
Agricultural Residue/wastes/fuels	Baseline (No Technique Specified)	Andreae, Darly (5), Darley (6)
Alfalfa (straws and/or stems)	Baseline - Heading Fire	Darley (1)
	Increase Combustion Efficiency - Backing Fire	Darley (1)
Almond (prunings)	Baseline (No Technique Specified)	Darley (4), Jenkins
	Baseline - Cold Ignition	Darley (1)
	Baseline - Roll-On Ignition	Darley (1)
	Increase Combustion Efficiency - Pile Burning	Darley (2), Jenkins
Apple (prunings)	Baseline - Cold Ignition	Darley (1)
	Baseline - Roll-On Ignition	Darley (1)
Apricot (prunings)	Baseline - Cold Ignition	Darley (1)
	Baseline - Roll-On Ignition	Darley (1)
Asparagus Fern (straws and/or stems)	Baseline (No Technique Specified)	Darley (4)
	Baseline - Flat Fire	Darley (1)
	Baseline - Heading Fire	Darley (1)
	Baseline - Heading Fire (Flaming Portion)	Darley (4)
	Baseline - Heading Fire (Smoldering Portion)	Darley (4)
	Increase Combustion Efficiency - Backing Fire	Darley (1), Darley (4)
Avocado (prunings)	Baseline - Cold Ignition	Darley (1)
	Baseline - Roll-On Ignition	Darley (1)
Barley (straws and/or stems)	Baseline (No Technique Specified)	Darley (3), Jenkins
	Baseline - Heading Fire	Darley (1), Darley (2)
	Baseline - Flat Fire	Darley (1)
	Increase Combustion Efficiency - Pile Burning	Darley (4)
	Increase Combustion Efficiency - Backing Fire	Darley (1), Darley (2), Darley (4), Miller (2)
	Increase Combustion Efficiency - Into-the-wind striplighting	Miller (2)
	Redistribute Emissions - CEWF Configuration - High Wind Speed	Jenkins
	Redistribute Emissions - CRNF Configuration - Low Wind Speed	Jenkins



## APPENDIX F. SAMPLE EMISSION REDUCTION PAGE

Fuel type	ERT	PM	PM 2.5	PM 10	Emissions Reduction	Location of study	Date of Study	Annotated Author	Reliability	Replication potential	Citation frequency
Biomass	Redistribute Emissions - Cloud Scavenging	30 to 50%				Hardiman, Battersby, Hill, Wicksteed	1987-1989	Radke (1)	Med		
Biomass	Redistribute Emissions - Cloud Scavenging	40 to 50%					1987-1989	Radke (2)	Med	Med	Low
Chaparral, California	Redistribute Emissions - Burn more frequently		83%	83%		California		Ottmar (6)			
Conifer, Interior Mixed	Reduce Fuels Consumed - High moisture in large fuels		43%	44%		Interior		Ottmar (6)			
Douglas Fir/Western Hemlock	Reduce Fuel Load - Mechanical Removal	48 lbs				Pacific Northwest		Sandberg (1)	High	Med	Med
Douglas Fir/Western Hemlock, (Pacific Northwest)	Increase Combustion Efficiency - Mass Ignition		10%	10%		Pacific Northwest		Ottmar (6)			



## APPENDIX G. SAMPLE EMISSION FACTOR PAGE

Fuel type	ERT	PM	PM 2.5	CO	CH4	NOx	Location of study	Time of Year	Total Number of Burns	Burn Number	Fuel loading	Date of Study	Annotated Author	Reliability	Replication potential	Citation frequency
Agricultural Fuels	Baseline (No Technique Specified)			40-140 (ave = 92)			Riverside , CA		Numerous			unknown	Darley (6)			
Agricultural residues	Baseline	26	7.8	184 +/-168	5.4	5.0 +/- 2.0	not specified	not specified					Andrea e			
Agricultural Wastes	Baseline (No Technique Specified)	11-13		92		50 ppm at temperature peak	San Joaquin, CA			NA - Average		1972	Darley (5)	Low-Med	Low	Low
Alfalfa straws and stems	Baseline - Heading Fire	41.5		103.7			Riverside , CA		4	1		January, 1977 (PUB)	Darley (1)	High	High	High
Alfalfa straws and stems	Baseline - Heading Fire	48.0		107.8			Riverside , CA		4	2		January, 1977 (PUB)	Darley (1)	High	High	High
Alfalfa straws and stems	Increase Combustion Efficiency - Backing Fire	26.1		125.3			Riverside , CA		4	3		January, 1977 (PUB)	Darley (1)	High	High	High
Alfalfa straws and stems	Increase Combustion Efficiency - Backing Fire	31.4		112.4			Riverside , CA		4	4		January, 1977 (PUB)	Darley (1)	High	High	High
Almond Tree Prunings	Baseline - Cold Ignition - 1	4.4		35.1			Riverside , CA		16	1		January, 1977 (PUB)	Darley (1)	High	High	High
Almond Tree Prunings	Baseline - Cold Ignition - 2	4.1		35.3			Riverside , CA		16	3		January, 1977 (PUB)	Darley (1)	High	High	High
Almond Tree Prunings	Baseline - Cold Ignition - 3	3.8		44.4			Riverside , CA		16	5		January, 1977 (PUB)	Darley (1)	High	High	High