AIR POLLUTION CONTROL ACTIVITIES IN THE STATE OF IDAHO

SMOKE MANAGEMENT PLAN FOR FIELD BURNING IN NORTHERN IDAHO

PREPARED FOR

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION X

1200 SIXTH AVENUE

SEATTLE, WASHINGTON 98101

JUNE 1982

ENGINEERING-SCIENCE
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OFFICES IN PRINCIPAL CITIES

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1200 SIXTH AVENUE
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IDAHO AIR MANAGEMENT SERVICES
ENGINEERING-SCIENCE, INC.
801 RESERVE STREET
BOISE, IDAHO 83702

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INTRODUCTION

1. INTRODUCTION

1.1. Purpose

The purpose of this Smoke Management Plan is to assure compliance with State air pollution control regulations pertaining to agricultural burning and to inform the public of the proposed approach to this problem. The Plan is divided into two sections. The first, called 'Users' Instructions,' is intended to notify persons responsible for burning of applicable regulations and procedures to be followed in 1982. The second, called 'Operational Procedures,' describes how smoke management decisions will be made and by whom.

1.2 Smoke Management Goals

1.2.1 Fields are burned only when weather conditions are conducive to good smoke dissipation.

1.2.2 Smoke sensitive areas are identified and special precautions are followed to protect them from adverse air quality effects due to open field burning.

1.2.3 Quick response to smoke-caused problems and adjustment of the Smoke Management Plan as necessary to prevent reoccurrences.

1.2.4 Restrict unnecessary burning and encourage research on alternative methods of disease controls and production enhancement.

1.2.5 Keep the public informed and provide opportunity for the public participating in developing the Smoke Management Plan.

1.3 Background

Smoke management is the practice of regulating open burning activities to those periods when atmospheric conditions are appropriate to minimize the adverse effects of the resulting air contaminants on people. It requires knowledge of atmospheric dispersion characteristics and the ability to forecast the onset and duration of suitable conditions to allow burning. It also requires a good understanding of source characteristics including emission amounts, rates, response time and the reliability of the operators; air pollution effects; silvacultural and agricultural practices and basic air pollution law.

Smoke management requires three activities to be conducted with reliable accuracy for success:

1. Forecasting of burning weather;
2. Communicating of forecast information and subsequent burning authorizations; and
3. Implementation of burning in accordance with the restrictions of burn authorizations.

All three activities require judgment and action by individuals who are subject, of course, to making errors. As a consequence, there are no ongoing smoke management programs with flawless records. All have had occasions of missed forecasts, misinterpreted communications or wrongly executed burns resulting in smoke intrusions into sensitive areas. To minimize the possibilities of such unfortunate results, most smoke management program operators are continually working to reduce errors in routine operations. These efforts include development of more sophisticated forecast techniques and improvement of data gathering equipment, better equipment and more rigorous procedures for communications, increased training and/or regulation to make burning results more predictable. The program operators in Northern Idaho have continued to make these same types of changes in an effort to reduce the potential for future smoke intrusions. It is recognized by smoke management experts, however, that these steps will never totally eliminate the potential for smoke intrusions.

In Northern Idaho open field burning has been conducted for more than twenty years. Public concern over the practice has generally increased in the last several years, expressed in increasing numbers of complaints. The potential of the air pollution effects of open field burning and resulting public concern were not lost on the local grass seed industry and in 1971 the Intermountain Grass Growers Association (IGGA)

was formed to address the needs of seed growers with regard to the problem. Over the next ten years, the State of Idaho, in its efforts to regulate the potentially substantial impacts of field burning, developed with IGGA, proposed plans for regulating burning and conducting research for non-burning alternatives. These plans were set forth in "Compliance Schedules" between the grass seed industry and the State. Both parties continued to operate under the restrictions of these schedules through the 1970's until the state legislature cancelled Air Bureau activities on June 30, 1981.

The last and most substantial effort at evaluating smoke management programs in Idaho was undertaken by the State just after the 1979 burning season. Seed growers, members of the public, and regulatory personnel, through the course of several meetings, jointly reviewed the Idaho program and made several recommendations for change. These were implemented in the 1980 season with apparent success.

At the onset of the 1981 field burning season, EPA received responsibility for all air pollution control in Idaho. However, Federal enforcement of State agricultural burning regulations during this period was limited by three constraints:

1. General language and lack of case precedents made State regulations difficult to enforce;

2. Federal enforcement authority was designed to deal with chronic, large-source violations rather than very short-term widely distributed sources like field burning; and
3. EPA resources were stretched thin trying to initiate a statewide air pollution control program.

To assist in the overall effort, EPA retained a consultant/ contractor, Engineering-Science, Inc. (ES), and assigned, as one of its tasks, the evaluation of field burning activities in Northern Idaho. A report, "Evaluation of the Grass Seed Field Burning Program in Northern Idaho" was produced by ES and served as a key source of information for development of this 1982 Smoke Management Plan.

As noted, it is anticipated that the State of Idaho's role in 1982 field burning will be limited, leaving regulatory responsibilities to EPA. Thus, federal enforcement procedures will again apply but, in contrast to the 1981 season, EPA proposes to provide on-site staff to manage and enforce open field burning in Northern Idaho during 1982. Unfortunately, federal enforcement procedures are cumbersome by most states' standards and are not well suited to field burning enforcement. However, if appropriate, substantial federal penalties can be levied for violations of any regulations included in Idaho's approved State Implementation Plan and these include all agricultural burning rules.

Traditionally, Idaho has not used a strong, regulation-based control program to deal with field burning. This reflects both the State's general approach to regulation of agricultural activities and the cooperative approach to control expressed by IGGA. Alternatively, the State of Washington has adopted specific regulations dealing with open field burning requiring permits to be issued for all open field burns. This difference in approaches is clearly noted between Spokane County, Washington where permitting of some 25,000A is required while adjacent Kootenai County, Idaho requires no permits for its 28,000A.

During 1981 the apparent disparity in control efforts was made even greater with the absence of any State of Idaho regulatory group. Because of acknowledged interstate smoke effects and disparate treatment of growers between Idaho and Washington, recent effort at program reform have focused on assuring uniformity between the two states. To this end, EPA took the lead in establishing a technical working group to review the problems of integrating control efforts while maintaining overall control and compliance with individual state laws. The product of the committee is to be an analysis and recommendation regarding the degree of practical uniformity that can or should be achieved. This working group's report recommendations will be considered for incorporation in this Smoke Management Plan and be made available for public review as part of the process for developing Smoke Management Program goals.

SECTION 2

USERS' INSTRUCTIONS

2. USERS' INSTRUCTIONS

2.1 Regulations and Authority

Regulations applicable to agricultural burning are contained in Section 1-1153.08 of Rules and Regulations for the Control of Air Pollution in Idaho. These regulations, which were adopted in 1970, will remain unchanged through the 1982 burn season. (House Bill 804 prohibits changes to air pollution control regulations until after December 1, 1982.) Therefore, applicable regulations for 1982 are as follows:

Section 1-1153.08 Agricultural Burning.

The open burning of plant life grown on the premises in the course of any agricultural, forestry or land clearing operation may be permitted when it can be shown that such burning is necessary and that no fire or traffic hazard will occur. Convenience of disposal is not of itself a valid necessity for burning. (9-21-70)

(a) It shall be the responsibility of any person conducting such burning to make every reasonable effort to burn only when weather conditions are conducive to a good smoke dissipation and only when an economical and reasonable alternate method of disposal is not available. (9-21-70)

(b) When such alternate method is made available, it shall be put into use within a reasonable time. (9-21-70)

(c) Any person conducting an agricultural, forestry, or land clearing burning operation similar to an operation carried out by a governmental agency shall follow the rules and procedures of the agency with regard to minimizing air pollution. (9-21-70)

(d) When such burning creates air pollution or a public nuisance, additional restrictions may be imposed to minimize the effect upon the environment. (9-21-70)

The U.S. Environmental Protection Agency is currently responsible for managing a program to control air pollution in Idaho. Though the legislature voted to reestablish the State's Bureau of Air Quality on August 2, 1982, it is unlikely the Bureau will be organized or staffed to assume responsibility for the 1982 burn season. Therefore, EPA, supported by its contractor, Engineering-Science, Inc. (ES) will be responsible for regulating agricultural burning in accordance with State regulations and the Clean Air Act. Since Section 1-1153-08, previously codified as Regulation D, Section 3, H is part of the federally-approved State Implementation Plan, it is enforceable by EPA according to Section 113 of the Clean Air Act.

2.2 Registration

As in past years, registration is required of any grass seed or cereal grain fields prior to burning. It shall be the responsibility of any person conducting such burning to complete and return by July 1, 1982 the appropriate forms.

Examples of these forms are shown in Figures 2-1 and 2-2. These forms can be detached and used or additional forms can be obtained by contacting:

Dennis Carlson
Executive Director
Intermountain Grass Growers Association
East 2375 Mullan
Post Falls, Idaho 83854
Phone: 773-5862

or

Jim Boylan
Engineering-Science, Inc.
801 Reserve Street
Boise, Idaho 83702
Phone: 344-6875

IT IS IMPORTANT TO NOTE THAT REGISTRATION DOES NOT AUTHORIZE BURNING.

2.3 Permits

Air pollution regulations in Idaho do not require a permit for agricultural burning. However, depending upon location of fields, certain Federal, State and local agencies responsible for fire safety do require burning permits. Compliance with air pollution regulations does not relieve a person of the responsibility of obtaining and meeting the terms and conditions of any applicable burning permits.

For example, during the period May 10th to October 20th the State Department of Lands requires a burning permit. A copy of this permit is shown in Figure 2-3.

FIGURE 2-1

STATE OF IDAHO
1982
SMOKE MANAGEMENT FIELD REGISTRATION FORM**

NAME AND ADDRESS

_____

_____

_____

DATE: _____

PHONE #: _____

FIELD COMMUNICATION (INCLUDE CHANNELS/FREQUENCIES): _____

_____

PERSON IN CHARGE OF BURNING: _____ PHONE #: _____

LINE NO.	LOCATION OF FIELD* (SEC., TWP., RANGE)	NUMBER OF ACRES	ON RATHDRUM PRAIRIE? (YES OR NO)	TYPE OF FIELD (GRASS OR CEREAL GRAIN
1	S_____ T_____ R_____			
2	S_____ T_____ R_____			
3	S_____ T_____ R_____			
4	S_____ T_____ R_____			
5	S_____ T_____ R_____			
6	S_____ T_____ R_____			
7	S_____ T_____ R_____			
8	S_____ T_____ R_____			
9	S_____ T_____ R_____			

(Continue List on Additional Forms if Necessary)

*THE RATHDRUM PRAIRIE DETAILED INFORMATION SHEET MUST BE COMPLETED FOR EACH FIELD LOCATED ON THE RATHDRUM PRAIRIE.

**ALL FORMS MUST BE COMPLETED AND RETURNED PRIOR TO THE BURNING OF ANY GRASS SEED FIELD OR CEREAL GRAIN FIELD. (AUTHORIZATION FOR BURNING MUST BE OBTAINED FROM PROGRAM MANAGER LOCATED AT THE RATHDRUM PRAIRIE WEATHER STATION OR APPROPRIATE DEPARTMENT OF LANDS REPRESENTATIVE PRIOR TO IGNITION.)

PLEASE RETURN WHITE COPY OF COMPLETED FORMS TO: JIM BOYLAN
ENGINEERING-SCIENCE, INC.
801 RESERVE STREET
BOISE, IDAHO 83702

RETAIN YELLOW COPY FOR PERSONAL RECORDS

SIGNED _____

FIGURE 2-2

REGISTRATION NO._____

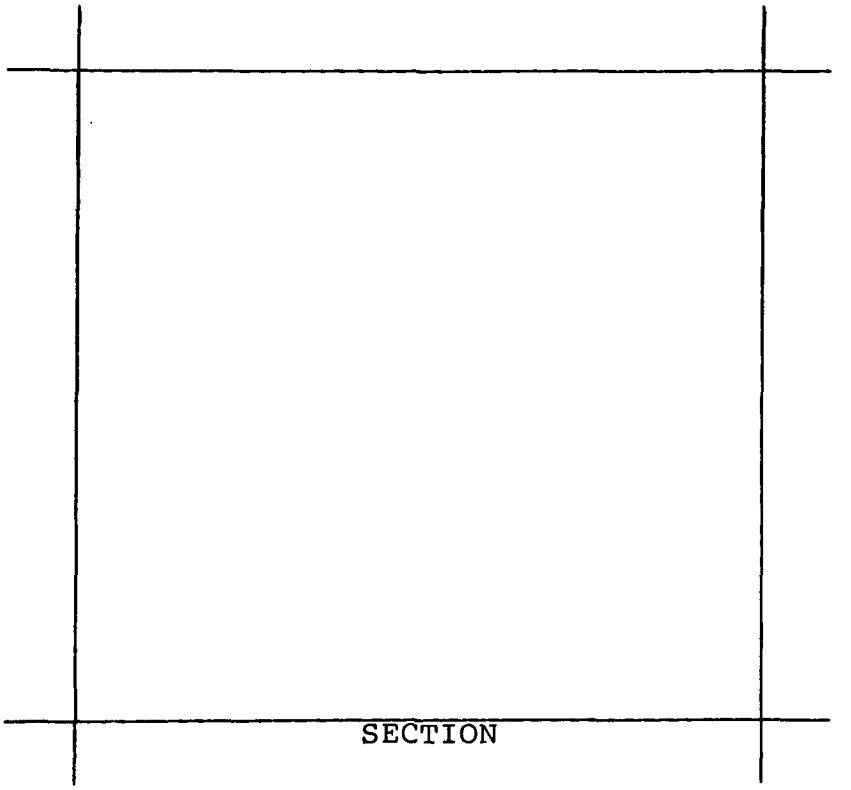
RATHDRUM PRAIRIE
DETAILED INFORMATION SHEET

DATE: _____ OWNER: _____

PLEASE LIST REGISTRATION FORM LINE NUMBER(S) CORRESPONDING TO FIELD(S) IDENTIFIED IN SECTION BELOW.

_____ _____ _____ _____
_____ _____ _____ _____

PLEASE LOCATE AND IDENTIFY IN THE SECTION BELOW: FIELD(S) TO BE BURNED, ROADS, HOUSES, OTHER SENSITIVE AREAS OR HAZARDS AND INCLUDE ARROWS WITH DISTANCES TO SENSITIVE AREAS OUTSIDE OF THIS SECTION. WHEN MORE THAN ONE FIELD IS SHOWN, LABEL THE FIELDS USING THE CORRESPONDING REGISTRATION FORM LINE NUMBERS.



SPECIAL BURN CONSIDERATIONS: _____

FOR OFFICE USE ONLY

FIELD ID. _____

MAP COORDINATES

_____

PLEASE SUBMIT WITH REGISTRATION FORM TO:

JIM BOYLAN
ENGINEERING-SCIENCE, INC.
801 RESERVE STREET
BOISE, IDAHO 83702

State of Idaho BURNING PERMIT No. 06700

In accordance with 38-115, Idaho Code, Rule 601.04 of the State Board of Land Commissioners*

Name	Address	Phone No.

is hereby granted a permit to burn the following materials:

	Section	Township	Range	County
LOCATION				
	Section	Township	Range	County

Burning will be confined to the hours of

The permittee must keep the burning operation confined within cleared firebreaks or barriers and provide the following men, equipment, and precautions on the fire until it is out.

Date Issued

through : inclusive

Issued By (Fire Warden)	Phone No.	*I certify I have read and understand this Permit and assume full responsibility for this permit burning.*
X		
Forest Protective District		Received By
		X

*See Reverse Side (38-115, Idaho Code, Rule 601.04)

CAUTION: This permit does not relieve permittee from responsibility of fire damage and suppression costs as a result of fire escaping from prepared permit area.

DL 806 (1/75)

38-115. Closed season for fires — Permits — Regulations — Extension of closed season — Suspension of permits — Penalty. The period from May 10 to October 20, inclusive, of each year shall be known as the closed season. During the closed season it shall be unlawful for any person to set or cause to be set a fire in any slashing area, or a fire to any stump or stumps, log or logs, down or standing timber or to set or cause to be set, a fire on any forest or range lands or dangerously near thereto, or in any field in any forest protective district, without having first procured a permit from the fire warden of the district, provided, that unless campfires have been prohibited during critical hazard perioeds, campfires may be set without permit provided there is compliance with the provisions of section 38-116, Idaho Code. Every permit shall prescribe the conditions upon which the permit is given, and contain rules and regulations governing the setting of fires and the prevention of the spread thereof to the property of another. At no time shall any fire be set when the wind is blowing to such an extent as to cause danger of the fire getting beyond the control of the person responsible for setting it, or without sufficient men, tools, supplies and fire-fighting equipment to control it, and the fire shall be kept under the control of the person responsible for setting it until it is out. The state board of land commissioners shall from time to time make all necessary rules and regulations governing the setting of fires on forest lands for both the closed and open season, and for their proper control and extinguishment. It shall be the duty of the director of the department of lands to prepare the proper form of permit to be used in carrying out the provisions of this section. The fire wardens shall at all times have authority to refuse permits and/or to revoke the same and to postpone their use when issued, when they shall deem it necessary so to do in the interest of public safety. Any permits obtained by misrepresentation shall be invalid.

In seasons, localities and under conditions of unusual fire danger, the director, with the advice of the fire warden of any protective district, shall have the power to extend the period of closed fire season in any district of the aforementioned districts to meet the particular fire hazard of each district, and when the safety of the public requires, change the closed season in any district by fixing inclusive dates other than those herein designated; close to entry therein by any person or party, the forest and range lands in any section of the state wherein a critical fire hazard exists, and may restrict or suspend travel on any road or trail leading into any such land, until a permit shall have been secured from the fire warden of the forest protective district wherein such lands are situated, and may also, without proclamation, suspend any and all permits or privileges authorized by this section and prohibit the setting of any campfires, and/or fire in forest and range land or dangerously near to such, or in fields in any forest protective district.

Any violation of the provisions of this section shall be deemed a misdemeanor.

601.04 Burning Permits. In each instance that a burning permit is issued during closed season, the permit shall be subject to the following conditions:

1. Permits issued for open fires shall be limited for that period of time needed to accomplish the prescribed burning; provided, however, in no event shall such permit be issued for more than 10 days.
2. Each permit shall contain all the terms and conditions deemed necessary by the State Forester for such burning, which terms and conditions shall remain effective for the entire period of the permit.

FIGURE 2-3

DEPARTMENT OF LANDS OPEN BURNING PERMIT

2.4 Burning Authorization

Any person conducting agricultural burning on the Rathdrum Prairie must obtain authorization to burn from the program manager located at the Rathdrum Prairie Weather Station and, in other areas, from the appropriate State Department of Lands Office prior to ignition. Failure to obtain available weather information or abide by the daily burn authorizations may be evidence of a violation of Section 1-1153.08(a).

SECTION 3

OPERATIONAL PROCEDURES

3. OPERATIONAL PROCEDURES

The following discussion of daily program organization and operations describes proposed activities for the State of Idaho, the Intermountain Grass Growers Association (IGGA) and to the extent necessary, the Spokane County Air Pollution Authority (SCAPCA). The proposed operation of the Idaho Smoke Management Program will be similar to that conducted during the 1980 season but will include changes incorporated by Engineering-Science, Inc. (ES) for the 1982 season. The changes are made to improve program technical approach, overall effciency and enforcement capabilities. ES's participation, as a contractor to EPA, is presumed even though the State legislature has authorized funding of the Bureau of Air Quality for fiscal year 1983 (1982 season). It is anticipated to be fiscal year 1984 before the Bureau has the resources and personnel in place to assume full program responsibility.

3.1 Organization and Contract

In fulfilling its obligations under the Clean Air Act, EPA is conducting air pollution control activities in Idaho with the aid of ES during the absence of the Idaho Bureau of Air Quality. The ES contract directed the company to perform many of the responsibilities of a normal air pollution control agency, leaving ultimate enforcement of violators to EPA. A specific requirement of the contract was the evaluation of the northern Idaho field burning activities and control programs.

Because funding for the State's Air Bureau will not be available until August 2, 1982 and field burning this year will probably begin in July, the State was not anticipated to have personnel available to conduct the 1982 Smoke Management Program. Consequently, ES's activities under the contract were modified to include management of field burning activities. ES personnel would carry out functions formerly completed by State personnel including coordination with IGGA and other interested parties, managing daily burning activity and identifying potential violations of regulations. The organization of personnel involved in the operation of the 1982 Idaho Smoke Management Program are identified in Figure 3-1.

3.2 Collection of Weather Data and Development of Forecasts

Meteorological data for the Idaho smoke management program will be obtained from the National Weather Service Office at Spokane International Airport (Gieger Field). Each weekday morning, the IGGA meteorologist will consult in-person with NWS staff. The IGGA meteorologist will also obtain and analyze weather maps, charts, and reports useful to making dispersion and wind direction forecasts.

The morning meteorological information will be updated periodically based upon local surface and upper air information from weather monitoring stations which are sited at locations identified in Figure 3-2. Throughout the day additional wind and vertical mixing information will be

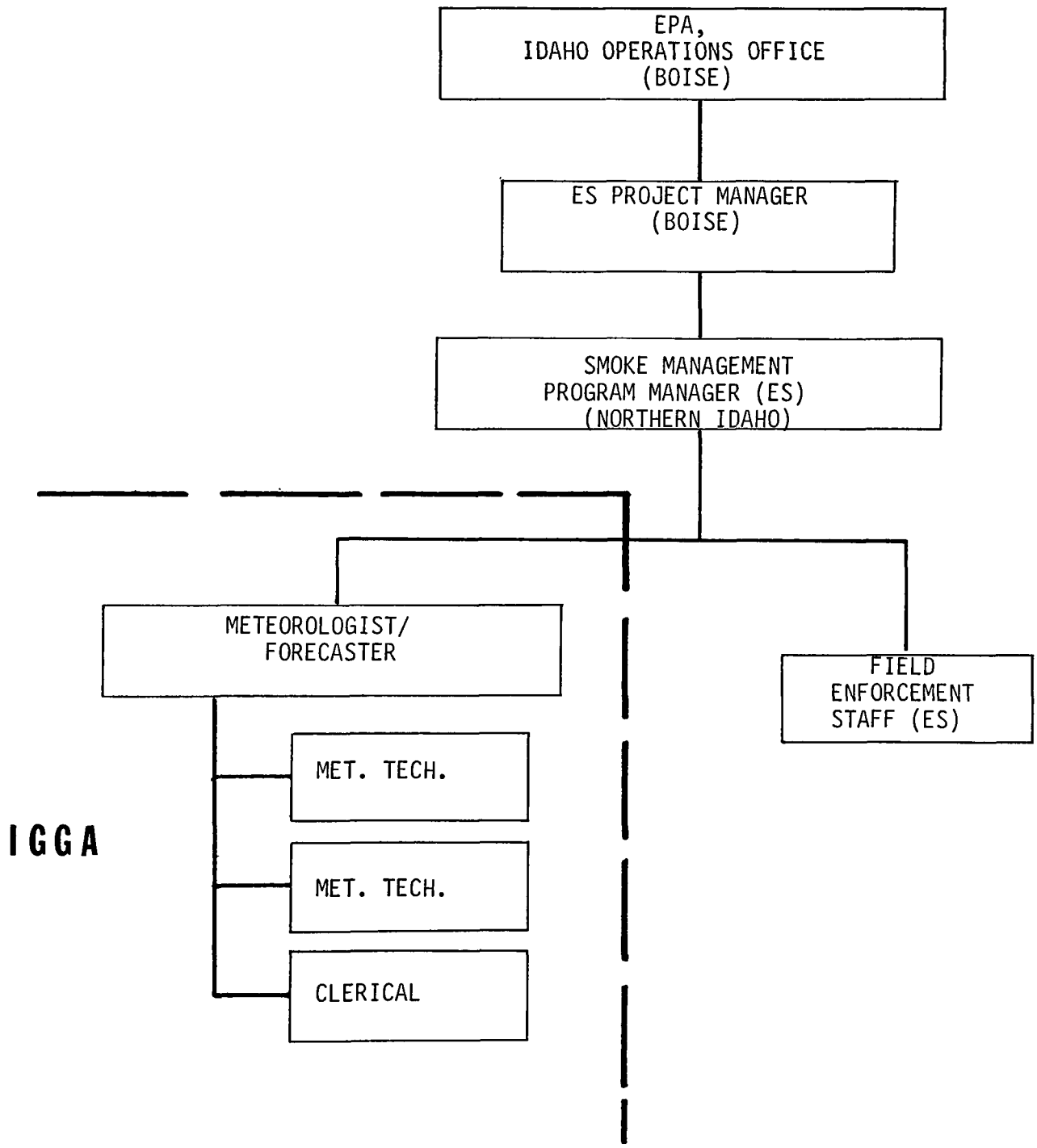


Figure 3-1. Organization of personnel in the 1982 Idaho Field Burning Smoke Management Program

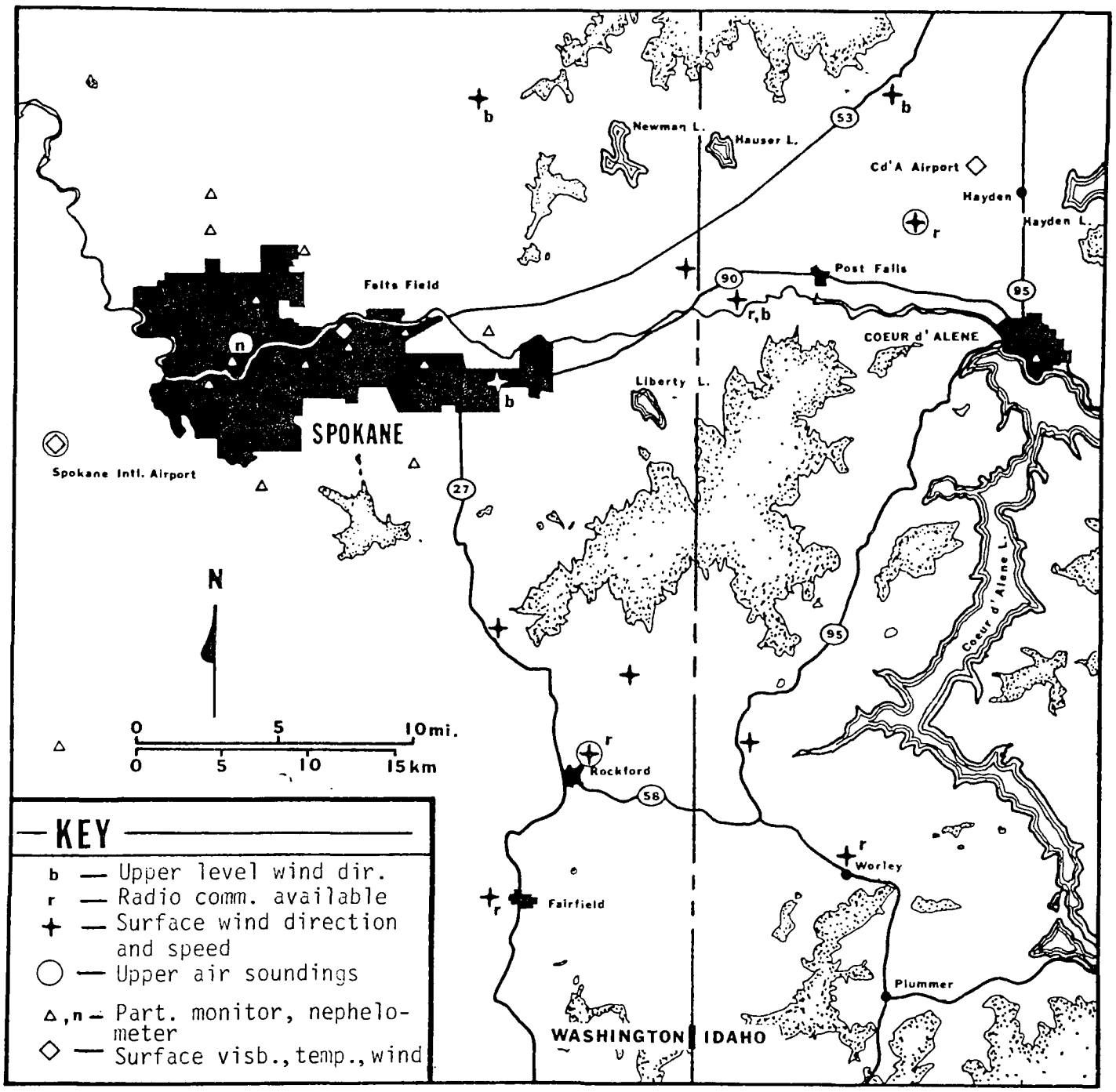


Figure 3-2. Types and locations of ambient monitoring instruments for operation of the Idaho smoke management program and analysis of smoke effects.

received by interrogating surface weather stations and by releasing radiosondes and pilot balloons to obtain upper level temperatures and winds. ES and IGGA staff will work collaboratively in collecting this information. During the Rathdrum Prairie burning season, this equipment will be located with IGGA and ES personnel at the IGGA weather station site near the center of the Prairie. Later in the season, these weather instruments will be transferred to the south Spokane County area which will be closer to the center of burning activity at that time. IGGA is anticipated to provide at least two staff members in addition to the meteorologist to operate and maintain this wind and temperature measuring equipment throughout the burning season. Also, throughout the day, ES staff will interrogate NWS personnel as necessary for more recent assessments of the weather situation.

An example of the data form to be used by the ES to record burn forecast data is shown in Figure 3-3.

3.2.1 Wind Information

Wind direction and wind speed data shall be determined chiefly through:

a. Upper air soundings, which are taken twice a day by the National Weather Service at Spokane International Airport (morning soundings will be obtained each day by the IGGA meteorologist);

FIELD BURNING WEATHER AND FORECAST
DATA SHEET

DATE_____ TIME _____

TODAY'S FORECAST

INVERSION BREAK-UP

TEMPERATURE_____ TIME (PDT)_____

FORECAST MIX. HT. _____

ELEVATION (MSL)	DIRECTION AND SPEED (KTS.)	
Surface	_____	_____
3,000	_____	_____
4,000	_____	_____
5,000	_____	_____
6,000	_____	_____
7,000	_____	_____
8,000	_____	_____
9,000	_____	_____
10,000	_____	_____
11,000	_____	_____
12,000	_____	_____

PRECIPITATION _____

TOMORROW'S FORECAST

OTHER CONSIDERATIONS

REVISED
7/6/79

NWS CONTACT PERSON: _____

OTHER CONSULTANTS: _____

BY: _____

AUTHORIZED BURNING PERIOD(S)
AND SPECIAL RESTRICTIONS

RATHDRUM PRAIRIE

WORLEY

ST. MARIES

CONTACT WITH DOL FIRE WARDENS

MICA OFFICE (664-8197)

_____CONTACTED AT ____A.M.

ST. MARIES OFFICE (245-4551)

_____CONTACTED AT ____A.M.

FIGURE 3-3. Proposed Data sheet for recording of daily meteorological data pertinent to field burning smoke dispersion.

b. Pilot balloon soundings taken at the Rathdrum Prairie weather station and southern Spokane County by IGGA personnel;

c. Visually tracked in-field balloon releases;

d. Tracking of smoke plume movements by observers located at the Rathdrum Prairie weather station, in fields, and in moving vehicles; and

e. Remote weather sites, accessible by telephone.

This information will be recorded on appropriate forms and logs.

3.2.2 Mixing Height

Vertical dispersion information for conducting the smoke management program will be determined from the early morning (4 A.M.) sounding taken at the Spokane NWS station and minisonde measurements taken as needed throughout the day at the Rathdrum Prairie weather station. Other useful information on upper level winds and stability will be sought from the NWS.

3.2.3 Rainfall

In general, determination of proper field fuel moisture conditions for burning will be left to the individual farmer both for periods following rainfall and after nighttime periods of high relative humidity and dew. Rainfall data from the nearby recording stations will be collected.

3.2.4 Weather Forecasts

3.2.4.1 Daily Burning Weather Forecasts

Weather forecast will be assembled by the chief IGGA meteorologist each morning prior to 7:00 A.M. Synoptic maps supplied by the NWS will be inspected as well as computerized weather prognoses. Prior to 8:00 A.M., local NWS forecasters will be interrogated regarding expected dispersal conditions. The meteorologist will forecast synoptic wind flow patterns through pressure gradient analysis and surface temperature forecasts (the time of "breakup" of a surface based inversions can strongly affect wind flow fields and this breakup depends on the surface temperature reaching a critical value). He also will make forecasts regarding microscale winds affecting flow over the Rathdrum Prairie and Spokane Valley.

Forecasts will be updated throughout the day based upon upper level wind and temperature measurements taken at the Rathdrum Prairie weather station. Additional information from the NWS, obtained from facsimile and/or teletype units[1], will be used to provide continuous updating of regional meteorological information.

Based on the developed forecasts the IGGA meteorologist will advise the program manager regarding the areas and amounts of burning and aid in the judgments regarding the burning of individual fields.

---

[1]Installation in 1982 contingent upon available funds.

3.2.4.2 Air Stagnation Advisories

Air Stagnation Advisories (ASA) are issued by the National Weather Service when atmospheric dispersal conditions are poor for an extended period of time (36 hours) and a buildup of air pollutants is expected. ALL OPEN BURNING WILL BE PROHIBITED WHEN AN ASA IS IN EFFECT.

3.3 Use of Aerial Observations

When feasible, aerial observations will be used to make rapid, accurate assessments of meteorological conditions as well as important burning information such as plume height and trajectory. In addition, the use of aircraft will facilitate:

a. Measurement of atmospheric temperature soundings;
b. Observation and more precise timing of forecast weather changes;
c. Immediate identification or verification of micro-meteorological changes; and
d. Observation of the extent and timing of smoke intrusions.

Due to the additional expense the use of aircraft are anticipated to be extremely limited.

3.4 Use of Test Fires

There is often little difference between test fires and normal burning on the Rathdrum Prairie since most fields are authorized for burning on an individual basis. Test

fires will not normally be conducted in other areas. Often the IGGA meteorologist will be on-site prior to the time of ignition for balloon releases or other observations. No specific requirements will be placed on test fires used for determining existing meteorology prior to additional burning except that the field should be representative of others to be burned. Test fires will not be selected which would result in other burning being unnecessarily delayed. The scheduling of Rathdrum test burns, as with all other burns, will be done directly between the grower and the weather staff. All such burns will be authorized by the ES program manager.

3.5 Collection and Use of Air Quality Data

No formal procedures will exist for the use of quantified ambient air quality data such as visibility, particulate loadings, and air pollution episode data since current monitoring will be inadequate for these purposes. However, visibility observations from Coeur d'Alene Airport will be used in making post-season assessments of impact there.

3.5.1 Visibility/Complaints

Prevailing visibility will be a factor in establishing burn releases in the area. It will be tracked formally and informally to quantify overall air quality as well as the intensity of smoke intrusions. In addition, reduced visibility due to field smoke in certain key communities will be reason to curtail burning upwind of those areas.

These communities are Spokane, Coeur d'Alene, Post Falls, Hayden Lake and Liberty Lake. Additional areas identified in Figure 3-4 will be protected also. Burning will be restricted in areas upwind of these visibility protection areas to avoid direct plume impact.

Complaints are a measure of air quality and will be used in identifying affected areas where burning may need to be limited beyond that which has been authorized already. Complaints will be recorded by ES staff, Division of Environment (Coeur d'Alene), IGGA and SCAPCA and compiled annually. They will be used as a non-specific but important measure of the program's success.

3.5.2 Particulate Monitors

Nephelometers, high volume samplers and other particulate measuring instruments, as currently available in Northern Idaho, cannot provide information in a time frame to be of value to smoke managers in controlling burning. Therefore, routine interrogation of real-time particulate monitors is not planned for the 1982 season.

The nephelometers operated by SCAPCA in Spokane (and any others that may be approved for northern Idaho) are sensitive to field burning smoke and will be used to retrospectively quantify smoke intrusion intensity and duration.

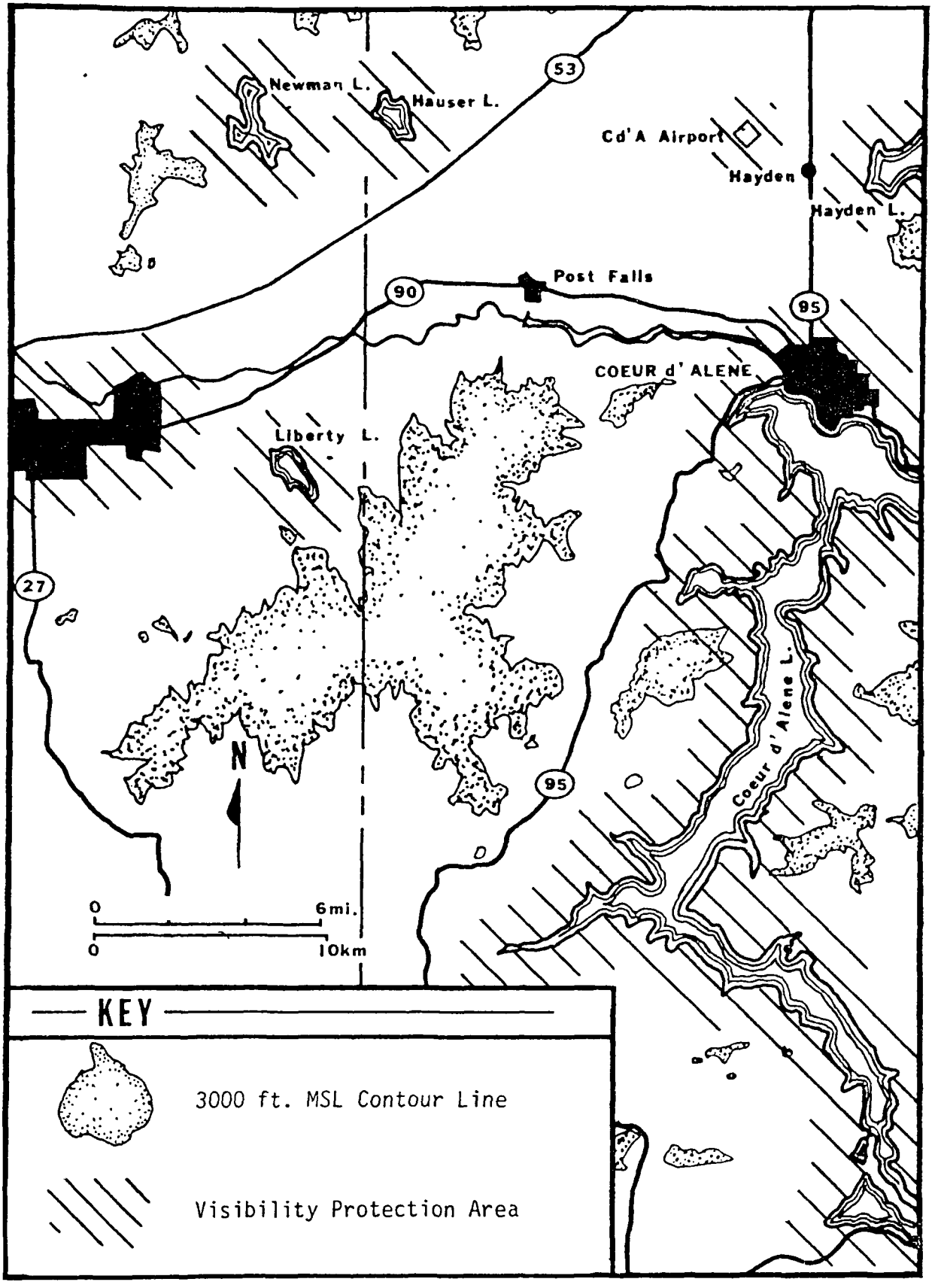


Figure 3-4. Visibility protection areas - a one mile (1.6 Km) wide protective area around identified cities, recreational areas, and airports. A recommended smoke management goal would be to prevent visibility reducing smoke intrusions into these areas.

3.5.3 Air Pollution Episodes

Air pollution episodes in this area usually occur in the winter due to high levels of carbon monoxide (CO) in the city of Spokane. TSP and ozone are not a problem. However, field burning advisories will be adjusted to mitigate any potential effects due to field burning should it be necessary.

3.6 Determination of Acreage for Burning

Because burning on the Rathdrum Prairie will be conducted only after direct contact between the burning crew or grower and the program manager and weather forecaster, the availability and conditions of individual fields should be well known at the time of a burn request. Tracking these factors will be intrinsic therefore to the Rathdrum operation. Such tracking in southern Kootenai, and Benewah counties will be accomplished at the fire district level. Direct contact between burn managers, fire safety agents and growers is anticipated to result in a good understanding of local field and burning conditions.

3.6.1 Determination of Burn Areas

Areas for burning will be chosen primarily on the basis of wind direction. Though the effects of wind speed and thermal stability will be considered, areas of concentrated burning will be selected downwind of major population areas, highways and airports. Upwind burning of these areas will be allowed only at a very reduced level when

light surface winds and good vertical mixing are sufficient to maintain acceptable surface air quality.

Wind flow patterns will be developed for both surface and upper levels, particularly the top of the mixing layer since the major proportion of the smoke will be concentrated here. Upper level flow directions will be based upon routine pilot balloon and rawinsonde data received throughout the day. From these wind directions and allowing for transverse horizontal dispersion, potential impact areas at long distances, 10 to 60 miles (15 to 100 km) downwind, will be identified for any proposed burning. If such trajectories indicate impact on major cities or other sensitive areas, burning will be restricted accordingly in the proposed area. ("Upwind for a given receptor (city, sensitive area, etc.) will include any area where, if pollutants were emitted, some portion would, through advection and dispersion, reach the receptor.) Often the "backward" plume concept will be applied to the wind flow field to determine areas from which burning emissions would cause receptor impacts.

Surface wind flow fields will be developed in a similar manner based upon wind observations, augmented by smoke observations and experience with local terrain-induced flow phenomena. Since information on local surface winds

will be available on a real-time basis, revisions to the surface flow field will be made routinely throughout each day.

The potentially large number of permutations of surface and transport winds may be limited to a few regimes typically observed in the Spokane/Coeur d'Alene area. These regimes and likely areas of burning are summarized in Table 3-1.

When possible operators will make use of very light surface winds to maximize plume rise. Under this conditions, upper level transport winds must be sufficient (10-15 miles per hour) for smoke to travel beyond sensitive areas within a few hours. Light surface winds also will be used near sensitive areas, even though directions are somewhat less certain, in order to take advantage of good burning and plume rise conditions. Periods with high surface wind speeds (>15 knots) will not be utilized due to plume fracture and fire safety concerns.

Use of upslope/downslope[1] surface flow to burn certain fields in critical locations will continue, but only under very close monitoring of low level wind flows.

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[1]Under appropriate conditions, easterly, downslope winds, prevalent in morning, will be utilized to burn fields near smoke sensitive areas on the eastern perimeter of the Rathdrum Prairie. After some period of westward drift on the waning downslope flow, developing westerly surface winds normally carry the now dispersed plume back toward the east.

TABLE 3-1

GENERALIZED IGGA FORECAST CRITERIA

FORECAST ELEMENT	COMMENTS
TRANSPORT WIND DIRECTION	Areas favorable for burning
Southwesterly	Spokane Valley, Foothills, Rathdrum Prairie
Easterly	S. Spokane Co. S. Kootenai Co.
Northeasterly	S. Spokane Co. S. Kootenai Co.
WIND SPEEDS	Transport (Upper Level) Winds: Should be 10-20 mph Lower speeds provide too slow of clearing and allow downward diffusion over protected areas. Surface Winds: Should be 6 - 10 mph Higher speed fracture convective column; lower speeds usually too variable
TEMPERATURE PROFILE	No low level stable layers
RELATIVE HUMIDITY	Low humidity preferrable but RH much less significant a factor than other criteria
CLOUDINESS AND PRECIPITATION	Cannot burn during and after precipitation; Cloudiness may signal useful ventilation

Because the timing of the burning with respect to the change in wind direction is critical, if smoke entrained in surface layers is not to impact Spokane and other smoke sensitive areas on the west of Rathdrum Prairie, ignition times will be closely controlled so as to coincide with the latest forecast for wind directions change. Such precise control of burning requires: 1) Use of short forecast periods; 2) Close monitoring of meteorological conditions; and 3) Immediate communications with the field personnel and accordingly it will only be considered when all three conditions are met.

Parameters affecting transverse dispersion are extremely difficult to prejudge and such estimates will be based largely upon general experience under similar conditions and the results of test fires or scheduled burns already in progress. Significant terrain features and bodies of water which can greatly affect dispersion will be taken into account in planning burning activities.

3.6.2 Determination of Amounts of Burning

The amount of burning to be authorized will be based on the program manager's judgment of downwind effects and acceptable air quality. The process of matching of emissions to ventilation conditions will be accomplished by evaluating fields on a case-by-case basis and weighing the anticipated combined effects with those from other authorized fields. The manager will consider at least

the following factors before making a decision regarding burning:

1. Ventilation conditions (surface and transport wind speeds and directions, turbulence, atmospheric stability);
2. Plume characteristics (mixing depth, surface wind speed, field fuel conditions);
3. Special area concerns (heavily populated areas, highways, problem terrain, airports, identified visibility protection areas);
4. Field conditions including fuel type, loading and moisture content, adjacent smoke sensitive areas, capability of crew conducting burning, and field size, shape and acreage. (In general, burning will remain restricted after periods of rainfall with about one day's drying required for each 0.1 inch of rainfall.)
5. Air quality considerations (effects on visibility and particulate loading, exposure time); and
6. Fire hazard considerations (adjacent woodlands, forests and other crops, wind speed, temperature, relative humidity, fuel conditions, Department of Lands burn advisories).

Although burning may be denied in consideration of one or more of these factors, burning releases will not be tied to specific values for mixing height, fuel moisture

content or other significant parameters. In general, however, field burning will not be conducted until any existing inversion is totally "broken up." This allows maximum air volume for dispersal of the smoke. When the atmospheric structure is such that other stable layers may hinder vertical movement, whether or not an inversion is present, burning will remain restricted unless vertical mixing heights of 3500 feet or greater are present. However, this restriction will not apply to fields located on the eastern edge of the Rathdrum Prairie in order to to take advantage of the upslope/downslope wind direction change often associated with inversion breakup in this area.

3.6.3 Modifications to Areas and Amounts of Burning

Burning authorizations issued by the program manager will be amended as weather conditions change, or ambient smoke levels or other factors become unacceptable. These changes will be communicated by telephone or radio to the burning crew or grower affected.

3.6.4 Coordination with SCAPCA

Each day after development of the daily burning forecast and identification of proposed areas for burning, but prior to release of any significant burning the Idaho program manager will contact the Spokane County Air Pollution Control Authority (SCAPCA) program director to discuss proposed burning activity in Spokane County. At this time, (approximately 10 A.M.) potential burning activity will be assessed

and decisions made to avoid excessive impacts in any areas. Anticipated impact areas will be identified, as well as the expected severity and duration of any smoke intrusions.

When deemed necessary the Idaho Program Manager will seek reductions in proposed burning in Spokane County to stem anticipated excessive impacts in Idaho.

Each day the Idaho Program Manager will contact the SCAPCA program director to identify and discuss the actual impacts of burning just completed. Estimates of impact areas, severity and times of intrusion will be made as well as recording of complaint totals. Attempts will be made at preliminarily identifying the field(s) implicated in the smoke problem. The results of these discussions with SCAPCA will be entered in an appropriate log for permanent record.

The overall process of developing an issuing burn authorizations and tracking resulting burning is displayed schematically in Figure 3-5. Responsible parties for each function are identified.

3.7 Authorization of Burning

All grass seed field burning in Northern Idaho will require authorization by the program manager. On the Rathdrum Prairie, such authorizations will be issued directly to seed growers.

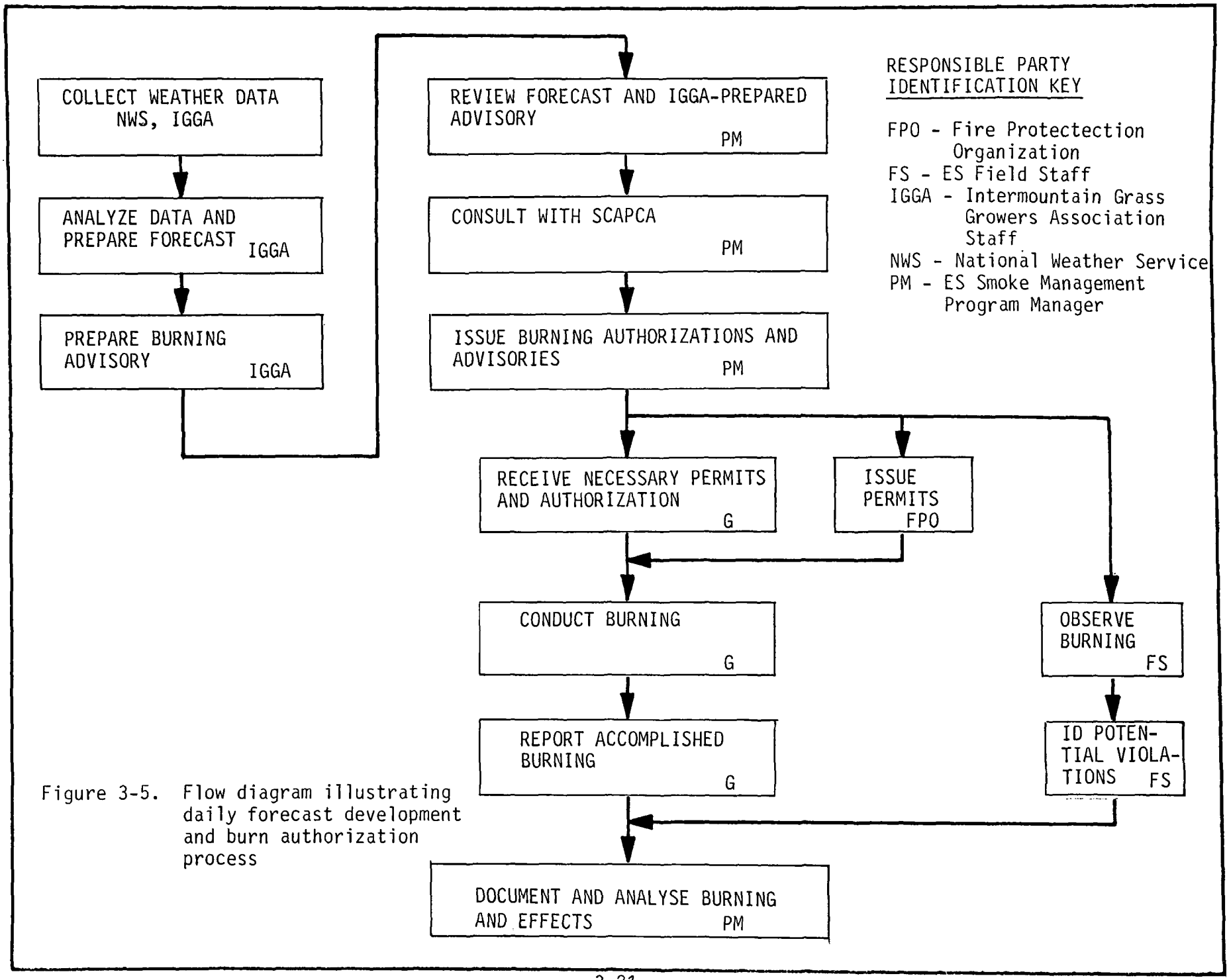

Figure 3-5. Flow diagram illustrating daily forecast development and burn authorization process

In other areas, the authorizations will be delivered through the Department of Lands, fire permit-issuing agents in compliance with the daily restrictions set forth by the program manager.

Authorizations will include a brief weather discussion and at least the following:

1. Identification of the field(s), areas and acreage(s) affected;
2. An earliest ignition time; and
3. A latest time for ignition to be completed.

Authorizations may also include restrictions or guidance regarding fuel conditions, wind direction or speed, ignition method or other factors important to smoke dispersion. Scrupulous records of authorizations will be maintained for use in subsequent smoke intrusion analyses or enforcement actions. Proposed forms for recording authorization data are shown in Figures 3-3 and 3-6.

3.8 Use of Communications

Routine communications, including authorizing burning, regarding field burning activities will be handled by telephone. To the extent possible in the Rathdrum Prairie area, use will be made of the IGGA radio network that will maximize direct communication between most parties involved in the program.

Where possible the program manager and meteorologist will take advantage of the existing on-farm radio systems. However, these arrangements will rely upon the availability of an individual to relay or repeat messages. Under such circumstances the program managers will feel less freedom in authorizing burning since the initiation of the burning must rely upon rebroadcast, subsequent repetition, or hand-carrying of the authorizing message. Under atmospheric conditions requiring precise control of burning, it is anticipated that program operators may limit authorizations to fields with which there is direct communication.

3.9 Program Documentation

Well organized records of weather data, air quality data, burn releases and acreage accomplishment will be maintained on a routine basis by all ES participants in field burning management. Such records will establish a data base to be used for subsequent program evaluation, improvement and quality assurance, as well as, supporting burn management decisions in any litigation regarding burning.

Where not already in use, standardized procedures will be adopted for the gathering of information and issuance of advisories. These procedures will be facilitated through use of standard forms, logs, checklists and flow diagrams. Suggested formats for logging daily burning activities and the collection of remote weather data are illustrated in Figures 3-6 and 3-7.

DAILY BURN ACTIVITY LOG

DATE _____

GROWER NAME	FIELD ID NUMBER	NUMBER ACRES PROPOSED	AUTHORIZED START TIME	ACTUAL IGNITION TIME	NUMBER ACRES COMPLETED	COMMENTS

Figure 3-6. Proposed form for recording daily burning activity

REMOTE WEATHER LOG

DATE _____

SITE (NAME/NO.)		TIME	WD	WS	VISIBILITY	COMMENTS

Figure 3-7. Proposed form for recording daily surface weather data from remote meteorological instruments