



AIR SCIENCES INC.

DENVER • PORTLAND

E^C/R Incorporated

FINAL

**Evaluation of Existing
Fire Tracking Systems**

WORK PLAN

PREPARED FOR:

WESTERN GOVERNORS'
ASSOCIATION
WESTERN REGIONAL AIR
PARTNERSHIP
FIRE EMISSIONS JOINT FORUM

PROJECT 178-9
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SECTION 1

INTRODUCTION

The Western Regional Air Partnership (WRAP) Policy/Fire Tracking System Executive Summary states that the WRAP is charged with developing technical and policy tools to assist states and tribes with implementing the Regional Haze Rule. The WRAP policy on Fire Tracking Systems (FTS) was developed through a stakeholder-based consensus process to assist the WRAP region states and tribes in addressing emissions from fire sources. It is the position of the WRAP FTS Policy that it is necessary to track fire activity information in the WRAP region using a fire tracking system, which will also provide the information essential to create a fire emissions inventory.

The Fire Tracking System Task Team (Task Team) is looking for a fire tracking system that meets the WRAP's minimum needs yet is flexible enough to allow for modifications to accommodate expansions to include additional options. The Task Team is not looking for a "brilliant, new design." The Work Plan should describe the methods to evaluate existing fire tracking systems to determine if an existing system, with few or minor modifications, will satisfy the WRAP's requirements. Both web-based and historical systems (e.g., wildfire systems) may be listed as candidate systems for evaluation. However, the primary emphasis of this project is on real-time data import and export capabilities.

The project team of Air Sciences and EC/R (Project Team) should review the WRAP Policy – Fire Tracking System (April 2, 2003), the "Needs Assessment for Evaluating and Design of an Emission Data Reporting, Management, and Tracking System" (July 25, 2003 – in particular those sections pertaining to fire tracking), the "Fire Tracking System" presentation from the Coeur d'Alene, Idaho meeting on May 15-17, 2001, and the WRAP Emissions Data Management System (EDMS) design information.

SECTION 2

PROJECT GOALS TASKS AND DELIVERABLES

The stated goals of this project are to evaluate existing fire tracking systems and provide the following:

- A feasibility assessment of existing systems.
- An analysis of modifying each system to include WRAP needs (e.g., what needs to be done to make the system fit the WRAP's needs).
- Estimate resources needed to modify the system to meet the required elements for tracking prescribed fires. The cost estimate should include development hours, any additional hardware costs, ongoing system costs, etc. The estimate should be itemized and should include some of the additional optional elements, provide for regional coordination, and transfer of data to the WRAP's EDMS system.

At least the following operational existing fire tracking systems must be evaluated:

- San Joaquin Valley Smoke Management System - California
- Airshed Management System (formerly RAZU) - Montana/Idaho
- Smoke Management Database - New Mexico
- Nez Perce Tracking System
- South Carolina
- Florida
- USDA Smoke Management System

The consultant may evaluate other operational systems that the consultant believes may be of interest to the FEJF with FTS Task Team approval. Fire tracking system evaluations need not be limited to only those currently being used in the Western U.S.

The Project Team will evaluate all of the listed fire tracking systems per the contents of the Evaluation Chart described in Section 3, Task 2 of this Work Plan. Based on the Project Team's review of this initial evaluation, up to two (2) existing fire tracking systems will be selected for further evaluation and assessment. This short list of fire tracking systems, along with a summary of the Project Team's selection justifications, will be presented to the Task Team for review. Each of the short-listed FTS systems will be evaluated for necessary modifications to meet the WRAP's required elements for tracking prescribed fires and to provide estimates of the resources that

would be necessary to modify an existing system to meet the WRAP's requirements and maintain the WRAP's FTS.¹

Also, the current manager of each short-listed FTS will be asked a few questions during the evaluation/interview process pertaining to the manager's assessment of the suitability of the existing system to become the WRAP's FTS. The Project Team will attempt to provide a preliminary and qualitative description of the manager's willingness to modify the existing system and host the WRAP FTS, given an acceptable contractual relationship with the Western Regional Air Partnership/Western Governors' Association. The primary objective of these questions will be to identify any FTS managers that would be unwilling to modify the existing FTS and host the WRAP FTS.

¹ The Project Team's estimates of the resources required to modify an existing FTS to meet the WRAP's requirements and to maintain the WRAP's FTS will be approximations based on input received from managers/users of existing FTS systems and input from the Project Team based upon our companies' related experience. These estimates should be considered approximate and not "fixed-price" costs to be used by the WRAP for future contracting purposes.

PROJECT TASKS AND METHODOLOGY

Task 1: Project Work Plan, Meetings, and Information Gathering

Task 1a: Work Plan

This Work Plan presents the methods and deliverables for the project to evaluate existing fire tracking systems (FTS Evaluation Project). This work is being managed by the Fire Tracking System Task Team (Task Team) of the Fire Emissions Joint Forum (FEJF) under contract to the Western Regional Air Partnership (WRAP) of the Western Governors' Association (WGA). The draft Work Plan has been reviewed by the Task Team and revised as necessary to prepare the final Work Plan. The final Work Plan has been submitted to the Task Team and Contract Officer for approval prior to implementation.

The Work Plan carefully defines the technical scope of work and deliverables in as many areas as possible. Some aspects of the Work Plan may be presented in a way that maintains more flexibility for the FEJF to investigate technical aspects of the work and provide input to final methodologies and products. The Work Plan is prepared with sufficient detail for the Air Sciences - EC/R Project Team to meet the Task Team's, FEJF's, and WRAP's expectations for the technical deliverables, the project schedule, and budget estimate.

Task 1b: Participation in Conference Calls and Meetings

A critical and appropriate member of the Project Team will participate in at least one Task Team conference call and two upcoming FEJF meetings.

- At the November 30 through December 1, 2005. FEJF meeting in Seattle, Washington, the Project Team will present a brief (45-minute) overview of the Work Plan (including the timeline for the project) and a project status report.
- A Task Team conference call (scheduled for January 6, 2006, at 1100 Mountain Standard Time) to approve the short list of up to two (2) fire tracking systems selected for assessment of necessary modifications and the costs associated with moving the existing FTS into the WRAP FTS.
- At the March 7 through March 8, 2006 FEJF meeting, the Project Team will present a brief (90-minute) presentation of the findings and recommendations for the project. The wrap-up will include presentation of the findings of the fire tracking system evaluation and recommendations to the FEJF/WRAP about fire tracking system selection and modification (including the estimated effort to modify an existing system) for the FEJF's Fire Tracking System.

Task 1c: Information Gathering and Obtaining User-Access to Existing FTS

The Project Team will contact existing FTS managers to acquire Users Manuals, field definitions, and user-access to the listed FTS. The Project Team's approach is to evaluate the existing systems at the user-level (not the programmer-level). The following list includes the list of primary contact(s) for each listed FTS based on the Project Team's best understanding at the time of preparing the Work Plan.

- San Joaquin Valley Smoke Management System: obtaining contact information.
- Airshed Management System (formerly, RAZU): Dave Grace, USDA – Forest Service
- Smoke Management Database – New Mexico: Lisa Bye, USDOJ – BLM, NPS, FWS in New Mexico.
- Nez Perce Tracking System: Julie Simpson/Andrea Boyer, Nez Perce Tribe
- South Carolina Tracking System: Ken Cabe, South Carolina Department of Forestry
- Florida Tracking System: Jim Brenner, Florida Division of Forestry
- USDA Smoke Management System: Dale Guenther, USDA – Forest Service

A critical assumption in this Work Plan is that access to these contacts as well user privileges for the existing FTS will be provided. Should this not be the case for any particular fire tracking system(s), the Project Team will notify the Task Team to request assistance with obtaining access. Systems for which access is not provided will be dropped from the list of FTS to include in the feasibility assessment.

The Project Team will interview each of these contacts (or others as appropriate) as part of the process of evaluating each existing FTS. In addition, the Project Team will conduct a follow-up interview for the contact for each short-listed FTS.

Task 2: Feasibility Assessment of Existing Systems

Task 2a: Basic Data Elements

Table 1 contains a list of the basic data elements that must be included in the WRAP's Fire Tracking System. The Project Team will develop a chart that lists the basic data elements and that will be used by the Project Team for the initial evaluation of all listed fire tracking systems.

Table 1: Basic Data Elements of the WRAP's Fire Tracking System

1. Actual date of burn (please indicate whether the system records multiple days for the same event)
a. Start date
i. Day 1 start hour (start at 0000 hrs)
ii. Day 2 start hour (start at 0000 hrs)
iii. Day 3 start hour (start at 0000 hrs)
b. End date
i. Day 1 end hour (if over 1 day, end at 2359 hrs)
ii. Day 2 end hour (if over 2 days, end at 2359 hrs)
iii. Day 3 end hour (if over 3 days, end at 2359 hrs)
2. Burn location
a. Burn name
b. Burn number
c. Latitude/longitude at center of proposed burn
d. County/Borough/tribal land/Reservation
e. Name of closest town
f. Miles to closest town
3. Area of burn
a. Size of burn (total acres)
b. Day 1 area burned (blackened) in acres
c. Day 2 area burned (blackened) in acres
d. Day 3 area burned (blackened) in acres
4. Fuel type (predominant cover)
5. Fuel loading (tons/acre)
6. Type of burn (broadcast, pile, etc.)
7. Classification of burn (anthropogenic or natural)
8. Additional components to support the development and implementation of annual emission goals
a. Regional coordination (pre-burn information)
i. Burn location
ii. Proposed burn size (acres)
iii. Burn classification (e.g., prescribed, wildfire, WFU, etc.)
iv. Fuel loading (tons)
v. Proposed burn date
b. Emissions from fire (or FTS program calculates from data provided?)
i. Emission factors used
ii. Daily emissions
for PM _{2.5} , PM ₁₀ , total PM, CO, VOC, NO _x , SO ₂ , NH ₃
iii. Yearly emissions
for PM _{2.5} , PM ₁₀ , total PM, CO, VOC, NO _x , SO ₂ , NH ₃

Table 1: Basic Data Elements of the WRAP's Fire Tracking System – continued

8.	Additional components to support the development and implementation of annual emission goals
c.	Coordination/tracking information
i.	Agency responsible for burn
ii.	Point of contact for burn
iii.	Address of agency responsible for burn
iv.	Phone number for agency / point of contact
v.	County code
vi.	Tribal code
vii.	State and County FIPS code
viii.	SCC code
ix.	Pollutant code
d.	Emission Reduction Techniques (ERT) for the use with Annual Emission Goals (AEG)
i.	ERT emission factors by fuel type
ii.	Estimate total emissions without using ERT's
iii.	Estimated total emissions with ERT's

In addition to the basic data elements listed in Table 1, each listed FTS will be evaluated for the items listed under Task 2b: System Information, Task 2c: Front-End and Back-End Applications, Task 2d: Indexing and Reporting, Task 2e: Optional Modules, and Task 2f: Interface and/or Exchange of Data.

Task 2b: System Information

The considerations to evaluate the system-related aspects of the existing FTS include:

- Is the system web-based/centrally located or desktop? (*Project Team shall place emphasis on its evaluation of this system-related aspect of an FTS, in particular the web-based capabilities of the FTS.*)
- Is the fire module a separate module from the rest of the agency program?
- If not, can it be easily separated to be stand-alone?
- In what programming language is the FTS application written?
- In what programming language is the user interface written?
- Are there elements for regional coordination contained within the system (i.e., can the data be easily shared between states)?
- Can the system import and export data to other fire tracking systems? (*Project Team shall place emphasis on its evaluation of this system-related aspect of an FTS.*)
- Is an emissions calculation tool contained within the system?
- If so, which one?

- Are there limitations to the calculation tool for the WRAP FTS?
- Does the application support ad-hoc queries? If so, what programming language must be used?
- Is the system GIS compatible? If so, in what manner and with what types of GIS systems?
- Are there software security concerns/issues (e.g., ability to assign different levels of edit/change/view rights, exchange of data between firewalls, etc.)?
- Is any part of the program proprietary? Can source codes be obtained? Are there any licensing issues or other restrictions on the use of the system?
- Considering the FEJF desire to expand the system to include more than just prescribed fire (e.g., wildfire, wildfire land use, etc.), can the system be modified to reflect future desires?

Task 2c: Back-End and Front-End Applications

In addition, the following lists some of the system design goals pertaining to back-end and front-end applications that should be taken into account when reviewing the existing FTS. The following design goals are necessary considerations during the review of the different FTS. Each FTS should be evaluated to assess their conformity with these goals.

- **Robust** - The FTS should be modular in design so it can be easily extended to include new applications or adapted to different and more complex applications by extension of the FTS rather than modification to the existing structure.
- **Flexible** - The FTS can handle a variety of different import and export data structures with a modular design that can be extended without major modification of the base system.
- **Consistent** - The components that make up the FTS are designed around explicit conventions for style, structure, and format.
- **Ease of Use** - Users of the FTS are not required to memorize complex structures or coding systems associated with data input, editing, output, querying, reporting, archiving, restoring archived data, etc.
- **Universal Acceptance** - All users understand and accept the FTS, including the regulated community, federal land managers, tribal and regulatory agencies.
- **Complete and Explicit** - There is nothing implied about any of the information and data contained in the application or transmitted between parties.
- **Compatibility** - The conversion/integration of data from existing system(s) is/are not unnecessarily complex.

- Rigorous - Definitions and principles upon which the FTS is designed must be adhered to and well defined.

Task 2d: Indexing and Reporting

Is the system capable of indexing information and providing fixed and ad-hoc reports, including, but not limited to the following:

- Yearly.
- Daily.
- Fire emissions sources (e.g., wildfire, wildland fire use, rangeland, agricultural burning activities, etc.).
- "Anthropogenic"/"Natural."
- Emission Reduction Technique reports.
- Pollutants.
- Defined geographic areas.
- States.
- Tribal Reservations.
- Tribal Reservations which are designated Class I areas.
- Counties or Boroughs.
- Mandatory Federal Class I areas.
- Nonattainment areas.
- Public lands (by land manager).
- Private lands.
- Geographic locations.
- Geographic coordinates (township and range, UTM, latitude/longitude).
- Date/time intervals.
- Native programming needed for ad-hoc reports?
- Security (e.g., reporting source and/or data manager able make changes while others are limited to viewing the information, system reasonably secure from internet hackers, etc.)?

Task 2e: Optional Modules

The following items are optional modules considered by the FEJF FTS Task Team. Evaluate if optional modules are contained within the fire tracking systems being reviewed.

- Emission calculator²
 - CONSUME
 - FOFEM
 - FEPS
 - SIS (Smoke Impact Spreadsheet)
- Daily fire/emission tracking for multiple day prescribed burns
- Wildfire tracking
 - wildland fire use
 - United States
 - Canada
 - Mexico
- Meteorological/ventilation dispersion information

Task 2f: Interface and/or Exchange of Data

The following list of current federal and state systems are tentatively considered by the Task Team to be the major systems we would like the FTS to be able to import from or export data to. The system should be capable of verifying that all imported/exported data has transferred properly. Which of the reviewed systems are able to exchange data with the programs/systems listed below?

- WRAP EDMS
- Federal database systems
 - US Department of Agriculture
 - Natural Resources Conservation Service
 - EPA National Emission Inventory
 - WFMI
 - FACTS
 - NIFPORS
- TEISS

² In addition, the Project Team will consider whether the WRAP's Phase III/IV Fire Calculation Tool could feasibly be integrated into an existing FTS.

Task 3: Assessment of Short-Listed FTS Modifications and Costs

The Project Team will compile and analyze the results of the FTS evaluations conducted in Task 2. The budget estimate for this project is based upon short-listing two FTS for assessment of necessary modifications and costs associated with moving the existing FTS to the WRAP FTS. Additional FTS can be reviewed for modifications with an associated cost of \$2,250 per FTS. The Task Team will be provided the short-list of FTS and the Project Team's selection justification for approval. Should the Task Team wish to include more than two FTS on the short list, a contract modification for the project will be necessary. Each of the short-listed FTS will be specifically evaluated for:

- An analysis of modifying each system to include WRAP needs, and
- An estimate of resources needed to modify the system to meet the required elements for tracking prescribed fires.

The resource estimates will be approximate and based on input received from managers/users of existing FTS systems and input from the Project Team based upon our companies' related experience. These estimates should be considered approximate and not "fixed-price" costs to be used by the WRAP for future contracting purposes. The cost estimates will include:

- Development hours,
- Additional hardware costs, and
- Ongoing system costs.

The Project Team expects that the cost estimates will be most meaningful when related to one another (e.g., "the cost to modify and host System 1 will be twice the cost to modify and host System 2). In addition, to the itemized cost estimates, the Project Team will attempt to include cost estimates for some of the additional optional elements, to specifically provide for regional coordination and inter-state/tribe data sharing, and transfer of data to the WRAP's EDMS system.

Task 4: Recommendations and Documentation

Timely and unambiguous documentation for this project will be prepared. Specific documentation deliverables will include:

- Work Plan (draft and final forms).
- Projection documentation (draft and final forms) including: a description of the methods used to evaluate existing FTS, compiled results of the FTS feasibility assessment, short-list of FTS including selection justifications, compiled results of evaluation of short-listed FTS for modifications and costs, and recommendations.

The recommendations of the Project Team to the FEJF and WRAP will be focused on critical aspects of the FEJF and WRAP's decisions to move toward a WRAP FTS, such as:

- What existing FTS would work best “as-is” for the WRAP’s FTS?
- What existing FTS would require the least amount of modification to work well as the WRAP FTS?
- What combination of existing FTS, technical modifications, and exceptional features from other FTS would comprise a WRAP FTS with the most complete set of features and capabilities?
- Rather than starting from an existing FTS, is there a better way for the WRAP to proceed with building the WRAP FTS?

SCHEDULE & PROJECT BUDGET

Table 2: Timeline for WRAP Project - Evaluate Existing Fire Tracking Systems

In this table major deliverables are bolded and ongoing task work is shown in normal text.

Timeline for WRAP Project - Evaluate Existing Fire Tracking Systems

Deliverable	Number of weeks from Project Kick-Off Call (11/11).																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
	11/18	11/25	12/2	12/9	12/16	12/23	12/30	1/6	1/13	1/20	1/27	2/3	2/10	2/17	2/24	3/3	3/10	3/17	3/24
Draft Work Plan																			
Final Work Plan																			
Present Work Plan and Project Status (FEJF mtg)		Nov 30																	
Develop Evaluation Chart																			
Acquire materials and user-access																			
Initial FTS evaluations and interviews																			
Selection of 1-3 FTS for further evaluation									Jan 3										
FTS Task Team approval of FTS short-list									Jan 6										
In depth evaluation and assessment																			
Compile findings and develop recommendations																			
Draft Findings and Recommendations															Feb 6				
Comments from Task Team to R. King																Feb 17			
Comments to Air Sciences / EC/R																Feb 20			
Final Findings & Recommendation																	Feb 28		
Present Results (FEJF meeting)																		Mar 7-8	

PROJECT TEAM MEMBER RESPONSIBILITIES

The Project Team of Air Sciences and EC/R will cooperate on many technical tasks. For some tasks, one Project Team member or the other will take the primary role to complete the task (or complete the task independently). The responsibilities of the Project Team members are as follows:

Air Sciences

- Work Plan finalization - lead.
- Meetings/presentations.
- Feasibility Assessment Chart review.
- Feasibility assessment - back-end/front-end application, interface/data exchange, fit with WRAP's FTS objectives.
- Assessment of modifications and costs – support.
- Recommendations.
- Documentation - support and delivery.

EC/R

- Work Plan finalization - support.
- System user access procurement/info gathering.
- Feasibility Assessment Chart development.
- Feasibility assessment (most categories).
- Interviews - EC/R.
- FTS short-list and selection justifications.
- Assessment of modifications and costs – lead.
- Recommendations.
- Documentation – lead.