

**Draft Work Plan
for
Development of a Fugitive Dust
Handbook and Website
(WGA Contract No. 30204-83)**

PRINCIPAL INVESTIGATORS

**Richard Countess - Countess Environmental
Chatten Cowherd – Midwest Research Institute**

Prepared for:

**Western Governors' Association
1515 Cleveland Place, Suite 200
Denver, Colorado 80202**

Prepared by:

**Countess Environmental
4001 Whitesail Circle
Westlake Village, CA 91361**

April 20, 2004

INTRODUCTION

The Western Regional Air Partnership's (WRAP) Dust Emissions Joint Forum (DEJF) recently selected Countess Environmental and Midwest Research Institute (the CE project team) to prepare a fugitive dust handbook and a website for accessing the information contained in the handbook. The handbook and website will:

- be used for technical and policy evaluations by WRAP members, stakeholders, and other interested parties when addressing specific air quality issues and when developing regional haze implementation plans;
- will incorporate available information from both the public (federal, state and local air quality agencies) and private sectors (e.g., reports addressing options to reduce fugitive dust emissions in areas of the country classified as nonattainment for PM10);
- serve as a comprehensive reference resource tool that will provide technical information on emission estimation methodologies and control measures for the following eight fugitive dust source categories: anthropogenically derived emissions from travel on paved and unpaved roads, materials handling, construction and demolition, and agricultural tilling, as well as naturally occurring windblown dust emissions from material storage piles, agricultural fields and open areas of disturbed vacant land; and
- need to be updated as new information becomes available in the future.

This document, representing the first project deliverable for WGA Contract 30204-83, is a draft project work plan containing the following key elements:

- description of technical approach for implementing each task;
- list of deliverables;
- personnel assigned to the project;
- estimated level of effort;
- schedule;
- assumptions; and
- discussion of maintenance and updating of the handbook and website.

The work plan will be finalized by the CE project team within one week of receiving comments on this draft work plan from members of the DEJF working group who have submitted their comments to Duane Ono for compilation and submittal to CE.

TECHNICAL APPROACH

This section describes the CE project team's technical approach for implementing four tasks (Task 2 through Task 5). Task 1 consisted of developing the project work plan and schedule that are included in this document.

Task 2: Compile Fugitive Dust Information. The CE project team will compile information for the following eight fugitive dust source categories:

- paved roads
- unpaved roads
- materials handling

- wind erosion from material storage piles
- construction and demolition
- open area wind erosion
- agricultural tilling
- agricultural wind erosion.

Both the EPA and the California Air Resources Board (CARB) have published emission estimation methodologies for fugitive dust from open area sources in AP-42 and CARB's Emission Inventory Procedural Manual, respectively. CARB makes a distinction between construction and demolition of roads versus construction and demolition of buildings, between unpaved road travel on farm roads versus other types of unpaved roads, and between windblown dust from unpaved roads versus agricultural and pasture lands. Furthermore, CARB utilizes a different methodology for calculating windblown dust emissions compared to the methodology recommended by EPA. These differences will be addressed in the handbook and website.

The CE project team will compile and review the following items for each of the eight fugitive dust source category: (a) emission estimation methods, (b) control techniques, and (c) fugitive dust compliance tools. Items (a) and (b) relate to calculation of the emission rate for a given source category (i.e., the uncontrolled emission factor, the source activity level, the extent of control, and the efficiency of control). Item (c), fugitive dust compliance tools, include field inspection techniques and review of records that document the type, frequency, and extent of control application. This information will then be summarized in a series of draft work products.

- a. Emission Estimation Methods. The CE project team will compile the text contained in AP-42 addressing PM10, PM2.5 and PM2.5-10 emission estimation methods together with any useful methods for obtaining activity level information for the emission estimates as well as alternative methods to AP-42 that can be used to improve the emission estimates for these source categories. Recent changes in characterizing the fine mode (PM2.5) of PM10 emissions will be taken into account. In all of this work, the distinguishing characteristics of predictive emission factor equations and single-valued emission factors will be discussed.
- b. Control Techniques. The CE project team will compile the following information on fugitive dust control techniques that have been implemented to reduce or prevent emissions: emission reductions associated with each control technique, methods for estimating control method costs, ranges of control measure costs, cost effectiveness values (in terms of dollars per ton of PM controlled) for each control method, and the assumptions associated with the cost effectiveness estimations. The distinguishing characteristics of preventive and mitigative control measures and the complexity of combining control techniques will be discussed, such as adding wind fences to soil stabilization, or adding surface road cleaning to road shoulder stabilization. Furthermore, continuous controls will be distinguished from periodically applied controls, such as application of dust suppressants to unpaved roadways. In the later case, it is important to differentiate between instantaneous control efficiency and time-average control efficiency. Predictive models to calculate control efficiency will be used when available.

- c. Fugitive Dust Compliance Tools. The CE project team will compile information on the methods used by facility operators and regulators to determine compliance with fugitive dust regulations. Examples (and web links if available) of regulatory language or facility permit conditions used to implement control measures will be provided.

Task 3: Summarize Fugitive Dust Control Method Options. The CE project team will summarize the following items for each fugitive dust source category: potential control methods and their range of emission reductions, control effectiveness, costs, and cost effectiveness in dollars per ton of PM controlled (PM2.5, PM10 and PM2.5-10). The summary of control options will be displayed as a table in the Executive Summary of the handbook and as a page on the website.

Task 4: Prepare Fugitive Dust Handbook. The CE project team will incorporate the information obtained from Tasks 2 and 3 into a comprehensive Fugitive Dust Handbook. References will be cited for all sources of information. The handbook will refer to other documents (e.g., EPA-approved air quality implementation plans) for more information on methods not discussed in AP-42. The handbook will use the eight major fugitive dust source categories as chapter headings. Within each chapter (source category), there will be sections that describe emission estimation methods, control techniques, and fugitive dust compliance tools. A possible format for the table of contents for the handbook is illustrated in Table A. Example applications will be used to illustrate the development of a cost-effective selection from among the control options indicated for each major source category. These applications will be based on hypothetical serious non-attainment areas.

Table A. Possible Format for the Table of Contents for the Fugitive Dust Handbook

	Disclaimer
	EXECUTIVE SUMMARY
	GLOSSARY
	TABLE OF CONTENTS
	List of Figures
	List of Tables
1.0	INTRODUCTION
1.1	Statement Of Purpose
1.2	Source Contributions to PM Emission Inventory
1.3	General Fugitive Dust Control Methods (natural vs. anthropogenic; preventive vs. mitigative; continuous vs. periodic)
1.4	Applicable Rules and Enforceability Issues
1.5	Document Organization
2.0	PAVED ROADS
2.1	Characterization of Source Emissions
2.2	Emission Estimation and Inventory Methods
2.3	Control Options (source extent/activity reduction; add-on controls)
2.4	Demonstrated Control Techniques (ranked by control efficiency, feasibility, and cost)
2.5	Potential Regulatory Formats
2.6	Compliance Tools
2.7	Case Study for Control Application
2.8	References
3.0 through 7.0	Repeat of Section 2.0 for the other seven fugitive dust source categories
APPENDIX A	TEST METHODS [#]
APPENDIX B	SAMPLE CALCULATIONS (FOR ALL SOURCES)
APPENDIX C	CONTROL COST ANALYSIS METHODOLOGIES

APPENDIX D AVAILABLE RESOURCES

Test methods include: silt content, surface silt loading, soil moisture, storage pile area calculation

The CE project team will follow the criteria below with respect to the format and content of the handbook:

- formatted as a stand-alone reference document that delineates the basic calculation procedure in a simplified step-by-step format that uses AP-42 as a model;
- provides a very useful tool to the user community (regulators, regulated entities, consultants, and others);
- clearly defines concepts and terms;
- lists the various types of input data and the measurement methods used to generate the data (activity level, uncontrolled emission factor, control options with efficiencies and costs);
- provides associated information sources for each emission source category;
- addresses each source category in a separate chapter that is formatted in a manner that is consistent throughout the document;
- structured as a "living" document, in the sense that all portions will be labeled with a revision code and a date of revision, along with a revision history for each chapter;
- presents a control application case study for each source category, along with sample calculations;
- demonstrates the use of seasonal and spatial factors in estimating emissions and control efficiencies;
- illustrates how control cost effectiveness can be most effectively achieved by attacking the most actively emitting source segments first within a given source category; and
- uses color graphics judiciously to clearly indicate the items of emphasis and the type of information being addressed.

Task 5: Create Fugitive Dust Website. The CE project team will create a website that can be used by WRAP members, stakeholders, and other interested parties to obtain access to the information contained in the handbook. The website will include references and/or web links for all sources of information cited in the handbook as well as lookup tables of important control efficiency parameters. The website will also provide links to other useful resources that have not been included in the handbook due to material volume size or possible redundancy. After the website design is approved and populated with information contained in the handbook, the CE project team will move the site to the WRAP website/server, in cooperation with the WRAP webmaster. Discussions with the WRAP webmaster will be held early in the project to ensure that the fugitive dust website being designed will require a minimum effort to incorporate within the WRAP website (www.wrapair.org).

The design and layout of the website will follow the general look (including the use of cascading style sheets for consistency) of the WRAP website with consideration given to the ease-of-transfer from the development web server to the WRAP web server. The Fugitive Dust Handbook primary menu will be laid out in chapters (e.g., introductory material, source categories) with pull-down subsections under each chapter. A secondary navigation menu will appear on the left side fashioned after the present navigation scheme utilized on the WRAP website. By having stand-alone chapters, each chapter can be updated independently with a

revision letter or date for each chapter. A log of updates to the website will be established and maintained. The directory structure for the website will contain separate hot links for each of the different fugitive dust source categories. Acceptance of the preliminary design will be required before finalization of the website design approach. The website will be designed so that it can be easily updated to incorporate new information. All sections of the Fugitive Dust Handbook will be incorporated into the website in Adobe Acrobat (pdf) file format and any pictures will be displayed in jpg format at low resolution.

Rather than post information that is already available on other websites, links will be provided to these websites such as:

- EPA's CHIEF website (www.epa.gov/ttn/chief/ap42) for accessing AP-42 emission estimation methodology;
- CARB's website (www.arb.ca.gov/emisinv/areasre/fullpdf) for accessing emission estimation methodology contained in CARB's Emission Inventory Procedural Manual; and
- websites for areas of the western US with PM10 attainment issues due to impact of extensive fugitive dust emissions (e.g., Maricopa County, AZ; Clark County, NV; and the following areas in California: San Joaquin Valley Air Basin, South Coast Air Basin, Coachella Valley, Great Basin Air Basin, Antelope Valley) for accessing examples of BACM and RACM control measures with associated costs, control efficiency, and cost effectiveness.

The website will have the following additional attributes:

- appear as a natural extension to the WRAP website;
- incorporates a simple framework for developing a cost-effective control strategy that achieves a target level of emission reduction (specified particle size range) within a defined geographic area;
- guides the user through data needs and calculation steps;
- provides the user a downloadable Excel workbook with spreadsheets for each source category with the following features:
 - o spreadsheets that will enable the user to document work on their own PC and not require an on-line connection for analysis of source emission controls;
 - o each spreadsheet to be populated with an example calculation so that it will be clear to the user what type of data is needed for each cell;
 - o each spreadsheet to be linked to a calculation flowchart that tracks the result of each calculation segment;
 - o selected cells in spreadsheets to be color-coded (e.g., input cells highlighted in light yellow, output/calculation cells highlighted in light blue) and have embedded comments to assist the user;
 - o spreadsheets that use "look-up" tables of default values for emission factor correction parameters (e.g., silt loading as a function of ADT, evapotranspiration rate as a function of geographical area and season);
 - o spreadsheets to be structured to allow the user to test "what if" scenarios in optimizing a control strategy, including the use of control combinations on a given source; and
 - o spreadsheets that also track the total emission reduction achieved at any point in the sequential application of controls to the various source categories.

DELIVERABLES

The CE Project team will prepare and submit the following deliverables to Lee Alter, the WGA Project Officer, for distribution to members of the DEJF working group:

- Draft work plan (electronic copy in Microsoft WORD format) within two weeks of contract award; final work plan (electronic copy in PDF format) within one week of receiving comments on the draft document (Note: Members of the DEJF working group to submit comments to Lee Alter for compilation and submittal to CE);
- Draft work products (electronic copy in Microsoft WORD format) for each fugitive dust source category within three months of contract award; final work products (electronic copy in PDF format) within four weeks of receiving comments on the draft documents (Note: Members of the DEJF working group to submit comments to Lee Alter for compilation and submittal to CE);
- Draft work product (electronic copy in Microsoft WORD format) summarizing the fugitive dust control method options within three months of contract award; final work product (electronic copy in PDF format) within four weeks of receiving comments on the draft documents (Note: Members of the DEJF working group to submit comments to Lee Alter for compilation and submittal to CE);
- Draft fugitive dust handbook (six color hard copies plus electronic copy in Microsoft WORD and PDF format) within five months of contract award;
- Final fugitive dust handbook (ten color hard copies plus electronic copy in Microsoft WORD and PDF format) within seven months of contract award;
- Draft web site design (electronic format) within four months of contract award; and
- Final web site design (electronic format) within nine months of contract award.

PERSONNEL ASSIGNED TO THE PROJECT

CE has assembled a team of senior individuals with clear assignments and responsibilities for this project. The project organizational chart showing key and support personnel is presented in Figure 1.

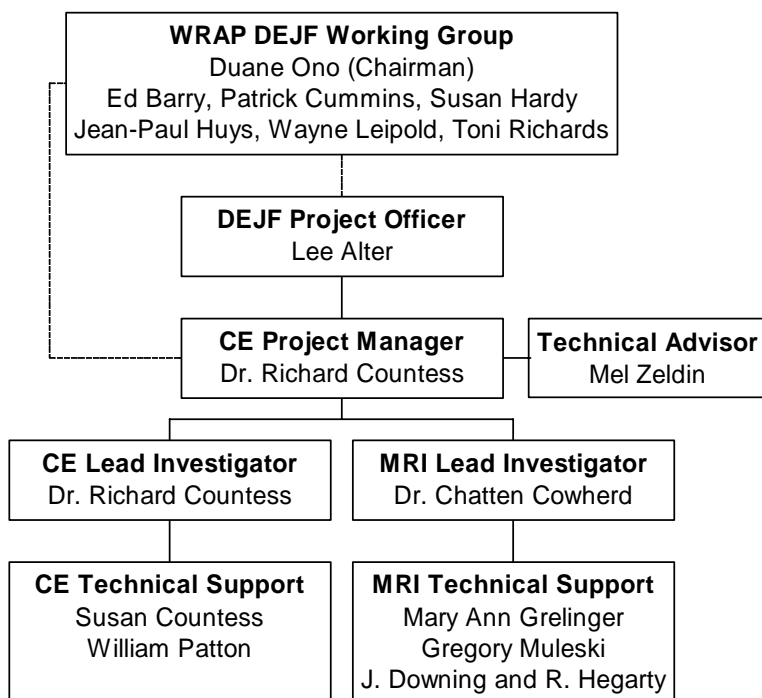


Figure 1. Project Organizational Structure

Members of the CE project team have many years of experience directly related to the proposed scope of work. Countess Environmental will serve as the prime contractor for the study with technical support for Tasks 2 through 4 provided by Susan Countess and staff from Midwest Research Institute. William Patton, with support from Dr. Countess, Susan Countess and Mary Ann Grelinger, will be responsible for designing the fugitive dust website (Task 5). Mel Zeldin will serve as Technical Advisor for Tasks 2 through 4 and will review all project deliverables for these three tasks prior to submittal to members of the DEJF working group. The responsibilities of the individual CE project team members for implementing each task and preparing project deliverables for each task are summarized below in Table B.

Table B. Responsibilities of CE Project Team Members

Task	Lead Responsibility	Support Role
2. Compile Dust Information	Chatten Cowherd Richard Countess	Mary Ann Grelinger; Gregory Muleski Jason Downing; Robert Hegarty Susan Countess
3. Summarize Control Method Options	Chatten Cowherd Richard Countess	Mary Ann Grelinger; Gregory Muleski Jason Downing; Robert Hegarty Susan Countess
4. Prepare Handbook	Chatten Cowherd Richard Countess	Mary Ann Grelinger; Gregory Muleski Jason Downing; Robert Hegarty Susan Countess
5. Create Website	William Patton	Mary Ann Grelinger Richard Countess; Susan Countess

ESTIMATED LEVEL OF EFFORT

An estimate of the level of effort required to conduct each of the four tasks discussed above is presented in Table C.

Table C. Estimated Level of Effort (Hours) by Task

TEAM MEMBER	Task 2	Task 3	Task 4	Task 5	Tasks 2 - 5
Richard Countess	40	40	34	8	122
Chat Cowherd	16	16	32	0	64
Mary Ann Grelinger	36	36	36	12	120
Gregory Muleski	8	8	0	0	16
William Patton	0	0	0	120	120
Mel Zeldin	8	8	8	0	24
Susan Countess	24	12	40	4	80
Jason Downing	80	40	40	0	160
Robert Hegarty	80	16	16	0	112
Total Labor	292	176	206	144	818

SCHEDULE

The schedule to conduct each task and submit each project deliverable is outlined below.

Task 1. Prepare Project Work Plan: April 12 – May 7, 2004

- Draft work plan by April 23rd
- Final work plan by May 7th

Task 2. Compile Fugitive Dust Information: April 19 – August 20, 2004

- Draft work products for each fugitive dust source category by July 9th
- Final work products for each fugitive dust source category by August 20th

Task 3. Summarize Fugitive Dust Control Options: April 19 – August 20, 2004

- Draft work product by July 9th
- Final work product by August 20th

Task 4. Produce Fugitive Dust Handbook: May 10 – November 5, 2004

- Draft Fugitive Dust Handbook by September 10th
- Final Fugitive Dust Handbook by November 5th

Task 5. Create Fugitive Dust Website: June 1 – December 10, 2004

- Draft website (electronic format) by August 16th
- Final website (electronic format) by December 10th

There will be several conference calls with members of the DEJF working group at critical decision points throughout the contract. In addition, members of the CE project team plan to attend two meetings with the DEJF during the project, as follows:

- Dr. Countess and Dr. Cowherd will meet with members of the DEJF working group in Bishop, CA in late September 2004 to respond to comments on the draft fugitive dust handbook and draft website design; and
- Countess Environmental will host a one day meeting in late November 2004 in southern California for members of the DEJF to test the fugitive dust website prior to moving the website to the WRAP website/server.

Monthly status reports will be submitted to Lee Alter via email for distribution to members of the DEJF working group. Monthly invoices (in duplicate) will be mailed to Rich Halvey using WGA Form 2121.

ASSUMPTIONS

The schedule presented above assumes:

- WGA contract # 30204-83 is executed by the WGA Executive Officer by April 12, 2004;
- one week for members of the DEJF working group to review the draft work plan and submit comments to Lee Alter for compilation and submittal to CE, and one week for the CE project team to revise the draft work plan (Task 1);
- two weeks for members of the DEJF working group to review the draft work products for Tasks 2 and 3 and submit comments to Lee Alter for compilation and submittal to CE, and four weeks for the CE project team to revise these draft work products;
- two weeks for members of the DEJF working group to review the draft handbook, and six weeks for the CE project team to complete the necessary revisions (Task 4); and
- one month for members of the DEJF working group and other interested parties to test the website operation based on the draft website design and submit comments to Lee Alter for compilation and submittal to CE, and three months for the CE project team to revise the draft website design and populate the website with material from the final version of the handbook (Task 5).

MAINTAINANCE/UPDATING THE HANDBOOK AND WEBSITE

Most regional haze plans will not be submitted to EPA until late in 2007. In the interim, there will be new emissions and control information that will become available beyond the end date of WGA contract # 30204-83 (i.e., December 31, 2004) that should be incorporated into the handbook and website. The CE project team proposes to track the availability of this new information through our contacts with members of CAPCOA, the BACM working group, state and local regulatory agencies, and EPA. We will then provide updates on individual sections of the fugitive dust handbook and website for calendar years 2005 through 2007 as an additional cost amendment to our current WGA contract. We propose to update the handbook and website on an as needed basis but no less frequently than twice a year.