Fugitive Dust Control
NACT 252

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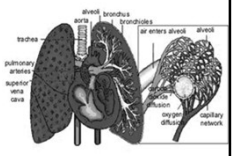
New Proposed Fugitive Dust Mitigation Measures

Today's Discussions

- Fugitive Dust and PM10 ID
- Health Effects of PM10 Pollution
- Fugitive Dust Sources
- Dust Control Measures
- Fugitive Dust Rules & Regulations
- Dust Control Plans
- VEE and Test Methods

Criteria Air Pollutants

- Ozone
- Carbon monoxide
- Oxides of Nitrogen
- Oxides of Sulfur
- Particulate Matter (PM10 & PM2.5)
- Lead



Pollutant [final rule cite]		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide [76 FR 54294, Aug 31, 2011]		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead [73 FR 66964, Nov 12, 2008]		primary and secondary	Rolling 3 month average	0.15 μg/m³ (1)	Not to be exceeded
Nitrogen Dioxide [75 FR 6474, Feb 9, 2010] [61 FR 52852, Oct 8, 1996]		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual Mean
Ozone [73 FR 16436, Mar 27, 2008]		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution Dec 14, 2012	$PM_{2.5}$	primary	Annual	12 μg/m³	annual mean, averaged over 3 years
		secondary	Annual	15 μg/m³	annual mean, averaged over 3 years
		primary and secondary	24-hour	35 μg/m³	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 μg/m³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide [75 FR 35520, Jun 22, 2010] [38 FR 25678, Sept 14, 1973]		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

as of October 20

*Most Polluted Regions In the United States**

Ozone (SMOG)

1. Los Angeles Region
2. Bakersfield, CA
3. Visalia, CA
4. Fresno-Madera, CA
5. Hanford, CA
6. Sacramento, CA
7. Houston, TX
8. Dallas, TX
9. Washington-Baltimore, DC

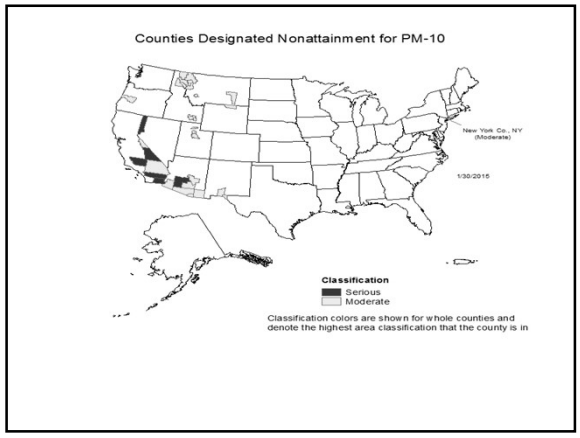
Particulates

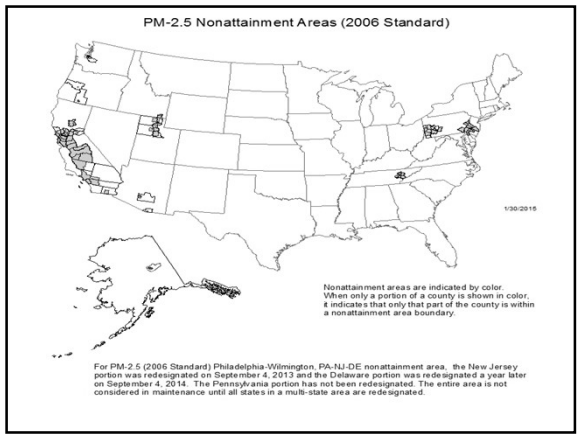
1. Bakersfield, CA
2. Fresno-Madera, CA
3. Hanford, CA
4. Los Angeles Region
5. Modesto, CA
6. Salt Lake City, UT
7. Pittsburgh, PA
8. Merced, CA
9. Fairbanks, AK

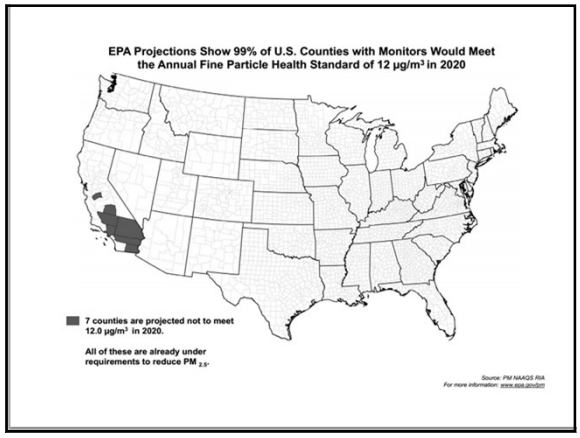
*American Lung Association "State of the Air" Report 2013

Classification of PM-10 Nonattainment Areas

Serious	Moderate
Clark Co., NV	Ajo (Pima County), AZ
Coachella Valley, CA	Anthony, NM
East Kern Co, CA	Butte, Mt
Imperial Valley, CA	Columbia Falls, MT
Owens Valley, CA	El Paso Co, TX
Phoenix, AZ	Flathead County, Whitefish, MT
Washoe Co, NV	Fort Hall Indian Reservation, ID


Counties Designated Nonattainment for PM-10
New York Co., NY
(Moderate)
1/30/2015
Classification
Serious
Moderate
Classification colors are shown for whole counties and denote the highest area classification that the county is in


PM-2.5 Nonattainment Areas (2006 Standard)
1/30/2015
Nonattainment areas are indicated by color. When only a portion of a county is shown in color, it indicates that only that part of the county is within a nonattainment area boundary.
For PM-2.5 (2006 Standard) Philadelphia-Wilmington, PA-NJ-DE nonattainment area, the New Jersey portion was redesignated on September 4, 2013 and the Delaware portion was redesignated a year later on September 4, 2014. The Pennsylvania portion has not been redesignated. The entire area is not considered in maintenance until all states in a multi-state area are redesignated.

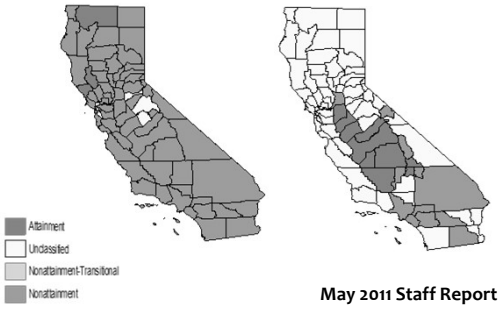

EPA Projections Show 99% of U.S. Counties with Monitors Would Meet the Annual Fine Particle Health Standard of 12 µg/m³ in 2020
7 counties are projected not to meet 12.0 µg/m³ in 2020.
All of these are already under requirements to reduce PM 2.5.
Source: PM NAAQS RIA
For more information: www.epa.gov/ttn

2012 $PM_{2.5}$ NAAQS Implementation Timeline

Milestone	Date
EPA promulgates 2012 $PM_{2.5}$ NAAQS rule	December 14, 2012
Issue Designations Guidance	April 16, 2013
States and tribes submit recommendations for $PM_{2.5}$ designations to the EPA	No later than December 13, 2013
EPA notifies states/tribes re: any intended modifications to their recommendations (120-day letters)	No later than August 14, 2014 (120 days prior to final $PM_{2.5}$ area designations)
EPA publishes public notice of state recs and EPA's intended modifications, if any; EPA initiates 30-day public comment period	No later than August 29, 2014
End of 30-day public comment period	No later than September 29, 2014
States/tribes submit additional information to respond to EPA's modification of a recommended designation	No later than October 29, 2014
EPA promulgates final $PM_{2.5}$ area designations	December 2014 (effective early 2015)

2011 PM10 Attainment Status

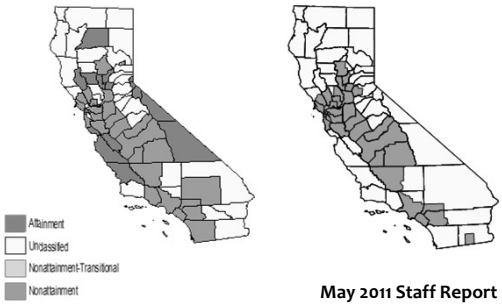
State ***Federal***



May 2011 Staff Report

2011 PM 2.5 Attainment Status

State ***Federal***



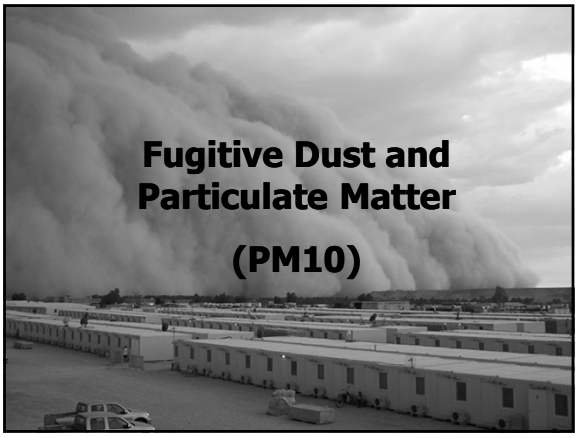
May 2011 Staff Report

California's Projected Growth

YEAR	POPULATION	REGISTERED VEHICLES	VEHICLE MILES TRAVELED
1930	6 Million	2 Million	
1940	7 Million	2.8 Million	24 Billion
1950	11 Million	4.5 Million	44.5 Billion
1960	16 Million	8 Million	71 Billion
1970	20 Million	12 Million	110 Billion
1980	24 Million	17 Million	155 Billion
1990	30 Million	23 Million	242 Billion
2000	34 Million	28.5 Million	300 Billion
2025	45 Million	40+ Million	500 Billion

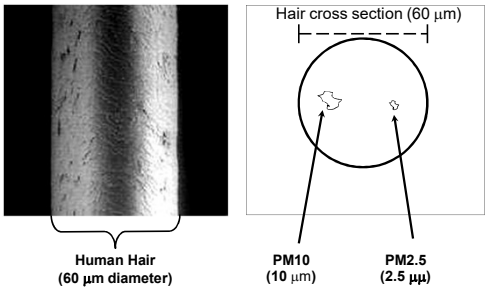
PM Source	Percent of PM10/day
Unpaved Road Dust	21%
Paved Road Dust	17%
Fires	14%
Windblown Dust	12%
Non-Anthropogenic (Wildfires)	10%
Construction/Demolition	8%
Farming Operations	7%
Vehicles	6%
Stationary Industrial Sources	5%
Total	100%

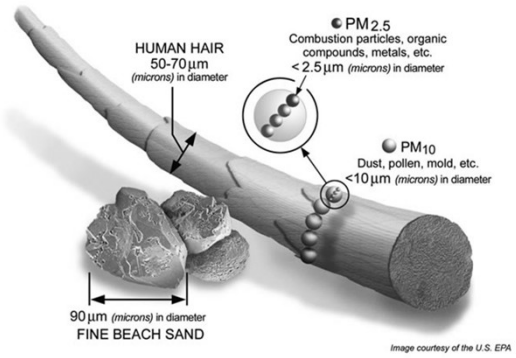
(ARB, Almanac Emissions Projection Data, 2013 Data)



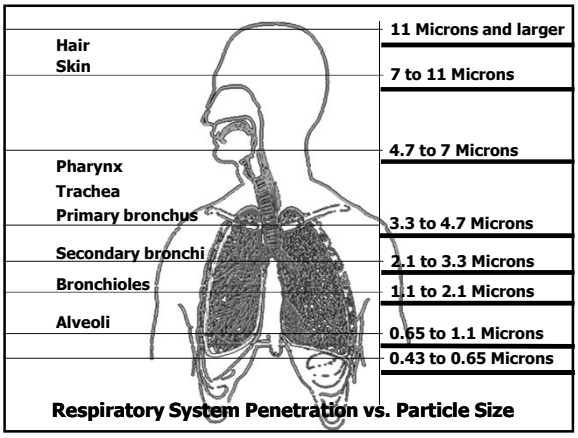
PM10

- PM10 = particles 10 microns and smaller
- How small is 10 microns?





What are particles composed of?



Respiratory System Penetration vs. Particle Size

What are the Health Effects of PM Air Pollution?

- Increases asthma attacks
- Reduces lung function
- Aggravates bronchitis
- Results in respiratory disease
- Can cause premature death

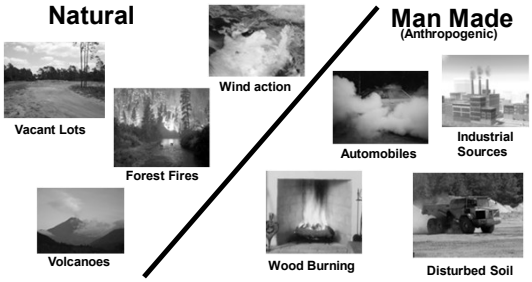
Effects are immediate and long term

Health Effects of Diesel Exhaust

Effects of Air Pollution

- Headaches, brain damage
- Sore throat, Stinging eyes
- Asthma, bronchitis, permanent lung damage
- Reproduction problems
- Reduced immunity, anemia, cancer, birth defects, premature death

PM Takes Several Forms and Comes From Many Sources



Video by
Dr. John Tatarko, USDA

District Rules Later Amended…

To avoid federal sanctions

To satisfy PM10 Plan commitments

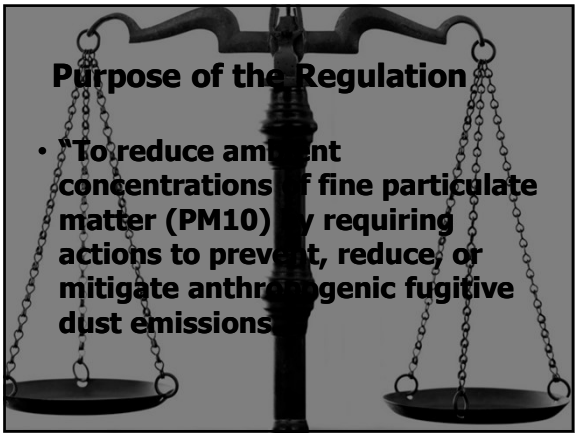
❖Two Basic Requirements

❖1. Limit "Visible Dust Emissions" (VDE)

- ❖to 20% opacity

❖2. Maintain a Stabilized Surface on

- ✓Unpaved roads
  (includes the 20% opacity VDE standard)
- ✓Disturbed surface areas
- ✓Outdoor bulk material storage piles



Fugitive Dust

- Any solid particulate matter entrained in the ambient air which is caused by anthropogenic or natural activities which is emitted into the air without first passing through a stack or duct…

Subject Sources

- Bulk Material Storage, Handling and Transport
- Construction / Earthmoving Activities
- Demolition Activities
- Vacant Open Areas
- Paved and Unpaved Roads
- Unpaved Traffic Areas
- "Off-Field" Agricultural Sources

Statewide Rule Summary

- 19/35 Districts have a Fugitive Dust Rule
  - ✓8/19 rules are "…crossing the property line" limitations, ONLY
  - ✓5/19 rules include additional mitigation requirements
- 8/19 rules also include a 20% VE opacity limit

Statewide Rule Summary

- 7 of those 19 Districts also include additional "adv[illegible]ed" req's such as:
  - ✓Du[illegible] Control Plans
  - ✓Be[illegible]ailable Control M[illegible]res (BACM)
  - ✓S[illegible]c Visible Emission [illegible] test methods [illegible]ving sources of dust
  - [illegible] methods that test for [illegible] Stabilized Surface" or measure silt content

"General" Rule Limitations

- …a person shall take every reasonable precaution not to cause or allow the emissions of fugitive dust from being airborne beyond the property line from which the emission originates…

Nuisance

- Any activity that causes fugitive dust must not cause a nuisance

"Specific" Rule Sections

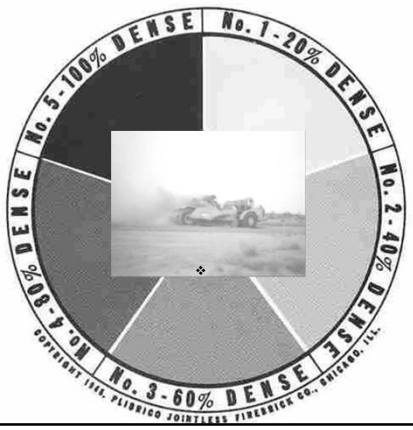
- General Requirements
- Construction, Demolition, Excavation, and Other Earthmoving Activities
- Bulk Materials
- Carryout and Trackout
- Open Areas
- Paved and Unpaved Roads
- Unpaved Vehicle/Equip. Traffic Areas
- Agricultural Sources

Two Basic Requirements

- Limit Visible Dust Emissions (VDE)
  - ✓to 20% opacity-methods described in Appendix A of Rule 8011
- Maintain a "Stabilized Surface" on:
  - ✓Unpaved roads
  - ✓Disturbed surface areas
  - ✓Outdoor bulk material storage piles

Visible Dust Emissions (VDE)

- Fugitive dust emissions that are visible to an observer
- "Opacity" is a visual evaluation of the amount of one's view that is obscured by a dust plume
- Limit VDE to 20% opacity
- A qualified observer is tested and certified by the California Air Resources Board



Definitions

- **Bulk Material:**
  - ✓ **...any unpackaged material with a silt content of more than 5%**
- **Silt:**
  - ✓ **...any aggregate material with a particle size of < 75 micrometers in diameter, which passes through a No. 200 sieve**

Definitions

- Trackout:
  - ✓…material that adheres to vehicle tires and is deposited onto paved public roads or their shoulders
- Carryout:
  - ✓…materials from vehicles or trailers falls onto paved public roads or their shoulders

Definitions

- Vehicle Daily Trips (VDT):
  - ✓…24-hour total count of all vehicles
- Annual Average Daily Vehicle Trips (AADT):
  - ✓…annual average 24-hour total of all vehicles counted on the road

Definitions

- Agricultural Sources:
  - ✓…commercial growing of crops or raising of fowl or animals
- On-field Agricultural Sources:
  - ✓paved and unpaved roads
  - ✓unpaved vehicle traffic areas
  - ✓bulk material handling, storage, and transport

Fugitive Dust
Visual Determination of Opacity

- Test Method For Unpaved Roads and Unpaved Traffic Areas
- Test Method For Time-Averaged Regulations
  - Must be qualified by the ARB as a certified VEE observer

"Visible" vs. "Fugitive" Emissions

- VE applies to any operation that emits visible emissions (usually through a stack)
- Ringelmann 1/20% opacity std.
  - ✓Not > 3 minutes in an hour
- Fugitive Dust-EPA Method 9 N/A
  - ✓ few Districts use specific methods for determining Visible Dust Emissions
  - ✓5% opacity std. for permitted sources with an emission from an unintended opening

METHODS TO DETERMINE COMPLIANCE

Methods to Determine Violations

- **Federal**
  - **Method 9**
  - **Method 22**
- **Local Air Districts**
  - **Alternate Method 9**
  - **Local Test Methods**

METHOD 22

❖**Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares**

EPA Method 9

How is Method 9 Applied to Fugitive Dust?

Method 9 for Fugitive Dust targets…

- **Fugitive dust from construction activities.**
- **Vacant lots/open space**
- **Unpaved roadways/easements**
- **Unpaved parking areas**
- **Commercial feedlots & commercial livestock areas**.

Method 9 for Fugitive Dust

- **Developed from a need for a method to evaluate visible emissions from mobile sources/equipment**
- **Why?**

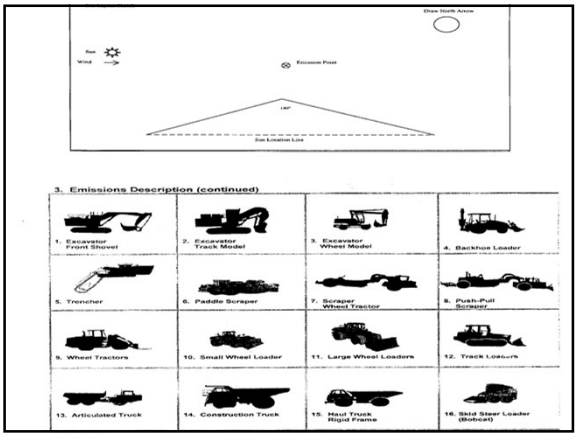
  Sources were not meeting 20% opacity standard even when they complied with work practices.

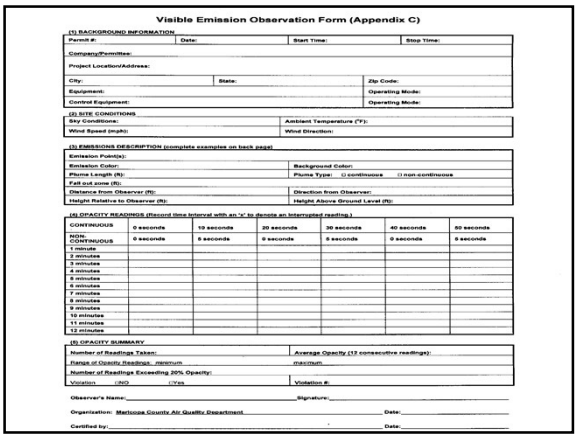
Problems encountered in Development

- **Challenges in using Method 9 in Reading Fugitive Dust Emissions**
  - **Bubble concept**
  - **Must be one discrete, not multiple operations**
  - **Must read only in the path of activity**
  - **Must follow activity of only one vehicle**

Problems, Cont.

- **Fallout zone determination**
  - **Is it Variable or set area?**
- **5 versus 10 second readings?**
- **0% reading versus a no activity reading?**





Visible Emission Observation Form (Appendix C)

(1) BACKGROUND INFORMATION

Permit #:	Date:	Start Time:	Stop Time:
Company/Permittee:			
Project Location/Address:			
City:	State:	Zip Code:	
Equipment:		Operating Mode:	
Control Equipment:		Operating Mode:	

(2) SITE CONDITIONS

Sky Conditions:	Ambient Temperature (°F):
Wind Speed (mph):	Wind Direction:

(3) EMISSIONS DESCRIPTION (complete examples on back page)

Emission Point(s):	
Emission Color:	Background Color:
Plume Length (ft):	Plume Type: ☐ continuous ☐ non-continuous
Fall out zone (ft):	
Distance from Observer (ft):	Direction from Observer:
Height Relative to Observer (ft):	Height Above Ground Level (ft):

(4) OPACITY READINGS (Record time interval with an 'x' to denote an interrupted reading.)

CONTINUOUS	0 seconds	10 seconds	20 seconds	30 seconds	40 seconds	50 seconds
NON-CONTINUOUS	0 seconds	5 seconds	0 seconds	5 seconds	0 seconds	5 seconds
1 minute						
2 minutes						
3 minutes						
4 minutes						
5 minutes						
6 minutes						
7 minutes						
8 minutes						
9 minutes						
10 minutes						
11 minutes						
12 minutes						

(5) OPACITY SUMMARY

Number of Readings Taken:	Average Opacity (12 consecutive readings):
Range of Opacity Readings: minimum	maximum
Number of Readings Exceeding 20% Opacity:	
Violation ☐NO ☐Yes	Violation #:

Observer's Name:_____ Signature:_____

Organization: Maricopa County Air Quality Department Date:_____

Certified by:_____ Date:_____

Method 9 for Fugitive Dust Now "Alternate Method 9"

- **2 methods adopted:**

Non-continuous dust plumes (e.g. unpaved roads and unpaved traffic areas)

Continuous dust plumes (e.g. blading operations)

Non-Continuous Dust Plumes

- **Includes vehicle traffic on unpaved roads**
- **Chose a discrete activity**
- **Readings conducted at 0 and 5 (or 10) seconds**
- **Average the highest 12 consecutive readings in one hour or less**

❖Visual Determination ❖of Opacity (VDE)

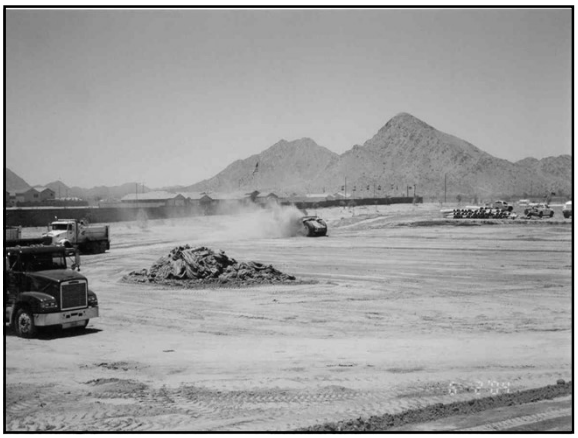
- **Stand at least 16.5 feet from source**
- **Stand perpendicular to wind w/ sun in 140 degree quadrant at back**
- **Read approx. 3 feet above surface where dust is being generated**
- **Two observations per vehicle, one and five seconds apart**

Continuous Dust Plumes

- **Includes graders, trenchers, paddlewheels, blades, clearing, leveling, and raking**
- **Readings are done along a discrete length of path or following a single piece of equipment**
- **Readings at 15 second intervals**
- **Average each set of 12 or 24 consecutive readings.**

❖Visual Determination ❖of Opacity (VDE)

- Stand at least 16.5 feet from source
- Stand perpendicular to wind w/ sun in 140 degree quadrant at back
- Read approx. 3 feet above surface where dust is being generated
- Record observations every 15 seconds



DEERE

Test Method For Unpaved Roads And Unpaved Traffic Areas

- Step 1:
  - At least 16.5′ from Dust Source
  - Sun 140^0 to Observer's Back
  - Read Plume Perpendicular to Line of Vision
  - Only One Plume at a Time

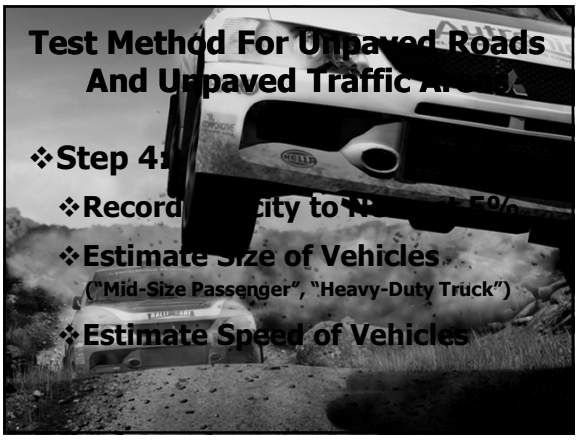
Test Method For Unpaved Roads And Unpaved Traffic Areas

- Step 2: Record Pertinent Data
  - Location & Type of Source
  - Observer's Name & VEE Cert Date
  - Sketch of Site
  - Time & Distance from Plume
  - Wind Speed
  - Color & Type of Background

Test Method For Unpaved Roads And Unpaved Traffic Areas

- Step 3:
  - Observe Plume Approx. 1 Meter Above it's Generation Point
  - Make Two Observations/Vehicle
    - ✓At "0" Seconds & "5" Seconds
  - Don't Read Plume Continuously

Test Method For Unpaved Roads
And Unpaved Traffic Areas
Read this spot twice, every 5
seconds, for six vehicles


Test Method For Unpaved Roads
And Unpaved Traffic Areas
❖Step 4:
❖Record
city to
❖Estimate Size of Vehicles
("Mid-Size Passenger", "Heavy-Duty Truck")
❖Estimate Speed of Vehicles

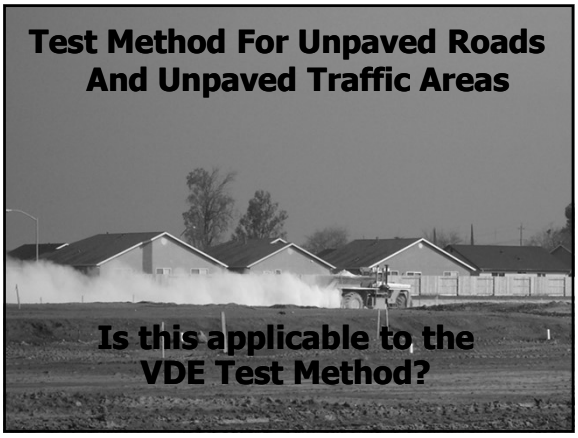
Test Method For Unpaved Roads
And Unpaved Traffic Areas

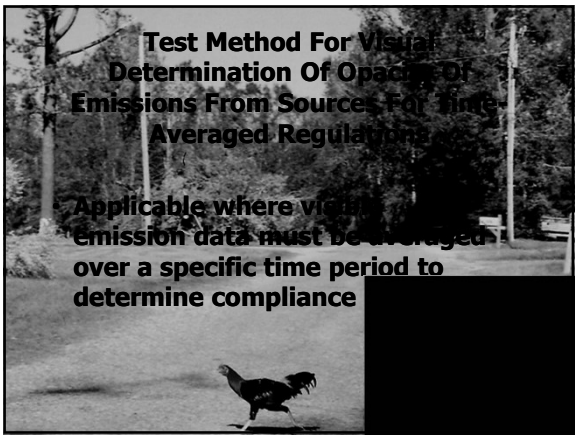
Test Method For Unpaved Roads And Unpaved Traffic Areas

- **Step 5:**
  - Repeat Step 3 (Observation) until 12 Consecutive Readings
    - (Six Vehicles [illegible] on Source)
    - Period Must Not Exceed 1 Hour

Test Method For Unpaved Roads And Unpaved Traffic Areas

- **Step 6:**
  - Average the 12 Readings
  - If 20% Opacity or Less, Source is Considered in Compliance


Test Method For Unpaved Roads And Unpaved Traffic Areas
Is this applicable to the VDE Test Method?


Test Method For Visual Determination Of Opacity Of Emissions From Sources For Time-Averaged Regulations
• Applicable where visible emission data must be averaged over a specific time period to determine compliance

Time-Averaged Regulated Sources
• Observer: Currently Certified by ARB
❖ at least 5 meters from source
❖ sun in 140° sector behind-back
❖ contrasting background
❖ line of sight perpendicular to plume
❖ may follow dust plume created by mobile earthmoving equipment

Time-Averaged Regulated Sources

- Record Pertinent Data
  - Location & Type of Source
  - Observer's Name & VEE Cert Date
  - Sketch of Site
  - Distance from Plume, Wind Speed
  - Color & Type of Background

Time-Averaged Regulated Sources

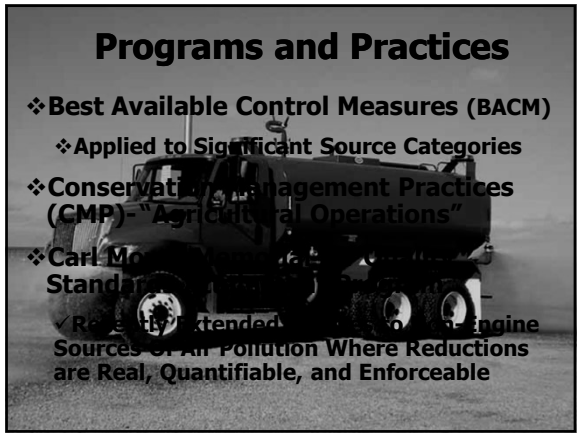
- Make Observations 1 meter above:
  - surface of storage piles
  - rim of open pit mining
  - equipment Generating Plume
- readings at 15 second intervals
- record to nearest 5% opacity
- 12 or 24 consecutive readings
  - Mark an "X" if Plume Travels too far or Ceases

Time-Averaged Regulated Sources

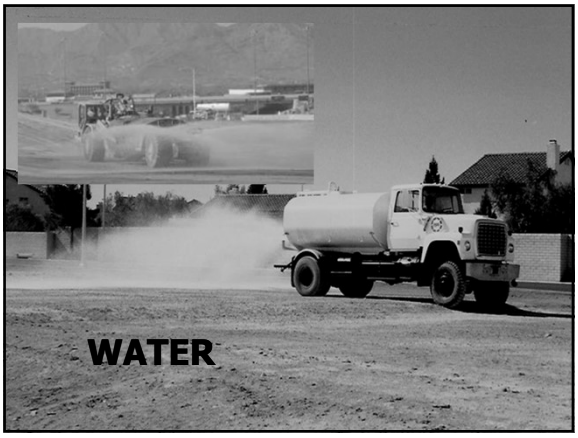
- Compliance Determination:
  - Average 12 or 24 consecutive readings
  - If 20% or lower, source is in compliance
  - Two Sets of Readings Shall Not Overlap

Programs and Practices

- SJVUAPCD Requires any "Key" Representative of the Project to Complete a Dust Control Training Course and Receive a Certificate
- ARB (SB656) List of Measures


Programs and Practices
❖Best Available Control Measures (BACM)
❖Applied to Significant Source Categories
❖Conservation Management Practices (CMP)-"Agricultural Operations"
❖Carl Moyer Memorial Air Quality Standards Attainment Program
✓Recently Extended Sources of Non-Engine Sources Of Air Pollution Where Reductions are Real, Quantifiable, and Enforceable

Control Measures
• Water
• Dust Palliatives
• Aggregate
• Pavement
• Vegetative Controls
• Restricting Vehicle Access
• Reducing Vehicle Speed
• Wind Barriers
• Carryout/Trackout Prevention


WATER

Benefits of Using Water

- Many available water sources
  - Fire Hydrants
  - Storage Tanks
  - Wells
  - Ponds, canals, lakes, and streams
- Easily applied [illegible]re-applied
  - Sprinklers
  - Water trucks, wagons, and trailers
  - Hoses

Foaming Products

Water and a special blend of surfactant creates a foam that increases wetting efficiency

Benefits of Using Water

- Reduces the silt content
  - Increases so[illegible] and ca[illegible]
  - Reduces the tendency for particles to become airborne
- Effective in reducing PM10 emissions
  - [illegible] Study reports an average [illegible] 87% ± 6% PM10 reduction when water is applied to an unpaved road

Benefits of Using Water

- Effective control on a variety of sources
  - Active and inactive open area
  - Trenching and earthmoving
  - Unpaved roads and traffic a
  - Bulk material handling an
  - Structure demolitions
  - Preventing trackout
- Low environmental impacts

Limitations of Using Water

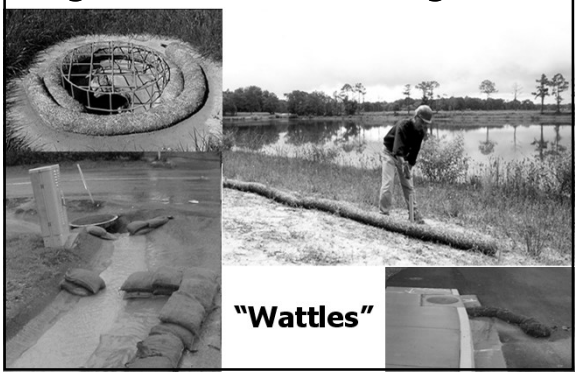
❖ Evaporation
- ✓ Ambient and surface temperatures
- ✓ Humidity
- ✓ Wind speed and direction
- ✓ Amount and frequency of water applied
- ✓ Vehicle type, speed, weight, etc.

❖ Potential environmental concerns
- ✓ Other agency req's and prohibitions
- ✓ Water contamination

Limitations of Using Water

- Application costs
  - *Generally* is expensive and labor intensive
  - Availability of equipment and resour
  - Someone to monitor the site
- Condition of treated surfaces
  - Hydrophobic vs. hydrophilic soils
  - Compaction
  - Materials may be damaged by wa
- Areas with limited access to wa
- Trackout due to over-watering

Regulation Conflicts Using Water



Dust Palliatives

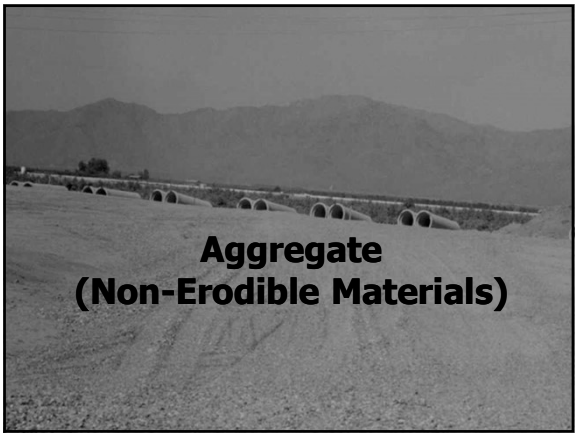
- **Basic Categories: (Besides Water)**
  - **Water Absorbing Products**
  - **Petroleum Based Products**
  - **Organic Non-Petroleum Based Products**
  - **Electrochemical Products**
  - **Polymer Products**
  - **Clay Additive Products**

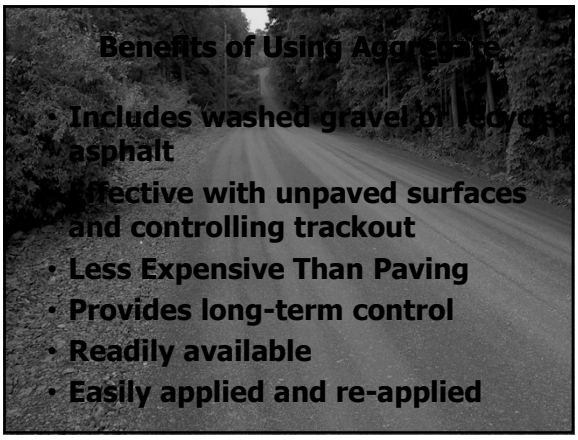
Benefits of Using Palliatives

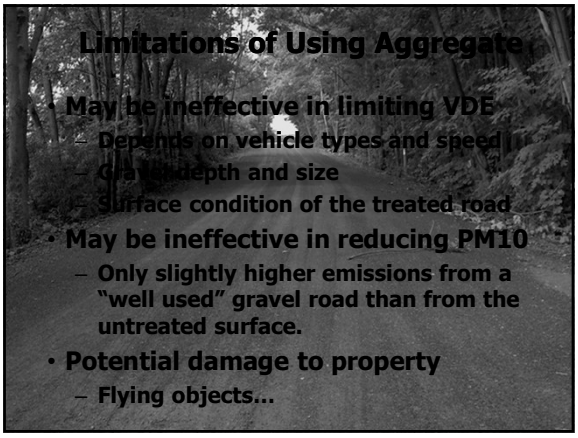
- PM10 control efficiency
  - Many products achieved 99% PM10 control when initially applied
  - Many products maintain at least 50% PM10 control for up to a year after initial application
- Can be Air Resources Board certified
- Application costs
  - Depends on the product, how its applied, and the frequency of reapplications
  - Long term costs – generally less than water
- Continued reapplication of petroleum emulsions or road oil may eventually qualify the surface as a paved surface

Limitations

- Not a permanent solution
  - Requires further applications
- Does not work with active earthmoving
- Hygroscopic (Road Salts)
  - Control [illegible] on the concentration [illegible] surface and the relative [illegible]
  - Potential to be depleted by precipitation and runoff due to high solubility


Aggregate
(Non-Erodible Materials)


Benefits of Using Aggregate
• Includes washed gravel or recycled asphalt
• Effective with unpaved surfaces and controlling trackout
• Less Expensive Than Paving
• Provides long-term control
• Readily available
• Easily applied and re-applied


Limitations of Using Aggregate
• May be ineffective in limiting VDE
– Depends on vehicle types and speed
– Gravel depth and size
– Surface condition of the treated road
• May be ineffective in reducing PM10
– Only slightly higher emissions from a "well used" gravel road than from the untreated surface.
• Potential damage to property
– Flying objects…

Paving

Benefits of Paving

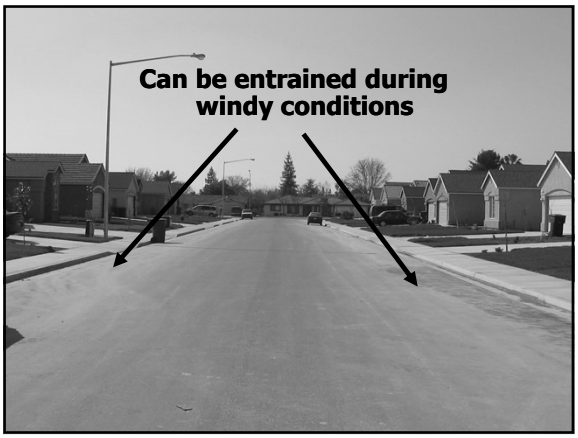
- Provides excellent PM10 control
- Provides long-term control
  - Long duration between application and re-application
- Best control for high traffic areas
- May be used for preventing trackout
- Minimizes Potential Pollutants into Storm Drains

Limitations

- Must consider the amount of traffic, vehicle speeds, number of lanes and types of vehicles

Limitations

- Requires periodic maintenance
  - Preventative controls for trackout and carryout.
  - Mitigation controls, such as frequent street cleaning


Can be entrained during
windy conditions

Vegetation

Types of Vegetation Control

- Re-establishing vegetation cover
- Sprayed-on products
  - Cellulose-type
  - Hydro-seeding
- Rice straw or hay
  - Shredded or Bales
- Mulch
- Wood chips

Benefits of Vegetation

- Increases surface stability
- Many products provide immediate control of open areas
- Can be effective reducing soil erosion
- Easily maintained
  - Stubble and materials left from mowing can be effective with maintaining surface stability and limiting VDE

Limitations of Vegetation

- Difficulties with re-vegetating open areas
  - Season, soil condition, veg. type
- Treated areas require sites to remain inactive
- Most materials applied on unpaved roads and traffic areas do not hold up under continuous traffic use

Limitations of Vegetation

- Application equipment may be a source of visible emissions
- Unmanaged vegetation may increase the risk of causing a fire
  - ✓Disked soils significantly reduces vegetation cover and soil stability
  - ✓Mowing or disking equipment may be a source of VDE

Reducing Vehicle Speed

Reducing Vehicle Speed

- Posting speed limit signs along unpaved roads
- Studies report reduced PM10 emissions

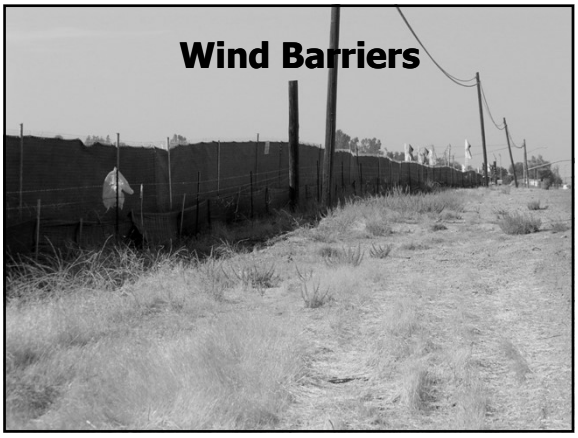
UC Davis Study (1994),

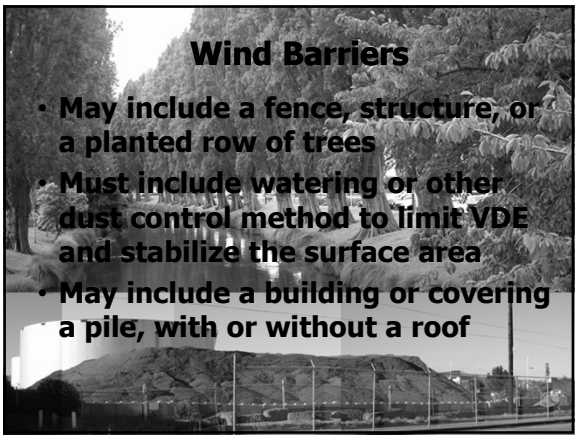
- ✓ Speed reduction from 25 MPH to 10 MPH resulted in a 58% reduction in PM10 emissions
- ✓ Speed reduction from 25 MPH to 15 MPH resulted in a 42% reduction in PM10 emissions

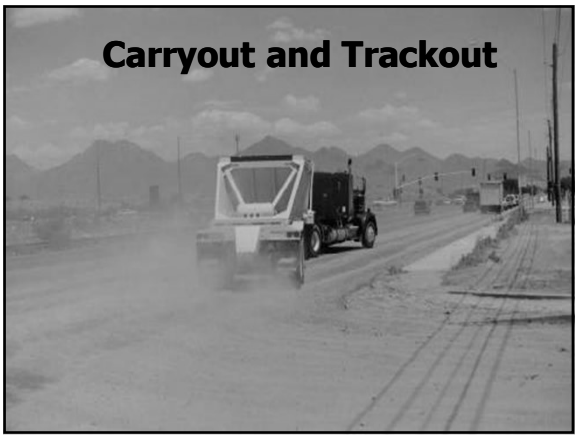
General Requirements

- Signs must meet State and Federal DOT stds
- 15 MPH maximum speed limit for access and haul roads at construction sites
  - Posted at the entrance and every 500 feet
  - Readable in both directions
- 15 MPH max speed limit for unpaved roads
  - Posted per mile in each direction
  - Every two miles in rural areas

Signs


Wind Barriers


Wind Barriers
• May include a fence, structure, or a planted row of trees
• Must include watering or other dust control method to limit VDE and stabilize the surface area
• May include a building or covering a pile, with or without a roof


Carryout and Trackout

Is this in compliance?

How about these?

Gravel Pad Requirements

- One inch or greater in diameter
- At least three inches deep
- Extend from the paved public road surface at least 50 feet
- Cover the full width of the exit surface for at least 50 feet
- Gravel pad clean-up frequency
  - At the end of the work day
  - Following the last vehicle
  - Once every 24-hours

Grizzly Requirements

- Extend at least 25 feet from paved public road
- Cover the full width of the exit surface for at least 25 feet
- A grizzly is often used in conjunction with gravel pads

Are these in compliance?

MACK
Wheel Wash Systems

PM10 Sweeper?

Sydney

Oslo

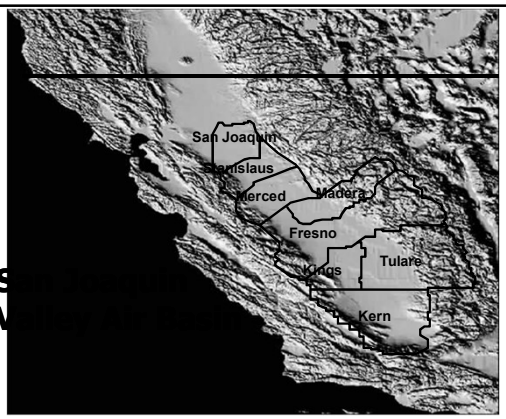
Your State Rule

Example of an "advanced" Air District Fugitive Dust Rule

San Joaquin Valley Unified Air Pollution Control District

Regulation VIII Prohibitory Rules

- Rule 8011 GENERAL REQUIREMENTS
- Rule 8021 CONSTRUCTION, EXCAVATION, EXTRACTION AND OTHER EARTH MOVING ACTIVITIES
- Rule 8031 BULK MATERIALS
- Rule 8041 CARRYOUT AND TRACKOUT
- Rule 8051 OPEN AREAS
- Rule 8061 PAVED AND UNPAVED ROADS
- Rule 8071 UNPAVED VEHICLE/EQUIPMENT TRAFFIC AREAS
- Rule 8081 AGRICULTURAL SOURCES
- Rule 3135 DUST CONTROL PLAN FEE



Rule 8011

GENERAL REQUIREMENTS

- ❖Purpose
- ❖Applicability
- ❖Definitions
- ❖General Requirements
- ❖Test Methods
- ❖Record keeping
- ❖Fugitive Dust Management Plan

Rule 8011

- ❖**Purpose:**
  - ✓…to reduce ambient concentrations of fine particulate matter (PM10) by requiring actions to prevent, reduce or mitigate anthropogenic fugitive dust emissions
- ❖**Applicability:**
  - ✓…to specified outdoor fugitive dust sources

Requirement of Rule 8021

- Identifies the fugitive dust sources and describes the control measures that will be implemented
- Residential developments of 10 or more acres of disturbed surface area
- Non-residential developments of 5 or more acres of disturbed surface area
- Relocation of more than 2,500 cubic yards per day of materials on at least three days of the project

Rules 8031-8081

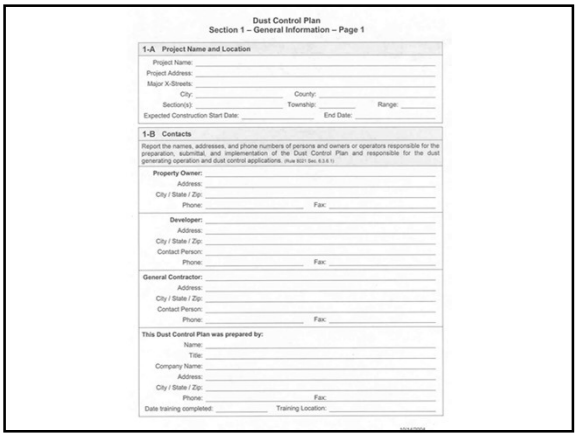
- ❖Additional Requirements in Rules…
  - ✓8031: BULK MATERIALS
  - ✓8041: CARRYOUT AND TRACKOUT
  - ✓8051: OPEN AREAS
  - ✓8061: PAVED AND UNPAVED ROADS
  - ✓8071: UNPAVED TRAFFIC AREAS
  - ✓8081: AGRICULTURAL SOURCES

Examples of Exemptions

- ❖Permitted Blasting Activities
- ❖Activities Above 3,000 feet Elevation
- ❖Removal of Existing Buildings by Not > 50% of 1,000 FT²
- ❖Single Family Residence
- ❖Government Agencies Disking Weeds for Fire Prevention
- ❖Agricultural Sources
- ❖Spreading of Landfill Daily Cover

Dust Control Plan

Practical Exercise



Dust Control Plan
Section 1 – General Information – Page 1

1-A Project Name and Location

Project Name: _____
Project Address: _____
Major X-Streets: _____
City: _____ County: _____
Section(s): _____ Township: _____ Range: _____
Expected Construction Start Date: _____ End Date: _____

1-B Contacts

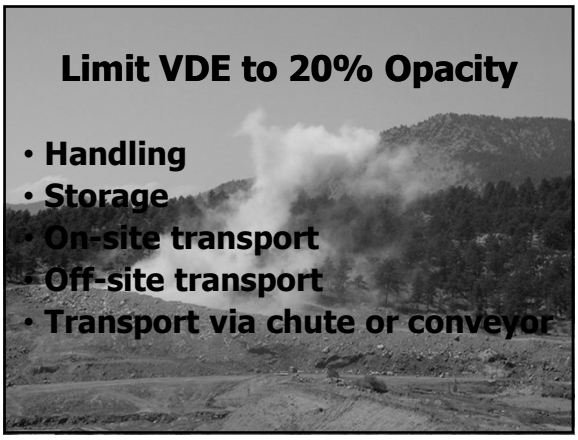
Report the names, addresses, and phone numbers of persons and owners or operators responsible for the preparation, submittal, and implementation of the Dust Control Plan and responsible for the dust generating operation and dust control applications. (Rule 8021 Sec. 6.3.6.1)

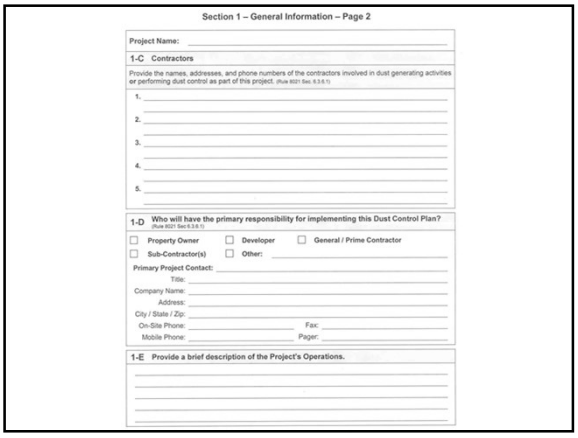
Property Owner: _____
Address: _____
City / State / Zip: _____
Phone: _____ Fax: _____

Developer: _____
Address: _____
City / State / Zip: _____
Contact Person: _____
Phone: _____ Fax: _____

General Contractor: _____
Address: _____
City / State / Zip: _____
Contact Person: _____
Phone: _____ Fax: _____

This Dust Control Plan was prepared by:
Name: _____
Title: _____
Company Name: _____
Address: _____
City / State / Zip: _____
Phone: _____ Fax: _____
Date training completed: _____ Training Location: _____





Section 1 – General Information – Page 2

Project Name: _____

1-C Contractors

Provide the names, addresses, and phone numbers of the contractors involved in dust generating activities or performing dust control as part of this project. (Rule 8021 Sec.6.3.8.1)

1. _____
2. _____
3. _____
4. _____
5. _____

1-D Who will have the primary responsibility for implementing this Dust Control Plan? (Rule 8021 Sec.6.3.8.1)

☐ Property Owner ☐ Developer ☐ General / Prime Contractor
☐ Sub-Contractor(s) ☐ Other: _____

Primary Project Contact: _____
Title: _____
Company Name: _____
Address: _____
City / State / Zip: _____
On-Site Phone: _____ Fax: _____
Mobile Phone: _____ Pager: _____

1-E Provide a brief description of the Project's Operations.

_____

Dust Control Plan
Section 2 – Plot Plan – Page 1

Project Name: _____

2-A Plot Plan

A plot plan identifies the type and location of each project. Attach appropriately sized maps with the project boundaries outlined or use the space in sections 2-B or 2-C to draw a plot plan. Attached maps may include tract maps, site maps, and topographic maps. Use the checklist below to make sure all areas have been identified on the plot plan. (Rule 8021 Sec. 6.3.6.3 & 6.3.6.5)

Identify the relative locations of actual and potential sources of fugitive dust emissions.

- ☐ Bulk material handling and storage areas.
- ☐ Paved and unpaved access roads, haul roads, traffic areas, and equipment storage yards.
- ☐ Exit points where carryout and trackout onto paved public roads may occur.
- ☐ Water supply locations if water application will be used for controlling visible dust emissions.

Identify the relative locations of sensitive receptors within ¼ mile of the project. (Rule 4102 Sec. 4.1)

- ☐ No sensitive receptors within ¼ mile of the project.
- ☐ Residential areas, schools, day care, churches, hospitals, nursing facilities, commercial, retail, etc.
- ☐ Freeways, roads, or traffic areas that may be affected by the dust generating activities.
- ☐ Other: _____

2-B Draw Plot Plan (if one is not attached) — May use the back of this form. Include a North Arrow

☐ Plot plan is attached (Skip to 3-A).

Dust Control Plan
Section 3 – Fugitive PM10 Sources – Page 1

Project Name: _____

3-A Disturbed Surface Area

Report the total area of land surface to be disturbed, the daily throughput volume of earthmoving in cubic yards, and the total area in acres of the entire project site. (Rule 8021 Sec. 6.3.8.3)

Total area of land surface to be disturbed:	_____	Acres
Daily maximum throughput volume of earthmoving:	_____	Cubic Yards
Daily average throughput volume of earthmoving:	_____	Cubic Yards
Total area of entire project site:	_____	Acres
Total disturbed areas that will be left inactive for more than seven days:	_____	Acres

3-B Dust Generating Activity Dates

The expected start and completion dates of **dust generating activities and soil disturbance activities** to be performed on site. For phased projects, it may be necessary to report expected start and completion dates separately. (Rule 8021 Sec. 6.3.8.4)

Expected start date:	_____	**Completion Date:**	_____
Phase Project Start – A:	_____	Completion – A:	_____
Phase Project Start – B:	_____	Completion – B:	_____
Phase Project Start – C:	_____	Completion – C:	_____

3-C Other Locations

Identify whether any other locations should be included with this plan that are involved with this project. An example may include listing any site where materials will be imported from or exported to. (Rule 8021 Sec. 6.3.2)

☐ No other locations are included with this project. (Skip to 3-D)

Location 1: _____

☐ No Dust Control Plan Required ☐ Included with this plan ☐ Included with another plan

Location 2: _____

☐ No Dust Control Plan Required ☐ Included with this plan ☐ Included with another plan

Location 3: _____

☐ No Dust Control Plan Required ☐ Included with this plan ☐ Included with another plan

Section 3 – Fugitive PM10 Sources – Page 2

Project Name: _____

3-D Sources of Fugitive Dust

This section describes the minimum requirements for limiting visible dust emissions from activities that cause fugitive dust emissions. (Rule 8021 Sec. 5.3-5.5) **Check at least one box under each category.**

Structural Demolition. (Rule 8021 Sec. 5.1, 6.3.3, & 6.3.6.5)

- ☐ No demolitions are planned for this project.
- ☐ Asbestos NESHAP notification and fees have been submitted to the District. (Rule 3050 and Rule 4002).
- ☐ Water will be applied to the following areas for the duration of the demolition activities:
  - Building exterior surfaces;
  - Unpaved surface areas where equipment will operate;
  - Razed building materials; and
  - Water or dust suppressants will be applied to unpaved surface areas within 100 feet of structure during demolition.

Pre-Activity. (Rule 8021 Sec. 5.2)

- ☐ Not applicable for this project (Please explain why in Section 3-F).
- ☐ The site will be pre-watered and work will be phased to reduce the amount of disturbed surface area at any one time (Complete Section 4-A).

Active Operations. (Rule 8021 Sec. 5.2)

- ☐ Water will be applied to dry areas during leveling, grading, trenching, and earthmoving activities (Complete Section 4-A).
- ☐ Wind barriers will be constructed and maintained, and water or dust suppressants will be applied to the disturbed surface areas (Complete Sections 4-A or 4-B, and 4-C).

Inactive Operations, including after work hours, weekends, and holidays. (Rule 8021 Sec. 5.2)

- ☐ Not applicable for this project (Please explain why in Section 3-F).
- ☐ Water or dust suppressants will be applied on disturbed surface areas to form a visible crust, and vehicle access will be restricted to maintain the visible crust. (Complete Section 4-A or 4-B, and 4-C)

Temporary stabilization of areas that remain unused for seven or more days. (Rule 8021 Sec. 5.2)

- ☐ Not applicable for this project (Please explain why in Section 3-F)
- ☐ Vehicular access will be restricted and water or dust suppressants will be applied and maintained at all unvegetated areas (Complete Section 4-A or 4-B, and 4-C).
- ☐ Vegetation will be established on all previously disturbed areas (Complete Section 4-C).
- ☐ Gravel will be applied and maintained at all previously disturbed areas (Complete Section 4-C).
- ☐ Previously disturbed areas will be paved (Complete Section 4-C).

Unpaved Access and Haul Roads, Traffic and Equipment Storage Areas. (Rule 8021 Sec. 5.2 and 5.3)

- ☐ Not applicable for this project (Please explain why in Section 3-F)
- ☐ Apply water or dust suppressants to unpaved haul and access roads (Complete Section 4-A or 4-B)
- ☐ Post speed limit signs of not more than 15 miles per hour at each entrance, and again every 500 feet. (Complete Section 4-C)
- ☐ Water or dust suppressants will be applied to vehicle traffic and equipment storage areas (Complete Section 4-A or 4-B).

Wind Events. (Rule 8021 Sec. 5.4)

- ☐
  - Water application equipment will apply water to control fugitive dust during wind events, unless unsafe to do so.
  - Outdoor construction activities that disturb the soil will cease whenever visible dust emissions cannot be effectively controlled.

Section 3 – Fugitive PM10 Sources – Page 3

3-E Bulk Materials (Rule 8021 Sec. 6.3.6.6 and Rule 8031)

Outdoor Handling of Bulk Materials. (Rule 8031 Sec. 5.0 A)

- ☐ No bulk materials will be handled during this project.
- ☐ Water or dust suppressants will be applied when handling bulk materials.
- ☐ Wind barriers with less than 50 percent porosity will be installed and maintained, and water or dust suppressants will be applied.

Outdoor Storage of Bulk Materials. (Rule 8031 Sec. 5.0 B)

- ☐ No bulk materials will be stored during this project.
- ☐ Water or dust suppressants will be applied to storage piles.
- ☐ Storage piles will be covered with tarps, plastic, or other suitable material and anchored in such a manner that prevents the cover from being removed by wind action.
- ☐ Wind barriers with less than 50 percent porosity will be installed and maintained around the storage piles, and water or dust suppressants will be applied.
- ☐ A three-sided structure (< 50% porosity) will be used that is at least as high as the storage piles.

On-Site Transporting of Bulk Materials. (Rule 8031 Sec. 5.0 C)

- ☐ No bulk materials will be transported on the project site.
- ☐ Vehicle speed will be limited on the work site.
- ☐ All haul trucks will be loaded such that the freeboard is not less than six inches when transported across any paved public access road.
- ☐ A sufficient amount of water will be applied to the top of the load to limit visible dust emissions.
- ☐ Haul trucks will be covered with a tarp or other suitable cover.

Off-Site Transporting of Bulk Materials. (Rule 8031 Sec. 5.0 D)

- ☐ No bulk materials will be transported to or from the project site.
- ☐ The following practices will be performed: (complete Section 5-B)
  - The interior of emptied truck cargo compartments will be cleaned or covered before leaving the site.
  - Spillage or loss of bulk materials from holes or other openings in the cargo compartment's floor, sides, and tailgates will be prevented.
  - Haul trucks will be covered with a tarp or other suitable cover or will be loaded such that the freeboard is not less than six inches when transported on any paved public access road to or from the project site and a sufficient amount of water will be applied to the top of the load to limit visible dust emissions.

Outdoor Transport using a Chute or Conveyor. (Rule 8031 Sec. 5.0 E)

- ☐ No chutes or conveyors will be used.
- ☐ Chute or conveyor will be fully enclosed.
- ☐ Water spray equipment will be used to sufficiently wet the materials.
- ☐ Transported materials will be washed or screened to remove fines (PM10 or smaller).

3-F Comments

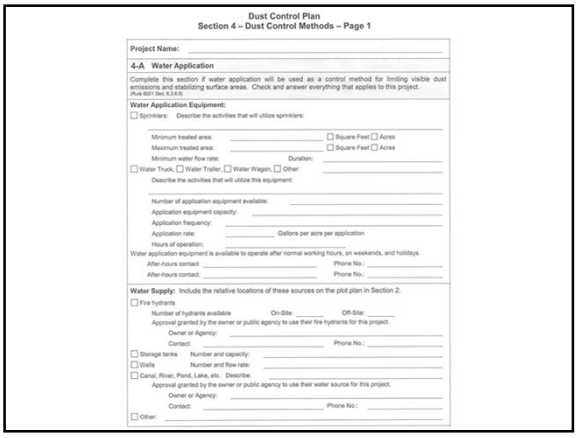
_____

Bulk Material Handling

Chutes & Conveyors

Wind Driven Fugitive Dust
07/13/2004

Site Grading



Dust Control Plan
Section 4 – Dust Control Methods – Page 1

Project Name: _____

4-A Water Application

Complete this section if water application will be used as a control method for limiting visible dust emissions and stabilizing surface areas. Check and answer everything that applies to this project.
(Rule 8031 Sec. 6.3.6.6)

Water Application Equipment:

☐ Sprinklers: Describe the activities that will utilize sprinklers:

Minimum treated area: _____ ☐ Square Feet ☐ Acres
Maximum treated area: _____ ☐ Square Feet ☐ Acres
Minimum water flow rate: _____ Duration: _____
☐ Water Truck, ☐ Water Trailer, ☐ Water Wagon, ☐ Other: _____
Describe the activities that will utilize this equipment:

Number of application equipment available: _____
Application equipment capacity: _____
Application frequency: _____
Application rate: _____ Gallons per acre per application
Hours of operation: _____
Water application equipment is available to operate after normal working hours, on weekends, and holidays.
After-hours contact: _____ Phone No.: _____
After-hours contact: _____ Phone No.: _____

Water Supply: Include the relative locations of these sources on the plot plan in Section 2.

☐ Fire hydrants
Number of hydrants available On-Site: _____ Off-Site: _____
Approval granted by the owner or public agency to use their fire hydrants for this project.
Owner or Agency: _____
Contact: _____ Phone No.: _____
☐ Storage tanks Number and capacity: _____
☐ Wells Number and flow rate: _____
☐ Canal, River, Pond, Lake, etc. Describe: _____
Approval granted by the owner or public agency to use their water source for this project.
Owner or Agency: _____
Contact: _____ Phone No.: _____
☐ Other: _____

Water Trailer Tank

?

Sprinklers

Spray Nozzles

Section 4 – Dust Control Methods – Page 2

Project Name: _____

4-B Dust Suppressant Products

Complete this section if a dust suppressant product will be used. These materials include, but are not limited to: hygroscopic suppressants (road salts), adhesives, petroleum emulsions, polymer emulsions, and bituminous materials (road oils). (Rule 8021 Sec. 6.3.6.6)

Copy this page if more than one dust suppressant product will be used.

☐ **Not Applicable.** Only water application will be the control method used. **Skip to 4-C.**

Application Area: _____

Product Name: _____

Contractor's Name: _____ Phone No: _____

Application Rate: _____ Gallons of undiluted material per ☐ mile or ☐ acre treated.

Application Frequency: _____ Applications per ☐ week, ☐ month, ☐ year

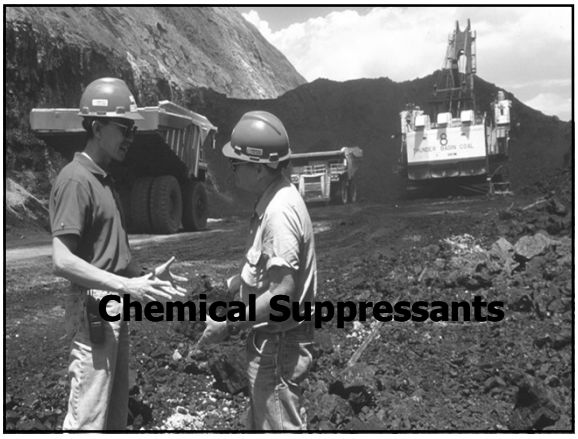
Application Equipment: _____

Number of Application Equipment Available: _____

Application Equipment Capacity: _____

Attach each of the following information that fully describes this product. Use the checklist below to make sure all information is submitted with this plan.

- ☐ Product Specifications (MSDS, Product Safety Data Sheet, etc.)
- ☐ Manufacturer's Usage Instructions (method, frequency, and intensity of application)
- ☐ Environmental impacts and approvals or certifications related to the appropriate and safe use for ground application.



Section 4 – Dust Control Methods – Page 3

Project Name: _____

4-C Other Dust Control Methods

Check below the other types of dust control methods that will be employed at the construction site. (Rule 8021 Sec. 5.0)

☐ Physical barriers for restricting unauthorized vehicle access:
☐ Fences ☐ Gates ☐ Posts ☐ Berms ☐ Concrete Barriers
☐ Other: _____

☐ Wind barriers Describe: _____

☐ Posted speed limit signs meet State and Federal Department of Transportation standards. (Rule 8021 Sec. 5.3)
☐ Posted at 15 miles per hour, ☐ Posted at _____ miles per hour (less than 15 MPH)

☐ Re-establish vegetation for temporarily stabilizing previously disturbed surfaces.
Explain: _____

☐ Apply and maintain gravel:
☐ On haul roads ☐ On access roads ☐ At equipment storage yards
☐ At vehicle traffic areas ☐ For temporarily stabilizing previously disturbed areas.
Explain: _____

☐ Apply pavement:
Explain: _____

☐ Other: _____

4-D Contingencies

Contingencies to be implemented if application equipment becomes inoperable, more equipment is needed to effectively control fugitive dust emissions during active and inactive periods, accessibility limitations occur at the water sources, or staff is not available to operate the application equipment. Describe the contingencies that will be in place and when they will be implemented. Attach any additional information if needed. (Rule 4102 and Rule 8021 Sec. 6.3.6.6)

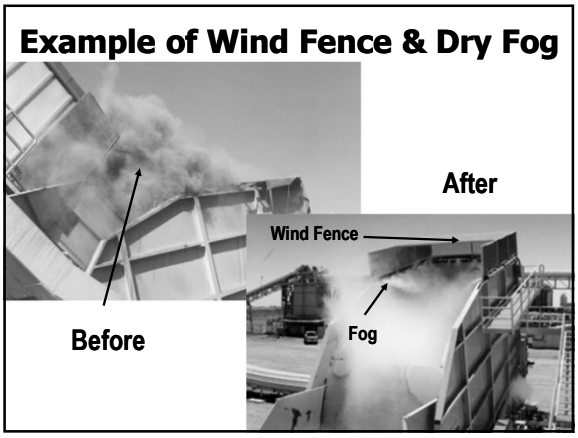
_____

4-E Record keeping (Rule 8011 Sec. 6.2)

Records and any other supporting documents for demonstrating compliance must be maintained, but only for those days when a control measure is implemented. The District has developed record keeping forms that may be used for complying with this requirement. Check one or both below:

☐ Records will be maintained using the forms developed by the District.

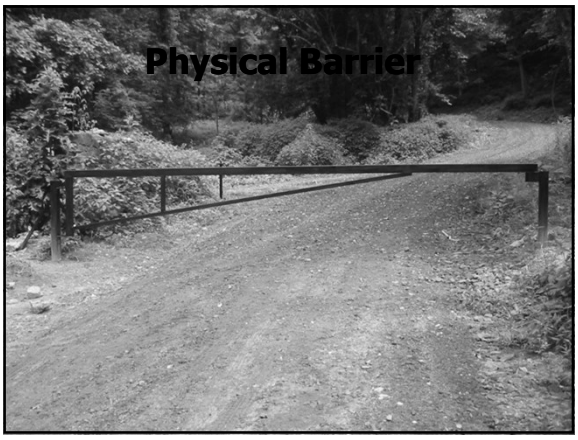
☐ Records will be maintained using documents or forms developed by the owner or operator.
Explain and include copies: _____


Example of Wind Fence & Dry Fog
After
Wind Fence
Fog
Before

Restricted Access
ROAD CLOSED
ROAD CLOSED

Posted Signs
ROAD ENDS AHEAD
CAUTION DUST AHEAD

SPEED
LIMIT
23
MPH
WHOA
Speed Limits


Physical Barrier

Application of Gravel
to Mitigate Dust

Dust Control Plan
Section 5 – Carryout and Trackout – Page 1

Project Name: _____

5-A Treatments for Preventing Trackout

Select the control devices that will be used for preventing trackout from occurring onto paved public roads. Trackout is any material that adheres to vehicle tires and is deposited onto a paved public road or the paved shoulder of a paved public road. Check one or a combination that will apply to this project.

☐ **Grizzly:** Rails, pipes, or grates used to dislodge debris off of vehicles before exiting the site. Extends from the intersection with the paved public road surface for the full width of the unpaved exit surface for a distance of at least 25 feet. (Rule 8041 Sec. 5.9.1)

Describe: _____

☐ **Gravel Pad:** A layer of washed gravel at least one (1) inch or larger in diameter, three (3) inches deep, and extends from the intersection with the public paved road surface for the full width of the unpaved exit surface for a distance of at least 50 feet. (Rule 8041 Sec. 5.9.2)

Gravel Size: _____ Inches

Pad Width: _____ Feet Length: _____ Feet Depth: _____ Inches

☐ **Paved Surface:** Extends from the intersection with the paved public road surface for the full width of the unpaved access road for at least 100 feet to allow mud and dirt to drop off of vehicles before exiting the site. (Rule 8041 Sec. 5.9.3)

Width: _____ Feet Length: _____ Feet

Mud and dirt deposits accumulating on paved interior roads will be removed with sufficient frequency, but not less frequently than once per workday. Cleanup will commence within ½ hour of generating any carryout and trackout. (Rule 8041 Sec. 5.8.2 and 5.9.3)

Clean-up Frequency: _____

☐ **Wheel Washer:** Uses water to dislodge debris from tires and vehicle undercarriage. (Rule 8011 Sec. 3.73)

Describe: _____

☐ **Other:** (Rule 8041 Sec. 5.8.1.2) _____

5-B Treatments for Preventing Carryout

Report the required treatments that will be used for preventing carryout from occurring on paved public roads. Carryout occurs when materials from emptied or loaded haul trucks, vehicles, or trailers falls onto a paved public road or paved shoulder of a paved public road.

☐ No haul trucks will be routinely entering or leaving the project site.

Emptied Haul Trucks: (Rule 8031 Sec 5.0)

☐ Interior cargo compartments will be cleaned before leaving the project site.

☐ Cargo compartment will be covered with a tarp or suitable cover before leaving the project site.

Loaded Haul Trucks: Spillage or loss of materials from holes or other opening in the cargo compartment will be prevented when material is transported onto any paved public access road. (Rule 8031 Sec 5.0)

Select one or both of the required applications:

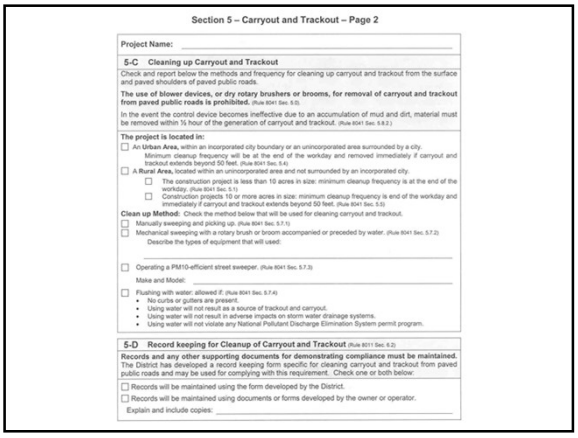
☐ Haul trucks will be loaded such that the freeboard is not less than six inches with water applied to the top of the load before leaving the project site.

☐ Cargo compartment and load will be covered with a tarp or suitable cover before leaving the project site.

☐ **Other:** _____

Preventative Measures

- ❖Grizzly
- ❖Gravel pad
- ❖Paved surfaces
- ❖Wheel washers



Section 5 – Carryout and Trackout – Page 2

Project Name: _____

5-C Cleaning up Carryout and Trackout

Check and report below the methods and frequency for cleaning up carryout and trackout from the surface and paved shoulders of paved public roads.

The use of blower devices, or dry rotary brushers or brooms, for removal of carryout and trackout from paved public roads is prohibited. (Rule 8041 Sec. 5.0)

In the event the control device becomes ineffective due to an accumulation of mud and dirt, material must be removed within ½ hour of the generation of carryout and trackout. (Rule 8041 Sec. 5.8.2)

The project is located in:

☐ An **Urban Area,** within an incorporated city boundary or an unincorporated area surrounded by a city.
Minimum cleanup frequency will be at the end of the workday and removed immediately if carryout and trackout extends beyond 50 feet. (Rule 8041 Sec. 5.4)

☐ A **Rural Area,** located within an unincorporated area and not surrounded by an incorporated city.

- ☐ The construction project is less than 10 acres in size: minimum cleanup frequency is at the end of the workday. (Rule 8041 Sec. 5.1)
- ☐ Construction projects 10 or more acres in size: minimum cleanup frequency is end of the workday and immediately if carryout and trackout extends beyond 50 feet. (Rule 8041 Sec. 5.5)

Clean up Method: Check the method below that will be used for cleaning carryout and trackout.

☐ Manually sweeping and picking up. (Rule 8041 Sec. 5.7.1)

☐ Mechanical sweeping with a rotary brush or broom accompanied or preceded by water. (Rule 8041 Sec. 5.7.2)
Describe the types of equipment that will used:
_____

☐ Operating a PM10-efficient street sweeper. (Rule 8041 Sec. 5.7.3)
Make and Model: _____

☐ Flushing with water: allowed if: (Rule 8041 Sec. 5.7.4)

- No curbs or gutters are present.
- Using water will not result as a source of trackout and carryout.
- Using water will not result in adverse impacts on storm water drainage systems.
- Using water will not violate any National Pollutant Discharge Elimination System permit program.

5-D Record keeping for Cleanup of Carryout and Trackout (Rule 8011 Sec. 6.2)

Records and any other supporting documents for demonstrating compliance must be maintained. The District has developed a record keeping form specific for cleaning carryout and trackout from paved public roads and may be used for complying with this requirement. Check one or both below:

☐ Records will be maintained using the form developed by the District.

☐ Records will be maintained using documents or forms developed by the owner or operator.

Explain and include copies: _____

Dust Control Plan
Section 6 – Certification

Project Name:	Tom's Apt Complex
6-A Certification	
I certify that all information contained herein and information submitted in the attachments to this documents are true and correct.	
Dusty Fields	Project Foreman
Print Name	Title
Dusty Fields	
Signature	Date
555-1212	555-1234
Phone Number / Fax Number	Cell Number

What about Violations?

- Notice Of Violation (NOV):
  - Failed Visible Dust Emission Evaluation (VDE > 20%)
  - Failed to Meet a "Stabilized Surface"
    - ✓Silt Content > 6% or 8%
    - ✓Silt Loading > 0.33 oz/ft^2

Four Options for Being Issued a NOV

- Continue to Operate in Violation
- Cease the Non-compliant Activity
- Correct the Problem
- Apply for a Variance

Summary of "non-VEE" Test Methods To Determine a Stabilized Surface

1. Visible Crust Determination
2. Determination of Silt Content for Unpaved Roads and Unpaved Vehicle/Equipment Traffic Areas
3. Determination of Threshold Friction Velocity (TFV)
4. Determination of Flat Vegetative Cover
5. Determination of Standing Vegetative Cover
6. Rock Test Method

"Stabilized Surface"

- Surface is "Stable" if…
  - Visible Crust is in compliance
  - Threshold Friction Velocity ≥ 100 cm/sec
  - Flat vegetation cover ≥ 50%
  - Standing vegetation cover ≥ 30%
  - Combination of standing veg. & TFV
  - Non-erodible elements ≥ 10%
- Unpaved Roads-silt content ≤ 6%
- Unpaved Traffic Areas-silt content ≤ 8%

"Stabilized Surface"

"Any disturbed surface area or open bulk storage pile resistant to wind blown fugitive dust emissions."

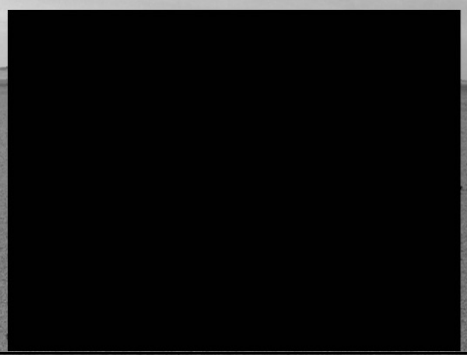
Disturbed Surface Area

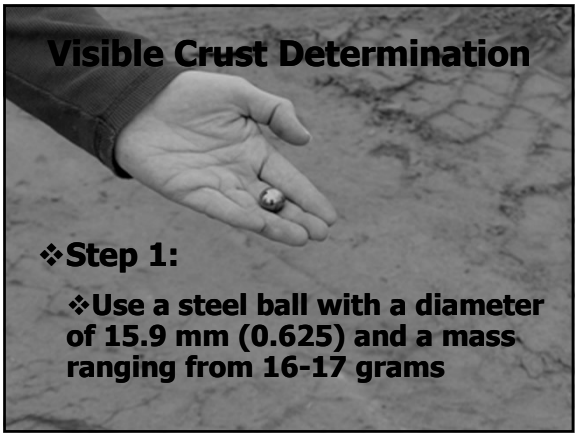
- An area in which naturally occurring materials have been physically moved, uncovered, destabilized, or otherwise modified by grading, excavating or similar activities and vehicle traffic and/or equipment operation has occurred

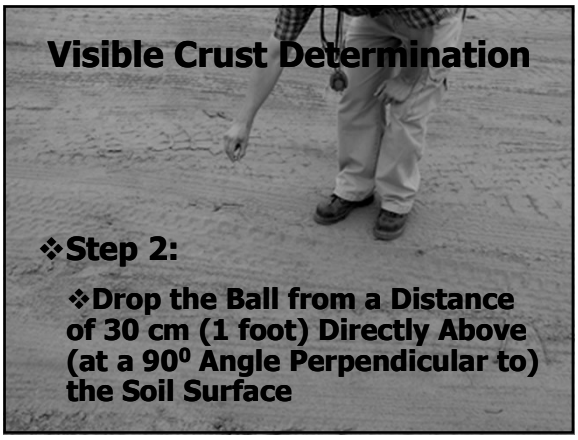
Visible Crust Determination

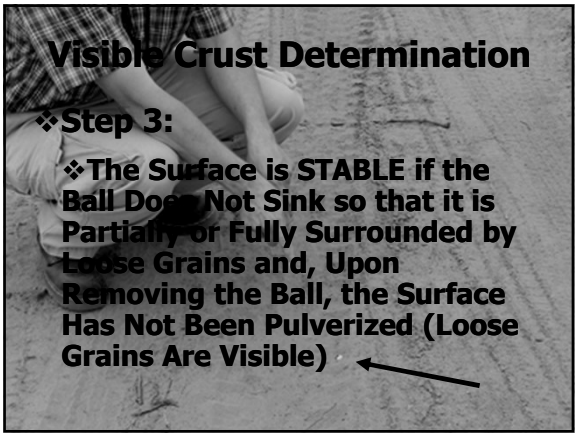
- First, determine if there is a visible crust
- Then, proceed with the "Ball Drop" test method to determine if there is a sufficient crust to establish compliance
  - *The higher the silt content, the more fine particles can be released during vehicle traffic*

Visible Crust Determination




Visible Crust Determination
❖Step 1:
❖Use a steel ball with a diameter of 15.9 mm (0.625) and a mass ranging from 16-17 grams


Visible Crust Determination
❖Step 2:
❖Drop the Ball from a Distance of 30 cm (1 foot) Directly Above (at a 90⁰ Angle Perpendicular to) the Soil Surface


Visible Crust Determination
❖Step 3:
❖The Surface is STABLE if the Ball Does Not Sink so that it is Partially or Fully Surrounded by Loose Grains and, Upon Removing the Ball, the Surface Has Not Been Pulverized (Loose Grains Are Visible)

Visible Crust Determination

- Step 4:
  - Drop the Ball Three Times Within a Random Survey Area of 1 Square Foot of the Overall Disturbed Site. A "Visible Crust" is Present if the "Drops" Pass Two Out of Three Times

Visible Crust Determination

- If the Surveyed Portion Does Not Appear to Represent the Crust Condition of the Overall Site, Repeat the Test as Often as Necessary in Order to Determine Compliance

Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests

[redacted]

Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests

- **Step 1:**
  - **Mark out Dirt Within a Well Traveled Area to an Approx. Depth of 3/8" in a 1 ft^2 Area. Collect a Sample of Loose Surface Material into a Dustpan.**

Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests

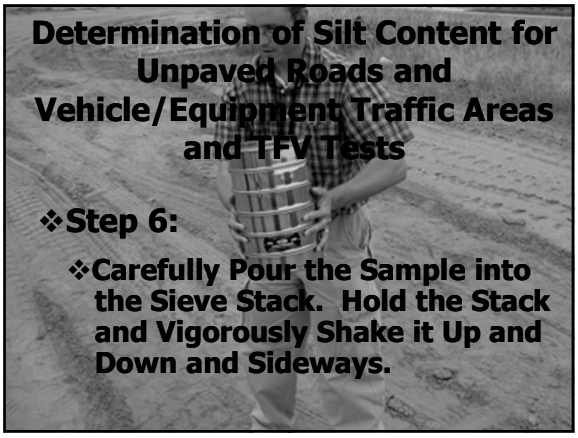
- **Step 2:**
  - **Place an Empty Container on a Scale on a Level Surface. Zero the Scale with the Weight of the Empty Container (tare weight)**

Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests

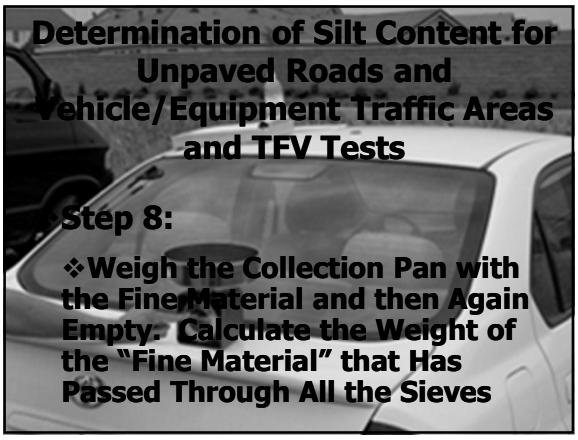
- **Step 3:**
  - **Transfer the Entire Sample Collected in the Dustpan to the Container.**

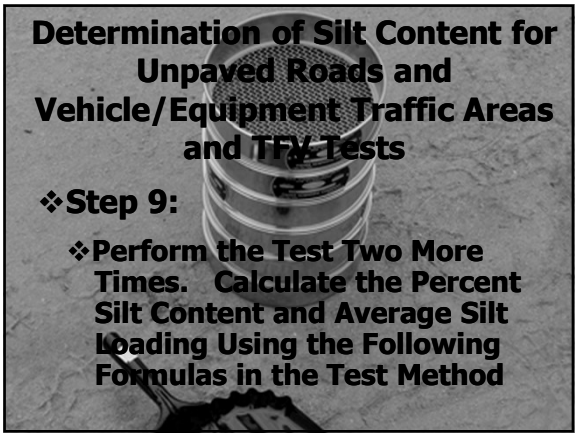
Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests
❖Step 4:
❖Weigh the Total Weight of the Sample and the Container. Subtract the Weight of the Empty Container (tare weight) from the Total Weight to Find the Weight of the Sample.

Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests
❖Step 5:
❖Stack a Set of 5 Sieved Collectors in Order According to Size Openings, With the Largest Size Opening on Top. Place a Collection Pan Underneath


Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests
❖Step 6:
❖Carefully Pour the Sample into the Sieve Stack. Hold the Stack and Vigorously Shake it Up and Down and Sideways.

Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests
❖Step 7:
❖Make Sure All the Finer Material Has Passed Through the Sieves and into the Collection Pan


Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests
❖Step 8:
❖Weigh the Collection Pan with the Fine Material and then Again Empty. Calculate the Weight of the "Fine Material" that Has Passed Through All the Sieves


Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests
❖Step 9:
❖Perform the Test Two More Times. Calculate the Percent Silt Content and Average Silt Loading Using the Following Formulas in the Test Method

Determination of Silt Content for Unpaved Roads and Vehicle/Equipment Traffic Areas and TFV Tests

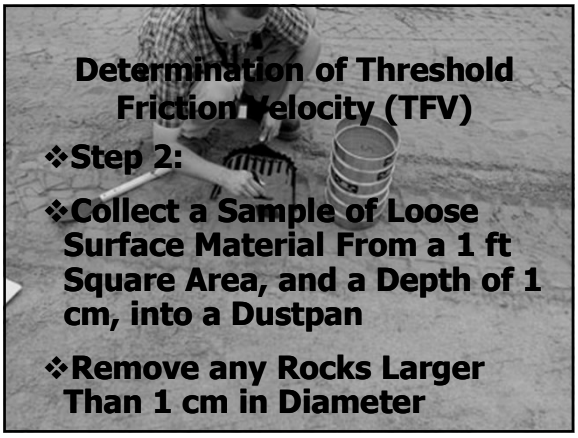
- If Source is an Unpaved Road and the Avg. "PSC" is 6% or Less, the Surface is STABLE
- If Unpaved Parking Lot and the Avg. "PSC" is 8% or Less, the Surface is STABLE

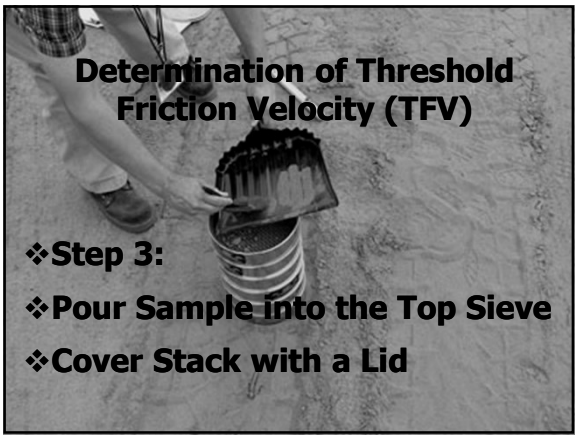
Determination of Threshold Friction Velocity (TFV)

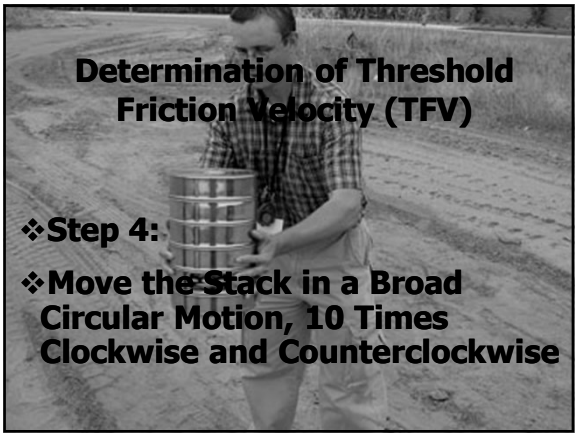
- For Disturbed Surface Areas That are not Crusted or Vegetated, This Test Measures the Characterization of Site Erodibility and it's Susceptibility to Wind Erosion
- TFV Must be 100 cm/sec or greater, Corrected for Non-Erodible Elements, to be Considered Stable

Determination of Threshold Friction Velocity (TFV)

- Step 1:
- Obtain and Stack a Set of 5 Sieves in Order According to Size Openings, With Largest Size Opening on Top
- Place a Collector Pan Underneath


Determination of Threshold Friction Velocity (TFV)
❖Step 2:
❖Collect a Sample of Loose Surface Material From a 1 ft Square Area, and a Depth of 1 cm, into a Dustpan
❖Remove any Rocks Larger Than 1 cm in Diameter


Determination of Threshold Friction Velocity (TFV)
❖Step 3:
❖Pour Sample into the Top Sieve
❖Cover Stack with a Lid


Determination of Threshold Friction Velocity (TFV)
❖Step 4:
❖Move the Stack in a Broad Circular Motion, 10 Times Clockwise and Counterclockwise

Determination of Threshold Friction Velocity (TFV)

- Step 5:
- Remove the Lid and Disassemble Each Sieve, Beginning With the Largest Sieve
- Tilt and Tap the Sieves so That the Material Aligns to One Side of Each Sieve
- Visually Determine Which Sieve Contains the Largest Volume of Material

Determination of Threshold Friction Velocity (TFV)

- Step 6:
- If unable to Visually Determine the Results, Use a Graduated Cylinder to Measure the Volume of Each Sieve
- Estimate the TFV for the Sieve Catch With the Greatest Volume Using the Table in the Test Method
- Repeat Test Two More Times

Determination of Flat Vegetative Cover

- Flat Vegetation Includes Attached (rooted or dead) Vegetation or Unattached Vegetation Debris Lying on the Surface With a Predominant Horizontal Orientation That is Not Subject to Wind

Determination of Flat Vegetative Cover

- Step 1:
  - Choose a Survey Area That Represents a Random Portion of the Overall Conditions of the Site

Determination of Flat Vegetative Cover

- Step 2:
  - Stretch a 100 Foot Measuring Tape Across the Area

Determination of Flat Vegetative Cover

- Step 3:
  - Firmly Anchor Both Ends of the Tape into the Surface Using a Tool Such as a Screwdriver, With the Tape Stretched Taut and Close to the Soil Surface

Determination of Flat Vegetative Cover

- Step 4:
  - Pinpoint an Area the Size of a 3/32" dowel Centered Above Each 1 Foot Interval Marks Along the Tape
  - Count the Number of Times That Flat Vegetation Lies Directly Underneath the Pinpointed Areas Along the Tape
  - The Number Counted Represents the Percentage of Vegetation Cover
  - Repeat Test Two More Times and Average the Three Results

Determination of Flat Vegetative Cover

- The "Flat Vegetation Cover" Must Cover at Least 50% of the Site to Qualify as a "Stabilized Surface"

Determination of Standing Vegetative Cover

- Standing Vegetation Includes Vegetation That is Attached (rooted, dead or alive) With a Predominant Vertical Orientation

Determination of Standing Vegetative Cover

- Percent Cover Standing; Vegetative Density Factor
  - Use Equations 10 & 11
  - If Percent Vegetative Density is = or > 30, Use Eqs. 16, 17 or 18
  - If < 30, Use Equations 12 & 13 to Calculate Frontal Silhouette Area

Determination of Standing Vegetative Cover

- Standing Vegetation Must Cover at Least 30% That is Attached With a Predominant Vertical Orientation or 10% Where the TFV is at Least 43 cm/sec When Corrected for Non-Erodible Elements

Rock Test Method (Section 7)

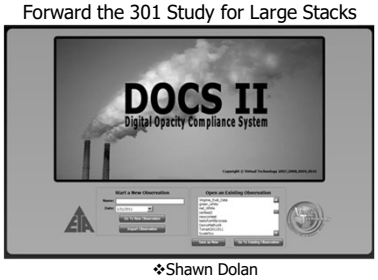
- Examines the Wind-Resistance Effects of Rocks and Other Non-Erodible Elements on Disturbed Surfaces
- Vegetation Does Not Count as a Non-Erodible Element in this Method (Basically, ONLY Rocks)

Rock Test Method (Section 7)

- If the Average Rock Cover is ≥ or = to 10%, the Surface Is Stable
- If < 10%, Use Table 3 of the Determination of Threshold Velocity Method (TFV) to Calculate the Correction Factor to the TFV

Digital Opacity Compliance System

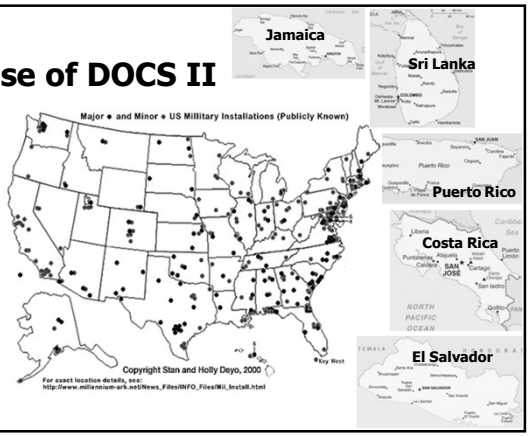
Second Generation
EPA Alternative Method 082, Moving Opacity Technology
Forward the 301 Study for Large Stacks



- Shawn Dolan
- Virtual Technology LLC
- Shawn.dolan@virtuallc.com

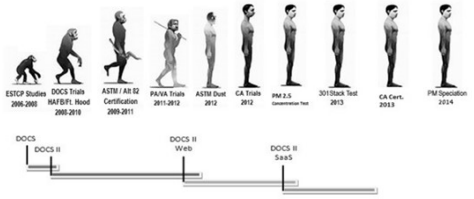
888 872 3836

Use of DOCS II



❖Evolution Of DOCS II (2006-2014)

Evolution of DOCS II...The Road to DOCS II SaaS



Evolution of DOCS II

- Late 1990's – Initial Digital Camera work by NASA and Utah State
- 2000 to 2005 – Several research projects contracted by DOD & Universities
  - DOD Shared Data with Federal EPA
  - EPA Technology Transfer Network, Emission Technology Center Publishes PRE-008 - Determination of Visible Emissions Opacity from Stationary Sources Using Computer-based Photographic Analysis Systems
- 2005 to 2009 – Research continued by DOD
  - 2007- ASTM Workgroup formed due to EPA's lack of resources
  - 2009 - ASTM 7520-09 approved and published
- Feb 2012 – EPA Office of Air Quality Planning and Standards published EPA Alternate Method 082 (ALT 082), citing ALT 082 certified DCOTS can be used "in-Lieu of" Method 9, for all subparts of 40 CFR 60, 61 and 63
- Jan 2013 – ASTM Fugitive emissions test High Definition Record beta test, within 7% of Transmisometer (300 readings, all opacity levels)
- April 2013 – IFDC PM correlation and High Definition Video production (less than 5% deviation from humans (48,000 readings), 10% from PM concentration <2.5)
- June 2013 – CA Recert, Smoke Schools day and night cert. always below class Deviation Average of 24.
- July 2013- EPA 301 Test stacks greater than 7' (less than 5% deviation, 1.3K readings)
- Feb 2014 – PM Concentration, Laser light second testing scheduled

How DOCS II Works

- An image or images of the emission source are captured by trained/certified camera operator using a certified camera.
- The images are uploaded to "the Cloud" where they are acquired by a certified analyst who identifies the region of interest within the imagery.
- Regions of Interest are marked according to explicit rules.
- DOCS II then applies algorithms to the Regions of Interest and calculates the opacity of each image and the average, based on selected rule, e.g. 6 min. avg., 3 min. avg.
- DOCS II stores an archive of the draft VEE report.
- Source owner accepts/rejects the draft VEE report.
- DOCS II generates final VEE report and archive record.

Simple, Fast, Reliable, Repeatable

Method 9 vs. EPA ALT 082 aka ASTM D7520

EPA Method 9

- Per Person 25 White and 25 Black (50) reading, certification
  - EPA Required Content Training
  - 50 plume certification
  - ±7.5% overall and <= 15% within each set of 25.
- Cert. duration 6 months
- Operational conditions
  - Unlimited backgrounds
  - Unlimited weather conditions
- Paper Non-Validated Record

EPA ALT 082

- **System certification**
- (6) sets of (25) White and (25) Black against various backgrounds (300 images)
- 4 independent Analyst use System to derive Opacity of each image (1200 results)
- All (4) Analyst must pass all (6) sets, ±7.5% overall and <= 15% within each set of 25
- Cert. duration 3 ½ years
- **Camera Operator training**
  - EPA Required Content Training
  - Camera Operator Training
  - Submit 1 acceptable set of images for analysis every 3 months
- Operational conditions
  - Unlimited backgrounds
  - Unlimited weather conditions
- Digital Validated Record

Electronic Method 9, allows separation of data "Capture" from "Analysis"

EPA ALT 082
Published, Broadly Applicable Standard

- Current Federal Register (CFR) February 2012
  - Can be used in Lieu of Method 9
    - Federal Permit changes not required
    - Recognize limits of ASTM D7520-09 (May 2012)
      - Case by case allowed for stacks >7' exit
- To Eliminate the 7' Limit of ASTM EPA Requested
  - EPA 301 Comparison between (Human Method 9) (Camera ALT 082)
    - What is a 301 Comparison?
    - Compare the Validated Results from each Method
    - EPA Requested a 301 at three different type facilities
      - Cement
      - Coal Fired Power
      - Natural Gas Fired Power

ASTM D7520 Updated

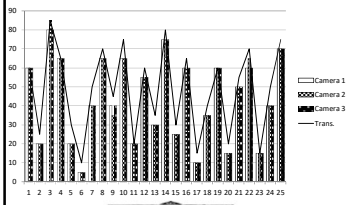
- D7520-12 Updated Approved by D22-03 In October 2012
  - Allows used of any Digital Image Device
    - High Definition Digital Recorders (Digital Video)
    - LTE based Cameras (Cell Phones)
    - CCD based Cameras (98% of Digital Cameras)
  - Matches ASTM Certification requirements to EPA ALT 082
  - Allows certification of optical and digital zoom
  - Enforces Performance of any configuration within Method 9 tolerances and precision and bias of ASTM
- Fugitive Dust Applicability
  - Original research performed using Dust June 05/06/07
  - Full NIST Long Path Trans. certification completed Jan. 12
  - ASTM Research Report submitted to committee July 2012
  - Update to D7520 to include Fugitives per 40CFR 60 sp 000

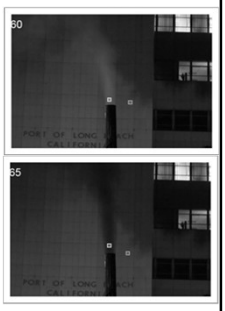
301 Study Summary

- ALT 082 is the same as Method 9
  - Stacks Greater than 7' at the exit
  - Deviation between Methods is < 5% overall
  - Deviation individually < 10%
  - Method 9 tolerance is 15%
  - ALT 082 has less variability that Method 9
  - ALT 082 is more repeatable than Method 9

DOCS II CARB Night Smoke School

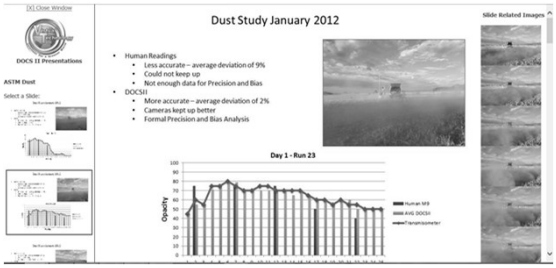
Long Beach, CA, July 2013





Fugitive Dust Study

Long Path Transmisometer, vs DOCS II and Human



PM Speciation

The Future of DOCS III

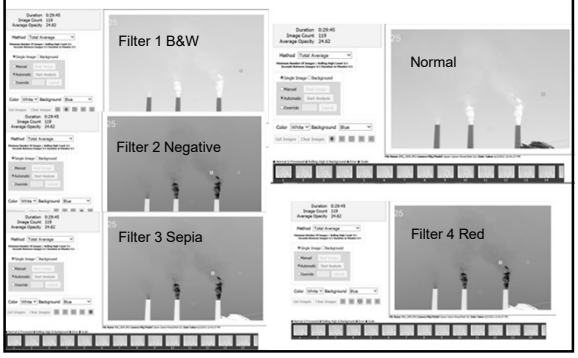
Adding Lasers of multiple wave lengths to the imagery,
allows scatter measurements to determine PM size and concentration.

DOCS II Software-as-a-Service (SaaS)

Cloud Computing Servers
Upload observation data from Smart Phone App,
Add facility and source information via web browser
Submit to Lab for Analysis
Approve and Publish Results
Print/Email/Fax Final Report On Demand

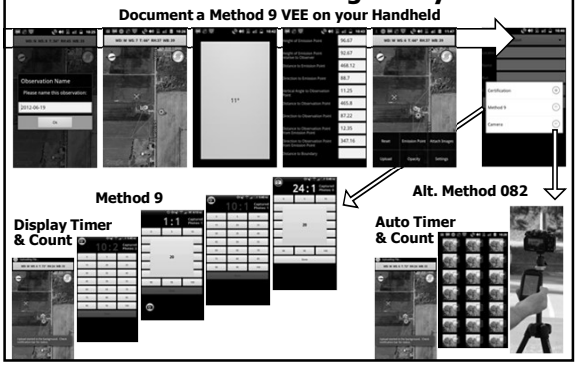
Analysis

Enhanced Visibility with Filters

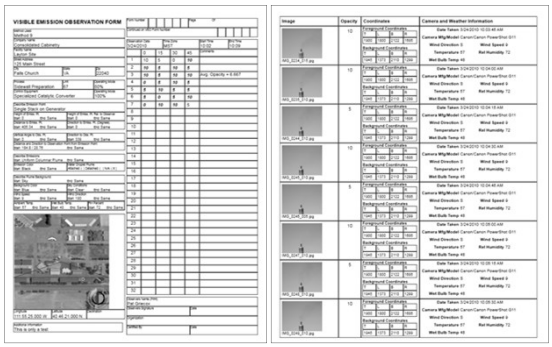


DOCS II SaaS Data Collection " Method 9" in the Google Play Store

Document a Method 9 VEE on your Handheld



Report



Forensic Data

Image	Opacity	Coordinates	Camera and Weather Information
IMG_0222.JPG	55	Foreground Coordinates T L B R 1781 1862 2128 1606 Background Coordinates T L B R 1788 1280 2183 996	Date Taken 3/24/2010 10:00:40 AM Camera Mfg/Model Canon/Canon PowerShot G11 Wind Direction SW Wind Speed 10 Temperature 60 Rel Humidity 38 Wet Bulb Temp 34
IMG_0223.JPG	75	Foreground Coordinates T L B R 1783 1911 2139 1595 Background Coordinates T L B R 1714 1151 2018 994	Date Taken 3/24/2010 10:00:57 AM Camera Mfg/Model Canon/Canon PowerShot G11 Wind Direction SW Wind Speed 10 Temperature 60 Rel Humidity 38 Wet Bulb Temp 34
IMG_0224.JPG	85	Foreground Coordinates T L B R 1792 1917 2124 1593 Background Coordinates T L B R 1703 1291 2093 1033	Date Taken 3/24/2010 10:01:20 AM Camera Mfg/Model Canon/Canon PowerShot G11 Wind Direction SW Wind Speed 10 Temperature 60 Rel Humidity 38 Wet Bulb Temp 34

Reaching Out in the Distance

EPA ALT 082, Distance only limited by Optical Zoom Capability

Sun Angle, Background, Weather All Make a Difference

All these Images are the Same Opacity - 50%

❖270

❖www.virtuallc.com

Construction Dust Control Video
Presented in cooperation with the
Maricopa County Air Quality Department

(approx. TRT: 5 min)

❖COMMUNITY OUTREACH

Community Outreach

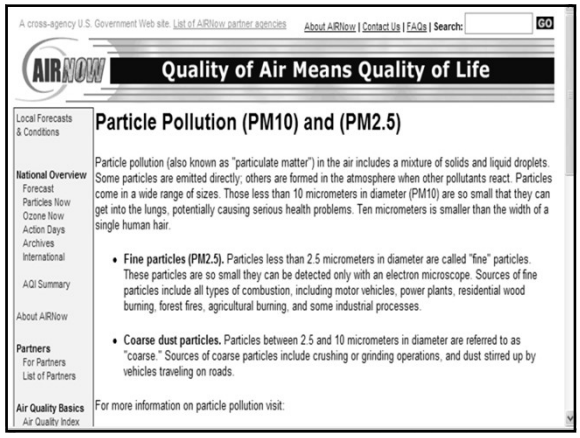
- Federal
- State
- Local Air Districts

What is *AIRNOW*?

- Cooperative effort between U.S. EPA, NPS, state and local air agencies to collect, quality assure, and transfer real-time and forecast air quality information to the public
- Utilizes the Air Quality Index (AQI); a national reporting program that links air quality levels to cautionary health messages
- Fast and easy access for the media to deliver understandable air quality information that will help the public make good health- based decisions about their daily activities

U.S.EPA AIRNOW

❖http://www.airnow.gov/



How is it being used? On Air

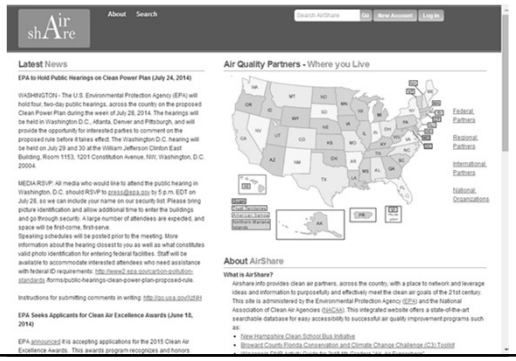
- Local/regional coverage
- National coverage

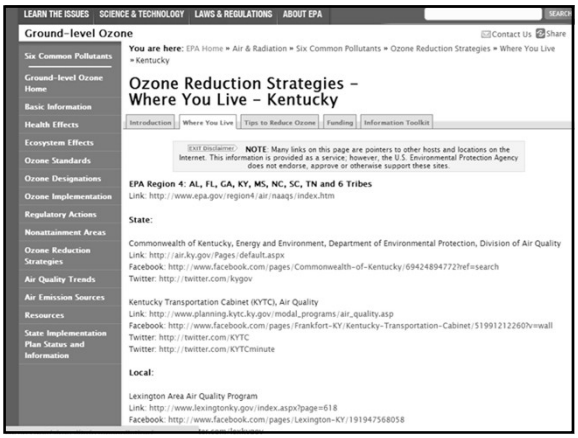
… and in Print

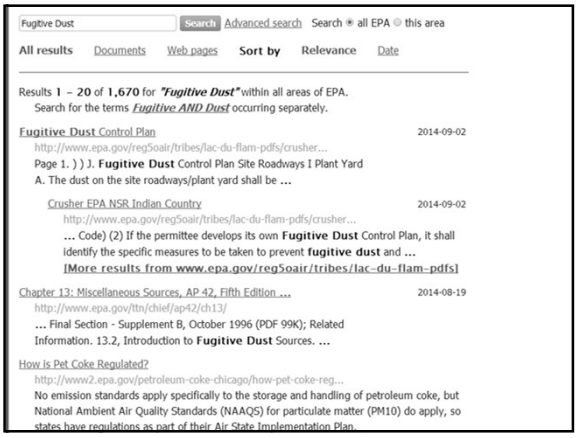
Get the Tools You Need

- **www.epa.gov/airnow**
- At-a-glance messages
- Health messages and tips
- Web updates to materials you can use to talk about air quality
- National and regional real-time maps and graphics

AIRSHARE
http://www.airshare.info/index.cfm/homepage.html

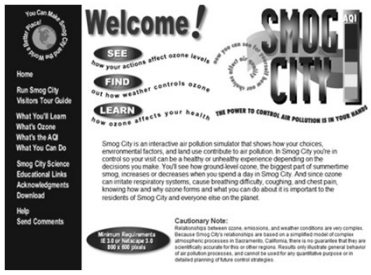


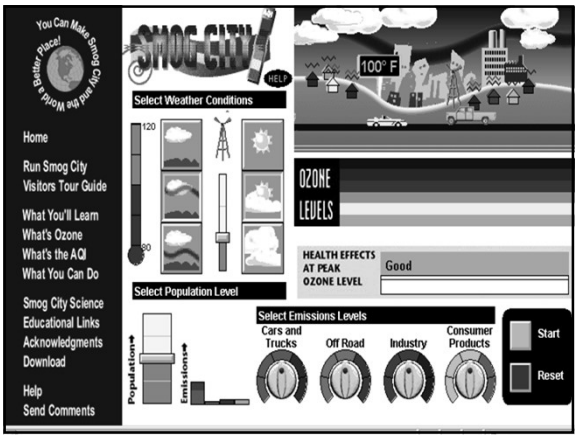




SMOGCITY

- **www.smogcity.com**





States

- Alaska
- California
- Nevada
- Arizona
- Michigan
- New Mexico

CA. AIR RESOURCES BOARD

- **http://www.arb.ca.gov/html/brochure/pm10.htm**

Local Districts

- San Joaquin AQMD, California
- South Coast AQMD, California
- Clark County DEQ, Nevada
- Pima County DEQ, Arizona
- Maricopa County DEQ, Arizona
- Albuquerque, New Mexico

Fugitive Dust Control for Agriculture

Fugitive Dust Control for Agriculture

Introduction

- Part I – Emissions Control Methods and Cost Effectiveness
- Part II – Conservation Management Practice Plan Program and Lessons Learned

❖Outreach & Education

Target Markets

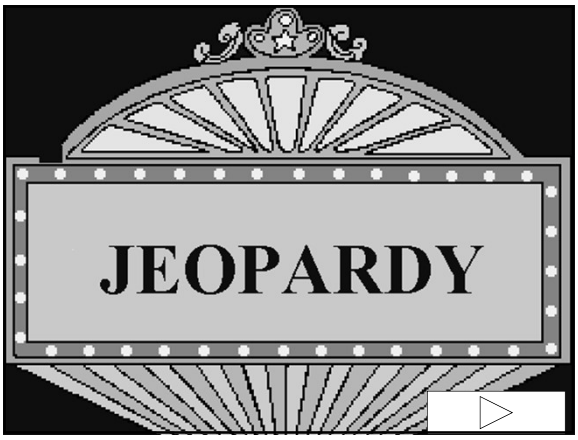
- Landowners
- Contractors/subcontractors/developers
- Off-road vehicle enthusiasts
- Landscape companies, apartment complexes
- Haul and street cleaning companies
- Government agencies
- Schools/youth
- General public
- Media

❖ Background

Why Educate About PM10?

- Regulatory requirements
- ***HEALTH EFFECTS***
  - *Breathing difficulties*
  - *Heart attacks*
  - *Premature death*

QUESTIONS ?


JEOPARDY