SAN JOAQUIN VALLEY UNIFIED AIR POLLUTION CONTROL DISTRICT

**RULE 8011 -- GENERAL REQUIREMENTS**
*(Adopted November 15, 2001)*

1.0 Purpose

The purpose of Regulation VIII (Fugitive PM10 Prohibitions) is to reduce ambient concentrations of fine particulate matter (PM10) by requiring actions to prevent, reduce or mitigate anthropogenic fugitive dust emissions.

The Rules contained in this Regulation have been developed pursuant to United States Environmental Protection Agency guidance for Serious PM10 Nonattainment Areas. The rules are applicable to specified anthropogenic fugitive dust sources. Fugitive dust contains PM10 and particles larger than PM10. Controlling fugitive dust emissions when visible emissions are detected will not prevent all PM10 emissions, but will substantially reduce PM10 emissions.

2.0 Applicability

The provisions of this rule are applicable to specified outdoor fugitive dust sources. The definitions, exemptions, requirements, administrative requirements, recordkeeping requirements, and test methods set forth in this rule are applicable to all Rules under Regulation VIII (Fugitive PM10 Prohibitions) of the Rules and Regulations of the San Joaquin Valley Unified Air Pollution Control District. The provisions of this rule shall be effective on and after May 15, 2002.

3.0 Definitions

The following definitions shall be applicable to rules contained in Regulation VIII.

3.1 Agricultural Source: any activity or portion of land associated with the commercial growing of crops or the raising of fowl or animals.

3.2 Annual Average Daily Vehicle Trips: annual average 24-hour total of all vehicles counted on a road.

3.3 Anthropogenic: sources of pollution of, relating to, or resulting from the influence of human beings on nature.

3.4 APCO: the Air Pollution Control Officer of the San Joaquin Valley Unified Air Pollution Control District or his designee.

3.5 Blasting: any excavation or demolition conducted with the use of explosives.

3.6 Bulk Material: any unpackaged material with a silt content of more than 5%.

3.7 Bulk Material Handling, Storage, and/or Transporting Operation: includes but is not limited to the use of equipment, haul trucks, and/or motor vehicles for the loading, unloading, conveying, transporting, piling, stacking, screening, grading, or moving of bulk materials at an industrial, institutional, commercial and/or governmental owned or operated site or facility.

3.8 Carryout and Trackout: any and all materials that adheres to and agglomerates on vehicles, haul trucks, and/or equipment (including trailers, tires, etc.) and falls onto a paved public road or the paved shoulder of a paved public road.

3.9 Chemical/Organic Stabilization/Suppression: means controlling PM10 emissions from fugitive dust by applying any non-toxic chemical or organic dust suppressant, other than water, which meets any specifications, criteria, or tests required by any federal, state, or local water agency and is not prohibited for use by any applicable law, rule, or regulations.

3.10 Construction: any on-site mechanical activities preparatory to or related to the building, alteration, rehabilitation, or demolition of an improvement on real property, including, but not limited to, land clearing, excavation related to construction, land leveling, grading, cut and fill grading, and the erection or demolition of any structure. As used in Regulation VIII, a construction site may encompass several contiguous parcels, or may encompass only a portion of one parcel, depending on the relationship of the property boundaries to the actual construction activities.

3.11 Disturbed Surface Area: an area in which naturally occurring soils, or soils or other materials placed thereon, have been physically moved, uncovered, destabilized, or otherwise modified by grading, land leveling, scraping, cut and fill activities, excavation, brush and timber clearing, or grubbing, and soils on which vehicle traffic and/or equipment operation has occurred. An area is considered to be disturbed until the activity that caused the disturbance has been completed, and the disturbed area meets the stabilized surface conditions specified in this rule.

3.12 Dust Suppressants: includes water, hygroscopic materials and, chemical/organic stabilization/suppression materials.

3.13 Earthmoving Activities: The use of any equipment for an activity that may generate fugitive dust emissions, including, but not limited to, cutting and filling, grading, leveling, excavating, trenching, loading or unloading of bulk materials, demolishing, blasting, drilling, adding to or removing bulk of materials from open storage piles, weed abatement through disking, and back-filling.

3.14 Emergency: any situation where immediate action on the part of a federal, state or local agency involved is needed and where the timing of such federal, state or

local activities makes it impractical to meet the requirements of this Regulation, such as natural disasters, civil disturbances, or hazardous materials spills. Only an authorized official of a federal, state or local agency may declare an emergency when deemed necessary to protect the general public.

3.15 Enclosed Structure: a building with walls on all sides covered with a roof.

3.16 Excavation: any digging, trenching, quarrying, extraction, or tunneling.

3.17 Extraction: removal of minerals, aggregate, or fossil fuels from the earth by excavation; including mining, surface stripping, open pit excavation, or tunneling.

3.18 Fallow Land: agriculturally productive land which has been developed and used for agricultural purposes in the past that is allowed to lie idle during the growing season, including agricultural land that has been plowed, harrowed, and broken up without seeding.

3.19 Freeboard: the vertical distance between the top edge of a cargo container area and the highest point at which the bulk material contacts the sides, front, or back of a cargo container area.

3.20 Fueling and Service: an activity that involves the transfer of fuel into a vehicle/equipment fuel tank, and/or the repair and maintenance activity performed on vehicles/equipment.

3.21 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 designed to control flow, including, but not limited to, emissions caused by movement of soil, vehicles, equipment, and windblown dust. This excludes particulate matter emitted directly in the exhaust of motor vehicles, from other fuel combustion devices, portable brazing, soldering, or welding equipment, and from pile drivers.

3.22 Gravel Pad: a layer of washed gravel, rock, or crushed rock which is at least one inch or larger in diameter and six inches deep, located at the point of intersection of a paved public roadway and a work site exit, and maintained to dislodge mud, dirt, and/or debris from the tires of motor vehicles and/or haul trucks, prior to exiting the work site.

3.23 Grizzly: a device (i.e., rails, pipes, or grates) used to dislodge mud, dirt, and/or debris from the tires and undercarriage of motor vehicles or haul truck prior to leaving the work site.

3.24 Haul Truck: any fully or partially open-bodied, self-propelled vehicle including any non-motorized attachments used for transporting bulk materials, including,

but not limited to, trailers or other conveyances which are connected to or propelled by the actual motorized portion of the vehicle.

3.25 Hygroscopic Materials: any material that is readily capable of absorbing moisture from the air.

3.26 Landfill Daily Cover: soil excavated and stockpiled from a landfill borrow site that is used for daily operations to cover solid waste, trash, garbage, or other waste at a landfill disposal site.

3.27 Landfill Disposal Site: a site where solid waste, trash, garbage, or other waste is disposed of by burying between layers of earth.

3.28 Land Preparation: any activity that disturbs the natural condition of land, including, but not limited to, brush or timber clearing, grubbing, scraping, ground excavation, land leveling, or grading.

3.29 Limit Visible Dust Emissions to 20% Opacity: Visible Dust Emissions (VDE) of such opacity to obscure a certified observer's view to a degree less than an opacity of 20 percent in accordance with the test methods in Appendix A, Sections 1 and 2 of this rule.

3.30 Local Agency: a city, county, or special district with jurisdiction over public roads or having land use authority.

3.31 Modified Road: any road that is widened or improved so as to increase traffic capacity or that has been reconstructed. This term does not include road maintenance, repair, chip seal, or surface overlay work.

3.32 New Paved Road: any paved road segment constructed or modified after May 15, 2002. (See the definition of paved road in this rule).

3.33 Off-field Agricultural Source: any agricultural source that meets the definition of: outdoor handling, storage and transport of bulk material; paved road; unpaved road; or unpaved vehicle/equipment traffic area

3.34 On-field Agricultural Source: any agricultural source that is not an off-field agricultural source, including:

3.34.1 activities conducted solely for the purpose of preparing land for the growing of crops or the raising of fowl or animals, such as brush or timber clearing, grubbing, scraping, ground excavation, land leveling, grading, turning under stalks, disking, or tilling;

3.34.2 drying or pre-cleaning of agricultural crop material on the field where it was harvested;

3.34.3 handling or storage of agricultural crop material that is baled, cubed, pelletized, or long-stemmed, on the field where it was harvested, and the handling of fowl or animal feed materials at sites where animals or fowl are raised;

3.34.4 disturbances of cultivated land as a result of fallowing, planting, fertilizing or harvesting.

3.35 Open Area: Any of the following described in subsection 3.35.1 through subsection 3.35.3 of this rule. For the purpose of this rule, vacant portions of residential or commercial lots and contiguous parcels that are immediately adjacent to and owned and/or operated by the same individual or entity are considered one open area. An open area does not include any unpaved vehicle/equipment traffic area as defined in this rule.

3.35.1 An unsubdivided or undeveloped land adjoining a developed or a partially developed residential, industrial, institutional, governmental, or commercial area.

3.35.2 A subdivided residential, industrial, institutional, governmental, or commercial lot, which contains no approved or permitted building or structures of a temporary or permanent nature.

3.35.3 A partially developed residential, industrial, institutional, governmental, or commercial lot and contiguous lots under common ownership.

3.36 Open Storage Pile: Any accumulation of bulk material, stored outside a building or warehouse.

3.37 Open-pit Mine: an excavation for a mining operation which, excluding entrances and egresses, is encircled by a “high-wall” at least 10 feet high. A “high wall” is a berm or cut having a slope of at least 1:1.

3.38 Operation: any activity, process, or project described in the applicability sections of the Rules under Regulation VIII.

3.39 Outdoor Handling, Storage, and Transport: handling (including loading and unloading), storage, and transport, and any accumulation of bulk material, temporarily or permanently stored outside of an enclosed structure.

3.40 Owner/Operator: includes, but is not limited to, any person who leases, supervises, or operates equipment, or owns/operates a fugitive dust source, in addition to the normal meaning of owner or operator.

3.41 Particulate matter: any material emitted or entrained into the air as liquid or solid particles, with the exception of uncombined water.

3.42 Paved Road: any road that is covered by concrete, asphaltic concrete, asphalt, or other materials which provides structural support for vehicles.

3.43 Person: any individual, public and private corporation, government agency, partnership, association, firm, trust, estate, or any other legal entity which is recognized by law as the subject of rights and duties.

3.44 PM10: particulate matter with an aerodynamic diameter smaller than or equal to a nominal ten (10) microns as measured by the applicable State and Federal reference test methods.

3.45 PM10-Efficient Street Sweeper: a street sweeper which has been certified by the South Coast Air Quality Management District (SCAQMD) to comply with the District's performance standards set forth in SCAQMD Rule 1186 utilizing the test methods set forth in SCAQMD Rule 1186, Appendix A.

3.46 Private Road: any road not defined as public.

3.47 Public Road: any road operated by a public road agency and maintained for unrestricted legal vehicle access.

3.48 Road: any road or street, highway, freeway, alley, way, access easement or driveway.

3.49 Road Length: the total centerline distance of all contiguous (connected) segments of an owner's road, regardless of change of direction, road name, or surface, or intersection with a road not owned or operated by the owner.

3.50 Road Segment: the portion of a road between two intersections, or between an intersection and the road’s terminus.

3.51 Roadmix: a mixture of tank bottoms from crude oil storage tanks, material from crude oil spills, or other crude-oil-containing soil mixed with aggregates and soils, that is used as a base or cover material for roads, parking lots, berms, tank and well locations, or similar applications.

3.52 Shipping, Receiving, and Transfer: an activity that involves handling, processing, and movement of materials, supplies or equipment.

3.53 Silt: any aggregate material with a particle size of less than 75 micrometers in diameter, which passes through a No. 200 Sieve. For the purpose of all Rules under Regulation VIII, the silt content level is assumed to be 5 percent or greater,

unless a person can show, by sampling and analysis, using the test method in Section 6.1.4 of this rule, that the silt content is less than 5 percent.

3.54 Site: real property or land used or set aside for any specific use.

3.55 Soil Stabilization: the process used to control PM10 emissions from fugitive dust for an extended period of time by applying dust suppressants or planting vegetative cover.

3.56 Stabilized Surface: any disturbed surface area or open bulk storage pile that is resistant to wind blown fugitive dust emissions. A surface is considered to be stabilized if it meets at least one of the following conditions specified in this Section and as determined by the test methods specified in Appendix B of this rule:

3.56.1 A visible crust; or

3.56.2 A threshold friction velocity (TFV) for disturbed surface areas corrected for non-erodible elements of 100 centimeters per second or greater; or

3.56.3 A flat vegetative cover of at least 50 percent that is attached or rooted vegetation; or unattached vegetative debris lying on the surface with a predominant horizontal orientation that is not subject to movement by wind; or

3.56.4 A standing vegetative cover of at least 30 percent that is attached or rooted vegetation with a predominant vertical orientation; or

3.56.5 A standing vegetative cover that is attached or rooted vegetation with a predominant vertical orientation that is at least 10 percent and where the TFV is at least 43 centimeters per second when corrected for non-erodible elements; or

3.56.6 A surface that is greater than or equal to 10 percent of non-erodible elements such as rocks, stones, or hard-packed clumps of soil.

3.57 Stabilized Unpaved Road: any unpaved road or unpaved vehicle/equipment traffic area surface which meets the definition of stabilized surface as determined by the test methods in Appendix B, Section 3 of this rule, and where VDE is limited to 20% opacity.

3.58 Three-sided Structure: A building with walls on three sides with or without a roof.

3.59 Threshold Friction Velocity (TFV): is the corrected velocity necessary to initiate soil erosion as determined by the test method specified in Section 6.0 of this rule.

The lower the TFV, the greater the propensity for fine particles to be lifted at relatively low wind speeds.

3.60 Trackout Control Device: a gravel pad, grizzly, wheel wash system, or a paved area, located at the point of intersection of an unpaved area and a paved road, that prevents or controls trackout.

3.61 Unpaved Road: any road that is not covered by one of the materials described in the paved road definition.

3.62 Unpaved Vehicle/Equipment Traffic Area: any nonresidential area that is not covered by asphalt, recycled asphalt, asphaltic concrete, concrete, or concrete pavement that is used for fueling and servicing; shipping, receiving and transfer; or parking or storing equipment, haul trucks, vehicles, and any conveyances.

3.63 Urban Area: an area within an incorporated city boundary or within unincorporated areas completely surrounded by an incorporated city

3.64 Vehicle: A device by which any person or property may be propelled, moved, or drawn , including mobile equipment, excepting aircraft or watercraft or devices moved exclusively by human or animal power or used exclusively upon rails or tracks.

3.65 Vehicle Trips Per Day: The 24-hour total (midnight to midnight) count of all vehicles traveling over a survey point on a road segment or unpaved vehicle/equipment traffic area. The survey point must represent the most heavily traveled portion of the road segment or unpaved vehicle/equipment traffic area. Trips made by "implements of husbandry" as defined in California Vehicle Code Division 16, Section 36000 through 36017 shall not be included in the "vehicle trips per day" count.

3.66 Visible Dust Emissions (VDE): dust emissions that are visible to an observer.

3.67 Wind Barrier: a fence or structure constructed, or row of trees planted, to reduce the amount of entrained fugitive dust.

3.68 Wheel Wash System: a system that uses water to dislodge mud, dirt and/or other debris from the tires and undercarriage of vehicles and/or haul trucks, prior to exiting the work site.

4.0 Exemptions

4.1 Emergency activities performed to ensure public health and safety are exempt from Regulation VIII. Emergency activities lasting more than 30 days shall be subject to this regulation, except where compliance would limit the effectiveness of the emergency activity performed to ensure public health and safety.

4.2 Active operations conducted by essential service utilities to provide electricity, natural gas, telephone, water and sewer during periods of service outages and emergency disruptions. Within one hour of completion of active operations, a person/owner must immediately comply with the requirements of Regulation VIII.

4.3 Activities conducted at an elevation of 3,000 feet or higher above sea level.

4.4 On-field agricultural sources.

5.0 General Requirements

5.1 Materials used for chemical/organic stabilization of soils, including petroleum resins, asphaltic emulsions, acrylics, and adhesives shall not violate State Water Quality Control Board standards for use as a soil stabilizer. Materials accepted by the California Air Resources Board (ARB) and the United States Environmental Agency (EPA), and which meet State water quality standards, shall be considered acceptable to the APCO.

5.2 Any material prohibited for use as dust suppressant by EPA, the ARB, or other applicable law, rule, or regulation is also prohibited under Regulation VIII.

5.3 Use of hygroscopic materials may be prohibited by the APCO in areas lacking sufficient atmospheric moisture of soil for such materials to effectively reduce fugitive dust emissions. The atmospheric moisture of soil is considered to be sufficient if it meets the application specifications of the hygroscopic product manufacturer. Use of such materials may be approved in conjunction with sufficient wetting of the controlled area.

5.4 Any use of dust suppressants or gravel pads, and paving materials such as asphalt or concrete for paving, shall comply with other applicable District Rules.

6.0 Administrative Requirements

6.1 Test Methods

The test methods specified in this section shall be used to determine compliance with the requirements of all rules under Regulation VIII.

6.1.1 Determination of VDE Opacity

Opacity observations to determine compliance with VDE standards shall be conducted in accordance with the test procedures for "Visual Determination of Opacity" as described in Appendix A of this rule. Opacity observations for sources other than unpaved traffic areas (e.g.,

roads, parking areas) shall be conducted per Section 2 of Appendix A and shall require 12 readings at 15-second intervals.

6.1.2 Determination of Stabilized Surface

Observations to determine compliance with the conditions specified for a stabilized surface, in any inactive disturbed surface area, whether at a work site that is under construction, at a work site that is temporarily or permanently inactive, or on an open area and vacant lot, shall be conducted in accordance with the test methods described in Appendix B of this rule. If a disturbed surface area fails all of the specified tests, then the surface shall not be considered stabilized.

6.1.3 Determination of Soil Moisture Content

Soil moisture content shall be determined by using ASTM Method D2216-98 (Standard Test Method For Laboratory Determination Of Water [Moisture] Content of Soil and Rock By Mass), or other equivalent test methods approved by the EPA, ARB, and the APCO.

6.1.4 Determination of Silt Content for Bulk Materials

Silt content of a bulk material shall be determined by ASTM Method C 136a (Standard Test Method For Sieve Analysis Of Fine and Coarse Aggregates), or other equivalent test methods approved by EPA, ARB, and the APCO.

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

Silt Content for unpaved roads and unpaved vehicle/equipment traffic areas shall be determined by using Section 3 of Appendix B of this Rule or other equivalent test methods approved by EPA, ARB, and the APCO.

6.1.6 Determination of Threshold Friction Velocity (TFV)

TFV shall be determined according to the sieving field procedure contained in "Determination of Threshold Friction Velocity (TFV)," as described in Appendix B of this rule.

6.2 Recordkeeping Requirements

A person or owner/operator shall maintain records and any other supporting documents to demonstrate compliance with the requirements of the rules under Regulation VIII only for those days that a control measure was implemented. Such records shall include the type of control measure(s) used, the location and

extent of coverage, and the date, amount, and frequency of application of dust suppressant, manufacturer's dust suppressant product information sheet that identifies the name of the dust suppressant and application instructions. Records shall be kept for one year following project completion that results in the termination of all dust generating activities. An owner/operator subject to Rule 2520 (Federally Mandated Operating Permits) shall keep the records for five years. Records shall be made available to the APCO upon request.

7.0 Fugitive PM10 Management Plan for Unpaved Roads and Unpaved Vehicle/Equipment Traffic Areas

As a compliance alternative for Rule 8061 section 5.2 and Rule 8071 section 5.1, an operator may implement a Fugitive PM10 Management Plan (FPMP) that is designed to achieve 50% control efficiency and has been approved by the APCO. The FPMP shall be implemented on all days that traffic exceeds, or is expected to exceed, 75 vehicle trips per day. The owner/operator remains subject to all requirements of the applicable rules of Regulation VIII that are not addressed by the FPMP. It should be noted that the FPMP is not a compliance option for any requirement for a stabilized surface as defined in Rule 8011. The requirements for FPMPs for agricultural sources are specified in Rule 8081 (Agricultural Sources) section 7.0.

7.1 An owner/operator shall provide the proposed FPMP to the APCO or his/her designee via fax, mail, or in person. The APCO shall approve, disapprove, or conditionally approve each proposed FPMP. An FPMP shall not be considered APCO-approved until the operator has received written approval from the APCO.

7.2 An owner/operator may submit one FPMP covering multiple unpaved roads and unpaved vehicle/equipment traffic areas.

7.3 An owner/operator shall retain a copy of an APCO-approved FPMP at the operators place of business and make it available for inspection by the APCO or his designee during normal business hours. The APCO-approved FPMP shall remain valid until notification by the APCO that it is no longer valid, or until the owner/operator notifies the APCO that the owner/operator has permanently discontinued implementing the FPMP.

7.4 Failure to comply with the provisions of an APCO-approved FPMP is deemed to be a violation of this rule.

7.5 A FPMP shall contain all of the following information:

7.5.1 Name(s), address(es), and phone number(s) of person(s) responsible for the preparation, submittal, and implementation of the FPMP, and of person(s) responsible for the unpaved road or traffic area.

7.5.2 A plot plan or map which shows the location of each unpaved road or traffic area to be covered by the FPMP, and the total length (miles) of unpaved roads, and the total area (acres) of the unpaved traffic areas.

7.5.3 The months (and weeks, if known) of the year that vehicle traffic is expected to exceed 75 vehicle trips per day, and the types of vehicles (e.g., passenger vehicles, trucks, mobile equipment) expected on each road or traffic area. As stated above, the FPMP shall be implemented on all days that traffic exceeds, or is expected to exceed, 75 vehicle trips per day.

7.5.4 Dust suppressants, gravel, and/or vegetative materials to be applied, including: product specifications; manufacturer's usage instructions (method, frequency, and intensity of application); type, number, and capacity of application equipment; and information on environmental impacts and approvals or certifications related to appropriate and safe use for ground application.

7.5.5 A description of the condition of the treated surfaces to be achieved as a result of the use of the suppressant or other dust control material.

APPENDIX A
Visual Determination of Opacity

SECTION 1 Test Method For Unpaved Roads and Unpaved Traffic Areas
SECTION 2 Test Method For Time-Averaged Regulations
SECTION 3 Qualification and Testing

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## SECTION 1 TEST METHOD FOR UNPAVED ROADS AND UNPAVED TRAFFIC AREAS

1.0 Opacity Test Method. The purpose of this test method is to estimate the percent opacity of fugitive dust plumes caused by vehicle movement on unpaved roads and unpaved traffic areas. This method can only be conducted by an individual who has received certification as a qualified observer. Qualification and testing requirements can be found in Section 3. of this appendix.

a. Step 1: Stand at least 16.5 feet from the fugitive dust source in order to provide a clear view of the emissions with the sun oriented in the 140° sector to the back. Following the above requirements, make opacity observations so that the line of vision is approximately perpendicular to the dust plume and wind direction. If multiple plumes are involved, do not include more than one plume in the line of sight at one time.

b. Step 2: Record the fugitive dust source location, source type, method of control used, if any, observer's name, certification data and affiliation, and a sketch of the observer's position relative to the fugitive dust source. Also, record the time, estimated distance to the fugitive dust source location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), observer's position to the fugitive dust source, and color of the plume and type of background on the visible emission observation form both when opacity readings are initiated and completed.

c. Step 3: Make opacity observations, to the extent possible, using a contrasting background that is perpendicular to the line of vision. Make opacity observations approximately 1 meter above the surface from which the plume is generated. Note that the observation is to be made at only one visual point upon generation of a plume, as opposed to visually tracking the entire length of a dust plume as it is created along a surface. Make two observations per vehicle, beginning with the first reading at zero seconds and the second reading at five seconds. The zero-second observation should begin immediately after a plume has been created above the surface involved. Do not look continuously at the plume but, instead, observe the plume briefly at zero seconds and then again at five seconds.

d. Step 4: Record the opacity observations to the nearest 5% on an observational record sheet. Each momentary observation recorded represents the average

opacity of emissions for a 5-second period. While it is not required by the test method, EPA recommends that the observer estimate the size of vehicles which generate dust plumes for which readings are taken (e.g. mid-size passenger car or heavy-duty truck) and the approximate speeds the vehicles are traveling when readings are taken.

e. Step 5: Repeat Step 3 (Section 1 c) of this appendix) and Step 4 (Section 1 (d) of this appendix) until you have recorded a total of 12 consecutive opacity readings. This will occur once six vehicles have driven on the source in your line of observation for which you are able to take proper readings. The 12 consecutive readings must be taken within the same period of observation but must not exceed 1 hour. Observations immediately preceding and following interrupted observations can be considered consecutive.

f. Step 6: Average the 12 opacity readings together. If the average opacity reading equals 20% or lower, the source is in compliance with the opacity standard described in Rule 8011 of this rule.

SECTION 2 TEST METHOD FOR VISUAL DETERMINATION OF OPACITY OF EMISSIONS FROM SOURCES FOR TIME-AVERAGED REGULATIONS

2.0 Applicability. This method is applicable for the determination of the opacity of emissions from sources of visible emissions for time-averaged regulations. A time-averaged regulation is any regulation that requires averaging visible emission data to determine the opacity of visible emissions over a specific time period.

2.1 Principle. The opacity of emissions from sources of visible emissions is determined visually by an observer qualified according to the procedures of Section 3 of this appendix.

2.2 Procedures. An observer qualified, in accordance with Section 3 of this appendix, shall use the following procedures for visually determining the opacity of emissions.

a. Position. Stand at a position at least 5 meters from the fugitive dust source in order to provide a clear view of the emissions with the sun oriented in the 140° sector to the back. Consistent as much as possible with maintaining the above requirements, make opacity observations from a position such that the line of sight is approximately perpendicular to the plume and wind direction. The observer may follow the fugitive dust plume generated by mobile earthmoving equipment, as long as the sun remains oriented in the 140° sector to the back. As much as possible, if multiple plumes are involved, do not include more than one plume in the line of sight at one time.

b. Field Records. Record the name of the site, fugitive dust source type (i.e., pile, material handling (i.e., transfer, loading, sorting)), method of control used, if any, observer's name, certification data and affiliation, and a sketch of the observer's position relative to the fugitive dust source. Also, record the time, estimated distance to the fugitive dust source location, approximate wind direction, estimated wind speed, description of the sky condition (presence and color of clouds), observer's position relative to the fugitive dust source, and color of the plume and type of background on the visible emission observation from when opacity readings are initiated and completed.

c. Observations. Make opacity observations, to the extent possible, using a contrasting background that is perpendicular to the line of sight. For storage piles, make opacity observations approximately 1 meter above the surface from which the plume is generated. For extraction operations and the loading of haul trucks in open-pit mines, make opacity observations approximately one meter above the rim of the pit. The initial observation should begin immediately after a plume has been created above the surface involved. Do not look continuously at the plume, but instead observe the plume momentarily at 15-second intervals. For fugitive dust from earthmoving equipment, make opacity observations approximately 1 meter above the mechanical equipment generating the plume.

d. Recording Observations. Record the opacity observations to the nearest 5% every 15 seconds on an observational record sheet. Each momentary observation recorded represents the average opacity of emissions for a 15-second period. If a multiple plume exists at the time of an observation, do not record an opacity reading. Mark an “x” for that reading. If the equipment generating the plume travels outside of the field of observation, resulting in the inability to maintain the orientation of the sun within the 140° sector or if the equipment ceases operating, mark an “x” for the 15- second interval reading. Readings identified as “x” shall be considered interrupted readings.

e. Data Reduction For Time-Averaged Regulations. For each set of 12 or 24 consecutive readings, calculate the appropriate average opacity. Sets must consist of consecutive observations, however, readings immediately preceding and following interrupted readings shall be deemed consecutive and in no case shall two sets overlap, resulting in multiple violations.

SECTION 3 QUALIFICATION AND TESTING.

3.1 Certification Requirements. To receive certification as a qualified observer, a candidate must be tested and demonstrate the ability to assign opacity readings in

5% increments to 25 different black plumes and 25 different white plumes, with an error not to exceed 15% opacity on any one reading and an average error not to exceed 7.5% opacity in each category. Candidates shall be tested according to the procedures described in section 3.2 of this appendix. Any smoke generator used pursuant to section 3.3 of this appendix shall be equipped with a smoke meter, which meets the requirements of section 3.1 of this appendix. Certification tests that do not meet the requirements of sections 3.2 and 3.3 of this appendix are not valid. The certification shall be valid for a period of 6 months, and after each 6-month period the qualification procedures must be repeated by an observer in order to retain certification.

3.2 Certification Procedure. The certification test consists of showing the candidate a complete run of 50 plumes, 25 black plumes and 25 white plumes, generated by a smoke generator. Plumes shall be presented in random order within each set of 25 black and 25 white plumes. The candidate assigns an opacity value to each plume and records the observation on a suitable form. At the completion of each run of 50 readings, the score of the candidate is determined. If a candidate fails to qualify, the complete run of 50 readings must be repeated in any retest. The smoke test may be administered as Section of a smoke school or training program, and may be preceded by training or familiarization runs of the smoke generator, during which candidates are shown black and white plumes of known opacity.

3.3 Smoke Generator Specifications. Any smoke generator used for the purpose of section 3.2 of this appendix shall be equipped with a smoke meter installed to measure opacity across the diameter of the smoke generator stack. The smoke meter output shall display in-stack opacity, based upon a path length equal to the stack exit diameter on a full 0% to 100% chart recorder scale. The smoke meter optical design and performance shall meet the specifications shown in Table A of this appendix. The smoke meter shall be calibrated as prescribed in section 3.3.a of this appendix prior to conducting each smoke reading test. At the completion of each test, the zero and span drift shall be checked, and if the drift exceeds plus or minus 1% opacity, the condition shall be corrected prior to conducting any subsequent test runs.

The smoke meter shall be demonstrated, at the time of installation, to meet the specifications listed in Table A of this appendix. This demonstration shall be repeated following any subsequent repair or replacement of the photocell or associated electronic circuitry, including the chart recorder or output meter, or every 6 months, whichever occurs first.

a. Calibration. The smoke meter is calibrated after allowing a minimum of 30 minutes warm-up by alternately producing simulated opacity of 0% and 100%. When stable response at 0% or 100% is noted, the smoke meter is adjusted to produce an output of 0% or 100%, as appropriate. This calibration shall be repeated until stable 0% and 100% readings are

produced without adjustment. Simulated 0% and 100% opacity values may be produced by alternately switching the power to the light source on and off while the smoke generator is not producing smoke.

b. Smoke Meter Evaluation. The smoke meter design and performance are to be evaluated as follows:

(1) Light Source. Verify, from manufacturer's data and from voltage measurements made at the lamp, as installed, that the lamp is operated within plus or minus 5% of the nominal rated voltage.

(2) Spectral Response Of Photocell. Verify from manufacturer's data that the photocell has a photopic response (i.e., the spectral sensitivity of the cell shall closely approximate the standard spectral-luminosity curve for photopic vision which is referenced in (b) of Table A of this appendix).

(3) Angle Of View. Check construction geometry to ensure that the total angle of view of the smoke plume, as seen by the photocell, does not exceed 15°. Calculate the total angle of view as follows:

$$\text{Total Angle Of View} = 2\tan^{-1} d/2L$$

Where:
d = The photocell diameter + the diameter of the limiting aperture; and
L = The distance from the photocell to the limiting aperture.

The limiting aperture is the point in the path between the photocell and the smoke plume where the angle of view is most restricted. In smoke generator smoke meters, this is normally an orifice plate.

(4) Angle Of Projection. Check construction geometry to ensure that the total angle of projection of the lamp on the smoke plume does not exceed 15°. Calculate the total angle of projection as follows:

$$\text{Total Angle Of Projection} = 2\tan^{-1} d/2L$$

Where:
d= The sum of the length of the lamp filament + the diameter of the limiting aperture; and
L = The distance from the lamp to the limiting aperture.

(5) Calibration Error. Using neutral-density filters of known opacity, check the error between the actual response and the theoretical linear response of the smoke meter. This check is accomplished by first calibrating the smoke meter, according to section 3.3(a) of this appendix, and then inserting a series of three neutral-density filters

of nominal opacity of 20%, 50%, and 75% in the smoke meter path length. Use filters calibrated within plus or minus 2%. Care should be taken when inserting the filters to prevent stray light from affecting the meter. Make a total of five nonconsecutive readings for each filter. The maximum opacity error on any one reading shall be plus or minus 3%.

(6) Zero And Span Drift. Determine the zero and span drift by calibrating and operating the smoke generator in a normal manner over a 1-hour period. The drift is measured by checking the zero and span at the end of this period.

(7) Response Time. Determine the response time by producing the series of five simulated 0% and 100% opacity values and observing the time required to reach stable response. Opacity values of 0% and 100% may be simulated by alternately switching the power to the lightsource off and on while the smoke generator is not operating.

Table A. Smoke Meter Design And Performance Specifications

Parameter Specification

a. Light Source: Incandescent lamp operated at nominal rated voltage.
b. Spectral response of photocell: Photopic (daylight spectral response of the human eye).
c. Angle of view: 15° maximum total angle.
d. Angle of projection : 15° maximum total angle.
e. Calibration error: Plus or minus3% opacity, maximum.
f. Zero and span drift: Plus or minus 1% opacity, 30 minutes.
g. Response time: Less than or equal to 5 seconds

APPENDIX B
Determination of Stabilization



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1. Test Methods For Determining Stabilization.

The test methods described in Section 2 through Section 7 of this appendix shall be used to determine whether an area has a stabilized surface. Should a disturbed area contain more than one type of disturbance, soil, vegetation, or other characteristics, which are visibly distinguishable, test each representative surface separately for stability, in an area that represents a random portion of the overall disturbed conditions of the site, according to the appropriate test methods in Section 2 through Section 7 of this appendix, and include or eliminate it from the total size assessment of disturbed surface area(s) depending upon test method results.

2. Visible Crust Determination.

2.1 Where a visible crust exists, drop a steel ball with a diameter of 15.9 millimeters (0.625 inches) and a mass ranging from 16-17 grams from a distance of 30 centimeters (one foot) directly above (at a 90° angle perpendicular to) the soil surface. If blowsand is present, clear the blowsand from the surfaces on which the visible crust test method is conducted. Blowsand is defined as thin deposits of loose uncombined grains covering less than 50% of a site which have not originated from the representative site surface being tested. If material covers a visible crust, which is not blowsand, apply the test method in Section 4 of this appendix to the loose material to determine whether the surface is stabilized.

2.2 A sufficient crust is defined under the following conditions: once a ball has been dropped according to section 2.1. of this appendix, the ball does not sink into the surface, so that it is partially or fully surrounded by loose grains and, upon removing the ball, the surface upon which it fell has not been pulverized, so that loose grains are visible.

2.3 Drop the ball three times within a survey area that measures 1 foot by 1 foot and that represents a random portion of the overall disturbed conditions of the site. The survey area shall be considered to have passed the Visible Crust Determination Test if at least two out of the three times that the ball was dropped,

the results met the criteria in section 2.2 of this appendix. Select at least two other survey areas that represent a random portion of the overall disturbed conditions of the site, and repeat this procedure. If the results meet the criteria of section 2.2 of this appendix for all of the survey areas tested, then the site shall be considered to have passed the Visible Crust Determination Test and shall be considered sufficiently crusted.

2.4 At any given site, the existence of a sufficient crust covering one portion of the site may not represent the existence or protectiveness of a crust on another portion of the site. Repeat the visible crust test as often as necessary on each random portion of the overall conditions of the site for an accurate assessment.

3. Determination of Silt Content for Unpaved Roads and Unpaved Vehicle/Equipment Traffic Areas

The purpose of this test method is to estimate the silt content of the trafficked parts of unpaved roads and unpaved vehicle/equipment traffic areas. The higher the silt content, the more fine dust particles that are released when vehicles travel on unpaved roads and unpaved vehicle/equipment traffic areas.

3.1 Equipment:

a. A set of sieves with the following openings: 4 millimeters (mm), 2mm, 1 mm, 0.5 mm and 0.25 mm, a lid, and collector pan.
b. A small whisk broom or paintbrush with stiff bristles and dustpan 1ft. in width (the broom/brush should preferable have one, thin row of bristles no longer than 1.5 inches in length).
c. A spatula without holes.
d. A small scale with half-ounce increments (e.g., postal/package scale).
e. A shallow, lightweight container (e.g., plastic storage container).
f. A sturdy cardboard box or other rigid object with a level surface.
g. A basic calculator.
h. Cloth gloves (optional for handling metal sieves on hot, sunny days).
i. Sealable plastic bags (if sending samples to a laboratory).
j. A pencil/pen and paper.

3.2 Step 1: Look for a routinely traveled surface, as evidenced by tire tracks [Only collect samples from surfaces that are not damp due to precipitation or dew. This statement is not meant to be a standard in itself for dampness where watering is being used as a control measure. It is only intended to ensure that surface testing is done in a representative manner.] Use caution when taking samples to ensure personal safety with respect to passing vehicles. Gently press the edge of a dustpan (1 foot in width) into the surface four times to mark an areas that is 1 square foot. Collect a sample of loose surface material into the dustpan, minimizing escape of dust articles. Use a spatula to lift heavier elements such as gravel. Only collect dirt/gravel to an approximate depth of 3/8 inch or 1 cm in the

1 square foot area. If you reach a hard, underlying subsurface that is <3/8 inch in depth, do not continue collecting the sample by digging into the hard surface. In other words, you are only collecting a surface sample of loose material down to 1cm. In order to confirm that samples are collected to a 1cm depth, a wooden dowel or other similar narrow object a least one-foot in length can be laid horizontally across the survey area while a metric rule is held perpendicular to the dowel. (Optional: At this point, you can choose to place the sample collected into a plastic bag or container and take it to an independent laboratory for silt content analysis. A reference to the procedure the laboratory is required to follow is at the end of this section)

3.3 Step 2: Place a scale on a level surface. Place a lightweight container on the scale. Zero the scale with the weight of the empty container on it. Transfer the entire sample collected in the dustpan to the container, minimizing escape of dust particles. Weight the sample and record its weight.

3.4 Step 3: Stack a set of sieves in order according to the size openings specified above, beginning with the largest size opening (4 mm) at the top. Place a collector pan underneath the bottom (0.25 mm) sieve.

3.5 Step 4: Carefully pour the sample into the sieve stack, minimizing escape of dust particles by slowly brushing material into the stack with a whiskbroom or brush. (On windy days, use the trunk or door of a vehicle as a wind barrier.) Cover the stack with a lid. Lift up the sieve stack and shake it vigorously up and down and sideways for at least 1 minute.

3.6 Step 5: Remove the lid from the stack and disassemble each sieve separately, beginning with the top sieve. As you remove each sieve, examine it to make sure that all of the material has been sifted to the finest sieve through which it can pass (e.g., material in each sieve (besides the top sieve that captures a range of larger elements) should look the same size). If this is not the case, re-stack the sieves and collector pan, cover the stack with the lid, and shake it again for at least 1 minute. (You only need to reassemble the sieve(s) that contain material, which requires further sifting.)

3.7 Step 6: After disassembling the sieves and collector pan, slowly sweep the material from the collector pan into the empty container originally used to collect and weight the entire sample. Take care not to minimize escape of dust particles. You do not need to do anything with material captured in the sieves – only the collector pan. Weigh the container with the materials from the collector pan and record its weight.

3.8 Step 7: If the source is an unpaved road, multiply the resulting weight by 0.38. If the source is an unpaved vehicle/equipment traffic area, multiply the resulting weight by 0.55. The resulting number is the estimated silt loading. Then, divide

the total weight of the sample you recorded earlier in Step 2 (section 3.3) and multiply by 100 to estimate the percent silt content.

3.9 Step 8: Select another two routinely traveled portions of the unpaved road or unpaved vehicle/equipment traffic area and repeat this test method. Once you have calculated the silt loading and percent silt content of the 3 samples collected, average your results together.

3.10 Step 9: Examine Results. If the average silt loading is less than 0.33 oz/ft$^2$, the surface is STABLE. If the average silt loading is greater than or equal to 0.33 oz/ft$^2$, then proceed to examine the average percent silt content. If the source is an unpaved road and the average percent silt content is 6% or less, the surface is STABLE. If the source is an unpaved parking lot and the average percent silt content is 8% or less, the surface is STABLE. If your field test results are within 2% of the standard (for example, 4%-8% silt content on an unpaved road) it is recommended that you collect 3 additional samples from the source according to Step 1 (section 3.2) and take them to an independent laboratory for silt content analysis.

3.11 Independent Laboratory Analysis: You may choose to collect samples from the source, according to Step 1 (section 3.2) and send them to an independent laboratory for silt content analysis rather than conduct the sieve field procedure. If so, the test method the laboratory is required to use is:
"Procedures For Laboratory Analysis for Surface/Bulk Dust Loading Samples", (Fifth Edition, Volume 1, Appendix C.2.3 "Silt Analysis", 1995), AP-42, Office of Air Quality Planning & Standards, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina.

4. Determination Of Threshold Friction Velocity (TFV).

For disturbed surface areas that are not crusted or vegetated, determine threshold friction velocity (TFV) according to the following sieving field procedure (based on a 1952 laboratory procedure published by W. S. Chepil).

4.1 Obtain and stack a set of sieves with the following openings: 4 millimeters (mm), 2 mm, 1 mm, 0.5 mm, and 0.25 mm or obtain and stack a set of standard/commonly available sieves. Place the sieves in order according to size openings, beginning with the largest size opening at the top. Place a collector pan underneath the bottom (0.25 mm) sieve. Collect a sample of loose surface material from an area at least 30 cm by 30 cm in size to a depth of approximately 1 cm using a brush and dustpan or other similar device. Only collect soil samples from dry surfaces (i.e. when the surface is not damp to the touch). Remove any rocks larger than 1 cm in diameter from the sample. Pour the sample into the top sieve (4 mm opening) and cover the sieve/collector pan unit with a lid. Minimize escape of particles into the air when transferring surface soil into the sieve/collector pan unit. Move the covered sieve/collector pan unit by hand using

a broad, circular arm motion in the horizontal plane. Complete twenty circular arm movements, ten clockwise and ten counterclockwise, at a speed just necessary to achieve some relative horizontal motion between the sieves and the particles. Remove the lid from the sieve/collector pan unit and disassemble each sieve separately beginning with the largest sieve. As each sieve is removed, examine it for loose particles. If loose particles have not been sifted to the finest sieve through which they can pass, reassemble and cover the sieve/collector pan unit and gently rotate it an additional ten times. After disassembling the sieve/collector pan unit, slightly tilt and gently tap each sieve and the collector pan so that material aligns along one side. In doing so, minimize escape of particles into the air. Line up the sieves and collector pan in a row and visibly inspect the relative quantities of catch in order to determine which sieve (or whether the collector pan) contains the greatest volume of material. If a visual determination of relative volumes of catch among sieves is difficult, use a graduated cylinder to measure the volume. Estimate TFV for the sieve catch with the greatest volume using Table 1 of this appendix, which provides a correlation between sieve opening size and TFV.

Table 1. Determination Of Threshold Friction Velocity

| Tyler Sieve No. | ASTM 11 Sieve No. | Opening (mm) | TFV (cm/s) |
|---|---|---|---|
| 5 | 5 | 4 | 135 |
| 9 | 10 | 2 | 100 |
| 16 | 18 | 1 | 76 |
| 32 | 35 | 0.5 | 58 |
| 60 | 60 | 0.25 | 43 |
| Collector Pan | --- | -- | 30 |

4.2 Collect at least three soil samples which represent random portions of the overall conditions of the site, repeat the above TFV test method for each sample and average the resulting TFVs together to determine the TFV uncorrected for non-erodible elements. Non-erodible elements are distinct elements, in the random portion of the overall conditions of the site, that are larger than 1 cm in diameter, remain firmly in place during a wind episode, and inhibit soil loss by consuming Section of the shear stress of the wind. Non-erodible elements include stones and bulk surface material but do not include flat or standing vegetation. For surfaces with non-erodible elements, determine corrections to the TFV by identifying the fraction of the survey area, as viewed from directly overhead, that is occupied by non-erodible elements using the following procedure. For a more detailed description of this procedure, see Section 6 (Test Methods For Stabilization-Rock Test Method) of this appendix. Select a survey area of 1 meter by 1 meter that represents a random portion of the overall conditions of the site. Where many non-erodible elements lie within the survey area, separate the non-erodible

elements into groups according to size. For each group, calculate the overhead area for the non-erodible elements according to the following equations:

$$\text{Average Dimensions} = (\text{Average Length}) \times (\text{Average Width}) \quad \text{Eq. 1}$$

$$\text{Overhead Area} = (\text{Average Dimensions}) \times (\text{Number Of Elements}) \quad \text{Eq. 2}$$

$$\text{Total Overhead Area} = \text{Overhead Area Of Group 1} + \text{Overhead Area Of Group 2 (etc.)} \quad \text{Eq. 3}$$

$$\text{Total Frontal Area} = \text{Total Overhead Area}/2 \quad \text{Eq. 4}$$

$$\text{Percent Cover Of Non-Erodible Elements} = (\text{Total Frontal Area}/\text{Survey Area}) \times 100 \quad \text{Eq. 5}$$

Note: Ensure consistent units of measurement (e.g., square meters or square inches when calculating percent cover).

Repeat this procedure on an additional two distinct survey areas that represent a random portion of the overall conditions of the site and average the results. Use Table 2 of this appendix to identify the correction factor for the percent cover of non-erodible elements. Multiply the TFV by the corresponding correction factor to calculate the TFV corrected for non-erodible elements.

Table 2. Correction Factors For Threshold Friction Velocity

| Percent Cover Of Non-Erodible Elements | Correction Factor |
|---|---|
| Greater than or equal to 10% | 5 |
| Greater than or equal to 5% and less than 10% | 3 |
| Less than 5% and greater than or equal to 1% | 2 |
| Less than 1% | None |

5. Determination Of Flat Vegetative Cover.

Flat vegetation includes attached (rooted) vegetation or unattached vegetative debris lying on the surface with a predominant horizontal orientation that is not subject to movement by wind. Flat vegetation, which is dead but firmly attached, shall be considered equally protective as live vegetation. Stones or other aggregate larger than 1 centimeter in diameter shall be considered protective cover in the course of conducting the line transect test method. Where flat vegetation exists, conduct the following line transect test method.

5.1 Line Transect Test Method. Stretch a 100 foot measuring tape across a survey area that represents a random portion of the overall conditions of the site. Firmly anchor both ends of the measuring tape into the surface using a tool such as a screwdriver, with the tape stretched taut and close to the soil surface. If vegetation exists in regular rows, place the tape diagonally (at approximately a 45° angle) away from a parallel or perpendicular position to the vegetated rows. Pinpoint an area the size of a 3/32 inch diameter brazing rod or wooden dowel centered above each 1 foot interval mark along one edge of the tape. Count the number of times that flat vegetation lies directly underneath the pinpointed area at 1 foot intervals. Consistently observe the underlying surface from a 90° angle directly above each pinpoint on one side of the tape. Do not count the underlying surface as vegetated if any portion of the pinpoint extends beyond the edge of the vegetation underneath in any direction. If clumps of vegetation or vegetative debris lie underneath the pinpointed area, count the surface as vegetated, unless bare soil is visible directly below the pinpointed area. When 100 observations have been made, add together the number of times a surface was counted as vegetated. This total represents the percent of flat vegetation cover (e.g., if 35 positive counts were made, then vegetation cover is 35%). If the survey area that represents a random portion of the overall conditions of the site is too small for 100 observations, make as many observations as possible. Then multiply the count of vegetated surface areas by the appropriate conversion factor to obtain percent cover. For example, if vegetation was counted 20 times within a total of 50 observations, divide 20 by 50 and multiply by 100 to obtain a flat vegetation cover of 40%.

5.2 Conduct the line transect test method, as described in section 5.1 of this appendix, an additional two times on areas that represent a random portion of the overall conditions of the site and average results.

6. Determination Of Standing Vegetative Cover.

Standing vegetation includes vegetation that is attached (rooted) with a predominant vertical orientation. Standing vegetation, which is dead but firmly rooted, shall be considered equally protective as live vegetation. Conduct the following standing vegetation test method to determine if 30% cover or more exists. If the resulting percent cover is less than 30% but equal to or greater than 10%, then conduct the test in Section 4 (Determination Of Threshold Friction Velocity (TFV)) of this appendix in order to determine if the site is stabilized, such that the standing vegetation cover is equal to or greater than 10%, where threshold friction velocity, corrected for non-erodible elements, is equal to or greater than 43 cm/second.

6.1 For standing vegetation that consists of large, separate vegetative structures (e.g., shrubs and sagebrush), select a survey area that represents a random portion of the overall conditions of the site that is the shape of a square with sides equal to at least 10 times the average height of the vegetative structures. For smaller standing vegetation, select a survey area of three feet by three feet.

6.2 Count the number of standing vegetative structures within the survey area. Count vegetation, which grows in clumps as a single unit. Where different types of vegetation exist and/or vegetation of different height and width exists, separate the vegetative structures with similar dimensions into groups. Count the number of vegetative structures in each group within the survey area. Select an individual structure within each group that represents the average height and width of the vegetation in the group. If the structure is dense (e.g., when looking at it vertically from base to top there is little or zero open air space within its perimeter), calculate and record its frontal silhouette area, according to Equation 6 of this appendix. Also, use Equation 6 of this appendix to estimate the average height and width of the vegetation if the survey area is larger than nine square feet. Otherwise, use the procedure in section 6.3 of this appendix to calculate the frontal silhouette area. Then calculate the percent cover of standing vegetation according to Equations 7, 8, and 9 of this appendix.

Frontal Silhouette Area = (Average Height) x (Average Width) Eq. 6

Frontal Silhouette Area Of Group = (Frontal Silhouette Area Of Individual Vegetative Structure) x (Number Of Vegetation Structures Per Group) Eq. 7

Total Frontal Silhouette Area = Frontal Silhouette Area Of Group 1 + Frontal Silhouette Area Of Group 2 (etc.) Eq. 8

Percent Cover Of Standing Vegetation = (Total Frontal Silhouette Area/Survey Area) x 100 Eq. 9

Percent Open Space = [(Number Of Circled Gridlines Within The Outlined Area Counted That Are Not Covered By Vegetation/Total Number Of Gridline Intersections Within The Outlined Area) x 100] Eq. 10

Percent Vegetative Density = 100 - Percent Open Space Eq. 11

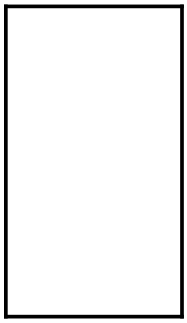
Vegetative Density = Percent Vegetative Density/100 Eq. 12

Frontal Silhouette Area = [Max. Height x Max. Width] x [Vegetative Density/0.4]0.5 Eq. 13

Note: Ensure consistent units of measurement (e.g., square meters or square inches when calculating percent cover).

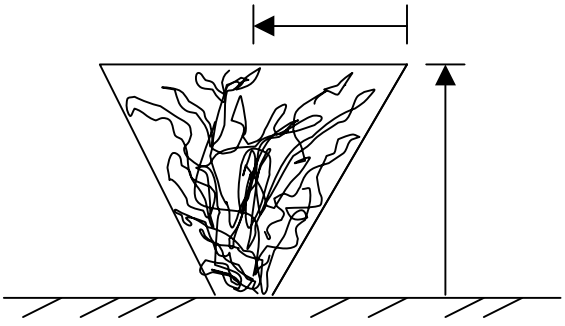
6.3 Vegetative Density Factor. Cut a single, representative piece of vegetation (or consolidated vegetative structure) to within 1 cm of surface soil. Using a white paper grid or transparent grid over white paper, lay the vegetation flat on top of the grid (but do not apply pressure to flatten the structure). Grid boxes of 1 inch or 1/2 inch squares are sufficient for most vegetation when conducting this procedure. Using a marker or pencil, outline the shape of the vegetation along its outer perimeter, according to Figure B, C, or D of this appendix, as appropriate. (Note: Figure C differs from Figure D primarily in that the width of vegetation in Figure C is narrow at its base and gradually broadens to its tallest height. In Figure D, the width of the vegetation generally becomes narrower from its midpoint to its tallest height.) Remove the vegetation, count and record the total number of gridline intersections within the outlined area, but do not count gridline intersections that connect with the outlined shape. There must be at least 10 gridline intersections within the outlined area and preferably more than 20, otherwise, use smaller grid boxes. Draw small circles (no greater than a 3/32 inch diameter) at each gridline intersection counted within the outlined area. Replace the vegetation on the grid within its outlined shape. From a distance of approximately 2 feet directly above the grid, observe each circled gridline intersection. Count and record the number of circled gridline intersections that are not covered by any piece of the vegetation. To calculate percent vegetative density, use Equations 10 and 11 of this appendix. If percent vegetative density is equal to or greater than 30, use an equation (one of the equations-Equations 16, 17, or 18 of this appendix) that matches the outline used to trace the vegetation (Figure B, C, or D) to calculate its frontal silhouette area. If percent vegetative density is less than 30, use Equations 12 and 13 of this appendix to calculate the frontal silhouette area.

Figure B. Cylinder



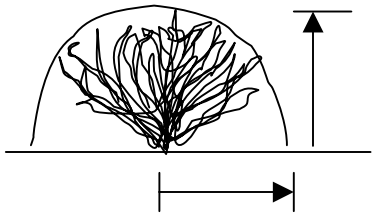
Frontal Silhouette Area = Maximum Height x Maximum Width Eq. 16

Figure C. Inverted Cone



Frontal Silhouette Area = Maximum Height x 1/2 Maximum Width Eq. 17

Figure D. Upper Sphere



Frontal Silhouette Area = (3.14 x Maximum Height x 1/2 Maximum Width)/2 Eq. 18

7. Rock Test Method.

The Rock Test Method, which is similar to Section 4 (Test Methods For Stabilization-Determination Of Threshold Friction Velocity (TFV)) of this appendix, examines the wind-resistance effects of rocks and other non-erodible elements on disturbed surfaces. Non-erodible elements are objects larger than 1 centimeter (cm) in diameter that remain firmly in place even on windy days. Typically, non-erodible elements include rocks, stones, glass fragments, and hardpacked clumps of soil lying on or embedded in the surface. Vegetation does not count as a non-erodible element in this method. The purpose of this test method is to estimate the percent cover of non-erodible elements on a given surface to see whether such elements take up enough space to offer protection against windblown dust. For simplification, the following test method refers to all non-erodible elements as "rocks".

7.1 Select a 1 meter by 1 meter survey area that represents the general rock distribution on the surface. (A 1 meter by 1 meter area is slightly greater than a 3 foot by 3 foot area.) Mark-off the survey area by tracing a straight, visible line in the dirt along the edge of a measuring tape or by placing short ropes, yard sticks, or other straight objects in a square around the survey area.

7.2 Without moving any of the rocks or other elements, examine the survey area. Since rocks >3/8 inch (1 cm) in diameter are of interest, measure the diameter of some of the smaller rocks to a get a sense for which rocks need to be considered.

7.3 Mentally group the rocks >3/8 inch (1 cm) diameter lying in the survey area into small, medium, and large size categories. Or, if the rocks are all approximately the same size, simply select a rock of average size and typical shape. Without

removing any of the rocks from the ground, count the number of rocks in the survey area in each group and write down the resulting number.

7.4 Without removing rocks, select one or two average-size rocks in each group and measure the length and width. Use either metric units or standard units. Using a calculator, multiply the length times the width of the rocks to get the average dimensions of the rocks in each group. Write down the results for each rock group.

7.5 For each rock group, multiply the average dimensions (length times width) by the number of rocks counted in the group. Add the results from each rock group to get the total rock area within the survey area.

7.6 Divide the total rock area, calculated in section 7.5 of this appendix, by two (to get frontal area). Divide the resulting number by the size of the survey area (make sure the units of measurement match), and multiply by 100 for percent rock cover. For example, the total rock area is 1,400 square centimeters, divide 1,400 by 2 to get 700. Divide 700 by 10,000 (the survey area is 1 meter by 1 meter, which is 100 centimeters by 100 centimeters or 10,000 centimeters) and multiply by 100. The result is 7% rock cover. If rock measurements are made in inches, convert the survey area from meters to inches (1 inch = 2.54 centimeters).

7.7 Select and mark-off two additional survey areas and repeat the procedures described in section 7.1 through section 7.6 of this appendix. Make sure the additional survey areas also represent the general rock distribution on the site. Average the percent cover results from all three survey areas to estimate the average percent of rock cover.

7.8 If the average rock cover is greater than or equal to 10%, the surface is stable. If the average rock cover is less than 10%, follow the procedures in section 7.9 of this appendix.

7.9 If the average rock cover is less than 10%, the surface may or may not be stable. Follow the procedures in Section 1.3 (Determination Of Threshold Friction Velocity (TFV)) of this rule and use the results from the rock test method as a correction (i.e., multiplication) factor. If the rock cover is at least 1%, such rock cover helps to limit windblown dust. However, depending on the soil's ability to release fine dust particles into the air, the percent rock cover may or may not be sufficient enough to stabilize the surface. It is also possible that the soil itself has a high enough TFV to be stable without even accounting for rock cover.

7.10 After completing the procedures described in section 7.9 of this appendix, use Table 2 of this appendix to identify the appropriate correction factor to the TFV, depending on the percent rock cover.

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