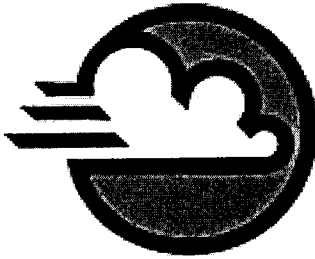


FINAL ENVIRONMENTAL IMPACT REPORT

NEW APCD RULE 55, FUGITIVE DUST

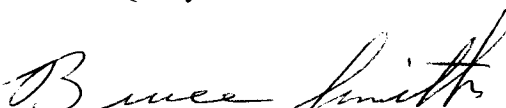
Ventura County Air Pollution Control District

**669 County Square Drive
Ventura, California 93003**

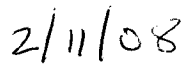


State Clearinghouse # 2007051049

The Environmental Report Review Committee recommends that the Ventura County Air Pollution Control Board find that this document has been completed in compliance with the California Environmental Quality Act.



Bruce Smith, Chair
Ventura County Environmental Report Review Committee



Date

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DISCLAIMER

This report contains references to company and product names to illustrate product availability only. Mention of these company and product names is not intended to be nor is to be considered an endorsement of any kind by the Ventura County Air Pollution Control District.

Chapter 1. Executive Summary

A. Proposed Project – APCD Rule 55

The Ventura County Air Pollution Control District (APCD) is proposing to adopt new Rule 55, Fugitive Dust (Appendix A). The purpose of this rule is to reduce Particulate Matter (PM) emissions in order to help attain the state ambient air quality standard for PM emissions in the APCD's jurisdiction. The County is currently in attainment with the federal PM standard. Senate Bill 656, adopted on October 9, 2003, requires individual air pollution control districts and air quality management districts to adopt control measures to reduce PM emissions in their respective jurisdiction. (Health and Safety Code § 39614).

Proposed Rule 55 establishes four separate fugitive dust standards to reduce PM emissions:

- No visible dust 50 feet beyond the property line.
- 20 percent opacity limit on visible dust.
- A maximum track-out standard of 25 feet in length on a public paved road.
- No visible dust plumes over 100 feet in length from earthmoving operations.

These fugitive dust standards apply to construction sites, sand and gravel operations, concrete batch plants, off-field agricultural operations, and private unpaved roads. One common method of PM control is to use water trucks to moisten the soil and reduce dust emissions. The proposed rule, however, does not specify the method of PM emission control. Proposed Rule 55 only sets fugitive dust standards to be met by the affected industries. Other means of controlling PM emissions are paving with gravel, treatment with dust suppressants, or limiting vehicle access. Another important control requirement proposed in Rule 55 is to limit the track-out, or the soil, dirt and dust that is carried out on truck tires and then deposited on public paved roads. This causes PM emissions when the deposited soil on public streets is pulverized by passing vehicle traffic. A common technique to control this emission source is to use street sweepers to remove the track-out in a timely manner.

B. Why is an EIR Required?

On March 16, 2007, APCD received a comment letter (Appendix D) from West Coast Environmental and Engineering, on behalf of their client, the California Construction and Industrial Materials Association (CalCIMA). Their review of the potential environmental impacts from the proposed rule indicated that potentially significant adverse impacts on air quality may result from the use of diesel-fueled vehicles used to comply with the fugitive dust suppression requirements or standards of the proposed rule. Diesel exhaust contains numerous pollutants including PM, nitrogen oxides (NO_x), reactive organic gases, and carbon monoxide. In addition, the Air Resources Board (ARB) has determined that diesel exhaust particulate is a toxic air contaminant and a potential carcinogen.

The APCD is charged with protecting local air quality and the public health of its citizens in accordance with applicable state and federal law. Although we believe that the overall air quality benefit of proposed APCD Rule 55 will be improved air quality, there is a possibility that there may be an increase in a pollutant emission as a result of the use of air pollution control equipment or implementation

of an air pollution control method. In the case of proposed APCD Rule 55, the estimated emission reductions of PM at six tons per day compares favorably with the NOx emissions from diesel exhaust of 25 pounds per day, which is the APCD air quality threshold cited by CalCIMA. The tradeoff of one pollutant (PM) for another (NOx) is desirable because of the difference in magnitude and impact of the two pollutants.

An Environmental Impact Report (EIR) is required by the California Environmental Quality Act (CEQA), Public Resources Code § 21000 et seq., whenever the lead agency determines that there is a significant environmental impact. CEQA Guidelines § 15187(a) states that “all air pollution control districts and air quality management districts . . . must perform an environmental analysis of the reasonably foreseeable methods by which compliance with that rule or regulation will be achieved.” According to CEQA, if there is a disagreement among expert opinion supported by facts over the significance of an effect on the environment, the lead agency shall treat the effect as significant and prepare an EIR. APCD does not dispute the fact that NOx and diesel PM may increase as a result of the proposed Rule 55, and that NOx emission increases may be greater than the 25 pounds per day air quality threshold adopted by the Board in the Ventura County Air Quality Assessment Guidelines in October of 2003. Therefore, this EIR as required by CEQA examines this air quality impact of Rule 55 in detail.

C. Significant Adverse Environmental Impact

Although the proposed project, Rule 55 (Fugitive Dust), is designed to improve air quality by reducing air pollution as PM emissions to help attain the state ambient PM air quality standard, a potential consequence of controlling dust emissions will be emissions of other air pollutants that may be a significant adverse environmental impact. In particular, common types of vehicles used to control fugitive dust are diesel-fueled water trucks and street sweepers, and resulting NOx and PM emissions from diesel exhaust may constitute this significant environmental impact.

These diesel emissions are deemed to be a significant adverse environmental impact according to APCD’s own Air Quality Assessment Guidelines. These Guidelines are used by APCD staff when evaluating the air quality impacts on projects proposed for Ventura County. The threshold for significance from the guidelines set NOx emission rates of 25 pounds per day in the County except for the Ojai Valley, where the significance level is only 5 pounds of NOx per day. As calculated by the CalCIMA, it is likely that these thresholds will be exceeded as a result of the implementation of Rule 55. However, proposed Rule 55 will still benefit air quality because PM emissions will be greatly reduced when compared to the diesel exhaust emissions, and eventually, the Air Resources Board (ARB), the responsible agency, and APCD (lead agency) have programs and regulations to mitigate diesel emissions from both new and existing vehicles to a less-than-significant level.

D. Mitigation Analysis

The mitigation of the significant adverse environmental impact (namely diesel exhaust from water trucks and street sweepers) has resulted from and will continue to result from, new regulations already adopted

and to be adopted by ARB and from APCD incentive programs such as the Carl Moyer Heavy Duty Diesel and Lower Emission School Bus Program. The new state regulations will eventually target existing emissions from diesel water trucks and sweepers, and will actually result in lower diesel exhaust emissions in the future.

According to ARB lead staff person, Gloria Lindner, the tentative proposed state-wide air pollution control regulation for existing on-road heavy duty diesel vehicles will affect both water trucks and larger private street sweepers. If a vehicle can obtain an on-road registration, it would then be covered by this rule, even if it is used in an off-road capacity. An existing government fleet diesel regulation adopted by ARB will regulate government sweepers. The proposed on-road existing vehicle regulation is scheduled to be adopted in 2008, and its first compliance date will be December 31, 2009. A two step approach is anticipated, with the first step established at 2004 NOx emission levels or 2.5 grams per brake horsepower hour with the installation of a diesel particulate filter capable of 85 percent control with 100 percent compliance by 2014. By 2020, it is anticipated all existing on-road diesel vehicles will be controlled to 2007 emission standards that will require a fleet average of 1.7 grams of NOx per brake horsepower hour and a diesel particulate filter. Thus, this mitigation will not be completed at the same time as the proposed Rule 55 implementation, but will eventually reduce diesel exhaust emissions to a point where there will no longer be an adverse environmental impact from the proposed project.

E. Analysis of Alternatives

Besides the required “No Project” alternative, the only other alternative evaluated in this EIR was a more stringent version of proposed Rule 55 that would address the adverse environmental impacts of the diesel exhaust emissions. Other fugitive dust rules adopted by other air pollution control districts, such as South Coast AQMD Rule 403 and San Joaquin APCD Regulation VIII were not evaluated because these already adopted PM emission control rules do not address the diesel exhaust emissions.

The “No Project” alternative is not recommended because it would not achieve the PM reduction goals needed to help attain state air quality standard for PM, as mandated by state law. The other alternative, the more stringent version of Rule 55, is also not recommended for two reasons. First, APCD does not have the legal authority to regulate emissions from mobile sources. This is the responsibility of the ARB. The second reason this alternative is not being recommended is the unavailability of current technologies which comply with ARB’s future PM emission standards and/or the excessive costs of immediate retrofits, repowers or replacements of existing water trucks or sweepers. The ARB has established a long implementation time frame of 2009 to 2020 to implement these more stringent mobile source emission reduction requirements. This additional time allows fleet owners to plan and budget their fleet modifications over time to reduce the costs and allow the technology to get verified and become cost-effective. The normal cost-effectiveness for adopting new rules, \$18,000 per ton of NOx reduced and \$10,000 per ton of PM reduced, would easily be exceeded if these new requirements were implemented now.

F. EIR Conclusion and Findings

The conclusion of this EIR is that Rule 55 as proposed may result in limited short term increases in diesel emissions but that it will improve PM air quality, and that this air quality improvement overwhelms any negative impacts of the diesel exhaust emissions. Moreover, in the long run, mitigation by APCD diesel emission reduction incentive programs and ARB mobile source regulations will reduce the NOx emissions and diesel PM emissions from mobile sources used to comply with proposed Rule 55 to a less than significant impact.

CEQA (Pub. Res. Code § 21002 and title 14, Cal. Code of Regs., § 15093) allows the lead agency for a project to balance, as applicable, the economic, legal, social, technological, or other benefits of a proposed project against its unavoidable adverse environmental risks when determining approval of a project. If the benefits of a proposed project outweigh the adverse environmental effects, these adverse effects may be considered “acceptable.” In the case of proposed Rule 55, the temporary adverse diesel exhaust emissions are acceptable in comparison to the improvement to PM air quality from less fugitive dust. In this case, the APCD Board would need to make a finding of overriding considerations in order to approve the adoption of this proposed rule.

The only Alternative examined besides the “No Project” alternative, is a more stringent version of proposed Rule 55 that would contain provisions requiring only those diesel vehicles with exhaust emission controls be used to comply with the fugitive dust standards. Although the air pollution control technology is currently available for these mobile sources, this Alternative is either too expensive to implement or the limited authority for APCD to regulate mobile sources is limited by state and federal laws. Therefore, this alternative is not feasible.

Chapter 2. Project Description

A. Project Applicant

Ventura County Air Pollution Control District (APCD)
669 County Square Drive, 2nd Floor
Ventura, California 93003

B. Project Location

The proposed project is a new fugitive dust (particulate matter) emission control rule (APCD Rule 55) that would impact the geographic area of jurisdiction of the Ventura County Air Pollution Control District, which includes Ventura County, Anacapa Island, San Nicolas Island, and all waters for which the District is designated the corresponding onshore area.

C. APCD Background

The Ventura County Air Pollution Control District was formed by the Ventura County Board of Supervisors in 1968, in response to the county's first air pollution study. The study identified Ventura County as having a severe air quality problem. Currently, Ventura County does not meet the federal air quality standards for ozone. It also exceeds the state standards for ozone and particulate matter. With over 800,000 county residents, the District is committed to programs that will clean the air to protect public health.

The District's mission is to protect public health and agriculture from the adverse effects of air pollution. It does this by identifying air pollution problems and developing a long-range comprehensive program to achieve and maintain state and federal air quality standards. From gas stations and dry cleaners to manufacturing facilities and power plants, the District keeps a close eye on the air in the 1,873 square miles of Ventura County. A ten-member Board, which includes the Ventura County Board of Supervisors and five additional elected city officials, oversees the activities of the District.

The United States Environmental Protection Agency (EPA) and the California Air Resources Board (CARB) classify Ventura County as a non-attainment area for both the federal and state ozone air quality standards. In addition, Ventura County does not meet state particulate matter (PM) standards. Therefore, the District must develop and implement rules designed to reduce air pollutants being emitted from local sources. The District's rules apply to many activities including open burning, incineration, gasoline storage, painting, solvent use, dry cleaning, screen printing, asphalt paving, chrome plating, fuel burning, landfills, and others. With pollution still threatening our skies, the economy and public health continue to be at risk. The Rule Development Section at the District is challenged with the task of developing rules to reduce emissions while minimizing their socioeconomic impacts. Proposed APCD Rule 55, Fugitive Dust, which is the project evaluated by this Environmental Impact Report, is an example of the rulemaking required to reduce PM air pollution in the county.

D. Project Objective

The applicant, Ventura County Air Pollution Control District, is proposing to adopt a new rule (Rule 55), the project, to reduce Particulate Matter emissions from sources of fugitive dust emissions, which is the objective. Fugitive dust is defined as any solid particulate matter that becomes airborne, other than that emitted from an exhaust stack, directly or indirectly as a result of any person or persons.

The proposed Rule 55 draft regulation is presented in Appendix A. Proposed Rule 55, Fugitive Dust, will apply to a wide range of sources of fugitive dust including any active operation, which includes any source capable of generating fugitive dust, including but not limited to the following:

- Bulk Material Handling facilities
- Earth Moving Activities
- Construction/Demolition
- Disturbed Surface Areas
- Vehicle movement on unpaved surfaces

Also included in the rule applicability are storage piles, track-out, and off-field agricultural operations. The wide applicability of the proposed rule is loosely based on South Coast AQMD Rule 403, but the regulatory approach of proposed Rule 55 differs significantly from the South Coast rule. The wide applicability was also recommended by the construction industry in a letter to the District dated February 24, 2006.

E. Proposed Rule Requirements

1. Fugitive Dust Standard: No Visible Dust 50 Feet Beyond the Property Line

A new standard for fugitive dust sources is proposed, which states that no person should cause or allow the emission of visible fugitive dust 50 feet beyond the property line. The importance of this standard is that it provides the District with an effective and easily implemented means to enforce fugitive dust control. Enforcement experience in the South Coast AQMD (i.e., Los Angeles, Orange, Riverside and San Bernardino Counties) indicates that visible dust at the property line is a much easier determination for district inspectors than a 20 percent opacity limit that requires strict adherence to an observation protocol.

2. Fugitive Dust Standard: 20 Percent Opacity Limit

Opacity is a measure of the degree of visibility impairment caused by a cloud of airborne particulate matter. For example, a thick cloud of dust (called a plume) has an opacity of 100 percent if it totally obscures the visibility of an object behind it. If a faint outline of the object can be observed through the plume, the opacity is less than 100 percent.

A trained observer tested and certified by the U.S. Environmental Protection Agency (EPA) in the practice of reading opacity can assign an opacity level to any plume. If only a faint outline can be

observed, the certified observer might assign an opacity reading of 80 percent to the plume. If most of the features of the object can be seen, the certified observer might assign an opacity reading of 15 percent or less to the plume.

APCD Rule 50, Opacity, which has been in effect since 1968, was designed to regulate the opacity of emissions from a defined point such as a smokestack, rather than the opacity of fugitive emissions such as dust generated by vehicle movement and windblown dust. Since APCD enforcement staff are currently certified opacity readers, existing resources are available to enforce the new rule. Staff has also reviewed the air quality regulations of the following regions, which also have an enforceable limit at 20 percent opacity:

- The South Coast Air Quality Management District (South Coast AQMD) covers all of Orange County and the urban portions of Los Angeles, Riverside, and San Bernardino counties. See SCAQMD Rule 403 at www.arb.ca.gov/drdb/sc/cur.htm.
- The San Joaquin Valley Air Pollution Control District (SJVAPCD) covers the counties of Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare. See SJVAPCD Regulation VIII at www.arb.ca.gov/drdb/sju/cur.htm.
- Maricopa County, AZ, which includes Phoenix. See Maricopa County Rule 310 at www.maricopa.gov/AQ/ruledesc.asp.
- Clark County, NV, which includes Las Vegas. See Clark County Section 41 at www.co.clark.nv.us/Air_Quality/regs.htm.

3. Track-Out Fugitive Dust Standard: Maximum 25 Feet in Length on a Public Paved Road

Track-Out is defined in proposed Rule 55 as any material that adheres to and agglomerates on vehicle tires or exterior surfaces and is deposited on a public paved road. This source of fugitive dust is typically caused by soil being dragged out of a disturbed or unpaved surface onto a public paved street where vehicle traffic pulverizes and disperses soil particles into the atmosphere.

The proposed track-out standard of a cumulative 25 feet in length is based on a similar standard in South Coast AQMD Rule 403. However, this track-out standard will not apply to operators that keep necessary records and implement at least one of the following fugitive dust control measures:

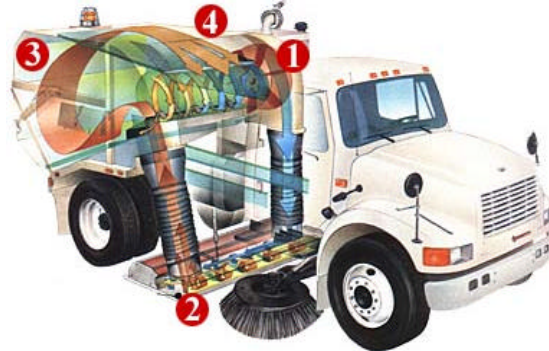
- 1) Track-Out Area Improvement: Pave or apply chemical stabilization at sufficient concentration and frequency to maintain a stabilized surface starting from the point of intersection with public paved surface, and extend for a centerline distance of at least 100 feet with an acceptable width to accommodate traffic ingress and egress from the site.
- 2) Track-Out Prevention: Check or clean the undercarriage and wheels on all vehicles before leaving unpaved surface or install a track-out control device that prevents track-out of soil onto paved public roads.
- 3) Track-Out Removal: Remove track-out from pavement as soon as possible but no later than one hour after it has been deposited on the paved road.

Thus, operators can become exempt from the track-out standard if they have implemented one of several track-out control measures. The simplest control technique is the installation of a rumble grate, a track-out control device that consists of a ground-level metal grate that is designed to remove soil from vehicles tires. An example is pictured below in Figure 1.



Figure 1: Grizzly rumble grate used to prevent track-out.

Figure 2: PM10-efficient street sweeper with enclosed air recirculation and cyclone particulate trap.



A special exemption from the track-out requirement is proposed for on-road vehicles (passenger cars and trucks) associated with agricultural operations that have caused track-out due to excessive muddy conditions resulting from rainfall. Rainy conditions, which may occur from October through April, cause muddy unpaved roads which can lead to track-out during the harvesting of row crops. Since the PM levels during the rainy season are low, the effect of this exemption on air quality is minimal.

The second part of the track-out requirement is that all track-out should be removed at the conclusion of each workday or evening shift. If a street sweeper is used to remove the track-out, then only a PM10 efficient street sweep may be used that has been certified by the South Coast AQMD to meet SCAQMD Rule 1186 requirements. A diagram of a street sweeper that has been PM10-certified shows the recirculation air flow pattern with a cyclone particulate control device is shown above in Figure 2.

4. Fugitive Dust Standard: No Visible Dust Plumes over 100 Feet in Length from Earthmoving Operations

The fourth and final fugitive dust standard in proposed Rule 55 prohibits a visible dust plume over 100 feet in length from earthmoving operations. This standard is also based on SCAQMD Rule 403, and no provisions have been proposed to create immunity from this standard because of the magnitude of this emission source.

5. Bulk Material Handling Facilities Track-Out Prevention Requirements

Prescribed fugitive dust control measures in proposed Rule 55 are only required for two types of sources: bulk material handling facilities to prevent track-out, and truck hauling. The bulk material handling facilities are permanent sources of fugitive dust and have relatively heavy truck traffic. Most of them already have track-out controls, but a few do not.

Examples of these facilities include rock/quarry handling, sand/gravel handling, concrete/ready mix product, and asphalt handling. There are approximately 40 of these sources in the county, and all of them are currently permitted by APCD to control air emissions. Almost all of these permits have conditions to control fugitive dust on the disturbed surface areas of the facility, but the permits do not currently have conditions specifying track-out controls.

The proposed requirement for track-out prevention at bulk handling facilities offers operators the flexibility to choose the particulate control measure or measures to prevent track-out. Also, there is an exemption for smaller operations having a monthly import or export of less than 2,150 cubic yards of bulk material. Basically, the operator must utilize at least one of the following track-out control measures at each vehicle egress site to a public paved road:

- 1) Install a pad consisting of washed gravel (minimum size: one inch) maintained in a clean condition to a depth of at least six inches and extending at least 30 feet wide and at least 50 feet long.
- 2) Pave the surface at least 100 feet and at least 20 feet wide.
- 3) Utilize a wheel shaker/wheel spreading device, also known as a rumble grate, consisting of raised dividers (rails, pipe, or grates) at least 24 feet long and 10 feet wide to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.
- 4) Install and utilize a wheel washing system to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.
- 5) Any other control measure or device that prevents track-out onto public paved roads.

6. Truck Hauling Fugitive Dust Control

In addition to the prescribed requirements for bulk material handling facilities, truck operators and workers loading trucks used for hauling soil or bulk material are also required to take steps to reduce fugitive dust from their loads. At least one of the following controls are required:

- 1) Use properly secured tarps, cargo covering, or enclosure that covers the entire surface area of the load.
- 2) Maintain a minimum of six inches of freeboard below the rim of the truck bed where the load touches the sides of the cargo area and insure that the peak of the load does not extend above any part of the upper edge of the cargo area.
- 3) Other effective dust prevention control measures.

The second dust control option is based on specification from the vehicle code. The proposed rule specifies the facility or site operator as the responsible party for the implementation of this requirement.

F. Conditional Exemptions

Proposed Rule 55 has conditional exemptions from all or some of the standards in the rule to allow an operator that has performed due diligence to eliminate or reduce the possibility of a Rule 55 violation. However, nothing in the proposed rule will provide any sort of immunity from any other district rules including Rule 50, Opacity, or Rule 51, Nuisance, or any state regulations.

1. Weed Abatement Operations

Weed abatement operations may be exempt from all rule requirements provided that only mowing or cutting of weeds is performed, leaving at least three inches of weed stubble. Presumably if the soil is not disturbed directly, fugitive dust emissions will be minimized. Alternatively, disking weeds by cutting into the soil may still qualify for this exemption provided effective dust emission prevention control measures are used when disking.

2. Frequently Traveled Unpaved Private Road Conditional Exemption

The operator or owner of a frequently traveled unpaved, private road may be exempt from the two fugitive dust standards, No Visible Dust Beyond the Property Line and Opacity, only if certain conditions are followed. For the purpose of this rule, a frequently traveled road is considered to have more than 20 vehicles traveling in either direction per day or more than six vehicles traveling in either direction in any one hour.

The operator or owner has the option of covering the unpaved road with a low silt material such as recycled road base or gravel to a minimum of four inches or implementing all of the following control measures:

1. Control Speed: Control speed to 15 miles per hour or less on unpaved roads through worker notification, signage, and any other necessary means.
2. Restrict Access: Restrict access to private unpaved roads currently used by the public either through signage or physical access restrictions.
3. Road Treatments: Treat unpaved and uncovered frequently traveled roads with water, mulch, or a non-toxic chemical dust suppressant that comply with all air and water quality government standards. If treated, roads shall be treated in a manner that will avoid the sticking of mud to tires that will be carried onto paved public roads.

An important part of qualifying for this conditional exemption is the necessity of keeping simple records documenting and diagramming the roads designated as frequently-traveled and describing the control measures used to control the fugitive dust emissions on those roads.

3. Lightly Traveled Unpaved Private Road Conditional Exemption

Similarly, the owner or operator of a lightly traveled unpaved, private road has an opportunity to gain immunity from visible dust standards in the proposed rule. However, the conditions necessary to qualify for this exemption are less demanding because there are fewer vehicles emitting fugitive dust on these unpaved roads. Again, the lightly-traveled roads are considered to have 20 or fewer vehicle trips per day. Both the following conditions must be implemented to qualify for this exemption:

- 1) Control Speed: Control speed to 15 miles per hour or less on unpaved roads through worker notification, signage, and any other necessary means.
- 2) Restrict Access: Restrict access to private unpaved roads currently used by the public either through signage or physical access restrictions.

4. Storage Pile Conditional Exemption

Owners of a storage pile may qualify for an exemption from the fugitive dust emissions standards in the proposed rule by keeping the simple records and by implementing at least one of the following control measures:

- 1) Wind Sheltering: Enclose material in a three-sided or four-sided barrier equal to the height of the material.
- 2) Watering: Apply water at a sufficient quantity and frequency to prevent wind driven dust.
- 3) Chemical Stabilization: Apply a non-toxic dust suppressant that complies with all applicable air and water quality government standards at a sufficient quantity and frequency to prevent wind driven dust.
- 4) Covering: Install and anchor tarps, plastic, or other material to prevent wind driven dust.

G. Opacity Test Methods

The proposed test method is a modified form of EPA Method 9, and is similar to the current opacity test method used in Rule 50. The proposed method requires that observers be certified by ARB or EPA, and APCD inspectors are trained and tested on a regular basis. The testing involves the generation of different plumes with known opacity as measured by an in-stack transmissometer.

The modifications to EPA Test Method 9 are as follows:

1. **Observation Distance from Source:** The proposed method allows observers to stand as close as 16.5 feet from the source, while the EPA Method limits the observation distance to 20 feet. This provides a little more flexibility for the inspector to make observations.
2. **Observers are instructed to read the smoke plume starting at a height of five feet above the emission source.** This allows the observer to screen for the fallout of fugitive dust that is not emitted into the atmosphere.
3. **Compliance Determination:** Similar to APCD Rule 50, if the observer records 12 readings of 20 percent or greater within an hour's time, then the source is in violation of the rule limit. Observations are taken once every 15 seconds, and the twelve readings do not have to be consecutive. Thus, once twelve 20 percent or greater readings are taken in an hour (3 total minutes), then the observer may stop and issue the violation.

H. Compliance Schedule

The requirements of this proposed rule will become effective six months after the adoption date. Once effective, the regulated community will have a six month phase-in period, where Notices to Comply rather than Notices of Violations will be issued by APCD staff.

I. Legal Authority

Health & Safety Code § 39614(d)(1) states, in pertinent part, that each air pollution control district “shall adopt and implement control measures to reduce PM 2.5 and PM 10 from stationary, area . . . sources, and to make progress toward attainment of state and federal PM 2.5 and PM 10 standards.” Pursuant to the California Environmental Quality Act (CEQA), the Ventura County Air Pollution Control District conducted an initial study (Appendix B), which determined that the project may have a significant effect on the environment and that an environmental impact report (EIR) would be required that focuses on the air quality impact of the proposed project. It should be noted that actions taken by regulatory agencies are generally categorically exempt from the provisions of CEQA. However, written comments dated March 16, 2007, (Appendix C) received from West Coast Environmental And Engineering expressed concerns that the proposed Rule 55 would have potentially significant negative impacts on air quality, mainly from the increased use of diesel watering trucks and street sweepers. The

purpose of this EIR is to examine these potential air quality impacts. Approval of the proposed new Rule 55 is at the discretion of the Ventura County Air Pollution Control Board given these legal mandates and principles.

J. CEQA Responsible and Trustee Agencies

The Ventura County Air Pollution Control District is the lead agency since the proposed project requires approval by the Ventura County Air Pollution Control Board. Responsible agencies include the California Air Resources Board (ARB) and United States Environmental Protection Agency (EPA). However, since Ventura County is in attainment with the federal PM air quality standards, the new rule will not be submitted to EPA as a revision to our State Implementation Plan. Ventura County is not in attainment with the state air quality standard, and the new rule will be submitted to ARB for their review in compliance with state mandates. There are no trustee agencies affected by the proposed project.

Chapter 3. Environmental Setting

A. Health Impacts of Particulate Matter (PM)

The effects of inhaling particulate matter have been widely studied in humans and animals and include, asthma, lung cancer, cardiovascular issues, and premature death. Those most sensitive to particle pollution include infants and children, the elderly, and persons with heart and lung disease. The size of the particle is a main determinant of where in the respiratory tract the particle will come to rest when inhaled. Larger particles are generally filtered in the nose and throat and do not cause problems, but particulates less than 10 microns can settle in the bronchi and lungs and cause health problems. The 10 micron size does not represent a strict boundary between respirable and non-respirable particles, but has been agreed upon for monitoring of airborne particulate matter by most regulatory agencies.

Similarly, particles smaller than 2.5 microns, penetrate into the gas-exchange regions of the lung, and very small particles (< 100 nanometers) may pass through the lungs to affect other organs. In particular, a study published in the Journal of the American Medical Association (Pope et. al, 2002), indicates that PM_{2.5} leads to high plaque deposits in arteries, causing vascular inflammation and atherosclerosis — a hardening of the arteries that reduces elasticity, which can lead to heart attacks and other cardiovascular problems. Researchers suggest that even short-term exposure at elevated concentrations could significantly contribute to heart disease.

There is also evidence that particles smaller than 100 nanometers can pass through cell membranes. For example, particles may migrate into the brain. It has been suggested that particulate matter can cause similar brain damage as that found in Alzheimer patients. This research was done by Dr. Lilian Calderon-Garciduenas of the National Institute of Pediatrics in Mexico City and a postdoctoral student in the environmental pathology program at the University of North Carolina at Chapel Hill. Particles emitted from modern diesel engines (commonly referred to as Diesel Particulate Matter, or DPM) are typically in the size range of 100 nanometers (0.1 microns). In addition, these soot particles also carry carcinogenic components like benzopyrenes adsorbed on their surface. The large number of deaths and other health problems associated with particulate pollution was first demonstrated in the early 1970s (Lave et. al, 1973) and has been reproduced many times since. PM pollution is estimated to cause 20,000-50,000 deaths per year in the United States (Mokdad et. al, 2004) and 200,000 deaths per year in Europe).

B. Particulate Matter Air Quality in Ventura County

The U.S. Environmental Protection Agency (U.S. EPA) and the California Air Resource Board (ARB) have adopted ambient air quality standards for PM₁₀ and PM_{2.5} (Table 1). California's standards are the most health-protective standards in the nation, and are designed to provide additional protection for the most sensitive groups of people, including infants and children, the elderly, and persons with heart or lung disease. Ventura County met the federal PM₁₀ standards in past years with the one exception occurring during October of 2003 as a result of a wildfire. However, both the state PM₁₀ and PM_{2.5} standards have been exceeded in the county.

Table 1. State and National Particulate Matter Ambient Air Quality Standards.

	California ($\mu\text{g}/\text{m}^3$)	National (2006) ($\mu\text{g}/\text{m}^3$)
PM10		
Annual	20	revoked
24-hour	50	150
PM2.5		
Annual	12	15
24-hour	35	35

The standards are expressed in micrograms per cubic meter ($\mu\text{g}/\text{m}^3$).

Ambient PM is comprised of both directly emitted PM such as fugitive dust and soot, known as primary PM, as well as PM formed in the atmosphere from the reactions of precursor gases - known as secondary PM. These precursor gases include nitrogen oxides (NO_x), sulfur oxides (SO_x), volatile organic compounds (VOC), and ammonia.

Sources of ambient PM include combustion sources such as trucks and passenger cars, off-road equipment, industrial processes, residential wood burning, and forest and agricultural burning; fugitive dust from paved and unpaved roads, construction, mining and agricultural activities; and ammonia from sources such as livestock operations and fertilizer applications. In general, combustion processes form fine particles, whereas emissions from dust sources tend to be coarse particles.

In Ventura County, PM concentrations are measured every sixth day at five locations (El Rio, Piru, Simi Valley, Ojai and Thousand Oaks) – for a total of about 300 air samples per year. Both PM10 and PM2.5 are measured at four of the locations.

Table 2 is a summary of recent PM10 and PM2.5 concentrations and exceedances of the California PM standards. Both California PM10 standards (24-hour and annual average) are exceeded at all five Ventura County sites.

Table 2 – PM10 and PM2.5 Concentrations and Exceedances

	Number of exceedances of the state PM10 standard 2001 through 2003. (measured)	Estimated* number of days exceeding the state PM10 standard in 2003. (California Standard is 50 mg/m³)	Annual Average (2003) PM10 concentration. (California Standard is 20 mg/m³)	PM10 Maximum Measured Concentration. (Average of top 4 measurements in 2003)	Annual Average (2003) PM2.5 concentration. (California Standard is 12 mg/m³)	PM2.5 Maximum Measured Concentration. (Average of top 4 measurements in 2003)
Simi Valley	12 days	31.1 days	30 µg/m ³	93 µg/m ³	14.2 µg/m ³	54 µg/m ³
El Rio	10 days	28.6 days	29 µg/m ³	94 µg/m ³	11.8 µg/m ³	44 µg/m ³
Thousand Oaks	4 days	20.1 days	25.8 µg/m ³	58 µg/m ³	12 µg/m ³	27 µg/m ³
Ojai	3 days	12.2 days	20.7 µg/m ³	47 µg/m ³	NA	NA
Piru	3 days	12.6 days	27 µg/m ³	60 µg/m ³	11 µg/m ³	24 µg/m ³

* Takes every sixth day sampling schedule into consideration

Source: <http://www.arb.ca.gov/adam/welcome.html>

Table 2 shows that the California 24-hour PM10 standard is exceeded at all monitoring sites in the County - most often at the Simi Valley site – 31 days in 2003 (est.). All County monitoring sites exceed the state annual average PM10 standard. The state annual average PM2.5 standard is exceeded only at the Simi Valley site, but all sites are close to the exceedance threshold. Although the state and federal 24 hour PM 2.5 standards were exceeded at both Simi Valley and El Rio sites in 2003, the federal exceedances were the result of ash fallout from a wildfire in October of that year.

Coarse particles (between 2.5 and 10 microns) are almost always a significant portion of total PM10. In fact, the average of the coarse fractions for all samples (not limited to samples collected on exceedance days) during 2001, 2002, and 2003 is over 50 percent. However, the local emission sources and local meteorology can significantly impact the coarse particle fractions, which can range from a low of 18 percent to as high as 88 percent.

Table 3 – Average Percent of Particles (by weight) that are Coarse Particles (2.5 mm to 10 mm)

	Simi Valley	Thousand Oaks	El Rio	Piru
Coarse Particles (% by weight)	52%	52%	57%	56%

Note: Data derived from separate samples (PM2.5 and PM10) collected simultaneously using two separate techniques.

The following figures show monthly averages of PM10 and PM2.5 at four monitoring stations: El Rio (Coastal Inland), Simi Valley (Inland Valley), Thousand Oaks, and Piru. A common pattern emerges for all four stations. Both the PM2.5 and PM10 values follow the ozone season, which lasts roughly from April through October. Since a significant part of both PM2.5 and PM10 are the result of secondary particle formation in the atmosphere, stable meteorological conditions with low inversions will increase PM concentrations. Direct particle emissions (primary) are also more concentrated when atmospheric dispersion is reduced.

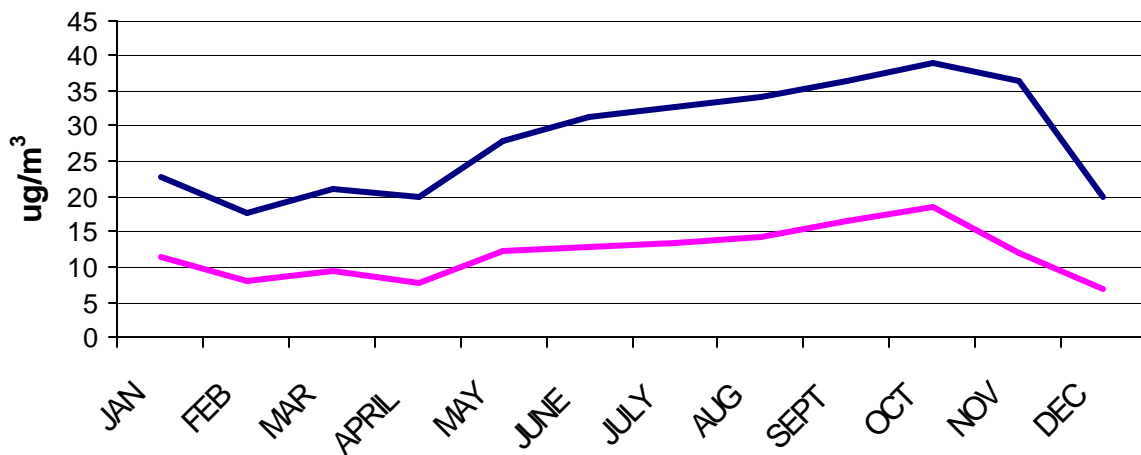


Figure 3 – El Rio Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.

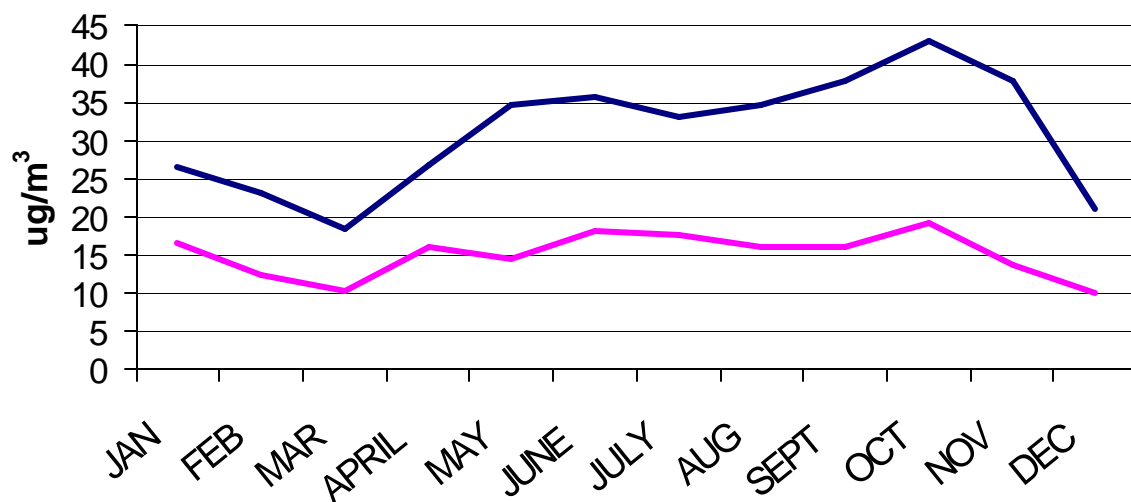


Figure 4 – Simi Valley Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.

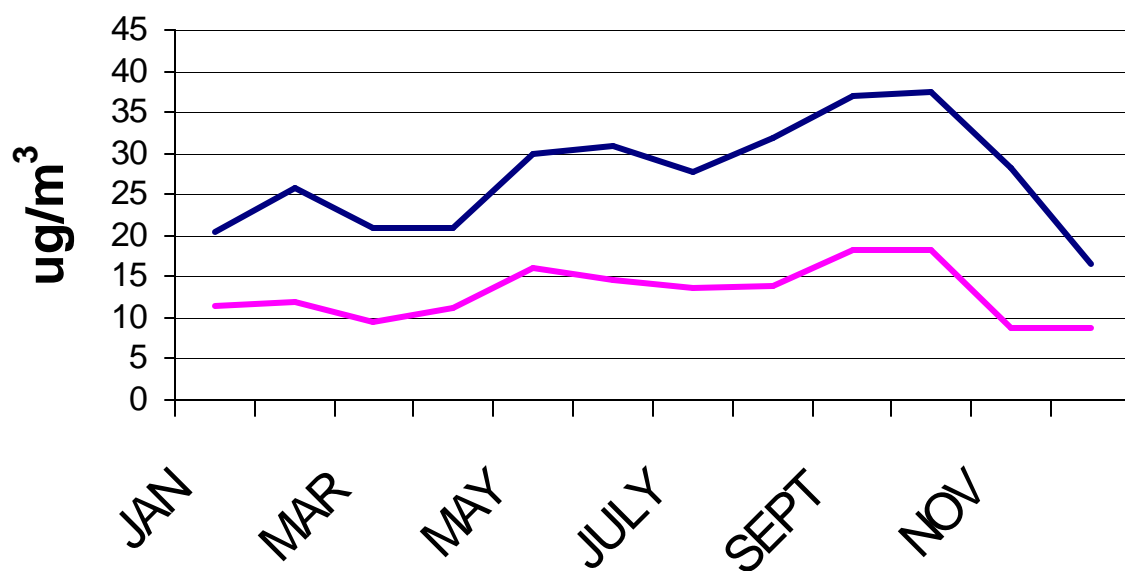


Figure 5 – Thousand Oaks Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.

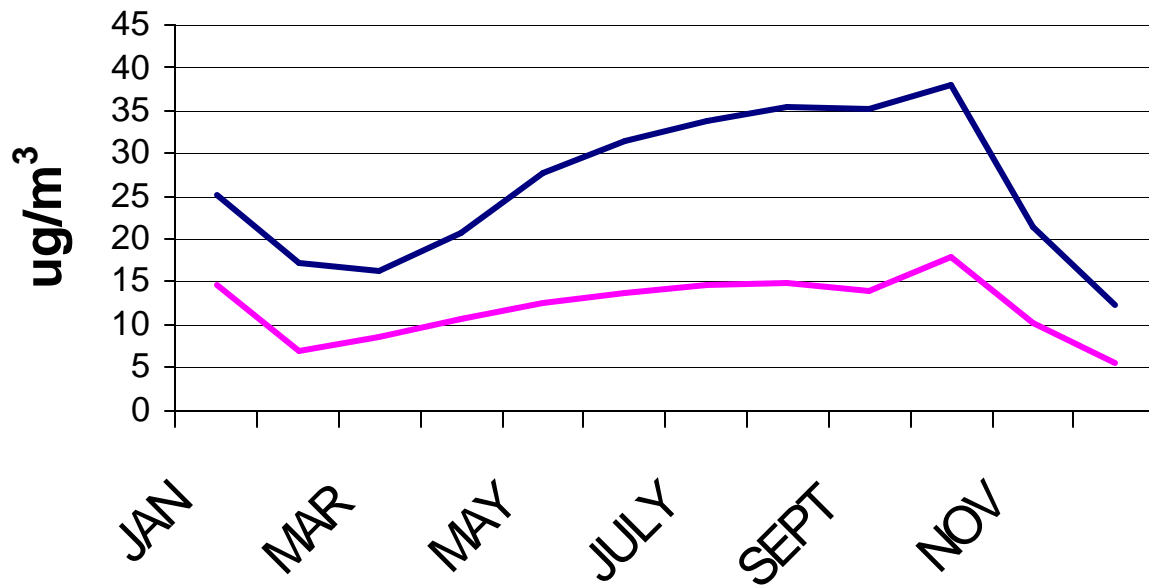


Figure 6 – Piru Monthly Average PM10 and PM2.5 Concentrations (micrograms per cubic meter). Monthly averages of all measurements taken from 2001 through 2003.

C. Existing Regulations for Controlling Particulate Matter

Ventura County APCD has already adopted rules to regulate both primary and secondary PM. Primary PM from stationary sources is regulated by the following rules:

- Rule 26, New Source Review
- Rule 50, Opacity
- Rule 52, Particulate Concentration
- Rule 53, Particulate - Process Weight
- Rule 56, Open Burning
- Rule 57, Incinerators
- Rule 57.1, Particulate Matter from Fuel Burning Equipment
- Rule 62.7, Asbestos
- Rule 74.1, Abrasive Blasting
- Rule 74.25, Restaurant Cooking Operations

Secondary PM formed from atmospheric reactions of precursor gases (Oxides of Nitrogen, Oxides of Sulfur, and Volatile Organic Compounds) are regulated by many district rules that have been adopted to reduce the ambient ozone levels. These include regulations for stationary combustion sources such as boilers, heaters, turbines, and engines, and sources that emit organic solvents including coatings, adhesives, fiberglass manufacturing, and solvent cleaning. Large sources of volatile organic compounds regulated by district rules include gasoline marketing and oil and natural gas production and storage. Sulfur oxides are regulated by rules governing the sulfur content of fuels.

The ARB also regulates PM emissions by regulating mobile sources, mainly internal combustion engines. A recent program to control toxic particulates generated by diesel engines will reduce PM from both stationary and mobile diesel engines. Besides regulations, the district has incentive programs to replace older heavy duty diesel engines with engines burning cleaner fuels such as natural gas or having particulate control equipment, such as particulate traps or oxidation catalysts.

However, even with all these existing regulations, the county remains in violation of the state standard for PM. As a result of recently enacted legislation (SB 656), the District is required to do more to help meet the ambient PM standard. This is the main basis for this proposed rule action to control fugitive dust. Fugitive dust is a significant portion of the PM problem, and this regulatory action will fill in a gap in an area that has not been formally regulated by the District.

D. SB 656: The Legislative Mandate to Further Reduce PM

SB 656 (Health and Safety Code 39614), was adopted on October 9, 2003, by the legislature to reduce particulate matter emissions and reduce public exposure to particulate matter. The intent of the bill is to accelerate progress toward meeting the federal and state PM ambient standards. The bill required ARB to consult with air districts, hold at least one public workshop, develop and adopt a list of the most readily available, feasible, and cost-effective control measures to reduce PM10 and PM2.5 emissions. These control measures were based upon rules and regulations in effect as of January 1, 2004, for specific emissions source categories and was published by ARB on October 19, 2004. Additional control measures were added on November 18, 2004.

Staff evaluated ARB's list of incentive programs, control measures, and district rules, which were presented in Appendix C of the ARB staff report. As stated earlier, many of the control measures on ARB's list are already being implemented by APCD, including the following:

- Rules to control secondary PM precursors (NOx, VOC, and SOx) from combustion and coating sources.
- Rules to control directly emitted PM from incinerators and fuel burning equipment.
- "Grain loading" rules for emissions from asphalt plants, smelters, forges, material dryers, and others.
- A rule to control agricultural burning.
- General visible emission limits (opacity).
- Incentive programs for diesel engine replacements.
- A transportation outreach program.
- A commercial grilling regulation.

APCD does not currently have local regulations to implement the following control measures contained in the ARB list:

- 1) Control of combustion emissions from residential wood burning fireplaces and wood burning heaters.
- 2) Control of fugitive dust emissions from:
 - Paved and unpaved roads
 - Unpaved parking lots and staging areas

- Construction sites
- Demolition activities
- Earthmoving and grading operations
- Carry-out and track-out
- Bulk material handling
- Inactive disturbed land
- Weed abatement activities
- Agricultural operations

Only combustion emissions from residential wood burning fireplaces and fugitive dust emissions were included on the ARB list that have yet to be adopted by Ventura County. No increase in PM concentrations is measured during the coldest part of the year that could be attributed to residential wood burning appliances. In fact, PM concentrations are consistently at their lowest during the coldest part of the year. Air districts in Northern California and ones with colder climates where residents use wood fueled stoves for heating are more likely to have a PM problem from smoke formation. Local regulatory restrictions, other than federal or state requirements for new stoves, are not being proposed to comply with PM10 air quality standards.

Therefore, fugitive dust control measures from Section C in that appendix of the ARB staff report will be the focus of our District rulemaking effort because the District does not currently regulate fugitive dust emissions except at bulk material handling facilities. From the ARB list, staff has evaluated the existing district rules from the South Coast AQMD and San Joaquin Valley Air Pollution Control District (SJVAPCD) as possibly applicable to Ventura County (Table 4).

Health & Safety Code § 39614 also requires the state board and each district to adopt an implementation schedule for the most cost-effective measures on that list after prioritizing the measures based on the effect individual control measures will have on public health, air quality, and emission reductions.

**Table 4 – ARB List of Readily Available, Feasible
and Cost-Effective Fugitive Dust Control Measures**

FUGITIVE PM SOURCE CATEGORIES	APPLICABLE SJVAPCD RULE(S)	APPLICABLE SCAQMD RULE(S)
Construction: Earth Moving/Demolition/Grading	Rule 8021	Rule 403
Inactive Disturbed Land	Rule 8021	Rule 403
Bulk Material: Handling/Storage	Rule 8031	Rule 403
Carry-out and Track-out	Rule 8041	Rule 403
Disturbed Open Areas	Rule 8051	Rule 403
Paved Road Dust: New/Modified Public and Private Roads	Rule 8061	Rule 1186
Paved Road: Street Sweeping		Rule 1186
Unpaved Parking Lots/Storage Areas	Rule 8061	Rule 1186
Weed Abatement Activities	Rule 8021	Rule 403
Windblown Dust: Construction/Earth Moving		Rule 403
Windblown Dust: Disturbed Areas		Rule 403
Windblown Dust: Bulk Materials/Storage Piles		Rules 403 and 403.1
Agricultural Operations	Rule 8081	Rules 403, 403.1,1186

The first step was to analyze data from existing air monitoring network, emission inventory, and other scientific studies to identify sources of particulate pollution and prioritize control measures for that pollution and its precursors. This data analysis is summarized in the prior section on the PM air quality in Ventura County. The prioritization and implementation schedule for Ventura County was adopted by the Ventura County Air Pollution Control Board on June 28, 2005.

E. Fugitive Dust Rule Development Schedule

On June 28, 2005, the Ventura County Air Pollution Control Board (Board) approved a plan proposed by staff to develop new PM control measures. This plan would establish new visible emission (opacity) limits for fugitive dust sources and would include new requirements to prevent vehicles from tracking out soils onto paved roadways where they are subsequently ground into small PM10 particles and entrained in the air by traffic. The following rule adoption schedule as outlined in Tables 5, 6, and 7, and description of proposed control measures was approved by the Board as Attachment 1 to the Board Letter.

PROPOSED CONTROL MEASURE IMPLEMENTATION SCHEDULE

Table 5: Control Measures to be adopted by 12/31/2007

Construction, demolition, or earthmoving operations
<ul style="list-style-type: none"> • Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.
<ul style="list-style-type: none"> • Operations contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.
<ul style="list-style-type: none"> • Establish visible dust emission limits (opacity).
Bulk material handling and storage facilities
<ul style="list-style-type: none"> • Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.
<ul style="list-style-type: none"> • Facilities contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.
<ul style="list-style-type: none"> • Establish visible dust emission limits (opacity).
Agricultural operations
<ul style="list-style-type: none"> • Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.
<ul style="list-style-type: none"> • Facilities contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.

Table 6: Control Measures to be adopted by 12/31/2008

Unpaved roads
<ul style="list-style-type: none"> • Establish visible dust emission limits (opacity).
Unpaved parking lots and staging areas
<ul style="list-style-type: none"> • Install equipment such as rumble strips, or implement work practices to reduce track out onto paved roadways.
<ul style="list-style-type: none"> • Facilities contributing to track-out should periodically sweep or otherwise remove their track-out material from paved roadways.
<ul style="list-style-type: none"> • Establish visible dust emission limits (opacity).
Weed abatement activities
<ul style="list-style-type: none"> • Establish visible dust emission limits (opacity).

Table 7: Control Measures to be adopted by 12/31/2009

New and modified public and private paved roads
<ul style="list-style-type: none"> • Develop control measures to minimize emissions from unpaved road shoulders.
In-use paved roads
<ul style="list-style-type: none"> • Develop incentives for municipal street sweeping.
<ul style="list-style-type: none"> • Require responsible entities to conduct post-event cleanup of roadways.

The proposed Rule 55, Fugitive Dust, will implement both the control measures to be adopted by December 31, 2007, and those to be adopted by December 31, 2008. Thus, the proposed rule will impact the following sources: construction, demolition, earthmoving operations, bulk material handling and storage facilities, off-field agricultural operations, unpaved roads, unpaved parking lots and staging areas, and weed abatement activities. This proposal to adopt an all encompassing regulation is based on an industry comment received at the March 1, 2006, Public Consultation Meeting, in which staff solicited public input on how best to regulate visible dust emissions.

F. Revised Regulatory Approach to Controlling Fugitive Dust

It is important to note that although the proposed Rule 55 agrees with the Board-approved plan in principle, the regulatory approach has been modified to provide more operator flexibility and further reduce the cost of Rule 55 compliance. This regulatory approach is based on expanding the concept outlined in the June 2005 Board letter which establishes a performance-based opacity limit instead of mandating prescribed dust control techniques. In particular, proposed Rule 55 will include a performance-based standard for track-out of 25 feet on a public paved road instead of mandating specific track-out control techniques. Furthermore, the proposed Rule 55 will allow operator flexibility by allowing operators to be exempt from the track-out standard if preventative measures have been taken and documented by records. Other performance-based standards in proposed Rule 55 are similar to South Coast AQMD Rule 403 and include the following:

- No visible dust 50 feet beyond the property line
- Opacity limit of 20 percent or greater
- No visible dust plume over 100 feet in length while engaged in earth-moving activities

An exception to this regulatory approach involves prescribing control techniques for two sources of fugitive dust: bulk material handling facilities and haul trucks. Prescribed techniques are proposed for bulk material handling facilities because these are permanent sources of air pollution currently permitted by APCD, and they have heavy truck traffic. The prescribed fugitive dust controls proposed for haul trucks regulate the dust generated by the load, and these regulations duplicate current state vehicle code requirements.

Chapter 4. Environmental Impacts

A. Effects Not Found to Be Significant

1. Potential Environmental Impacts Evaluated by Ventura County Planning Division

An EIR shall contain a statement indicating the reasons that various possible significant effects of a project were determined not be significant and are not discussed in detail in the main body of this report. This detailed discussion may be found in the attached Initial Study (Appendix B) and in the Response to the Initial Study from the Ventura County Planning Division (Appendix C).

A review of the environment impacts was performed by staff from the Planning Division of the County of Ventura based on the countywide General Plan and planning-related issues of the Initial Study. Areas reviewed included air quality, water quantity and quality, energy resources, noise, land use, traffic congestion, visual resources, and vehicle parking. None of the impacts were identified as having a significant environmental impact. It was recommended that APCD review other air quality standards to determine if these impacts could have significant effects. The air pollutants in question were from diesel combustion sources. Beside the PM and ozone air quality standards, the only other criteria pollutant ambient air quality standards that may be impacted are ambient air quality standards for carbon monoxide and nitrogen dioxide. Ventura County is in attainment with both the federal and state ambient air quality standards for these two pollutants. The purpose of proposed APCD Rule 55 is to reduce PM emissions to help attain the state ambient air quality standard for particulate matter. The only environmental effect discussed in detail in this EIR is the air quality impact from the proposed project.

2. Potential Impact on Global Warming

The California Global Warming Solutions Act of 2006 (Health & Safety Code § 38500 et seq.) requires all state agencies to consider and implement strategies to reduce greenhouse gas emissions to help prevent global warming. The state has determined that greenhouse gas emissions are an important environmental issue. This issue may be evaluated under CEQA by this EIR. As mentioned previously, control techniques used to reduce fugitive PM emissions may increase the combustion of diesel fuel used to power water trucks and street sweepers. The combustion of any carbonaceous fuel, such as diesel, emits carbon dioxide, which is a greenhouse gas implicated in global warming. However, the environmental impact from the additional diesel fuel usage that may occur as a result of proposed Rule 55 compliance may not be considered to be significant because it is a very small fraction of the total diesel fuel used in the County. More importantly from a CEQA perspective, the ARB has the primary task of further mitigating greenhouse gas emissions from mobile sources by developing tailpipe emission standards, regulations and programs. To date, these CARB standards are either still in the process of finalization or pending litigation outcomes and are thus too speculative to apply in this rulemaking context.

B. Discussion of Environmental Effects of Proposed APCD Rule 55

1. Significant Environmental Impacts of Proposed APCD Rule 55

The proposed project, APCD Rule 55, has the potential of having a significant adverse impact on air quality by allowing the use of diesel watering trucks and street sweepers as a control method for reducing fugitive dust particulate emissions. The air contaminant, nitrogen oxides or NO_x, results from the combustion of diesel fuel, and is a precursor to the formation of ozone. Also, diesel PM, or soot, results from diesel fuel combustion and has been declared a toxic air contaminant by the Air Resources Board and a potential carcinogen.

Based on the Initial Study and comments received on the Initial Study, the only significant adverse environmental impact is on air quality. It may be questioned why an agency charged with protecting air quality and public health would propose a new rule that may adversely impact air quality. The answer lies in the fact that the study of air pollution is a complex science, and sometimes an unavoidable consequence of reducing one air pollutant is increased emissions of a different air pollutant. Two important points to consider are that the projected emission reductions of 6 tons per day of PM from the proposed rule are much greater than the potential increase of 25 pounds per day of NO_x, and that diesel exhaust emissions will eventually be mitigated by ARB and APCD programs and new regulations. Thus, the significant environmental impacts are only temporary until such time as when the new ARB regulations regarding mobile source diesel exhaust controls are implemented. As long as air quality is improved overall and progress is made toward meeting the federal and state ambient air quality standards, then the proposed rule can be adopted pursuant to CEQA.

2. Significant Environmental Impacts Which Cannot Be Avoided

Although this aforementioned air quality impact can be mitigated in the long term, as discussed later in this draft EIR, it cannot be avoided or mitigated to a level of insignificance right away. In this case, “significance” is defined by APCD air quality guidelines. Air pollution tradeoffs (one pollutant for another) have been and will always be part of the solution to air quality problems. For example, combustion sources such as thermal oxidizers are commonly used to control Reactive Organic Compound (ROC) emissions, which are another precursor to ozone. Unfortunately, every source of combustion will emit NO_x emissions, which is another ozone precursor. Flares are required in oilfields to combust vented gas rather than allowing much more ROC emissions. When evaluating these tradeoffs, the key factor is evaluating the quantity and reactivity of the air pollution emanating from the control equipment vs. the uncontrolled stack. Photochemical models can estimate impacts on ozone formation, and lead to the most efficient way to improve air quality. For several decades, the APCD, as have many other local air pollution control districts, have been using the dual strategy of controlling both ROC and NO_x emissions to reduce ozone formation.

3. Significant Irreversible Changes Caused by the Proposed Project

An EIR must identify any significant irreversible impacts which would be caused by the proposed project. Examples of irreversible environmental changes may be a project's current or future commitment to using non-renewable resources, or secondary impacts that commit future generations to similar uses. The three examples from the CEQA Guidelines involve land use, irreversible damage from an environmental accident, and consumption of nonrenewable fuel such as diesel. Proposed APCD Rule 55 would not cause any irreversible changes because it involves no planning or zoning issues and causes no physical change to any existing location. Although non-renewable fuel (diesel) would be consumed by those water trucks and sweepers used to comply with the proposed requirements, the amount of fuel is a very small part of the diesel fuel consumed in the county, the bulk of which is used by truck traffic, off-road construction equipment, and marine vessels.

4. Growth-Inducing Impact of the Proposed Project

The EIR must discuss how the proposed project, if implemented, could induce growth. This discussion should evaluate the ways in which the proposed project will foster economic or population growth, or the construction of additional housing, either directly or indirectly. The proposed project, VCAPC Rule 55, is a new rule that regulates the emissions of fugitive dust from such sources as agricultural, mining, and construction activity, but neither encourages nor constrains the amount or degree of economic activity. Therefore, there are no growth-inducing impacts from the proposed project.

C. Potential Air Quality Impact of APCD Rule 55

1. Particulate Matter (PM) Emission Inventory

The PM emissions inventory for Ventura County in 2001 was supplied by the Air Resources Board, and is shown in Figure 7 on the following page. It shows the relative contributions for various categories of directly emitted PM₁₀. The chart depicts only directly emitted particles. Fine secondary particles that account for a significant portion of the total PM₁₀ mass are not included in the chart because they are formed in the atmosphere and not directly emitted. Fugitive dust emissions, including windblown dust, vehicle-entrained road dust, construction and demolition dust and farming dust account for about 77 percent of this directly-emitted PM₁₀ inventory. Coarse particles are, by far, the major contributor to PM₁₀ during Santa Ana wind conditions in the dry season. Both PM₁₀ and PM_{2.5} concentrations rise during the dry season and drop sharply after the first rain in autumn. The PM₁₀ emission inventory in 2001 was approximately 26 tons per day for direct (primary) emissions. Since fugitive dust emissions account for 77 percent of the total, approximately 20 tons per day of fugitive dust are emitted.

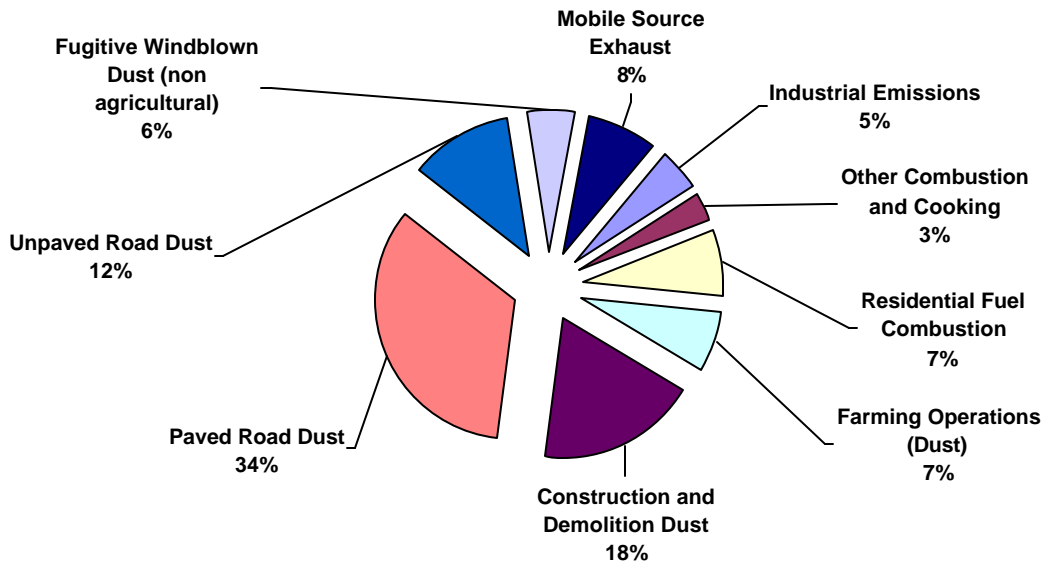


Figure 7 – 2001 Ventura County PM10 Emissions Inventory – Direct Emissions = 26 Tons per Day

2. Particulate Matter Emission Reductions

The estimated emission reductions as a result of this rule adoption are estimated at **six tons** per day of PM10. This is based on an estimated control effectiveness of the proposed rule at about 30 percent of the 20 tons per day fugitive dust emission inventory. Since many of the impacted sources are already in compliance with the proposed rule requirements or existing regulations, the actual control effectiveness of the proposal has been estimated at 30 percent.

Much of the construction industry in Ventura County also operates in the South Coast AQMD, which first adopted a fugitive dust rule in 1976. Furthermore, city and county planning agencies in Ventura County already require construction sites to take actions to mitigate fugitive dust emissions. However, the adoption of this new rule will create new fugitive dust standards, especially in regards to track-out, and enable District inspectors to enforce those standards.

Besides the construction industry, the rule will apply to track-out caused by the agricultural industry and by bulk materials handling facilities. Unpaved roads, a previously unregulated source, will also be subject to new standards.

3. Combustion Contaminants from Diesel Exhaust

On March 16, 2007, APCD received a letter from Scott Cohen, Senior Engineer for West Coast Environmental and Engineering, on behalf of CalCIMA. (See Appendix D). In this letter, Mr. Cohen states that fugitive dust control measures or rules can result in potentially significant negative impact on air quality when compared to the APCD air quality impact thresholds. The thresholds referenced by

Mr. Cohen are those in the October 2003 Ventura County Air Quality Assessment Guidelines, adopted by the Ventura County Air Pollution Control Board. According to Mr. Cohen, the following combustion contaminants, some of which are also air toxics, results from the use of diesel watering trucks, on-road trucks, and street sweepers to comply with proposed APCD Rule 55. The following points are verbatim excerpts from his letter.

- Water truck activity and emissions will increase. For instance, the default URBEMIS2002 off-highway truck working 8 hr/day will emit 22.86 lb/day of NO_x and 1.01 lb/day of PM-10. If water trucks operate an additional 10 hr/day county-wide due to proposed Rule 55, then the rule would have a significant impact as compared to the APCD 25 lb/day threshold.
- On-road truck trips will increase because some material will be displaced by water. If material moisture is increased by one percent (1%) due to proposed Rule 55 and aggregate demand in Ventura County is 6.2 MMtpy, each ton of which requires 40 miles of truck travel, then the moisture increase will result in approximately 100,000 VMT/yr and generate 10 lb/day of NO_x (HHD emissions of 17.5 g/VMT from EMFAC2007 assuming Ventura County fleet, 70 degrees, 50% relative humidity, average speed of 40 mph).
- Emissions from asphalt plants and other processes that dry aggregate will increase.
- Requiring daily sweeping results in engine emissions from the sweeper truck enroute and on-site; as well as increased emissions from traffic congestion caused by the sweeper activity. Sweeper trucks are assumed to be medium duty trucks with emission characteristics of one gram of NO_x per vehicle mile traveled (1 g/VMT, EMFAC2007). On this basis, increase in sweeper truck activity greater than 11,340 VMT/day would result in exceedance of the 25 lb/day NO_x threshold.

According to Mr. Cohen, these potentially significant negative impacts on air quality coupled with the fact that natural crustal particulate matter has been shown by EPA to be inherently less dangerous than smaller particulate (e.g. ultrafine and fine particulate) generated by urban sources should lead APCD to the conclusion that some fugitive dust control methods may be too costly from an ozone attainment (i.e. NO_x) or air toxics emissions perspective.

We agree with Mr. Cohen that the NO_x emissions resulting from implementation of proposed Rule 55 may exceed the significance thresholds adopted by our Board in the Ventura County Air Quality Assessment Guidelines in the near term. The important question regarding air quality is the overall and future impact, and will proposed Rule 55 prevent Ventura County from attaining the ozone standards. Since the proposed Rule will reduce 6 tons per day of PM, allowing 25 pounds per day of NO_x seems like a reasonable tradeoff in the near term, especially since this proposed rule is consistent with the Ventura County Air Quality Management Plan, which projects attainment of the new 8 hour federal ozone standard. And in fact, proposed Rule 55 is also consistent with Ventura County Air Quality Assessment Guidelines, which has an entire section mitigating fugitive dust emissions, with the use of reclaimed water being one of the recommended fugitive dust control methods.

Another important point is that proposed Rule 55 does not require the use of diesel watering trucks or street sweepers as the only methods to reduce fugitive dust emissions. Rather, the proposed rule sets standards that will reduce dust emissions, and provides a choice of control methods with watering trucks and street sweepers as one of the allowed methods. Alternative methods of control such as the

use of dust suppressants, paving of unpaved roads, and covering of piles of bulk materials may be used to comply with the rule requirements.

4. San Joaquin Valley Fever

As far as the toxic question of diesel particulate and fine particulate, Mr. Cohen is correct about the dangers inherent in these emissions, and the ARB and the local air pollution control district are committed to reducing diesel PM from all sources by 80 percent. However, the proposed Rule 55 will help to reduce a very dangerous problem found in soil, namely San Joaquin Valley Fever. Formally known as *Coccidioidomycosis*, valley fever is an infectious disease caused by the fungus *Coccidioides immitis*. San Joaquin Valley Fever is also known as Valley Fever, Desert Fever, or Cocci.

Human infection is caused by inhalation of *Coccidioides immitis* spores that have become airborne when dry, dusty soil or dirt is disturbed by wind, construction, farming, or other activities. The Valley Fever fungus tends to be found at the base of hillsides, in virgin, undisturbed soil. It usually grows in the top few inches of soil, but can grow down to 12 inches. The fungus does not survive well in highly populated areas because there is not usually enough undisturbed soil for the fungus to grow. Additionally, the fungus is not likely to be found in soil that has been or is being cultivated and fertilized. This is because manmade fertilizers, such as ammonium sulfate, enhance the growth of the natural microbial competitors of the Valley Fever fungus. Infection is most frequent during summers that follow a rainy winter or spring, especially after wind and dust storms. Valley Fever infection is common only in arid and semiarid areas of the Western Hemisphere. In the United States, it is mostly found from Southern California to southern Texas. In Ventura County, the Valley Fever fungus is most prevalent in the county's dry, inland regions.

In its primary form, symptoms appear as a mild upper respiratory infection, acute bronchitis, or pneumonia. The most common symptoms are fatigue, cough, chest pain, fever, rash, headache, and joint aches, although 60 percent of people infected are asymptomatic and do not seek medical attention. In the remaining 40 percent, symptoms range from mild to severe. A small percentage, less than one percent, die as a result of the disease. The incubation period for the primary infection is from one to four weeks. Occasionally, a progressive form of Valley Fever develops from the primary form and may appear after a few weeks, months, or even years. In this progressive form, Valley Fever may cause a chronic infection of many organs, including the skin, lymph glands, spleen, liver, bones, kidneys, and brain. Individuals most vulnerable to Valley Fever are agricultural workers, construction and road workers, and archeologists, because they are exposed to the soil where the fungus might be just below the surface. Many infections, however, occur in persons without occupational exposure. Of those without an occupational risk of contracting the disease, the most susceptible are those with suppressed immune systems due to such conditions as organ transplants, HIV infection, Hodgkin's disease, diabetes, and pregnancy (3rd trimester). Domestic animals, especially dogs, are also susceptible to Valley Fever.

There are about 100,000 new cases of Valley Fever per year in the southwestern United States. The average number of reported new cases of Valley Fever in Ventura County before 1994 was 40 per year. In 1994, the year of the Northridge earthquake, the number of reported new cases of Valley Fever was 243. This increase was attributed to the great quantities of airborne dust generated by the

Northridge earthquake. Since 1995, the number of reported cases has been comparable to the average before 1994. However, the actual number of cases may be much higher because Valley Fever is often misdiagnosed as the flu and not reported by physicians.

D. Comparing Proposed Rule 55 with other Dust Regulations

Health and Safety Code 40727.2 requires Districts to compare the requirements of a proposed rule with other air pollution control requirements in order to avoid regulatory redundancy. These other air pollution control requirements include federal New Source Performance Standards (NSPS), federal National Emissions Standards for Hazardous Air Pollutants (NESHAPS), Best Available Control Technology (BACT), and any other District rule applying to the same equipment.

1. Comparison with Federal and APCD Regulations

There are no national federal regulations regarding area source fugitive dust emissions, which includes construction sites, unpaved roads, and agricultural operations. The Environmental Protection Agency does regulate toxic fugitive dust at stationary sources through its National Emission Standards for Hazardous Pollutants. Examples include ferroalloy production, primary copper smelting, and secondary lead smelting.

However, EPA has adopted fugitive dust rules within a particular State Implementation Plan for those areas that are non-attainment with respect to the PM10 standard. Examples of non-attainment areas having fugitive dust rules include the South Coast AQMD, the San Joaquin Valley APCD, Maricopa County (Arizona), and Mammoth Lakes Planning Area. Because these areas are federal non-attainment areas, the EPA requires them to implement similar regulations including Best Available Control Measures (BACM) and compliance tests for fugitive dust.

2. Comparison with BACT and APCD Regulations

For the purpose of the best available control technology (BACT) comparative analysis required by the Health and Safety Code Section 40727.2(a), BACT shall be considered to be the control technology guidance identified in the best available control measure (BACM) Tables in South Coast AQMD Rule 403. These BACM tables contain mandated guidance and fugitive dust control measures for the following construction sources: backfilling, clearing and grubbing, clearing forms, crushing, cut and fill, demolition, disturbed soil, earth-moving activities, importing/exporting bulk materials, landscaping, road shoulder maintenance, screening, staging areas, stockpiles, traffic areas, trenching, truck loading, turf overseeding, unpaved roads, and vacant land.

Rather than mandating prescribed guidance such as those contained in the South Coast AQMD BACM tables, Ventura County APCD is proposing emission standards as an alternative method of controlling emissions. Since Ventura County meets the federal PM10 standards, the District is not required to duplicate these regulations and test methods. The regulations developed for Ventura County to meet the state standards may take a different approach that is equally effective. Also, Ventura County does not currently directly regulate area source fugitive dust emissions. In the past, sources of fugitive dust emissions have been regulated using Rule 51, Nuisance.

Chapter 5. Mitigation Measures

The California Environmental Quality Act (CEQA) requires that for each significant impact identified, the EIR must discuss feasible measures to avoid or substantially reduce the project's significant environmental effect. Since there is only one significant environmental impact, namely air quality, the focus of this analysis on mitigation measures will be on reducing the impact of increased NO_x and toxic Particulate Matter emissions resulting from diesel exhaust from delivery trucks, watering trucks and street sweepers used to reduce fugitive dust emissions. The mitigation measures to be discussed are mainly air quality programs already in place by the VCAPD (the lead agency) or by the Air Resources Board (a responsible agency), that will reduce both NO_x and PM emissions countywide from sources of diesel exhaust. Although these measures may not control diesel engines used for dust control at the present time, eventually almost all diesel engines operating in the state will have both their PM and/or NO_x emissions reduced so impacts are less than significant. In the mean time, these air quality programs will reduce other existing and new sources of diesel exhaust to reduce the impact on air quality in the county overall.

A. CARB Diesel Risk Reduction Plan

In September 2000, the California Air Resources Board (ARB), a CEQA Responsible Agency for this rulemaking project, adopted the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles. The Plan's goals are a 75 percent reduction in diesel PM by 2010 and an 85 percent reduction by 2020 from the 2000 baseline. In 2003, the ARB adopted a new regulation lowering the sulfur content of diesel fuel to enable the use of advanced control technologies for diesel engines. The California diesel regulations for sulfur and aromatics are estimated to result in 25 percent less PM and seven percent less NO_x emissions. Sulfur levels in diesel fuels were lowered to less than 15 parts per million (ppm) in July 2006. California's rule applies to on-road, off-road and stationary engines.

1. Standards for New On-Road Diesel Engines

In 2001, ARB adopted new PM and NO_x emission standards to clean up large diesel engines that power big-rig trucks, trash trucks, delivery vans, and other large vehicles. The new standards took effect in 2007 and reduces to 0.01 gram of PM per brake horsepower-hour (g/bhp-hr). This is a 90 percent reduction from the existing PM standard. New engines will meet this new standard by using diesel particulate filters that trap the PM before the exhaust leaves the vehicle. Similarly, the new NO_x emissions represent reductions of 90 percent over existing diesel engines. NO_x reduction strategies include engine modifications such as exhaust gas recirculation, engine timing retarding, and catalytic reduction controls.

2. Standards for New Off-Road Diesel Engines

ARB has worked closely with the United States Environmental Protection Agency (U.S. EPA) on developing new PM and NO_x standards for engines used in off-road equipment such as backhoes, graders, and farm equipment. In May 2004, EPA adopted new standards that would reduce the emissions from off-road engines to similar levels to the on-road engines by 2011 to 2013. On

December 9, 2004, the Board adopted a fourth phase of emission standards (Tier 4) that are nearly identical to those finalized by the U.S. EPA on May 11, 2004, in its Clean Air Nonroad Diesel Rule. As such, engine manufacturers are now required to meet aftertreatment-based exhaust standards for particulate matter (PM) and NO_x starting in 2011 that are over 90 percent lower than current levels, putting off-road engines on a virtual emissions par with on-road heavy-duty diesel engines

3. In-Use Diesel Engines Regulations

Since 2002, ARB has developed 12 new regulations to reduce PM emissions and other pollutants from diesel engines. These regulations have relied on the following four approaches to significantly reduce emissions from diesel engines:

- Replace/Repower – Replace the existing engine with a new diesel engine.
- Retrofit – Apply an ARB-verified diesel emission control system to the existing engine and fuel system (can include alternative fuels).
- Retire the Whole Vehicle – Replacing it with an alternative-fueled vehicle or vehicle with a new, cleaner diesel engine.
- Operational Modification – Examples include reduced operating time, reduced idling, or use of electric power.

The ARB has adopted several regulations that will reduce diesel emissions from in-use vehicles and engines throughout California. In some cases, the PM reduction strategies also reduce smog-forming emissions such as NO_x. These regulations include:

- **Waste Collection Trucks (adopted 2003)** – The waste collection vehicle rule offers a variety of strategies that owners must select and apply to each truck in a phased-in schedule from 2004 through 2010 to achieve PM reductions of up to 85 percent. The rule includes compliance flexibility. A key benefit of the rule is the reduction of PM in residential neighborhoods.
- **Fleet Rule for Transit Agencies (adopted 2000)** – This regulation cuts NO_x and PM emissions from about 10,000 buses operated by transit agencies. The fleet rule for transit agencies moves forward in steps over 10 years, requiring cleaner engines, cleaner fuel, and retrofitting of older buses. Amendments proposed for 2004 will require transit agencies to clean up the buses that had not been covered in the original rule.
- **School Bus Idling Restrictions (adopted 2002)** – To reduce the exposure of children to toxic PM emissions, ARB enacted a rule to stop the prolonged idling of diesel school buses and other diesel vehicles near schools. Buses and commercial diesel vehicles are required to turn off their engines after arriving at a school and are allowed to start the engine no more than 30 seconds before departing, unless required for safety or work.
- **Stationary Engines (adopted 2004)** – There are approximately 26,000 stationary diesel-fueled engines in California. Most are used as emergency backup in the event of a power failure. Others are used to pump water in agricultural areas, to run compressors, cranes, and other equipment. New ARB standards for these engines will approximately 80 percent PM reduction by 2020 through stricter standards for new engines and requirements to retrofit existing engines.
- **Transport Refrigeration Units (adopted 2004)** – Transport Refrigeration Units (TRUs) are diesel-powered refrigeration units that cool temperature sensitive products while they are being shipped in trucks, trailers, shipping containers, and rail cars. Although the diesel engines

powering TRUs tend to be relatively small, there are about 40,000 of them operating in California. Their PM emissions will be reduced by 65 percent by 2010 and by 92 percent by 2020.

- **Portable Engines (adopted 2004)** – California has about 33,000 portable diesel engines used in pumps, airport ground support equipment, oil drilling rigs, generators, and a variety of other equipment. Portable engines emit a total of 4.2 tons per day of diesel PM. The engines also emit about 75 tons per day of smog-forming emissions. ARB’s rule requires stepped reductions in emissions from portable engines, reaching a 95 percent reduction in PM emissions in 2020 with concurrent significant cuts in smog forming emissions.
- **Government Fleet Rule (adopted 2005)** – On December 8, 2005, ARB adopted a fleet rule to reduce diesel PM from existing fleets operated by public agencies and utilities. A utility is a privately owned company that provides the same or similar services for water, electricity or natural gas as those provided by a public utility. Best Available Control Technology (BACT) is required to be installed to reduce PM from diesel exhaust, via retrofit, repower, or purchase of a new vehicle. Alternative-fueled engines are another means of compliance.
- **Off-Road Engines (adopted 2007)** - On July 26, 2007, ARB adopted the nation’s toughest standards for off-highway diesel vehicles such as bulldozers, airport baggage trucks, and ski resort snowcats. This new regulation will reduce NOx and PM emissions from 180,000 off-road diesel vehicles, and eventually will force the oldest and most polluting pieces of equipment out of service and require construction firms and other companies to spend billions of dollars on new vehicles or engine retrofits. This new rule would impact almost all offroad diesel vehicles, many used at landfills, construction sites, and mining operations. For example, large construction firms or large government fleets having hundreds of diesel loaders, graders, scrapers and rollers would be affected. Strategies for compliance including retrofitting with PM traps, repowering with newer cleaner diesel engines, or replacement with Tier 4 engines, which are required to have PM traps. This regulation will directly impact diesel vehicles used for watering and street sweeping, the main environmental concern over the development of the proposed project, APCD Rule 55, Fugitive Dust. This new regulation will require that emissions from backhoes, forklifts and other types of diesel equipment will be cleaned up gradually beginning in 2010. The rules would be phased in through 2020 for fleets of large vehicles and 2025 for smaller equipment.

4. Incentive Programs Reduce Diesel Emissions

In addition to adopted regulations, the ARB has programs in place to provide incentives for owners of higher polluting diesel engines or vehicles to replace that equipment with cleaner, less-polluting equipment. Three of these programs being implemented in Ventura County are the Carl Moyer Program, the Lower-Emission School Bus Program, and the Clean Air Fund.

The Carl Moyer Program was established in 1999 to offer monetary incentives to reduce NOx emissions from heavy duty diesel engines. Some of the strategies used to reduce NOx, such as replacing old diesel engines with new alternative-fuel engines have also resulted in lower PM emissions. The Moyer Program pays vehicle owners to offset the extra cost of reducing NOx emissions below the levels called for by current standards, agreements, or regulations. In the first six years of the grant program, Carl Moyer grants have reduced about 18 tons per day of NOx statewide and 1 ton per day

of diesel PM from the cleanup of 7,000 diesel engine. In Ventura County, the Board recently approved initial funding for Phase Nine of the Carl Moyer program which will provide over \$1.8 million when fully funded. The recent approval of \$309,000 in Carl Moyer grants will repower 33 agricultural irrigation pumps with new lower emission heavy duty diesel engines with emission reductions of 27.7 tons per year of NOx, 4.1 tons per year of Reactive Organic Gases (ROG) and 1 ton per year of PM.

The Lower-Emission School Bus Program is another grant program that is focused on reducing emissions from diesel engines. This program focuses on replacing older, high-polluting school buses with new cleaner buses having engines burning compressed natural gas (CNG) with oxidation catalysts or cleaner burning diesel engines with particulate traps or oxidation catalysts. Since the program began in 2000, almost 40 old polluting school buses have been replaced and 110 school buses will have been retrofitted with pollution control devices in Ventura County.

The Clean Air Fund was started in 1992 with a \$1.5 million donation from the 3M Company to provide grants on projects that reduce ozone precursors, NOx and ROG, and PM emissions. The South Coast Area Transit (SCAT) was awarded \$300,000 to help purchase 15 new CNG transit buses as a replacement for their diesel buses. Currently, the Clean Air Fund has a permanent endowment of \$800,000 with its earnings (\$35,000 per year) being available for projects in the future. More recently, the Clean Air Fund has sponsored a grant program to incentivize the replacement of older two-stroke gasoline engines that are a major source of ROG emissions. Example of two-stroke gasoline engines being retired include marine and freshwater outboard engines, lawn mowers, and commercial leaf blowers. The newer gasoline engines are subject to new strict ARB standards and result in a reduction of precursor emissions of over 90 percent compared to the older engines.

5. Compliance Assurance Activities

The ARB enforces its diesel engine regulations which require that these engines not smoke excessively. Excessive smoke or diesel PM from diesel-fueled vehicles are cited by ARB enforcement teams. Owners are required to perform smoke tests annually on their diesel trucks. Violators face fines and must bring their vehicles into compliance. In addition, ARB inspects vehicles and engines to determine compliance with their in-use diesel regulations. Once a vehicle or engine is in compliance, it must remain that way throughout its life in California.

One of the options for ARB's in-use diesel PM reduction rules is reducing PM through the application of ARB-verified diesel emission control strategies to existing engines. Verified control devices such as filters and catalysts or verified fuels can be cost-effective means to reduce diesel PM from engines. ARB verifies diesel emission control strategies to assure they significantly reduce diesel PM, are durable, and have a mandatory warranty. Owners are required to use only ARB-verified products to ensure the mandated PM reductions are real and durable. ARB works with companies to verify products for those applications where they work best.

B. VCAPCD Reduces Ozone Precursors and PM

The Ventura County Air Pollution Control District (APCD), the CEQA Lead Agency for this rulemaking project, has as its mission to attain the state and federal ambient air quality standards to

protect public health. There is only one significant environmental impact, albeit temporary, from the proposed adoption of APCD Rule 55, Fugitive Dust, (project), which is the impact on air quality from diesel exhaust from vehicles used to comply with the proposed rule requirements to reduce PM dust emissions. Many of the activities of APCD are designed to reduce both ozone precursors, NOx and Reactive Organic Gases (ROG), and PM emissions, which directly mitigates the air pollution resulting from diesel exhaust. The air pollution mitigations activities of APCD include: planning of air pollution control strategies, rule and regulation development to implement those strategies, enforcement of rules and regulations to insure compliance, permitting of stationary sources of air pollution, and monitoring of the local air quality to determine progress in meeting the ozone and PM air quality standards. Another major component, which was discussed in the previous section, is the use of financial incentives to directly reduce emissions from diesel exhaust. Ventura County participates fully in both the Carl Moyer and Lower-Emission School Bus grant programs. The Clean Air Fund is strictly a Ventura County emission mitigation grant program.

1. Ventura County Air Quality Management Plan (AQMP)

The Ventura County AQMP, which was scheduled for revision in 2007, contains the strategy by which the county will attain the federal ambient 8 hour ozone standard. This plan will be submitted to the EPA as part of the California State Implementation Plan. The plan will demonstrate that the county should meet this standard by June 15, 2013, using a comprehensive strategy involving both stationary and mobile source emission reductions using adoption of mandatory regulations and the incentives to reduce emissions from sources not currently subject to regulatory standards. As such, since the adoption of the proposed Rule 55, Fugitive Dust (project) is consistent with the AQMP, and since the AQMP demonstrates attainment, therefore the air quality impacts of precursor emissions, mainly NOx, from diesel exhaust, will be fully mitigated by other actions of the District, ARB and EPA. Where the ARB's diesel risk reduction strategy focuses on reducing diesel PM, the AQMP focuses on the concurrent reduction of both ozone precursor emissions, NOx and ROG.

The District has the primary responsibility for regulating stationary sources, including some area (nonpoint) sources within Ventura County. State and federal laws prohibit local air districts from regulating mobile sources. The ARB regulates on-road motor vehicles, some off-road mobile sources, and consumer products, and sets motor vehicle fuel specifications in California. The EPA regulates emissions from locomotives, aircraft, heavy-duty trucks used in interstate commerce, and some off-road engines exempt from state authority or best regulated at the national level.

The 2007 AQMP control strategy consists of a local component implemented by the District, and a combined state and federal component implemented by the ARB and EPA. The District's components consists of cost-effective stationary source and area source control measures which are adopted into rules, transportation control measures (TCMs), and the District's mobile source incentive program, most notably Carl Moyer and the Lower-Emission School Bus Program. The state and federal components include existing and proposed measures for on-road mobile sources, off-road mobile, and other sources (including locomotives) and aircraft, motor vehicle fuel specifications, pesticides, and consumer products. The state and federal components are vital to Ventura County's strategy to meeting the state and federal ozone standards.

Historically, California air agencies, including VCAPCD, have aggressively pursued measures to meet state and federal clean air standards and have developed many of the most innovative and effective clean air strategies in the world. VCAPD along with other California air districts, long ago implemented clean air measures that other parts of the country are just now considering.

By 2002, APCD has fully implemented most of the local control measures from earlier Ventura County AQMPs, and most stationary sources are now subject to clean air regulations. The percentage of total countywide ROG and NOx emissions under District jurisdiction has been shrinking for many years, and is now only 45 percent and 12 percent of the total inventory (excluding Outer Continental Shelf emissions), respectively.

2. Ventura County APCD Stationary Source Control Measures/Rules

Stationary source control measures are rules and regulations that APCD has implemented or will implement in the future to help attain the federal 8-hour ozone standard. Stationary sources are sources of air pollution that do not move, such as power plants, turbines, refineries, oil field facilities, manufacturing facilities, industrial engines, water heaters, furnaces, and gasoline stations. Stationary source control measures are critical elements of Ventura County's overall strategy to attain federal and state ozone standards.

Stationary sources include both large emitters, such as power plants and industrial engines, and small, widely distributed sources, such as residential water heaters, paint and solvent use, and dry cleaners. Small, widely distributed stationary sources are often termed "area sources." Stationary source control measures are techniques and equipment that reduce ozone precursor emissions, ROG and NOx, from stationary sources in the county. Examples of stationary source control measures include petroleum and gasoline vapor recovery systems, landfill gas recovery systems, low-NOx burners on water heaters and furnaces, and emission control systems on industrial engines.

Stationary source control measures provided the framework for District rules that reduce harmful air emissions. District rules implement AQMP control measures and apply to many activities including power generation, gasoline storage and dispensing, petroleum storage and processing, paint and solvent use, dry cleaning, printing, asphalt paving, and fuel combustion in industrial engine, turbines, and boilers. Rule 74.2, Architectural Coatings, was amended in 2003 and will reduce ROG emissions from the use of paint used on architectural structures including bridges, buildings, floors, aboveground tanks, and other residential, commercial, public, or industrial locations. Amendments of this rule are also being proposed for additional emission reductions based on the draft proposal of ARB's Suggested Control Measure (SCM), which is scheduled to be adopted by the end of 2007. Another significant rule action being proposed is to amend APCD Rule 74.18, Auto Refinishing. This action will be based on the SCM or state model rule adopted last year by ARB. The major change in this regulation will be the requirement to use Low ROG coatings, such as the waterborne color coat on auto collision repairs. There are over 100 auto painting facilities in the county, and this proposal will result in significant reduction of ROG emissions.

3. Enforcement of APCD Rules and Regulations

Compliance Division staff inspects all permitted air pollution-emitting facilities to assure their compliance with APCD rules and regulations and applicable provisions of the California Health and Safety Code and Environmental Protection Agency regulations. Permitted sources include gas stations, dry cleaners, auto body shops, oil field operations, semiconductor and electronics manufacturing facilities, municipal government operations, power plants, and chemical processing plants. Inspectors ensure that pollution-emitting facilities are properly permitted, operated, and source tested according to applicable rules and permit conditions. Unpermitted facilities are also inspected to determine if they are subject to the District's permit requirements and rules and regulations. Inspectors may issue Notices of Violation, Notices to Comply, or Notices to Supply Information.

Compliance staff investigate air pollution-related complaints from citizens to determine the source of odors, dust, fumes, and other pollutants that may cause harm or discomfort to the public. Complaint investigations often require interaction with other agencies such as the County's Environmental Health Department, fire agencies, building and safety and code enforcement agencies.

Asbestos renovation and demolition projects are reviewed and inspected by District inspectors to assure that the projects are conducted according to District and federal rules and regulations. This District program ensures that asbestos abatement renovation and demolition projects will not release asbestos containing materials that may harm the public health.

State law requires that APCD give approval before occupancy permits are issued. This helps prevent the installation of unpermitted sources of air pollution, and unsupervised renovation and demolition of facilities containing asbestos. Staff interviews applicants for certificates of occupancy and building permits, and issues authorization to the planning or building and safety department only after the applicant complies with, or has been determined to be exempt from APCD requirements.

Motor vehicles are a significant cause of Ventura County's air quality problem. Many times a vehicle can be causing excessive pollution without the owner being aware of it. To alert motor vehicle owners that their vehicle may be emitting excessive pollution, the District's Compliance Division operates a Smoking Vehicle Hotline that allows people to anonymously report smoking vehicles. Owners of vehicles that are reported to be smoking are sent a letter asking them to have their vehicle checked by a mechanic and, if necessary, repaired.

4. Permitting of Stationary Sources of Air Pollution

The Ventura County APCD requires permits for new air pollution-emitting facilities and modifications to existing air pollution-emitting facilities. The District has a two-step permit program.

Facility operators are required to obtain an Authority to Construct before construction or modification begins. This allows District staff time to review the project plans and determine if the project will comply with all applicable District rules. The District integrates state and federal requirements for new source review into its Authority to Construct process. An important aspect of this process is the determination of BACT for every new or modified source. This insures that emissions of NO_x, ROG, PM and air

toxics are reduced using the best controls currently available. In some cases, new sources will demonstrate state-of-the-art air pollution control systems that may be applicable to existing stationary sources. In addition, emission offsets must be supplied for emission increases. Two common sources of emission offsets are the Essential Public Services Bank (for non-major essential public services only) and the use of Emission Reduction Credits (ERCs).

After construction is completed, but before operation begins, operators are required to obtain a Permit to Operate. A temporary Permit to Operate may be issued so that emissions testing or a District inspection may be conducted while the new or modified facility is operating. Upon determining that the facility is complying with all applicable APCD rules, District staff issues a Permit to Operate with enforceable permit conditions to ensure continuing rule compliance. This permit program is one way the District and businesses work together to clean the air and protect public health in Ventura County.

District rules and regulations apply to both large and small businesses. Typical large businesses requiring permits include bulk petroleum operations; oil production facilities; power plants; and sand, gravel and cement operations. Smaller businesses include dry cleaners, gasoline service stations, and facilities that use solvents or paints in their operations. Gas or oil fired equipment (greater than or equal to 1 million BTUs/hr) and internal combustion engines (greater than or equal to 50 HP) also require a permit.

Permits are required:

- For new equipment, or processes that may release air pollutants
- Before modifying existing equipment
- When a facility changes ownership
- When equipment is relocated to a new address
- When a change in the method of operation occurs at a facility
- When a facility wishes to modify a permit condition, including changing its permitted emissions.

5. Monitoring Air Quality in Ventura County

Ozone, carbon monoxide, nitrogen dioxide (NO_x), particulate matter (PM), sulfur dioxide, and lead; these chemicals, called criteria pollutants, are harmful to our health, materials, and agriculture.

That's why the APCD's Monitoring Division technicians, chemists, and meteorologists continuously maintain and operate the sophisticated gaseous pollutant analyzers, particle collectors, and weather sensors at monitoring stations located in Ventura County including Ventura, Piru, Simi Valley, Thousand Oaks, El Rio, and Ojai to determine the type and level of pollutants in the outside air. These monitoring stations also measure relative humidity, ultraviolet and solar radiation, barometric pressure, visibility, surface temperature, winds, and precipitation. Real-time ozone and fine particulate levels are monitored and recorded for each station.

Because weather conditions are crucial to the formation and movement of air pollution, each monitoring station also measures atmospheric conditions. A seventh monitoring station, called an "atmospheric profiler," measures, in three dimensions, temperatures, wind direction, and wind speed up to 6,000 feet above the surface.

Our quality assurance program ensures valid and representative air pollution and weather data from each monitoring station. Historical summaries of Ventura County's pollutant data and air quality trends may be obtained, and additional air quality data analysis is available from the District upon request. Air quality data for the entire state can be found at the California Air Resources Board's Air Quality Data website.

Daily air quality, weather, and agricultural burning reports and forecasts may be obtained on the District's website. Local newspapers also publish daily air quality forecasts using the "Air Quality Index" (AQI). More information about the AQI is available on our website under Air Quality/Air Quality Index. Air quality conditions are listed as "Good", "Moderate", "Unhealthy for Sensitive Groups", "Unhealthy" (for all), and "Very Unhealthy." In recent years, Ventura County's worst air quality days have been in the "Unhealthy" range. Local air quality has continued to improve, and the number of days in the unhealthy ranges has been declining.

When air quality exceeds or is forecast to exceed the air quality standards, the elderly, the very young, or those with certain health problems should curtail their physical activity, especially during the afternoon hours.

"Smog" is measured as ground-level ozone concentration. To measure ozone concentrations in the air we breathe, outside air is sucked through long, candy-cane shaped glass tubes, where it moves to the ozone analyzer instrument inside each monitoring station. Inside the instrument, the air sample passes through a tube, where an ultraviolet (UV) light is shined on the air sample. The amount of UV light that passes through the air sample in the tube generates a voltage signal that is proportional to the ozone concentration in the specific air sample.

Carbon monoxide, sulfur dioxide, and oxides of nitrogen are also analyzed using complex methods and continuous analyzers.

Adverse health effects also occur due to particulate matter (PM), which is monitored differently than the gaseous pollutants - it is collected on filters and weighed. Air flows through the PM sampler like a vacuum. Very small particles pass through the intricate tubing and onto uncontaminated, pre-weighed filters. Afterwards, filters are weighed again in the District's lab. The amount of actual PM pollution is determined by the weight of the PM collected on the filter and the volume of air that flowed through the sampler during PM collection.

The District monitors PM at regularly scheduled 24-hour periods. PM is sampled on separate instruments for 2.5 micron and 10 micron sizes. (Ten microns equals about one-seventh the diameter of a human hair). Individual PM particles are too small to be seen, but collectively they are visible - sometimes in the "haze," in tailpipe smoke, or in windblown dust.

Because certain chemicals contained in PM samples can have adverse health effects of their own, or can contribute to the formation of ozone through atmospheric interaction, some PM samples from certain District monitoring stations are also analyzed at outside laboratories for chemical content.

Just because you can't see air pollution doesn't mean it isn't there. That's why the District keeps a close watch on air quality levels day in and day out - to protect public health and welfare from the adverse effects of air pollution. Rain or shine, the District's Monitoring Division monitors the air we breathe throughout Ventura County's great outdoors.

Chapter 6. Alternatives to the Proposed Project

The EIR must describe a reasonable range of feasible alternatives to the project that could feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the significant environmental objectives of the proposed project. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decisionmaking and public participation. According to the CEQA Guidelines (Section 15126.6), the EIR should focus on alternatives to the project which are capable of avoiding or substantially lessening any significant effects of the project.

As the lead agency and project proponent, Ventura County APCD is responsible for selecting a range of project alternatives and must disclose the reasons for selecting those alternatives. The range of alternatives evaluated include those projects that are technically feasible to accomplish but may have high costs or may not be easily implemented. The alternatives to be evaluated include an alternative rule proposal that includes diesel exhaust emission controls and the no rule proposal.

Two potential alternatives to APCD Rule 55, Fugitive Dust, that are not evaluated in this section are South Coast Air Quality Management District Rule 403 and San Joaquin Valley APCD Regulation VIII. Both of these rules are designed to limit the PM dust emissions from fugitive dust sources, and are similar in purpose to proposed APCD Rule 55. Since these rules do not have any provisions that would substantially lessen the diesel exhaust impacts from diesel watering trucks or street sweepers, it was determined that they would not be adequate alternatives.

A. Alternative A: Proposed Rule 55 & Diesel Emission Controls

This alternative consists of the proposed project, APCD Rule 55, plus additional requirements to reduce the air pollution emissions from the diesel engines used to comply with the dust reduction requirements. This would accomplish the main objective of Rule 55, to reduce PM emissions from fugitive dust, while lessening the impact to the environment from those diesel PM and NOx emissions. The technology exists today to reduce both PM and NOx emissions from diesel exhaust, especially with the availability of ultra low sulfur diesel fuel (less than 15 ppm). This very low sulfur content in the fuel allows the use of after treatment control devices such as catalytic controls and particulate traps. NOx emission control technology for diesel engines has also been demonstrated for newer diesel engines including such control techniques as EGR (exhaust gas recirculation), reduction catalysts, and SCR (selective catalytic reduction).

Although technically achievable, this alternative would be extreme costly and exceed economic criteria (greater than \$9 per pound of pollutant reduced) used by the APCD to determine the reasonableness of a proposed rule. Since almost all diesel truck and street sweepers currently in operation do not have the aforementioned control technology, the only compliance options would be retrofitting the engine, repowering with a new engine, or replacing the vehicle with a new model.

1. ARB Verified Retrofit Technologies for Level 3 Control (85% or greater PM Reduction)

The first compliance option would be retrofitting the diesel engine with an exhaust control device. The Air Resources Board has a stringent set of criteria to determine the effectiveness and durability of diesel engine retrofit technologies. The most effective controls are given the Level 3 designation, which equates to 85 percent or greater PM reduction. This project alternative would require that diesel water trucks and street sweepers used for fugitive dust compliance would have to be retrofitted with a Level 3 control device to reduce the diesel PM by at least 85 percent. Several vendors have already had their control equipment verified by ARB as Level 3 devices. These include the following ARB-verified Level 3 devices:

- Claire's Horizon Electric Particulate Filter
- Claire's Longview Diesel Particulate Filter
- Donaldson's Diesel Particulate Filter
- Engine Control Systems Combifilter and Purifilter
- Huss Umwelttechnik FS-MK Selective Catalytic Reduction Catalyst
- Johnson Matthey's CRT Particulate Filter

The Claire Horizon Electric Particulate Filter is an actively regenerated diesel particulate filter or trap. This level 3 device reduces diesel PM by at least 85 percent, and also reduces tailpipe NO₂ emissions. This unit replaces the muffler on a vehicle and has stainless steel construction for durability. Its silicon carbide filters guards against melting and thermal breakdown. The Claire Horizon™ is specifically designed to provide diesel particulate (PM) reductions for in-use diesel engines in challenging applications and duty cycles including off-road, cold exhaust and older engines. This active regeneration system uses clean electricity, through an integrated heating element, to "cook off" the captured diesel particulate, much like a self cleaning oven, while the vehicle is parked overnight. Horizon™ is managed by Claire's proprietary MLC® which monitors system parameters and controls the automatic electric regeneration process. The MLC also stores the monitored parameters in the memory for later retrieval and analysis. Horizon's modular design facilitates service and de-ash cleaning of the diesel particulate filter. The reusable metal seal and band clamp design provide quick turn around for maximum up time.

The Donaldson diesel particulate filter is another muffler replacement using a passive regenerated catalytic trap. This is also a Level 3 device that is capable of at least 90 percent exhaust PM control according to Donaldson. Since this is a passive device, sufficient exhaust temperature must be available to adequately regenerate the catalyst. The cost of this equipment including installation is approximately \$10,000 per engine. Donaldson recommends a diesel particulate filter (DPF) Muffler if the exhaust temperature is above 240 degrees C at least 40 percent of the time. If the exhaust temperature does not meet this level, but does meet 200 degrees C at least 40 percent of the time, then the LTF muffler is recommended. This muffler contains more catalytic activity and is more suitable for the lower exhaust temperatures.

Another vendor of diesel exhaust emission controls is Engine Control Systems (ECS). Diesel engine exhaust emissions in construction projects can present problems in part due to their high concentration in a small area. Exposure to diesel exhaust may affect worker health and safety and performance. Required emissions reductions are fast becoming an essential component in state or municipal funded contracts. The harmful components of diesel exhaust can be significantly reduced with proven and

readily available technologies. ECS offers a variety of retrofit solutions designed with the construction site in mind, including diesel oxidation catalysts (DOC) and diesel particulate filters. DOC are flow-through oxidation catalysts that are considered Level One devices that reduce PM exhaust emissions by at least 25 percent. The Purifilter is the passively-regenerated ECS diesel particulate filter or trap. Exhaust comes out clean and the filter continually "regenerates" itself. The Purifilter replaces the current muffler it provides superior noise attenuation comparable to high grade mufflers. Their actively regenerated particulate trap called the Combifilter is comprised of an integrated diesel particulate filter and silencer in one design and an active electrically powered regeneration station. The filter assembly typically removes greater than 90 percent of the DPM from engine exhaust. The filtered particles are stored in the filter until it is regenerated. Regeneration is typically required on a daily basis either once a work shift or overnight. Because the Combifilter is electrically regenerated there is no concern for adequate vehicle duty cycles or temperature traces.

2. Controlling NOx Emissions from Diesel Engines

The second compliance option in this alternative would be the installation of retrofit NOx controls. The status of NOx retrofit controls is far behind the PM control devices, which are usually just simple muffler replacements. Thus NOx control equipment is more usually available only as an option on new equipment. The three NOx reduction control technologies that are feasible for mobile diesel sources include: Selective Catalytic Reduction (SCR) using urea injection, Selective Catalytic Reduction using diesel fuel injection, and exhaust gas recirculation.

Another vendor of diesel exhaust emission control technology is the German company, Huss. Besides developing diesel oxidation catalyst (DOC) and diesel particulate filters, Huss is marketing a mobile Selective Catalytic Reduction to reduce NOx emission from diesel-fueled vehicles. The SCR-System works in the following way: An aqueous urea dilution is sprayed to the exhaust gases and provides a NOx reduction of up to 80 percent. This solution acts as a reducing agent and is transformed with the help of a catalytic converter into ammonia (NH₃). The ammonia reacts with the NOx gases into harmless water and nitrogen. This special system has to be created, because a normal three-way catalytic converter found on gasoline engines will not work on diesel engines due to the excess oxygen in the exhaust gases. The urea dilution is located in a separate tank, which is heated electrically or through the waste heat of the engine. A pump/dosing unit conditions the dilution and sprays it into the exhaust gases during the operation mode. The catalytic converter then enables the chemical reduction which reduces the NOx gases by 80%. Although the urea solution is readily available in Germany because of greater demand, the United States has not yet required these products in sufficient quantity to encourage its availability.

Another vendor that has both PM and NOx emission control technology for diesel-fueled vehicles is Johnson Matthey. The CRT Particulate Filter is a passively regenerated Level 3 PM control device at least 90 percent control efficiency. This Johnson Matthey device uses a two stage concept with an oxidation catalyst followed by the catalytic particulate filter. The first stage oxidizes the nitrogen oxide to nitrogen dioxide which is used to catalyze the soot collected in the second stage filter. Johnson Matthey sells two NOx control devices: the EGRT and the SCRT. The EGRT or Exhaust Gas Recirculation device diverts exhaust gases back into the engine combustion, which lowers the flame temperatures responsible for NOx emissions. This device is combined with the CRT to control PM at

90 percent and NOx at 40 percent. The SCRT or Selective Catalytic Reduction Technology is similar to the equipment manufactured by Hess. It also uses urea injection in reduction catalyst to convert the NOx into nitrogen and water. This system will reduce NOx emission from 50 to 80 percent.

The Claire Longview is a diesel particulate filter that uses passive exhaust temperature to regenerate the catalyst by burning off the collected soot. This is a Level 3 device with greater than 85 percent diesel PM control and greater than 25 percent NOx emissions control. This control device uses diesel fuel rather than ammonia or urea as a NOx Reduction Reagent in the catalyst. Its stainless steel exterior construction with the silicon carbide filter provides equipment durability and guards against melting and thermal breakdown. The Claire Longview[®] is specifically designed to provide cost-effective NOx and diesel particulate (PM) reductions for in-use diesel engines. Configured in a modular, use-friendly design, Longview integrates a NOx reduction catalyst and catalyzed wall-flow silicon carbide diesel particulate filter. This provides simultaneous reduction of NOx, PM, hydrocarbon (HC) and carbon monoxide (CO) from one system. Longview is managed by Claire's proprietary MLC[®] which monitors system parameters and controls NOx reductant (diesel fuel) injection. The MLC also logs the monitored parameters for later retrieval and analysis.

3. Alternative-Fueled Water Trucks and Street Sweepers

Another method of controlling NOx and PM from diesel-fueled vehicles is to replace the engines with ones that operate on cleaner burning fuel, such as liquefied natural gas (LNG) or propane. Kenworth Truck Company is manufacturing a truck model (Kenworth T800), which is equipped with Westport Innovations' LNG fuel system installed on a Cummins 15-liter engine.

Waste Management has the nation's largest fleet of natural gas garbage and recycling trucks with 430 LNG-fueled vehicles. Natural gas is the cleanest burning alternative transportation fuel for heavy duty vehicles. Each year, Waste Management's natural gas trucks eliminate the need for nearly three million gallons of diesel fuel and reduce greenhouse gas emissions by more than 4,700 tons. This same technology can be applied to the water trucks used to reduce visible dust emissions at construction sites and landfills.

TYMCO is currently selling several low emission alternative-fueled Regenerative Air sweepers including Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG). TYMCO has been manufacturing alternative-fueled sweepers since 1984. The cost of the LPG or propane option for a new sweeper is approximately \$43,000, with the total price of about \$195,000. The local distributor for TYMCO sweepers in Ventura County is GCS Western Power & Equipment. Thus, the alternative-fuel option for a new sweeper is a significant cost, and retrofit for existing sweepers is currently unavailable.

4. Alternative A Evaluation

Alternative A is not a viable rule because of the high costs associated with its compliance and because APCD lacks the authority to regulate mobile sources or private vehicle fleets. ARB has the authority to regulate mobile sources and has a diesel reduction plan in place to reduce diesel PM significantly by

over 85 percent by 2020. The longer time frame of these proposed regulations reduces the financial impacts and makes them cost-effective proposals.

Although the technology has been developed to mitigate both PM and NOx emissions from the diesel exhaust, the implementation of these controls on existing equipment is limited to PM catalytic controls that are still not cost-effective in a near term time frame. The costs associated with the capital cost of the retrofit equipment plus the additional maintenance expenses exceeds the current thresholds for Best Available Control Technology (BACT) of \$5 per pound of PM reduced. NOx controls typically involve the use of new expensive replacement equipment that is alternative-fueled or has an SCR type catalyst. The new equipment replacement costs to achieve NOx emission reductions would easily exceed the BACT threshold of \$9 per pound of NOx reduced.

B. Alternative B: No Project Alternative

The No Project Alternative would mean that proposed APCD Rule 55 would not be adopted by the Ventura County Air Pollution Control Board. Thus, significant sources of fugitive dust would not be regulated as comprehensively, and approximately 6 tons per day of PM emission reductions would not be achieved. Furthermore, APCD would be in violation of Health and Safety Code 39614, which requires air districts that are nonattainment with federal or state ambient PM standards to adopt new regulations to reduce PM air emissions.

1. Comparing Current Air Quality Impacts: Proposed VCACD Rule 55 or No Rule

Although some fugitive dust control measures have been implemented by city or county conditional use permits particularly at construction sites and APCD has conditioned some stationary sources such as sand and gravel operations with fugitive dust controls, much more can be done to reduce PM emissions from such fugitive dust sources such as unpaved roads and track-out emissions. The “No Rule” alternative does not mean all current dust controls will stop, just that existing controls are not as comprehensive as proposed APCD Rule 55. In comparison to the more stringent requirements of APCD Rule 55, much more fugitive dust PM emissions, estimated at 6 tons of PM per day, will result, and the District’s ability to meet the state ambient PM standards will be hindered.

The air quality impacts from controlling dust emissions, namely diesel exhaust, may be less for the time being under the “No Rule” alternative than proposed Rule 55. These air pollutants are the NOx emissions that are precursors to ambient ozone, commonly known as smog, and diesel PM, which is unburned soot and is a toxic air contaminant and potential carcinogen according the California Air Resources Board. However, APCD has adopted an Air Quality Management Plan (AQMP) to attain the ambient ozone standards, and Rule 55 is not inconsistent with the AQMP. Fugitive dust can be a health hazard as well, causing harm in terms of increased incidences of pulmonary diseases. It is also can be a source of the toxic fungus, Valley Fever. Beside heath impacts, dust emissions contaminate agricultural plants causing particular problems with citrus and avocado trees. Also fugitive dust impacts everything outside and indoors, which usually requires some sort of water cleanup. Although it is difficult to estimate the excess diesel emissions from Rule 55, it has been determined that it exceeds Ventura County air quality guidelines threshold of 25 pounds per day. Although Rule 55 does not

explicitly require the use of diesel water truck or street sweepers, these are common methods of control that may be a cost-effective means of control for the sources affected by the rule.

2. Comparing Future Air Quality Impacts: Proposed VCACD Rule 55 or No Rule

Because the State of California is the responsible agency for diesel exhaust control, and the Air Resources Board has a major program to reduce diesel PM from both existing and new diesel engines, the air quality impacts from Rule 55 will become lessened over time. Once fully implemented, the ARB's Diesel Risk Reduction Program will reduce diesel PM by at least 75 percent by 2010 and 85 percent by 2020. As part of this program, the NOx emissions from diesel exhaust will be controlled when diesel engines are replaced or new vehicles are introduced into mobile fleets. The ARB regulation in this program usually stipulates that fleet operators must retrofit, re-power or replace vehicles that do not comply with the proposed standards.

Ventura County staff has evaluated the long term implications of proposed Rule 55 in terms of the diesel exhaust tradeoff and has found that air quality will improve faster with proposed Rule 55 than with the "No Project" alternative.

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B. Organizations and Persons Consulted

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Trackout Control, LLC: L. Lange

Ventura County Agricultural Association: Rob Roy

Ventura County APCD: Keith Duval, Don Price, Alicia Stratton, Terri Thomas, Chuck Thomas, Mike Villegas, and Kerby Zozula

Ventura County Dept of Airports: Erin Powers

Ventura County Planning Division: Chuck Anthony

West Coast Environmental: Scott Cohen

C. Organizations and Persons Commenting on Draft EIR

Malzacher Ranch: Fred and Elaine Malzacher and Dr. Edo McGowan (Appendix E)

California Construction and Industrial Materials Association (CalCIMA): Scott Cohen, West Coast Environmental (Appendix G)

APPENDIX A - PROPOSED VCAPCD RULE 55, FUGITIVE DUST

VENTURA COUNTY AIR POLLUTION CONTROL DISTRICT

RULE 55 – FUGITIVE DUST

(Adopted / /)

A. Applicability

The provisions of this rule shall apply to any operation, disturbed surface area, or man-made condition capable of generating fugitive dust, including bulk material handling, earth-moving, construction, demolition, storage piles, unpaved roads, track-out, or off-field agricultural operations.

B. General Requirements – All Fugitive Dust Sources

1. **Visible Dust Beyond the Property Line:** No person shall cause or allow the emissions of fugitive dust from any applicable source such that the dust remains visible beyond the midpoint (width) of a public street or road adjacent to the property line of the emission source or beyond 50 feet from the property line if there is not an adjacent public street or road.
2. **Opacity:** No person shall cause or allow the emissions of fugitive dust from any applicable source such that the dust causes 20 percent opacity or greater during each observation and the total duration of such observations (not necessarily consecutive) is a cumulative 3 minutes or more in any one (1) hour. Only opacity readings from a single source shall be included in the cumulative total used to determine compliance.
3. **Track-Out**
 - a. No person shall allow track-out to extend 25 feet or more in length unless at least one of the following three control measures is utilized
 - i. **Track-Out Area Improvement:** Pave or apply chemical stabilization at sufficient concentration and frequency to maintain a stabilized surface starting from the point of intersection with public paved surface, and extend for a centerline distance of at least 100 feet with an acceptable width to accommodate traffic ingress and egress from the site.
 - ii. **Track-Out Prevention:** Check and clean the undercarriage and wheels on all vehicles before leaving unpaved surface or install a properly functioning and well-maintained track-out control device(s) that prevents track-out of soil onto paved public roads.
 - iii. **Track-Out Removal:** Remove track-out from pavement as soon as possible but no later than one hour after it has been deposited on the paved road. If a street sweeper is used to remove any track-out, only

PM10-efficient street sweepers certified to meet South Coast AQMD Rule 1186 requirements shall be used. The make and model information and certification documentation of any sweeper used shall be made available upon request.

- b. Notwithstanding the preceding, all track-out shall be removed at the conclusion of each workday or evening shift subject to the same condition regarding PM-10 efficient street sweepers as outlined in Subsection B.3.a.iii. The use of blowers for removal of track-out is expressly prohibited under any circumstances.

C. Specific Activity Requirements

1. **Earth-Moving:** No person shall engage in earth-moving activities in a manner that creates visible dust emissions over 100 feet in length.
2. **Bulk Material Handling Facilities Track-Out Prevention:** No person shall conduct an active operation with a monthly import or export of 2150 cubic yards or more of bulk material without utilizing at least one of the following measures at each vehicle egress from the site to a public paved road:
 - a. Install a pad consisting of washed gravel (minimum size: one inch) maintained in a clean condition to a depth of at least six inches and extending at least 30 feet wide and at least 50 feet long.
 - b. Pave the surface at least 100 feet long and at least 20 feet wide.
 - c. Utilize a wheel shaker/wheel spreading device, also known as a rumble grate, consisting of raised dividers (rails, pipe, or grates) at least 24 feet long and sufficient width to allow all wheels of vehicle traffic to travel over grate to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.
 - d. Install and utilize a wheel washing system to remove bulk material from tires and vehicle undercarriages before vehicles exit the site.
 - e. Any other control measure or device that prevents track-out onto public paved roads.
3. **Truck Hauling:** No person (including facility or site operator) shall load or allow the loading of bulk materials or soil onto outbound trucks unless at least one of the following dust prevention techniques is utilized:

- a. Use properly secured tarps or cargo covering that covers the entire surface area of the load or use a container-type enclosure.
- b. Maintain a minimum of 6 inches of freeboard below the rim of the truck bed where the load touches the sides of the cargo area and insure that the peak of the load does not extend above any part of the upper edge of the cargo area.
- c. Water or otherwise treat the bulk material to minimize loss of material to wind or spillage.
- d. Other effective dust prevention control measures.

D. Exemptions

1. This rule shall not apply to:

- a. On-field agricultural operations.
- b. Off-field agricultural operations necessary to minimize adverse effects on agricultural or horticultural commodities caused during officially declared disasters or states of emergency.
- c. Active operations conducted during emergency life-threatening situations, or in conjunction with any officially declared disaster or state of emergency.
- d. Active operations conducted by essential service utilities to provide electricity, natural gas, telecommunication, water or sewer during periods of service outages or emergency disruptions.
- e. Weed abatement operations provided that:
 - i. Mowing, cutting or other similar process is used which maintains weed stubble at least three inches above the soil, or
 - ii. Any disking or similar operation where effective dust emission prevention control measures are used.
- f. Abrasive blasting operations meeting the requirements of Rule 74.1.
- g. Unpaved service roads having traffic volume of 20 vehicle trips or fewer per day used by one or more public agencies for inspection of infrastructure and not used for construction or maintenance-related activity.

- h. Motion picture, television, or video production activities when dust emissions are required for visual effects. [In order to obtain this exemption, the APCO must receive notification in writing at least 72 hours in advance of any such activity and no nuisance results from such activity.](#)
 - i. Temporary earth coverings of public paved roadways where such coverings are approved by a local government agency for protection of the roadway, and where such roadway is closed to through traffic and visible roadway dust is removed within one day following cessation of activities.
 - j. Any paved road unless it has track-out or any publicly-owned unpaved road.
 - k. Demolition operations using blasting explosives, which have been permitted by the California Division of Industrial Safety.
2. **Frequently Traveled Private Unpaved Road Conditional Exemption:** The requirements in Subsections B.1 (Visible Dust Beyond the Property Line) and B.2 (Opacity) shall not apply to fugitive dust from frequently traveled (more than 20 vehicles per day passing in either direction) unpaved private roads if the operator has covered them with a low silt content material such as recycled road base or gravel to a minimum of four inches; or has implemented all of the following control measures:
- a. **Control Speed:** Control speed to 15 miles per hour or less on unpaved roads through worker notification, signage, and any other necessary means.
 - b. **Restrict Access:** Restrict access to private unpaved roads currently used by the public either through signage or physical access restrictions.
 - c. **Road Treatments:** Treat unpaved and uncovered frequently traveled roads with water, mulch, or a non-toxic chemical dust suppressant that complies with all applicable air and water quality government standards. If treated, roads shall be treated in a manner that will avoid the sticking of mud to tires that will be carried onto paved public roads.
3. **Lightly Traveled Unpaved Private Road Conditional Exemption:** The requirements in Subsections B.1 (Visible Dust Beyond the Property Line) and B.2 (Opacity) shall not apply to fugitive dust from lightly traveled unpaved private roads if the operator has implemented both of the following control measures:
- a. **Control Speed:** Control speed to 15 miles per hour or less on unpaved roads through worker notification, signage, and any other necessary means.
 - b. **Restrict Access:** Restrict access to private unpaved roads currently used by the public either through signage or physical access restrictions.
4. **Storage Pile Conditional Exemption** The requirements in Subsections B.1 (Visible Dust Beyond the Property Line) and B.2 (Opacity) shall not apply to fugitive dust from

storage piles if the operator has implemented at least one of the following control measures:

- a. **Wind Sheltering:** Enclose material in a three or four sided barrier equal to the height of the material.
 - b. **Watering:** Apply water at a sufficient quantity and frequency to prevent wind driven dust.
 - c. **Chemical Stabilization:** Apply a non-toxic dust suppressant that complies with all applicable air and water quality government standards at a sufficient quantity and frequency to prevent wind driven dust.
 - d. **Covering:** Install and anchor tarps, plastic, or other material to prevent wind driven dust.
5. **High Wind Exemption:** The requirements in Subsections B.1 (Visible Dust Beyond the Property Line), B.2 (Opacity), and C.1 (Earth-Moving) shall not apply to fugitive dust when on-site wind speed exceeds 25 miles per hour (mph) for at least 5 minutes in any one hour period as measured by an anemometer with a minimum resolution of 1.0 mph provided:
- a. Applicable control measures outlined in Table 1 have been implemented, and
 - b. Daily records of specific dust control measures have been maintained.
6. **Track-out Exemption:** The provisions of Subsection B.3 (Track-Out) shall not apply to on-road vehicles (trucks and passenger vehicles) associated with agricultural operations that have caused track-out due to excessively muddy conditions resulting from rainfall.
7. Groundwater Recharge Basin Exemption: The provisions of Subsection B.2 (Opacity) shall not apply to the fugitive dust generated by maintenance operations at a groundwater recharge basin operated by a public agency. A "Public agency" is any state agency, any city, county, special district, or any other political subdivision.

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E. Recordkeeping Requirements

1. **Bulk Material Handling Records:** Any operator handling bulk materials and having an APCD Permit to Operate shall keep a monthly log, available upon request, containing or referencing the following information:
 - a. Operator name, location of operation, and dates of operation.
 - b. Amount (in yards) of bulk material imported or exported per month.

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- c. Diagram or map of all egress sites to a public paved road and description of corresponding track-out control measure, if required by this rule.
2. **Frequently Traveled Unpaved Road Exemption Records:** Any operator or owner of an private unpaved road claiming exemption from the requirements in Subsection B.1 (Visible Dust Beyond the Property Line) and Subsection B.2 (Opacity) shall keep the following records:
 - a. Operator name, location of operation, dates when road is open to travel.
 - b. List and diagram of unpaved private roads that have more than 20 vehicle trips per day with corresponding method and description of fugitive dust control. If an unpaved private road is being treated, then describe the method used to control speed and restrict access.
3. **Storage Pile Exemption Records:** Any owner or operator of a storage pile claiming the exemption from the requirements in Subsection B.1 (Visible Dust Beyond the Property Line) and Subsection B.2 (Opacity) shall keep the following records:
 - a. Operator name, location of operation, dates of operation
 - b. Description of control measure used to minimize fugitive dust including amount of material applied and frequency of application if watering or chemical suppressants are used.
4. **High Wind Exemption Records:** Any operator claiming the high wind exemption in Subsection D.5 shall keep daily records of specific dust control actions taken.
5. **Track-Out Area Exemption Records:** Any operator claiming an exemption from track-out area requirements in Subsection B.3.a shall keep the following records:
 - a. Operator name, location of operation, and dates of operations.
 - b. Description of control measure used in the improvement of the track-out area or control measure used to prevent track-out.
6. **Dust Suppressant Records:** Any person using dust suppressants shall keep the following records: Description of dust control measure; Location and extent of coverage; Date, amount, and frequency of application of dust suppressant; and Manufacturer's dust suppressant product information sheets.
7. Any recordkeeping required by this rule shall be made available to APCD compliance personnel upon request. Records shall be retained for a minimum of two years.

F. Test Methods

Compliance with the opacity limit in Subsection B.2 shall be determined using EPA Method 9 with the following modifications:

1. Position: Stand at least 16.5 feet from the plume(s) with the sun oriented in the 140° sector to your back. If feasible, make opacity observations so your line of sight is approximately perpendicular to the direction of plume travel. To the extent possible, position yourself to make opacity observations using a contrasting background.
2. Field Records: Note the following on a record sheet:
 - a. Description and location of activity generating emissions, and method of control used, if any.
 - b. Observer's name, certification data, and affiliation, and a sketch of the observer's position relative to the dust generating activity and the sun, including estimated distances and direction to the plume.
 - c. Time that reading began, approximate wind speed and direction, description of the sky condition (presence and color of clouds), color of the plume, and type of background.
3. Observations: For each reading, make the observation at the highest opacity in the dust plume starting at an elevation line 5 feet above the emission source. Do not look continuously at the source, but make momentary observations once every 15 seconds. Record each observation to the nearest 5 percent. Each reading represents a 15 second period. If multiple plumes exist, do not include more than one plume in the line of sight at one time.
4. Compliance Determination: If the observer records twelve (12) readings of 20 percent or greater during a one-hour period, the source is not in compliance and observations may stop. The 20 percent or greater opacity readings are not required to be consecutive.
5. Only observers certified by the California Air Resources Board, or the U.S. Environmental Protection Agency may determine compliance with opacity limits.

G. Violations

Failure to comply with any provision of this rule is a violation of this rule.

H. Definitions

1. “Active Operation”: Any source capable of generating fugitive dust, including, but not limited to, bulk material handling, earth-moving activities, construction or demolition activities, or vehicular movement on unpaved surfaces.
2. “Bulk Material”: Sand, gravel, aggregate material less than two inches in length or diameter, and other organic or inorganic particulate matter.
3. “Construction/Demolition Activities”: Any on-site mechanical activities conducted in preparation of, or related to, the building, alteration, rehabilitation, demolition, or improvement of property, including, but not limited to, grading, excavating, loading, crushing, cutting, plating, or ground breaking.
4. “Disturbed Surface Area”: This means a portion of the earth’s surface which has been physically moved, uncovered, destabilized, or otherwise modified from its undisturbed natural soil condition, thereby increasing the potential for emission of fugitive dust. This definition excludes those areas which have:
 - a. Been restored to a natural state, such that the vegetative ground cover and soil characteristics are similar to adjacent or nearby natural conditions;
 - b. Been paved or otherwise covered by a permanent structure.
5. “Earth-Moving Activities”: This means the use of any equipment for any activity where soil is being moved or uncovered, and shall include, but not be limited to the following: grading, earth cutting and filling operations, loading and unloading of dirt, adding to or removing from open storage piles, landfill operations, mining operations, and weed abatement operations.
6. “Frequently-Traveled Unpaved Private Road”: For the purpose of defining the conditional exemption in Subsection D.2 , any private unpaved road where the count of vehicles traveling in either direction on the road exceeds 20 in any 24 hour period .
7. “Fugitive Dust”: Any solid particulate matter that becomes airborne, other than emitted from an exhaust stack, directly or indirectly as a result of the activities of any person(s).
8. “Lightly-Traveled Unpaved Private Road”: For the purpose of defining the conditional exemption in Subsection D.3, any private unpaved road where the count of vehicles traveling in either direction on the road is 20 or less in any 24 hour period.
9. “Off-field Agricultural Operations”: Any activities excluding those considered by this rule to be on-field agricultural operations.

10. "On-field Agricultural Operations": Activities, excluding travel on field access roads, conducted solely for the purpose of preparing land for the growing of agricultural or horticultural commodities, tree fruits, or raising of fowl or animals, such as:
 - a. Brush or timber clearing, grubbing, scraping, ground excavation, land leveling, grading, turning under stalks, disking or tilling.
 - b. Drying, pre-cleaning, handling, or storing of agricultural commodity material on the field where it was harvested.
 - c. Handling of fowl, or animal feed materials at sites where animals or fowl are raised.
 - d. Disturbing of cultivated land as a result of fallowing, seeding, planting, plowing, disking, fertilizing the soil, cultivating, irrigating, controlling weeds, thinning, heating, pruning, fumigating, spraying, dusting, or harvesting.
11. "Paved Road": A public or private improved street, highway, alley, public way, or easement that is covered by typical roadway materials including, but not limited to, asphalt paving or concrete. For this purpose of this rule, roads covered with recycled road base or gravel are not considered to be paved.
12. "PM-10 Efficient Street Sweeper": Any street sweeper certified by the South Coast AQMD to meet their Particulate Matter (10 microns and less) capture efficiency criteria outlined in SCAQMD Rule 1186 Appendix A.
13. "Source": A source includes all activities and operations that are located on contiguous property under common ownership or control, and includes associated facility-access and haul roads.
14. "Stabilized Surface": Any surface that has been treated, worked, or modified to increase soil stability in order to limit fugitive dust emissions. Methods used to stabilize surface include but are not limited to the following: watering, dust palliatives, vegetation, aggregates, and paving.
15. "Storage Pile": Any accumulation of bulk material or soil, which attains a height of three feet or more and a total surface area of 150 or more square feet.
16. "Track-Out": Any material that adheres to and agglomerates on the exterior surface or tires of motor vehicles, haul trucks, or mobile equipment that have been released onto a named, numbered, or lettered public paved road and can be removed by a PM-10 efficient street sweeper under normal operating conditions.

I. Compliance Schedule :

April 8, 2008

Rule 55: 9

The requirements of this rule shall become effective on October 8, 2008.

J. Compliance Status

Compliance with this rule shall not guarantee that a person will be in compliance with any other district rule or state regulation, including but not limited to, Rule 50 (Opacity), Rule 51 (Nuisance), Health and Safety Code Section 41700 (Nuisance), or Health and Safety Code Section 41701 (Opacity).

Table 1
Control Measures Needed to Qualify for High Wind Exemption in Subsection D.5

FUGITIVE DUST SOURCE CATEGORY	CONTROL MEASURES
Earth-Moving	<ol style="list-style-type: none"> 1. Cease all active operations; OR 2. Apply water to soil not more than 15 minutes prior to earth-moving activities.
Disturbed Surface Area	<ol style="list-style-type: none"> 1. On the last day of active operations prior to any Sunday, 1-day holiday, or any other period when active operations will not occur for at least four consecutive days, apply water with a mixture of chemical stabilizer diluted to not less than 5 percent by volume of the chemical stabilizer or to chemical stabilizer manufacturer specifications; OR 2. Apply chemical stabilizers at least 30 minutes prior to the wind event; OR 3. Apply water to all unstabilized disturbed areas at least every 4 hours during the wind event. If there is any evidence of wind-driven dust, water frequency is increased until wind-driven dust is minimized; OR 4. Establish a vegetative ground cover within 21 days after active operations have ceased. Ground cover must be of sufficient density to expose less than 30 percent of unstabilized ground within 90 days of planting, and at all times thereafter.
Unpaved Roads	<ol style="list-style-type: none"> 1. Apply chemical stabilizers prior to allowing traffic; OR 2. Apply water at least twice per hour during active operations; OR 3. Stop all vehicular traffic.
Open Storage Piles	<ol style="list-style-type: none"> 1. Apply water at least twice per hour during the wind event; OR 2. Install temporary coverings.

APPENDIX B
INITIAL STUDY

Ventura County Air Pollution Control District Rule 55, Fugitive Dust

Project Background Information

1. Project Title:

Ventura County Air Pollution Control District (APCD) Rule 55, Fugitive Dust

2. Lead Agency Name and Address:

Ventura County Air Pollution Control District
669 County Square Drive
Ventura, CA 93003

3. Contact Person and Phone Number:

Stan Cowen, Air Quality Engineer
805/645-1408

4. Project Location:

The project applies to all areas of Ventura County.

5. Project Sponsor's Name and Address:

Ventura County Air Pollution Control District
669 County Square Drive
Ventura, CA 93003

6. Section A - Project Description:

The California Environmental Quality Act (CEQA) requires the evaluation of the environmental impacts of proposed projects and the consideration of feasible methods to reduce, avoid, or eliminate identified significant adverse environmental impacts. In addition, this law requires that projects carried out by public agencies be subject to the same level of public review and consideration as private projects requiring approval by public agencies. To fulfill the purpose and intent of CEQA, the Ventura County Air Pollution Control District (APCD) is distributing this initial study (IS) for proposed adoption of VCAPCD Rule 55, Fugitive Dust.

Because Ventura County fails to meet California ambient health standards for Particulate Matter (PM10 and PM2.5), Health & Safety Code Section 39614 requires the APCD to adopt new regulations to reduce particulate pollution. On June 28, 2005, the Ventura County Air Pollution Control Board approved APCD staff's plan to develop new PM control measures. The proposed adoption of Rule 55, Fugitive Dust, will implement almost all of those adopted control measures. A separate rule (Rule 55.1) will focus on PM emissions from street sweeping activities and require the use of PM-10 certified street sweepers. Because no additional street sweeping will be required by Rule 55.1, and sweepers used will have fewer emissions, there are will no environmental impacts associated with this rule. Thus, this environmental review will focus on the impacts associated only with the implementation of Rule 55.

Proposed Rule 55 will impact any man-made condition capable of generating fugitive dust. Fugitive dust emissions are any particulates emitted into the atmosphere from any source other than through

smokestacks or exhaust pipes. Affected sources include bulk material handling facilities, construction/demolition sites, storage piles, unpaved roads, off-field agricultural operations, and earth-moving operations. The following new standards are proposed to reduce fugitive dust emissions:

1. No visible dust beyond the property line.
2. New 20 percent opacity limit.
3. New track-out limit of 25 feet.
4. No visible dust plume over 100 feet in length during earthmoving activities.

The estimated emission reductions from the implementation of Rule 55 are six tons per day of PM, based on a 30 percent control effectiveness. This 30 percent control effectiveness assumes that most of the impacted sources are already in compliance with the proposed rule requirements.

This Initial Study identifies environmental issues that will be the focus of the EIR. This document also provides the rationale for excluding those topics that are not expected to have significant environmental impacts as a result of the adoption of VCAPCD Rule 55.

The draft Rule 55 is posted on the District's website at www.vcapcd.org.

7. Other Agencies Whose Approval is Required:

No other agencies have discretionary authority over this project.

8. Project Compatibility with Existing Zones and Plans:

Adoption of this rule will not affect any land use zones or plans.

9. Name of Person Who Prepared Initial Study:

Stan Cowen, Air Quality Engineer

SECTION B
INITIAL STUDY CHECKLIST*
PROJECT NAME: APCD Rule 55, Fugitive Dust

<u>ISSUE</u>	<u>ISSUE AREA</u>	<u>PROJECT IMPACT</u>				<u>CUMULATIVE IMPACT</u>			
		<u>DEGREE OF EFFECT**</u>				<u>DEGREE OF EFFECT**</u>			
		N	LS	S	U	N	LS	S	U
GENERAL:	1. <u>GENERAL PLAN ENVIRONMENTAL GOALS AND POLICIES:</u>	X				X			
LAND USE:	2. <u>LAND USE</u>								
	A. COMMUNITY CHARACTER:	X				X			
	B. HOUSING:	X				X			
	C. GROWTH INDUCEMENT:	X				X			
RESOURCES:	3. <u>AIR QUALITY</u>								
	A. REGIONAL:			X				X	
	B. LOCAL:			X				X	
	4. <u>WATER RESOURCES</u>								
	A. GROUND WATER QUANTITY:		X				X		
	B. GROUND WATER QUALITY:		X				X		
	C. SURFACE WATER QUANTITY:		X				X		
	D. SURFACE WATER QUALITY:		X				X		
	5. <u>MINERAL RESOURCES</u>								
	A. AGGREGATE:	X				X			
	B. PETROLEUM:	X				X			
	6. <u>BIOLOGICAL RESOURCES</u>								
	A. ENDANGERED, THREATENED, OR RARE SPECIES:	X				X			
	B. WETLAND HABITAT:	X				X			
	C. COASTAL HABITAT:	X				X			
	D. MIGRATION CORRIDORS:	X				X			
	E. LOCALLY IMPORTANT SPECIES/ COMMUNITIES:	X				X			
	7. <u>AGRICULTURAL RESOURCES</u>								
	A. SOILS:	X				X			
	B. WATER:	X				X			
	C. AIR QUALITY/MICRO-CLIMATE:	X				X			
	D. PESTS/DISEASES:	X				X			
	E. LAND USE INCOMPATIBILITY:	X				X			
	8. <u>VISUAL RESOURCES</u>								
	A. SCENIC HIGHWAY:	X				X			
	B. SCENIC AREA/FEATURE:	X				X			
	9. <u>PALEONTOLOGICAL RESOURCES:</u>	X				X			
	10. <u>CULTURAL RESOURCES</u>								
A. ARCHAEOLOGICAL:	X				X				
B. HISTORICAL:	X				X				

ISSUE	ISSUE AREA	PROJECT IMPACT				CUMULATIVE IMPACT			
		DEGREE OF EFFECT**				DEGREE OF EFFECT**			
		N	LS	S	U	N	LS	S	U
RESOURCES: (CONT'D)	C. ETHNIC, SOCIAL OR RELIGIOUS:	X				X			
	11. <u>ENERGY RESOURCES:</u>		X				X		
	12. <u>COASTAL BEACHES & SAND DUNES:</u>	X				X			
HAZARDS:	13. <u>SEISMIC HAZARDS</u>								
	A. FAULT RUPTURE:	X				X			
	B. GROUND SHAKING:	X				X			
	C. TSUNAMI:	X				X			
	D. SEICHE:	X				X			
	E. LIQUEFACTION:	X				X			
	14. <u>GEOLOGIC HAZARDS</u>								
	A. SUBSIDENCE:	X				X			
	B. EXPANSIVE SOILS:	X				X			
	C. LANDSLIDES/MUDSLIDES:	X				X			
	15. <u>HYDRAULIC HAZARDS</u>								
	A. EROSION/SILTATION:	X				X			
	B. FLOODING:	X				X			
	16. <u>AVIATION HAZARDS:</u>	X				X			
	17. <u>FIRE HAZARDS:</u>	X				X			
	18. <u>HAZARDOUS MATERIALS/WASTE</u>								
	A. HAZARDOUS EMISSIONS:		X				X		
	B. BELOW-GROUND HAZARDOUS MTLs.:	X				X			
	C. HAZARDOUS WASTE:	X				X			
	19. <u>NOISE AND VIBRATION:</u>		X				X		
20. <u>GLARE:</u>	X				X				
PUBLIC FACILITIES/ SERVICES:	21. <u>TRANSPORTATION/CIRCULATION</u>								
	A. PUBLIC ROADS AND HIGHWAYS								
	(1) LEVEL OF SERVICE:	X				X			
	(2) SAFETY/DESIGN:	X				X			
	(3) TACTICAL ACCESS:	X				X			
	B. PRIVATE ROADS AND DRIVEWAYS								
	(1) SAFETY/DESIGN:	X				X			
	(2) TACTICAL ACCESS:	X				X			
	C. PEDESTRIAN/BICYCLE								
	(1) PUBLIC FACILITIES:	X				X			
	(2) PRIVATE FACILITIES:	X				X			
	D. PARKING:	X				X			
	E. BUS TRANSIT:	X				X			
	F. RAILROADS:	X				X			
	G. AIRPORTS:	X				X			
	H. HARBORS:	X				X			
	I. PIPELINES:	X				X			
22. <u>WATER SUPPLY</u>									

ISSUE	ISSUE AREA	PROJECT IMPACT				CUMULATIVE IMPACT				
		DEGREE OF EFFECT**				DEGREE OF EFFECT**				
		N	LS	S	U	N	LS	S	U	
PUBLIC FACILITIES SERVICES: (CONT'D)	A. QUALITY:		X				X			
	B. QUANTITY:		X				X			
	C. FIRE FLOW:	X				X				
	23. WASTE TREATMENT/DISPOSAL									
	A. INDIVIDUAL SEWAGE DISPOSAL SYSTEM:	X				X				
	B. SEWAGE COLLECTION/TREATMENT FACILITIES:	X				X				
	C. SOLID WASTE FACILITIES:	X				X				
	24. UTILITIES									
	A. ELECTRIC:	X				X				
	B. GAS:	X				X				
	C. COMMUNICATION:	X				X				
	25. FLOOD CONTROL/DRAINAGE									
	A. FLOOD CONTROL DISTRICT FACILITY:	X				X				
	B. OTHER FACILITIES:	X				X				
	26. LAW ENFORCEMENT/EMERGENCY SVS									
	A. PERSONNEL/EQUIPMENT:	X				X				
	B. FACILITIES:	X				X				
	27. FIRE PROTECTION									
	A. DISTANCE/RESPONSE TIME:	X				X				
	B. PERSONNEL/EQUIPMENT/FACILITIES:	X				X				
	28. EDUCATION									
	A. SCHOOLS:	X				X				
	B. LIBRARIES:	X				X				
	29. RECREATION									
	A. LOCAL PARKS/FACILITIES:	X				X				
	B. REGIONAL PARKS/FACILITIES:	X				X				
	C. REGIONAL TRAILS/CORRIDORS:	X				X				

* Analyzing:

- a) changes resulting from APCD Rule 55
- b) changes with respect to circumstances
- c) new information

** Explanation: Degree of Effect

- N = No Effect
- LS = Less Than Significant Effect
- S = Significant Effect; MND or EIR Required
- U = Unknown; EIR Required

D. MANDATORY FINDINGS OF SIGNIFICANCE		YES/	
BASED ON THE INFORMATION CONTAINED WITHIN SECTIONS B AND C:		MAYBE	NO
1.	DOES THE PROJECT HAVE THE POTENTIAL TO SIGNIFICANTLY DEGRADE THE QUALITY OF THE ENVIRONMENT, SUBSTANTIALLY REDUCE THE HABITAT OF A FISH OR WILDLIFE SPECIES, CAUSE A FISH OR WILDLIFE POPULATION TO DROP BELOW SELF- SUSTAINING LEVELS, THREATEN TO ELIMINATE A PLANT OR ANIMAL COMMUNITY, REDUCE THE NUMBER OR RESTRICT THE RANGE OF A RARE OR ENDANGERED PLANT OR ANIMAL, OR ELIMINATE IMPORTANT EXAMPLES OF THE MAJOR PERIODS OF CALIFORNIA HISTORY OR PREHISTORY?		X
2.	DOES THE PROJECT HAVE THE POTENTIAL TO ACHIEVE SHORT- TERM, TO THE DISADVANTAGE OF LONG-TERM, ENVIRONMENTAL GOALS? (A SHORT- TERM IMPACT ON THE ENVIRONMENT IS ONE WHICH OCCURS IN A RELATIVELY BRIEF, DEFINITIVE PERIOD OF TIME WHILE LONG-TERM IMPACTS WILL ENDURE WELL INTO THE FUTURE).		X
3.	DOES THE PROJECT HAVE IMPACTS WHICH ARE INDIVIDUALLY LIMITED, BUT CUMULATIVELY CONSIDERABLE? (SEVERAL PROJECTS MAY HAVE RELATIVELY SMALL INDIVIDUAL IMPACTS ON TWO OR MORE RESOURCES, BUT THE TOTAL OF THOSE IMPACTS ON THE ENVIRONMENT IS SIGNIFICANT).		X
4.	DOES THE PROJECT HAVE ENVIRONMENTAL EFFECTS WHICH WILL CAUSE SUBSTANTIAL ADVERSE EFFECTS ON HUMAN BEINGS, EITHER DIRECTLY OR INDIRECTLY?	X	

E. DETERMINATION OF ENVIRONMENTAL DOCUMENT	
ON THE BASIS OF THIS INITIAL EVALUATION:	
<input type="checkbox"/>	I FIND THE PROPOSED PROJECT COULD NOT HAVE A SIGNIFICANT EFFECT ON THE ENVIRONMENT, AND A NEGATIVE DECLARATION SHOULD BE PREPARED.
<input type="checkbox"/>	I FIND THAT ALTHOUGH THE PROPOSED PROJECT COULD HAVE A SIGNIFICANT EFFECT ON THE ENVIRONMENT, THERE WILL NOT BE A SIGNIFICANT EFFECT IN THIS CASE BECAUSE THE MITIGATION MEASURE(S) DESCRIBED IN SECTION C OF THE INITIAL STUDY WILL BE APPLIED TO THE PROJECT. A MITIGATED NEGATIVE DECLARATION SHOULD BE PREPARED.
<input checked="" type="checkbox"/>	I FIND THE PROPOSED PROJECT, INDIVIDUALLY AND/OR CUMULATIVELY, MAY HAVE A SIGNIFICANT EFFECT ON THE ENVIRONMENT AND AN ENVIRONMENTAL IMPACT REPORT IS REQUIRED.

Dated: _____

VENTURA COUNTY
AIR POLLUTION CONTROL DISTRICT

Air Pollution Control Officer

SECTION C
RESPONSES TO THE INITIAL STUDY CHECKLIST

ISSUE

1. General Plan Environmental Goals and Policies

The provisions of APCD Rule 55 are fully consistent with the goals and policies of the Ventura County General Plan to improve the environment of Ventura County.

2. Land Use (a-c)

APCD Rule 55 does not have any provisions that would impact community character, increase demand for housing, remove impediments to growth in the county, or result in a significant loss of agricultural land. There are no provisions in APCD Rule 55 that would affect land use plans, policies, or regulations. It is also expected that APCD Rule 55 will not affect infrastructure development or require changes to existing zone designations. Land use and other planning considerations are determined by local governments and no land use or planning requirements will be altered by APCD Rule 55. There are no provisions in APCD Rule 55 that would induce substantial population growth in an area, nor displace a substantial number of existing housing or people.

3. Air Quality (a-b)

The adoption and implementation of APCD Rule 55 will reduce particulate matter (PM) emissions as required by Health & Safety Code Section 39614, which states in pertinent part that “each district, in carrying out the requirements of this section, shall adopt and implement control measures to reduce PM 2.5 and PM 10 from stationary, area, and mobile sources, and to make progress toward attainment of state and federal PM 2.5 and PM 10 standards.” The environmental consultant for the California Construction and Industrial Materials Association (CalCIMA) claims that the control measures required by APCD Rule 55 may have a significant adverse impact on air quality. In particular, CalCIMA contends that the following PM reduction activities may result in an increase in combustion-related emissions, some of which may also be toxic air contaminants (e.g. diesel exhaust particulate):

- A. Water truck activity is used to reduce fugitive dust and emissions may increase. For instance, the default emission factor for a single water truck working 8 hours per day is 22.86 pounds/day of Nitrogen Oxides (NO_x), an ozone precursor, and 1.01 pound per day of PM-10. If the rule then results in an additional 10 hours per day countywide of water truck activity, the rule would have a significant impact as compared to the VCAPCD 25 pound per day threshold outlined in the APCD CEQA guidelines for air quality impacts.
- B. On-road truck trips may increase because some material will be displaced by water. If material moisture is increased by one percent as a result of APCD Rule 55, then Vehicle Miles Traveled (VMT) will increase and NO_x emissions will increase approximately 10 pounds per day. This calculation is based on the aggregate demand in the county is 6.2 million tons per year and each ton requires 40 miles of truck travel. The additional one percent moisture will necessitate an additional 100,000 miles of VMT per year. The NO_x emission factor for

Heavy Duty trucks is 17.5 grams per VMT and the weather conditions are 70 degrees F, 50 relative humidity and an average speed of 40 mph.

- C. Emissions from asphalt plants and other processes using combustion equipment to dry the aggregate may increase.
- D. Requiring sweeping if there is track-out results in engine emissions from the sweeper truck in route and on-site: as well as increased emissions from traffic congestion caused by sweeper activity. Sweeper trucks are assumed to be medium duty trucks with emission characteristics of one gram of NO_x per VMT. On this basis, the increase in sweeper truck activity of greater than 11,340 VMT per day would generate emissions in exceedance of the 25 lb/day threshold.

CalCIMA further asserts the fugitive dust or natural crustal particulate matter has been shown by the United States Environmental Protection Agency to be inherently less dangerous than smaller particulate generated by combustion sources. They further imply that the fugitive dust control measures in Rule 55 may be too costly in terms of the ozone non-attainment status of the county or in terms of air toxic emissions.

The air quality consequences, both positive and negative, of adopting APCD Rule 55 on air quality will be examined in the EIR, and will focus on the effect of this rule adoption on the general health, safety, and welfare. Each of the significant impacts discussed above will be addressed in the EIR.

4. Water Resources (a-d)

When adopted, APCD Rule 55 will not require that all unpaved roads be treated either with chemical dust suppressants or water. However, operators may claim an exemption from the visible dust standards for frequently traveled unpaved road if these unpaved roads are treated. Thus, there is a potential impact to water quality from the treating of unpaved roads to reduce fugitive dust emissions. This impacts are considered to be less than significant because APCD Rule 55 includes requirements that all treatments of unpaved roads use water or non toxic chemical dust suppressants and that all treatments comply with all air and water quality government standards. Excess treatment or runoff of unpaved road is regulated by the Los Angeles Regional Water Quality Control Board (LARWQCB), which has adopted storm water regulations to mitigate contaminated effluent.

One of the options for controlling track-out fugitive dust emission is the installation of a wheel washing system to remove dirt and soil from trucks prior to their traveling on public paved streets. Again, the storm water regulations from LARWQCB will mitigate any excess water used for this purpose.

5. Mineral Resources (a-b)

APCD Rule 55 is not expected to adversely impact mineral resources because it will neither limit access to, nor increase demand for, such materials. There are no provisions in APCD Rule 55 that would result in the loss of availability of known mineral resources or a locally important mineral resource recovery site that would be of value to the region and residents of the county.

6. Biological Resources (a-e)

APCD Rule 55 does not include any provision that would impact biological resources. The adoption of APCD Rule 55 is not expected to adversely affect existing plant or animal species or communities, unique or endangered plant or animal species, or agricultural crops. No significant adverse impacts to biological resources are expected to result from the proposed rule adoption because APCD Rule 55 is expected to affect existing sites and areas where biological resources are already disturbed. Further, improvements in Ventura County's air quality expected from APCD Rule 55 are expected to provide health benefits to plant and animal species, as well as to humans.

7. Agricultural Resources (a-e)

APCD Rule 55 does not include any provision that would adversely impact agricultural resources. Because many agricultural crops are sensitive to air pollution, APCD Rule 55 should benefit agricultural resources in Ventura County by improving regional air quality.

The adoption of APCD Rule 55 is not expected to have a significant impact upon agricultural resources. APCD Rule 55 will affect off-field agricultural activities that generate fugitive dust such as unpaved access roads and track-out onto paved streets. The cost impacts from this rule adoption on agriculture have been lessened via appropriate exemptions for on-field activities, emergency operations, and track-out resulting from muddy conditions caused by rainfall. The costs associated with rule compliance will not result in the conversion of farmland to non-agricultural use.

8. Visual Resources (a-b)

APCD Rule 55 does not include any provision that would adversely impact visual resources. APCD Rule 55 should benefit visual resources in Ventura County by reducing regional haze and improving atmospheric visibility.

The adoption of APCD Rule 55 will not affect aesthetics. The reduction of particulate matter emissions from the new rule requirements will reduce the particulate deposition on historic buildings. The reduction of fugitive dust will improve the visual quality of sites normally impacted by construction activity.

9. Paleontological Resources

APCD Rule 55 does not include any provision that would adversely impact paleontological resources.

10. Cultural Resources (a-c)

There will be no impact on any cultural or historic resources from the adoption of APCD Rule 55. Further, improvements in air quality from APCD Rule 55 are expected to lessen the damage to historic sites from the effects of particulate air pollution.

11. Energy Resources

Although APCD Rule 55 does not directly require the use of additional water trucks and street sweepers, efforts to comply with the visual dust standards of the rule may cause operators to increase their use of these vehicles that normally use non-renewable diesel fuels. However, the projected use of diesel fuel for these purposes would be of relatively small quantity compared to the existing demand for diesel fuel, most of which is consumed by truck traffic in the county. Consequently, the impact from APCD Rule 55 on non-renewable fuel supplies would not be significant.

12. Coastal Beaches and Sand Dunes

APCD Rule 55 does not include any provisions that would adversely impact coastal beaches or sand dunes.

13. Seismic Hazards (a-e)

APCD Rule 55 does not include any provisions that would result in seismic hazard impacts.

14. Geologic Hazards (a-c)

APCD Rule 55 does not include any provisions that would result in geologic hazard impacts. Some of the control measures used to comply with fugitive dust standards include watering and chemical treatment will act to prevent soil erosion and the loss of topsoil. This project is expected to have a beneficial impact on soil erosion and the loss of topsoil.

15. Hydraulic Hazards (a-b)

APCD Rule 55 does not include any provision that would result in hydraulic hazard impacts.

16. Aviation Hazards

APCD Rule 55 does not include any provision that would increase aviation hazards. APCD Rule 55 may enhance aviation safety by improving atmospheric visibility.

17. Fire Hazards

APCD Rule 55 does not include any provision that would increase the potential for fire hazards. Existing state and local regulations pertaining to handling, using, and disposing of hazardous and flammable materials will ensure that any such impacts will not be significant.

18. Hazardous Emissions/Waste (a-c)

Because water trucks may be used to reduce fugitive dust emissions, diesel exhaust from these vehicles is considered to be a toxic air pollutant by the California Air Resources Board. These hazardous emissions will not cause the violation of any ambient air quality standard or create any likely potential for nuisance, and thus should be considered less than significant impact.

Applicators who treat unpaved roads with dust suppressants must comply with manufacturer specifications and must also comply with regional/state water quality control board requirements. APCD Rule 55 requires that only nontoxic chemicals be applied to unpaved roads in compliance with all government air and water quality control regulations.

19. Noise and Vibration

When adopted, APCD Rule 55 will not require that all construction sites water or treat unpaved areas to reduce fugitive dust emissions. Rather, the operators may water or chemically treat unpaved areas as one option to avoid violating visible dust standards that are established by the rule. Since it is possible that construction site operators may employ more watering trucks than currently required by local planning permits to insure compliance with APCD Rule 55, the additional heavy duty diesel water trucks may result in increased noise. However, the resulting noise may not be much greater than currently allowed noise at construction sites, and the resulting noise is expected to be less than significant.

20. Glare

APCD Rule 55 does not include any provision that would increase glare.

21. Transportation and Circulation (a-i)

One provision of APCD Rule 55 requires that track-out on public paved surfaces be removed daily. Track-out occurs when the soil or dirt which is carried out by trucks traveling on unpaved surfaces is deposited on public streets. The dust emissions result from the pulverization and dispersion of the track-out by passing vehicles. Since the rule requires that track-out on public paved surface be removed daily, it is possible that traffic congestion may occur as a result of this removal process. However, the time required to remove the dirt deposited on public streets should be minimal, and the disruption of traffic patterns minimized, resulting in a less than significant impact.

22. Water Supply (a-c)

Potential environmental impacts to the water supplies in Ventura County may result from implementation of APCD Rule 55 for fugitive dust control. This rule sets standards for controlling visible dust, which may be met by using water or other dust palliatives. However, the projected increased use of water would be of relatively small quantity compared to the existing surface and groundwater supplies that are available for use in Ventura County for public domestic, municipal, industrial or agricultural consumption. Consequently, the direct effects of APCD Rule 55 on reducing the available water supply are negligible and would not be significant.

23. Waste Treatment/Disposal (a-c)

APCD Rule 55 does not include any provision that would adversely impact waste treatment/disposal facilities. Existing state and local regulations governing waste treatment and disposal will ensure that there are no significant impacts.

24. Utilities (a-c)

Local power or natural gas that is converted to electrical power may be affected when used as energy sources to pump water that will be used as a dust suppressant. This increase in energy use is considered to be negligible since it will not result in the need for additional power plants or modifications to power distribution systems.

Storm water drainage ponding basins may be affected when removing soil (excavating/scraping), disking soil to increase drainage, and transporting soil (potential track-out) outside of the basin. The transport of solid waste and disposal material will not be affected. However, construction or modification of landfills are subject to this regulation.

There are no provisions in the proposed APCD Rule 55 that would affect existing communication systems, sewer or septic tanks, or regional water treatment or distribution facilities. However, construction-related activities for new communication systems or regional water treatment or distribution facilities will be required to comply with fugitive dust standards in APCD Rule 55.

25. Flood Control/Drainage (a-b)

APCD Rule 55 does not include any provision that would adversely impact flood control or drainage facilities.

26. Law Enforcement/Emergency Services (a-b)

APCD Rule 55 does not include any provision that would adversely impact law enforcement or emergency services.

27. Fire Protection (a-b)

APCD Rule 55 does not include any provision that would adversely impact fire protection impacts.

28. Education (a-b)

APCD Rule 55 does not include any provision that would adversely impact education.

29. Recreation (a-c)

APCD Rule 55 does not include any provision that would adversely impact on recreation or recreation facilities.

Section D. Discussion of Mandatory Findings of Significance (1-4)

There are no provisions in APCD Rule 55 that would have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, or impact in any manner any rare or endangered plant or animal. Nor would this rule impact or eliminate any important examples of the major periods of California history or prehistory.

APCD Rule 55 does not have the potential to achieve short term, to the disadvantage of long-term goals. This project also does not have impacts which are individually limited but cumulatively considerable.

Based on the analysis of the potentially significant impacts on air quality from diesel exhaust discussed in Section 3 (Air Quality), the adoption of APCD Rule 55 may cause potentially significant adverse effects on human beings. Diesel exhaust is considered to be a toxic air contaminant with known health risks for humans, and it also contains ozone precursors such as NOx that may interfere with the District's plan to attain the state and federal ambient ozone standard. The EIR will address these issues.

Appendix C

**County of Ventura
Planning Division
MEMORANDUM**

DATE: November 8, 2007

TO: Stan Cowen, Air Quality Engineer
Ventura County Air Pollution Control District

FROM: Bruce Smith, Manager
General Plan Section
Resource Management Agency

SUBJECT: APCD Rule 55, Fugitive Dust

The Planning Division has prepared responses for Planning-related issues for the above referenced project (see attached).

If you have any questions, please contact me at extension 2497.

APCD Rule 55, Fugitive Dust

As APCD Rule 55 applies to the all of Ventura County, the scope and content of the environmental review is based on the countywide General Plan and Planning-related issues of the Initial Study Assessment Guidelines.

1. General Plan Environmental Goals and Policies (Planning):

Ventura County General Plan Goals, Policies and Programs The General Plan is organized into four chapters: Resources; Hazards; Land Use; and Public Facilities and Services.

Resources Chapter - The Resources Chapter identifies goals, policies and programs related to the preservation, conservation, production and utilization of resources in Ventura County. The Chapter addresses Air Quality, Water Resources, Mineral Resources, Biological Resources, and Coastal Beaches and Sand Dunes.

The adoption and implementation of APCD Rule 55 (project) is designed to reduce particulate matter (PM) emissions. Adherence to and implementation of all APCD rules and standards would make the project potentially consistent with the General Plan's Air Quality goals and policies. However, the Initial Study identifies the possible increase of combustion-related emissions (nitrogen oxides and smaller particulates) as a result of proposed Rule 55. Other APCD air quality standards should be reviewed to determine if these impacts could have significant effects.

The use of water in the treatment of unpaved roads and the option of installing wheel washing systems to reduce fugitive dust emissions could impact water quantity and quality. Nevertheless, the Initial Study states that stormwater regulations from the Los Angeles Regional Water Quality Control Board (LARWQCB) will provide sufficient mitigation, thereby making it consistent with Water Resources goals and policies.

Efforts to comply with the visual dust standards of the Rule 55 may cause operators to increase their use of vehicles that normally use non-renewable diesel fuels. APCD argues that impacts Energy Resources will be less than significant because the projected use of diesel fuel for these purposes would be of relatively small quantity compared to the existing demand for diesel fuel, most of which is consumed by truck traffic in the county. The project appears consistent with Energy Resources goals and policies.

The project is consistent with all other applicable goals, polices and programs contained in the Resources Chapter of the County General Plan.

Hazards Chapter - The Hazards Chapter identifies goals, policies and programs relating to existing and potential hazards, and other significant constraints to development. This chapter addresses Fault Rupture, Ground Shaking, Tsunami, Seiches, Liquefaction, Landslides/Mudslides, Inundation from Dam Failure, Subsidence, Expansive Soils, Coastal Wave and Beach Erosion Hazards, Flood Hazards Airport Hazards, Hazardous Materials and Waste, and Noise.

The Initial Study discusses potential noise impacts from possible increased water truck activity associated with treating unpaved areas. GP Noise policies 2.16.2-(4) and 2.16.2-(5) ensure that noise standards and thresholds are not exceeded for non-construction noise and construction noise generation. Noise control measures and codes are identified in the County Construction Noise Threshold Criteria and Control Plan and the Programs (2.16.3) of the General Plan as means of reducing noise impacts. Although compliance with noise standards and thresholds will result in potentially significant impacts, the impacts were addressed in the 2005 Certified SEIR for the Focused Update of the County General Plan. Moreover, compliance with these standards are consistent with these GP policies.

The project is consistent with all other applicable goals, polices and programs contained in the Hazards of the County General Plan.

Land Use Chapter - The Land Use Chapter establishes goals, policies and programs to guide future growth in the unincorporated area of Ventura County. The Land Use Chapter is organized into the following topical areas: General Land Use Goals, Policies and Programs, Land Use Designations, Population and Housing and Employment and Commerce and Industry. The consistency impact analysis focuses on the issues of Environmental Goals and Policies and Land Use Designations.

The proposed project does not modify or amend goals and policies associated with zoning or land use designations, land uses, land use maps, General or Area Plan text, building intensity or population density, or parcel size. APCD Rule 55 is consistent with all applicable environmental goals, policies and programs of the Land Use Chapter of the Ventura County General Plan.

Public Facilities and Services Chapter - The Public Facilities and Services Chapter of the County General Plan identifies goals, policies and programs applicable to public facilities and services throughout Ventura County at both a local and regional level. The areas addressed include: Transportation/ Circulation, Water Supply Facilities, Waste Treatment and Disposal Facilities, Public Utilities, Flood Control and Drainage Facilities, Law Enforcement and Emergency Services, Fire Protection, Education and Library Facilities and Services, Parks and Recreation, and Other Public Buildings and Grounds.

The dust control measure of track-out removal from road pavement could result in increased street-sweeper traffic. This or other dust control measures could impact roads and highways through increased traffic congestion. However, impacts to traffic flow would generally be temporary and the dirt deposited on public streets should be minimal. Thus, the effects are not considered significant and the project is considered consistent with GP Transportation/Circulation goals and policies.

The project is consistent with all other applicable goals, polices and programs contained in the Public Facilities and Services Chapter of the County General Plan.

Area Plans - There are no impacts identified in the Initial Study that would cause inconsistencies with applicable environmental goals and policies of the Ventura County General Plan's Area Plans.

2. **Land Use** (Planning):

- a. **Community Character**: APCD Rule 55 has no impact on community character as it does not affect design/architectural style, zoning or general plan designations, land uses, or parcel sizes.
- b. **Housing**: The proposed project will not remove any existing housing or create a demand for additional housing. Thus, there will be no impacts to housing.
- c. **Growth Inducement**: The proposed project is not considered to be growth inducing because it is not removing an impediment nor setting a precedent for future growth. Therefore, this issue will have no impact.

5. **Mineral Resources** (Planning)

- a. **Aggregate**: APCD Rule 55 is not expected to adversely impact aggregate resources because it will neither limit access to, nor increase demand for, such materials. Therefore, there are no impacts to aggregate resources.
- b. **Petroleum**: The proposed project is not expected to adversely impact petroleum resources because it will neither limit access to, nor increase demand for, this resource. Therefore, there are no impacts to petroleum resources.

8. **Visual Resources**

- a. **Scenic Highway** (Planning): APCD Rule 55 does not include any provision that would adversely impact visual resources. APCD Rule 55 should benefit

visual resources in Ventura County by reducing regional haze and improving atmospheric visibility.

22. Transportation/Circulation

- d. **Parking** (Planning): APCD Rule 55 may indirectly generate demand for additional parking because of the potential for increased use of water trucks to treat unpaved areas/roads. The Initial Study Assessment Guideline for Off-Street Parking states that if the project requires additional parking which will be either provided on-site for construction phase or is proposed to be constructed to serve the operation phase and meets the parking standard of the Zoning Ordinance, it may be considered less than significant. Compliance with these standards will result in a less than significant impact.

Appendix D.

**Initial Comment Letter from
California Construction and Industrial Materials Association (CaCIMA)**



WEST COAST
ENVIRONMENTAL
AND ENGINEERING

1838 Eastman Avenue, Suite 200
Ventura, CA 93003-5753
Phone 805/644-7976 Fax 805/644-5929

21550 Oxnard Street, Suite 300
Woodland Hills, CA 91367
Phone 818/224-6628 Fax 818/224-6629

www.wcenviro.com

March 16, 2007

Mr. Stan Cowen
Ventura County APCD
669 County Square Drive
Ventura, CA 93003

Re: CalCIMA Comments on Proposed Rule 55

CAL180

Dear Mr. Cowen:

West Coast Environmental and Engineering (WCE) has reviewed the Ventura County APCD draft Proposed Rule 55 (PR55) dated January 9, 2007 and draft Staff Report dated January 3, 2007. Comments in this letter are made on behalf of WCE's client, the California Construction and Industrial Materials Association (CalCIMA).

Overall, PR55 is a good start towards a workable and reasonable rule. WCE and CalCIMA appreciate the opportunity to have our comments considered by Staff. Each comment is discussed briefly as follows:

1. **Reading Multiple Concurrent Plumes using EPA Method 9.** PR55.B.2 states that "Opacity readings from the separate reading of multiple plumes from any activities at a source and its associated access and haul roads shall be included in the cumulative total used to determine compliance." In addition, PR55.E.3 states that "If multiple plumes exist, read the plume with the highest opacity, but do not include more than one plume in the line of sight at one time." EPA Method 9 requires the observer to evaluate one source at a time. Reading two sources and combining those readings into one NOV is not permitted under Method 9. The definition of source in PR55.G.13 is a related issue.
2. **100-Foot Plume.** PR55.B.4 reads "Earth Moving: No person shall engage in earth-moving activities in a manner that creates visible dust emissions over 100 feet in length." The draft Staff Report states that "no exemption is proposed ... since a 100 foot or greater dust plume should be a violation because of the magnitude of the dust emission." As we discussed during the February 26, 2007 workshop on PR55, the fact that no 100-foot plume test method is available causes us great concern. In addition, low wind can create a long plume from relatively small amounts of emissions.
3. **On-road Truck Freeboard/Covering.** PR55.B.6 assumes that it is the facility owner/operator's responsibility to ensure that proper freeboard/covering occurs. However, often the facility does not own or have direct control of the trucks that are most often operated by independent contractors. It would be more appropriate to make the facility responsible for providing notice and/or posting signs stating the freeboard/covering requirements. Violations for not having signs or notice can be given to the facility, but violations for not complying with freeboard/coving requirements would be given to the owner/operator of the truck.

4. **High-Wind Exemption.** The exemption (PR55.C.5) does not exempt earth moving from 100-foot plume limit in B.4. Earth moving during high wind conditions should be exempt from the standards PR55 under certain circumstances. The South Central Coast Air Basin experiences many high wind days each year and it may not be possible for earth moving operations to cease activity each and every high wind day. Thus, there is good reason for extending the high-wind exemption to include the 100-foot plume performance standard. Lastly, in order to enjoy the exemption, the operator is required to maintain an anemometer onsite. Options or guidelines for using District station data and/or cooperative data from nearby locations should be considered.

With respect to CEQA, VCAPCD is claiming that the rulemaking is categorically exempt as a regulatory action to protect natural resources and the environment under CEQA Sections 15307 and 15308. Therefore, no additional environmental analysis beyond the limited data provided in the draft Staff Report or public review under CEQA is necessary.

Although the categorical exemption to CEQA may apply, review of the environmental impacts that are discussed in the draft Staff Report shows that negative impacts on air quality have not been disclosed. Only water quality impacts are disclosed. This omission is normal for fugitive dust rulemaking but does not adequately describe the impact of fugitive dust control on air quality. For instance, the following activities contribute combustion contaminants, some of which are also air toxics (e.g. diesel exhaust particulate):

- Water truck activity and emissions will increase. For instance, the default URBEMIS2002 off-highway truck working 8 hr/day emits 22.86 lb/day of NO_x and 1.01 lb/day of PM-10. If water trucks operate an additional 10 hr/day county-wide due to PR55, then the rule would have a significant impact as compared to the VCAPCD 25 lb/day threshold.
- On-road truck trips will increase because some material will be displaced by water. If material moisture is increased by one percent (1%) due to PR55 and aggregate demand in Ventura County is 6.2 MMtpy, each ton of which requires 40 miles of truck travel, then the moisture increase will result in approximately 100,000 VMT/yr and generate approximately 10 lb/day of NO_x (HHD emissions of 17.5 g/VMT from EMFAC2007 assuming Ventura County fleet, 70 degrees, 50% relative humidity, average speed of 40 mph).
- Emissions from asphalt plants and other processes that dry aggregate will increase.
- Requiring daily sweeping results in engine emissions from the sweeper truck in route and on-site; as well as increased emissions from traffic congestion caused by the sweeper activity. Sweeper trucks are assumed to be medium duty trucks with emission characteristics of one gram of NO_x per vehicle mile traveled (1 g/VMT, EMFAC2007). On this basis, increase in sweeper truck activity greater than 11,340 VMT/day would result in exceedence of the 25 lb/day NO_x threshold.

It should be clear based on the list above that fugitive dust control measures can result in a potentially significant negative impact on air quality when compared to the VCAPCD thresholds. This, coupled with the fact that natural crustal particulate matter has been shown by EPA to be inherently less dangerous than smaller particles (e.g. ultrafine and fine particulate) generated by

*Mr. Stan Cowen
March 16, 2007*

urban sources should lead APCD to the conclusion that some fugitive dust control methods may be too costly from an ozone attainment (i.e. NOx) or air toxics emissions perspective.

In summary, PR55 is a good start towards a workable and reasonable rule. CalCIMA and WCE look forward to working through the above issues with District Staff. If you have any questions or comments, then please do not hesitate to contact me or John Hecht at 805.644.7976.

Respectfully submitted,

Scott D. Cohen, P.E., C.I.H.
Senior Engineer
West Coast Environmental and Engineering

cc: Stephen Bledsoe, CalCIMA
John Hecht, WCE

Appendix E.

Comment Letter from
Malzacher Ranch/Dr. Edo McGowan
on Draft EIR

Malzacher Ranch

F.H. MALZACHER

E.C. MALZACHER

(805) 525-2739



SANTA PAULA, CALIFORNIA U.S.A.



RECEIVED
VENTURA COUNTY
07 DEC 21 PM 12:16
A.P.C.D.

December 20, 2007

Stan Cowen
Air Quality Engineer
Ventura County Air Pollution Control District
669 County Square Drive
Ventura, CA 93003

RE: APCD Rule 55, Fugitive Dust

Dear Mr. Stan Cowen,

We are deeply concerned with the effects that fugitive dust have as a vehicle for pathogens. Our concern is real and we feel strongly that current illnesses inflicted on our family are a result of these pathogens from the current City of Santa Paula Wastewater Treatment Plant. The risk of greater infection and illness is increasing as there is currently a proposal to build a new Wastewater Treatment Plant within 100 feet of our home.

There is substantial evidence that fugitive dust is a vehicle for pathogens and I have attached the response from Dr Edo McGowan to support this claim.

In particular concern to our family is the fact that the proposed percolation ponds will be built less than 100 feet from our home. As discussed in Dr. Edo McGowan's comments and supporting documentation, there is substantial scientific support that gives evidence that fugitive dust is harmful to humans.

If you have any other questions or need additional documentation, please feel free to contact us at (805) 656-1760.

Sincerely,

Fred and Elaine Malzacher

RECEIVED
VENTURA COUNTY
08 JAN 10 PM 2:48
A.P.C.D.

January 10, 2008

Ventura County Air Pollution District
669 County Square Drive
Ventura, CA 93003

ATTN: Stan Cowen

Re: Addendum to letter

VENTURA COUNTY
ENVIRONMENTAL REPORT
REVIEW COMMITTEE
CASE NO. <u>DEIR</u>
EXHIBIT <u>B</u>
DATE <u>1-16-2008</u>

Dear Mr. Cowen,

This letter is an addendum to my prior letter concerning the Notice of Completion of a Draft Environmental Impact Report; Project Title Rule 55 Fugitive Dust. This review would include a review of the Water Recycling Facility and Fugitive Dust. In the DEIR of the Water Recycling Facility of Santa Paula "depending on the technology utilized, flaring ("burning") of methane gas generated in plant operations may be required"). My speculation is in the final EIR and in the functioning Water Recycling Facility, how does the City of Santa Paula plan to function without air pollution?

The percolation ponds in the original plan were to be located adjacent to my parcel on producing fruit from orchard (the map indicated "no information available"). The WRF percolation ponds would be 40' from my residence and 150' from the granny house residence. Families and the orchard are there 24/7 annually and will now have intimate proximity. "Fugitive dust is a vehicle for pathogens."



Elaine Malzacher
15325 Todd Lane
Santa Paula, CA 93060

To: Stan Cowen – Air Quality Engineer
Re: Comments on EIR for the APCD Rule 55, Fugitive Dust
Fm: Dr Edo McGowan

Stan,

First my credentials. I have a degree in medicine and a Ph.D. in water quality and am on a newly established national scientific panel (U.S. EPA/WERF) looking at pathogens, antibiotic resistance and pathogenesis in sewage sludge (biosolids). This is my area of expertise. Unless the EIR discusses in considerable detail the impacts and mitigation for dust generated by sewer plants, I would say it is deficient and thus does not allow decision-makers adequate information upon which to make a determination.

Fugitive dust is a vehicle for pathogens. The City of Santa Paula and the Ventura County Regional San District will be contributing to the load of fugitive dust within the county's airshed through the generation and transport of sewage sludge and processing of sewage. This has a potential adverse public health impact and thus needs to be discussed within the EIR.

The City of Santa Paula proposes to build a new sewer facility off Todd Road and the haulage of sewage sludge and its production and stock-piling will thus represent a nidus for dust generated pathogens. The other sewer plants operating within the county fall to the same argument. VCRSD also proposes to use sewage sludge as a source of daily cover for the Tolan Land fill. The use of this material may set up plumes of drifting dust. There is no doubt that sewage sludge contains abundant pathogens and pathogens that are antibiotic resistant. What also needs to be stated is the risk to agriculture from dust as a vehicle for phytopathogens. Additionally to the extent that sewer plants use Roundup or similar herbicides to kill weed seeds in sludge, this presents an issue for dust drift within agricultural areas.

Additionally, since the proposal for the City of Santa Paula's sewer plant assumes the use of several large percolation ponds, these will need to be periodically dried out to break up the bacterial scum on the bottom of the percolation ponds that over-time builds up and thus reduces percolation. This dried crust, when disked up will create dust. Since the crust is mainly dried bacteria and their cell fragments, the genetic material will present a public health problem for neighbors as well as down-wind city residents. Included within this dust will be the lipopolysaccharides (LPS) from the cell wall fragments. LPS is a major inflammatory initiator. Those with cystic fibrosis (CF) are particularly sensitive. Because this dust contains antibiotic resistant pathogens, these people with CF are especially vulnerable to treatment failure.

Organic dusts cause inflammatory reactions in the tissues exposed. This irritated tissue thus becomes greatly responsive to pathogenesis from pathogens found in the same dust. The lung and the cells lining the surface of the respiratory tract are the primary area where this irritation, hence pathogen interaction takes place. Many receptors have

been shown to react specifically on the presence of microorganisms that are ubiquitous elements in organic dusts. There is a great variability in the individual response to organic dusts. Almost 50% of Caucasians are hyporesponders to LPS exposure, and people with alpha-1-antitrypsin deficiency are hyperresponsive to organic dust exposure. The diseases resulting from organic dust exposures include asthma, allergy, hypersensitivity pneumonitis and toxic pneumonitis (organic dust toxic syndrome). The inflammation and the subsequent mechanism of disease need to be well discussed to aid decision-makers an adequate background for ascertaining public health impacts. Toxicological studies including human experimental exposures and ex vivo studies of cells are described need to be discussed within the EIR. Of particular importance are cellular reactions that are mediated through the attachment LPS and (1,3)-d-glucan to lipopolysaccharide binding protein, CD14 and Toll-like receptors. The relation between protein release and the gene activation needs review.

Because sewage sludge contains not only pathogens but also their genetic fragments (both antibiotic resistant genes and virulence islands) dust arising from a variety of sources warrants further analyses within the EIR.

Sewage sludge and its compost are often used as erosion control along roadways. This material, when getting onto the roadbed will become ground by the traffic to become part of the road dust. Thus one must look at the synergistic adverse effects accruing to the Ventura County severe nonattainment for ozone when combined with road dust, hence the impacts on human health.

There is the noted adverse impact of ozone on lung tissue and the respiratory system, hence public health. When the additional synergistic impacts of LPS and pathogens arising from sewage sludge are added, the impacts on public health warrant discussion, but are these impacts addressed within the EIR?

Entrained road dust acts synergistically with ozone. Thus while there may be attainment of ozone standards, this ignores the synergistic impacts between ozone and other materials. Accordingly, reaching a specified ozone level may have an insufficient beneficial impact on health. As these other synergistic constituents gain greater importance in human health, it may take less and less ozone to augment an acute or chronic impact on health. These impacts are potentially significantly adverse. Thus the EIR should provide a broader review of synergistic interactions on health.

Within this entrained dust, including road dust are numerous constituents that may be considered as carcinogenic. Others are irritants. Then there are the various pathogens (bacteria, viruses, fungi, and protozoa) many of which may contain and thus could transfer antibiotic resistance. Other constituents of road dust also adversely affect the functioning of the respiratory system through allergic reactions. That the respiratory tissues are irritated merely opens those surfaces to increased risk from pathogens. The process here is cyclic.

Within the heading of road dust one finds, as mentioned above, tire dust. This is material that is removed from the tires as they contact the road. The average amount of tire dust lost annually through wear has been estimated at 2.5 pounds per tire. Thus a 4-wheel vehicle will lose about 10 pounds of rubber per year. Estimates from Los Angeles put the aerosol load from tire dust at about 10,000 pounds *per day*. This is divided into microscopic latex particles, many of which will stay suspended for hours as they waif around and then move down wind. Many will reach the smallest recesses of the lung.

Much of this rubber dust is composed of latex and falls within the PM-10 to PM-2.5 or smaller range. Because these particles reach the deepest recesses of the lung, this exacerbates allergic reactions as well as asthma. The current medical literature indicates that this type of dust may actually be **initiating asthma** as well as exacerbating that condition. Asthma is a growing national health crisis. There is also, within the European medical literature, a sufficient number of papers to suggest that this type of dust becomes statically charged by exposure to the corona effect surrounding large power lines, lines that often parallel roadways. This remaining charge on dust particles causes them to preferentially adhere to moist lung tissue. Those living along transport corridors are subjected to heavy loads of this type of air pollution. Those affected most are children who, per body mass and metabolism, breathe about twice as much as adults. In addition the elderly are also amongst those most adversely impacted.

Of the school-aged children, those with asthma are at a significant adverse disadvantage academically. There are numerous studies in the medical and scientific literature to demonstrate this situation. Asthma affects their school performance and their behavior. These children are affected intellectually, emotionally, and physically, hence their academic accomplishments are diminished. If these children are atopic (prone to allergic reactions) and then placed on the less expensive but more common first generation antihistamine medications, this merely adds to their inability to effectively compete in school because of drowsiness. Other medications taken by allergic and asthmatic children have similar impacts.

There is also a tendency to place low income--low cost housing along transport corridors because of the reduced property cost. Thus, the section of society that might most often utilize this type of housing may also overlap with that portion of society that relies heavily on publicly subsidized medical care. This would also include sections of society that lack insurance for medical coverage. This broad group of people, out of necessity, will often let a medical condition go until it reaches a crisis state, a state that is much more costly to treat and may leave lingering damage. Thus, the impact is also one that should be of interest to land use planners and transportation planners.

A significant portion of the agricultural work force upon which Ventura County depends is within that socio-economic strata.

Here, I would also like to argue that transport corridors themselves are actually stationary sources, and thus could come under the purview of APCD. What, logically, makes a source stationary--versus mobile? A factory smokestack puffs out a pollutant, thus comes under scrutiny. The smokestack itself, if nothing is supplied to produce a pollutant, is merely an inert stack of brick and concrete. It is the material brought into the factory and combined within that factory that makes the smokestack an issue. The same logic can be applied to asphalt and concrete roadways. Asphalt itself is composed of rubber material, hence its wearing releases rubber as well as other materials that adversely impact health. Rubber is a complex mixture of toxins, reactive proteins and allergens. Other materials brought into the corridor contribute to the increased air risk.

For example, under the greening of government, the mandated procurement of composted biosolids (sewer sludge) for roadway maintenance and erosion control brings in large quantities of pathogens (many of which are antibiotic resistant) and respiratory irritants in the form of lipopolysaccharides (the cell wall of Gram negative bacteria which cause violent immune reactions and are a major portion of biosolids) and liming chemicals. Additionally, for areas irrigated with reclaimed sewer water, there is enough evidence in the scientific literature to raise questions about pathogen release and down-wind aerosols. These released pathogens, often containing resistant genes, can pass this genetic information to soil microbes. These soil microbes then become lending libraries for this genetic information. These become part of the road dust and are entrained to move down wind into adjacent areas.

Then there are the deposits from the vehicles themselves, tire wear, engine derived materials, dust from breaks, clutches, belt wear, and action of tires on the road surface. Added to this are the materials from the area that fall out as dust, bacterial and fungal spores or materials washed onto roadways, including right-of-way maintenance materials such as pesticides.

All these materials, which form a complex of irritants, are re-entrained daily. Thus this mix, which is unique to roadways, constitutes a stationary source of air pollution. Who is responsible for an evaluation of this source, and to whom does the regulatory responsibility fall? **This question should be answered within the EIR**—who is responsible and are there adequate safeguards, or is this something falling between the cracks?

As is noted above, the impacts from a variety of sources as well as their combination with ozone constitute air pollution and have adverse influences on health. What, if any, are the limits on the discussion of such combinations within the EIR? If the EIR is not able to discuss these issues, where is the forum?

SPECIFICS

Because of my limited time and resources, the specifics will be desegregated and merely supply the interested reader with some indicators of where additional information

might be found. I would be most pleased to assist agency staff look more deeply into these areas.

I'm working on the greening of government issue (see red below) of selling composted biosolids as bagged potting soil and similar issues where government agencies will be forced to purchase it.

The State of California is a major user of composted materials for roadway maintenance and erosion control. This then ties back to the air quality issues of road dust interacting with ozone and tire dust which contains a large percentage of latex rubber dust, a dust in particulate sizes that can enter the inner-most portions of the lung tissue (PM-2.5). This borrows on David Lewis' theory of chemical irritants found within sewage sludge synergizing the adverse effect of pathogens. If the radioactive material from certain areas is also added, (refer to Hugh Kaufman's testimony) then the impact on lung tissue may see a rise in lung cancers--ozone already causes this, thus it is at least additive, if not synergistic. The fungi that are pathogens and are now developing increased resistance to antimicrobials are also another issue in this. Additionally, latex is a major allergin and causes both asthma (growing crisis in the U.S.) and exacerbates asthma. Tire dust is mainly PM-10 to PM-2.5 latex particles. Thus the synergistic effect of ozone, other exhaust gasses, latex, and pathogens and possibly radioactive materials will increase once sewer sludge is added to the roadway maintenance. Thus in cases of erosion control (this is done to help reduce water from getting on the roadway and causing cars to hydro plane as well washing out roadways) the use of sewage sludge compost may see this material aerosolized and thus affect health of not only the transport corridor users but also those fall-out areas adjacent to the corridor.

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This action may potentially affect those ``procuring agencies"--a term defined in RCRA section 1004(17)--that purchase the following: composts made from manure or biosolids and fertilizers made from recovered organic materials. For purposes of RCRA section 6002, procuring agencies include the following: (1) Any federal agency; (2) any state or local agencies using appropriated federal funds for a procurement; or (3) any contractors with these agencies (with respect to work performed under the contract). The requirements of section 6002 apply to such procuring agencies only when procuring designated items where the price of the item exceeds \$10,000 or the quantity of the item purchased in the previous year exceeded \$10,000. Potential regulated entities for this rule are shown in Table 1.

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Treatment failure in invasive aspergillosis: susceptibility of deep tissue isolates following treatment with amphotericin B.

Paterson PJ, Seaton S, Prentice HG, Kibbler CC.

Departments of Microbiology and Haematology, Royal Free and University College Medical School, Royal Free Campus and Royal Free Hospital, Pond Street, London NW3 2QG, UK.

OBJECTIVES: To determine whether treatment failure in invasive aspergillosis (IA) is the result of resistance of *Aspergillus* spp. isolates to amphotericin B. **METHODS:** Six *Aspergillus fumigatus* and six *Aspergillus flavus* isolates cultured from deep tissue biopsies in 11 patients with haematological malignancies during 1991-1998 were tested. A method based on the NCCLS M38-A broth microdilution method, with colorimetric determination of MICs, was used to determine the MICs of amphotericin B and itraconazole. **RESULTS:** All *A. fumigatus* isolates were susceptible to amphotericin B (MIC 0.25-0.5 mg/L), as were three *A. flavus* isolates (MIC 1 mg/L), but three were less susceptible (MIC 2 mg/L). All isolates were susceptible to itraconazole (MIC 0.125-0.25 mg/L). All patients had been treated with amphotericin B, having received a median of 12 days of treatment when the tissue was obtained. **CONCLUSION:** The difficulty in treating IA may not be because of the susceptibility of the isolates, but because of poor penetration of antifungal agents into infected tissue. ***Aspergillus* spp. invade blood vessels causing thrombosis and tissue infarction, and therefore it may be difficult for antifungal drugs to exceed MICs in infected tissues.** This highlights the need for different treatment strategies, such as surgery and the administration of cytokines. *J Antimicrob Chemother.* 2003 Nov;52(5):873-6. Epub 2003 Sep 30.

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Microbial characterization during composting of municipal solid waste.

Hassen A, Belguith K, Jedidi N, Cherif A, Cherif M, Boudabous A.

Laboratoire Eau et Environnement, Institut National de Recherche, Scientifique et Technique, Cite Mahrajene, Tunis, Tunisia.

This study investigates the prevailing physico-chemical conditions and microbial community; mesophilic bacteria, yeasts and filamentous fungi, bacterial spores, *Salmonella* and *Shigella* as well as faecal indicator bacteria: total coliforms, faecal coliforms and faecal *Streptococci*, present in a compost of municipal solid waste. Investigations were conducted in a semi-industrial pilot plant using a moderate aeration during the composting process. Our results showed that: (i) auto-sterilization induced by relatively high temperatures (60-55 degrees C) caused a significant change in bacterial communities. For instance, *Escherichia coli* and faecal *Streptococci* populations decreased, respectively, from 2×10^7 to 3.1×10^3 and 10^7 to 1.5×10^3 cells/g waste dry weight (WDW); yeasts and filamentous fungi decreased from 4.5×10^6 to 2.6×10^3 cells/g WDW and mesophilic bacteria were reduced from 5.8×10^9 to 1.8×10^7 bacteria/g WDW. On the other hand, the number of bacterial spores increased at the beginning of the composting process, but after the third week their number decreased notably; (ii) *Salmonella* disappeared completely from compost by the 25th day as soon as the temperature reached 60 degrees C; and (iii) the bacterial population increased gradually during the cooling phase. While *Staphylococci* seemed to be the dominant bacteria during the mesophilic phase and at the beginning of the thermophilic phase, bacilli predominated during the remainder of the composting cycle. The

appearance of gram-negative rods (opportunistic pathogens) during the cooling phase may represent a serious risk for the sanitary quality of the finished product intended for agronomic reuse. Compost sonication for about 3 min induced the inactivation of delicate bacteria, in particular gram-negatives. By contrast, gram-positive bacteria, especially micrococcus, spores of bacilli, and **fungal propagules survived, and reached high concentrations in the compost.**

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Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution.

Pope CA 3rd, Burnett RT, Thun MJ, Calle EE, Krewski D, Ito K, Thurston GD.

Department of Economics, Brigham Young University, 142 FOB, Provo, UT 84602, USA.
cap3@email.byu.edu

CONTEXT: Associations have been found between day-to-day particulate air pollution and increased risk of various adverse health outcomes, including cardiopulmonary mortality. However, studies of health effects of long-term particulate air pollution have been less conclusive. OBJECTIVE: To assess the relationship between long-term exposure to fine particulate air pollution and all-cause, lung cancer, and cardiopulmonary mortality. DESIGN, SETTING, AND PARTICIPANTS: Vital status and cause of death data were collected by the American Cancer Society as part of the Cancer Prevention II study, an ongoing prospective mortality study, which enrolled approximately 1.2 million adults in 1982. Participants completed a questionnaire detailing individual risk factor data (age, sex, race, weight, height, smoking history, education, marital status, diet, alcohol consumption, and occupational exposures). The risk factor data for approximately 500 000 adults were linked with air pollution data for metropolitan areas throughout the United States and combined with vital status and cause of death data through December 31, 1998. MAIN OUTCOME MEASURE: All-cause, lung cancer, and cardiopulmonary mortality. RESULTS: Fine particulate and sulfur oxide--related pollution were associated with all-cause, lung cancer, and cardiopulmonary mortality. Each 10-microg/m(3) elevation in fine particulate air pollution was associated with approximately a 4%, 6%, and 8% increased risk of all-cause, cardiopulmonary, and lung cancer mortality, respectively. Measures of coarse particle fraction and total suspended particles were not consistently associated with mortality. CONCLUSION: Long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. JAMA 2002 Mar 6;287(9):1132-41

Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults.

Pope CA 3rd, Thun MJ, Namboodiri MM, Dockery DW, Evans JS, Speizer FE, Heath CW Jr.

Department of Environmental Health, Harvard School of Public Health, Boston, Massachusetts.

Time-series, cross-sectional, and prospective cohort studies have observed associations between mortality and particulate air pollution but have been limited by ecologic design or small number of subjects or study areas. The present study evaluates effects of particulate air pollution on mortality using data from a large cohort drawn from many study areas. We linked ambient air pollution data from 151 U.S. metropolitan areas in 1980 with individual risk factor on 552,138 adults who resided in these areas when enrolled in a prospective study in 1982. Deaths were ascertained through December, 1989. Exposure to sulfate and fine particulate air pollution, which is primarily from fossil fuel combustion, was estimated from national data bases. The

relationships of air pollution to all-cause, lung cancer, and cardiopulmonary mortality was examined using multivariate analysis which controlled for smoking, education, and other risk factors. Although small compared with cigarette smoking, an association between mortality and particulate air pollution was observed. Adjusted relative risk ratios (and 95% confidence intervals) of all-cause mortality for the most polluted areas compared with the least polluted equaled 1.15 (1.09 to 1.22) and 1.17 (1.09 to 1.26) when using sulfate and fine particulate measures respectively. Particulate air pollution was associated with cardiopulmonary and lung cancer mortality but not with mortality due to other causes. Increased mortality is associated with sulfate and fine particulate air pollution at levels commonly found in U.S. cities. The increase in risk is not attributable to tobacco smoking, although other unmeasured correlates of pollution cannot be excluded with certainty. (Am J Respir Crit Care Med 1995 Mar;151(3 Pt 1):669-74.)

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Lung cancer is known to associated with air pollution with increased risks in the range 1.3 to 2.5 (Katsouyanni & Pershagen 1997). Corona ions emitted

from high voltage powerlines increase the charge state of pollutant aerosol particles in the air. Aerosols in the size range 20 to 200 nm are of special interest,

especially those containing PAHs such as benzo[a]pyrene. There is evidence that in this size range the effect of single charges on aerosols is sufficient to

increase the deposition of inhaled aerosols in the tracheobronchial lung region by a factor of 2 to 3 (Cohen et al 1998).

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----- Original Message -----

From: "Gene Shinn" <eshinn@usgs.gov>

To: <edomcgowan@earthlink.net>

Cc: <cholmes@usgs.gov>; <ginger_garrison@usgs.gov>

Sent: Monday, November 24, 2003 6:47 AM

Subject: dust and lightning

> Dear Edward. The information regarding a potential connection between
> electrical coronas/lightning and dust is very interesting. Our
> preliminary work shows a high concentration of radiogenic beryllium
> (Be-7, half life 53 days) in African and volcanic dust. Be-7 is
> naturally generated in the upper atmosphere and falls out in rainfall
> at relatively low levels. It also occurs in dust but at many orders
> of magnitude greater. We have therefore wondered if a static charge
> is causing it to bind with dust particles. Beryllium is toxic and its
> isotope Be-7 emits gamma radiation. For this reason your information
> is very interesting. I would be interested in any additional
> information you may have. Thank you very much. Gene

((((((((((((((((McGowan's comment--fallout onto roadways and then resuspension with passing traffic?))))))))))

. Within 15 m of an installation, elevated SMRs were seen for lung cancer, all leukaemias, other lymphatic

neoplasms and all respiratory disease. Only the result for lung cancer was statistically significant (odds ratio = 2.15, 95% CI = 1.18 - 3.61) and this was

mainly driven by an effect in women. The odds ratios for lung cancer showed a consistent gradient of increasing excess mortality with proximity to the line,

but at distances greater than 15 m these were not statistically significant.

Lung cancer is known to associated with air pollution with increased risks in the range 1.3 to 2.5 (Katsouyanni & Pershagen 1997). Corona ions emitted

from high voltage powerlines increase the charge state of pollutant aerosol particles in the air. Aerosols in the size range 20 to 200 nm are of special interest,

especially those containing PAHs such as benzo[a]pyrene. There is evidence that in this size range the effect of single charges on aerosols is sufficient to

increase the deposition of inhaled aerosols in the tracheobronchial lung region by a factor of 2 to 3 (Cohen et al 1998).

The risk calculation takes the affected population as living within 400 metres of high voltage powerlines, downwind of the prevailing south-westerly wind.

An average 15% aerosol charging by single charges is assumed to lead to a 30% increase in lung deposition of inhaled aerosols. The average male/female

lung cancer rate in the UK is taken to be 74 per 100,000 per year. The number of people living within 400 m of 132, 275 and 400 kV powerlines is taken to

be $4.6\% \times 6 \times 10^7$ people = 2.76×10^6 people. A 30% increase in risk downwind compared with upwind of powerlines is assumed. This yields 306

cases

annually. The range quoted in the table of 250 - 400 cases annually takes into account two possibilities: (i) that on average corona ion effects may not

extend to 400 m from powerlines or (ii) that a contribution to risk in those living upwind of the prevailing south-westerly wind should be included.

This risk estimate is explained in more detail in Fewes et al (2001).

Condition

References

Key findings/Risk assessment

Predicted excess cases annually in
the UK near high voltage powerlines

Lung cancer

McDowall, 1986

Katsouyanni & Pershagen, 1997

Risk assessment based on increased exposure to air
pollution via corona ion effects.

250 - 400 cases

Other illnesses associated with air pollution

Seaton (1995) has discussed the range of illnesses associated with air pollution, especially respiratory and cardiovascular disease. If these are increased near

powerlines as a result of increased lung deposition of inhaled aerosols

charged by corona ions, then the number of excess cases could reach several thousand. Not all of these would be fatal.

Condition

References

Key findings/Risk assessment

Predicted excess cases annually in
the UK near high voltage powerlines

Other illnesses associated with air
pollution

Seaton et al, 1995

Risk assessment based on increased exposure to air
pollution via corona ion effects.

~ a few thousand cases

Suicide and Depression

The literature contains a number of papers associating both suicide and depression with exposure to magnetic fields, including near powerlines.
Increased

risk of both suicide and depression are both considered biologically plausible either by reduced production of melatonin by magnetic fields or by the

magnetic field induction of electric fields in the body. A discussion may be found in Wijngaarden et al (2000).

The literature reveals a number of features:

1. A general consistency that both suicide and depression are associated with power frequency magnetic field exposure. Some studies also hint at an

association with power frequency electric fields.

2. A threshold effect occurring at low magnetic field exposures, $\sim 0.1 \mu\text{T}$. Such a low threshold would embrace exposures near all types of powerlines not

merely those at 132 kV and above.

3. Occupational studies appear to show lower effects than for residential studies. This would be consistent with a mechanistic effect associated with reduced

melatonin production, which occurs mainly at night and therefore has a larger effect on chronically exposed populations.

(i) Suicide

The average suicide rate for males and females is taken to be 9.6 per 100,000 per year. An exposure threshold of $0.1 \mu\text{T}$ is assumed which is effective up

to 150 m either side of 132, 275 and 400 kV powerlines. This embraces 1.05% of the population. The exposed population is therefore $1.05\% \times 6 \times 10^7 =$

630,000 people. Assume the risk to be doubled. This would imply 60 cases annually.

(ii) Mild depression

Again take an exposed population of 630,000 people. Some estimates suggest that 15% of the population experience an episode of mild depression each

year. If there is a 40% increase in risk above $0.1 \mu\text{T}$, this would lead to a large number of cases of mild depression associated with magnetic field

exposure. The value quoted in the table of 9,000 cases annually is a conservative estimate.

Condition

References

Key findings/Risk assessment

Predicted excess cases annually in
the UK near high voltage powerlines

Suicide and Depression

Reichmanis et al, 1979

Perry et al, 1981

Perry et al, 1989

Poole et al, 1993

Savitz et al, 1994

Verkasalo et al, 1997

Beale et al, 1997

van Wijngaarden et al, 2000

Considered biologically plausible via magnetic field
exposure. Apparent low threshold ~ 0.1 μ T.

40% increase in suicide in West Midlands; small
increase in general depressive illnesses; 2 to 3-fold
increase in severe depression and a 2 to 3.6-fold
increase in suicide among electric utility workers.

(i) Suicide

60 cases

(ii) Depression

Up to 9,000 cases of mild depression

[Click here to see full table](#)

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"...confirms that the sewage-contaminated environments in an important
>> storage place of pathogenic fungi, mostly from the opportunistic
>> subgroup...":
>> Reference Type: Journal Article
>> Record Number: 16612
>> Author: Ulfig, K.
>> Year: 1994
>> Title: [The occurrence of keratinolytic fungi in the polluted
>> environment of the Labedy District in Gliwice]
>> Journal: Rocznik Panstw Zakl Hig
>> Volume: 45
>> Pages: 337-46
>> Abstract: This study was undertaken to find relationships between the
>> degree of bacteriological contamination with qualitative
>> composition of potentially pathogenic keratinolytic fungal population in
>> soil, sediment and air samples from the Labedy district in
>> Gliwice (Poland). The examined soil samples were characterized by the
>> predominance of *Botryotrichum piluliferum*,
>> *Chrysosporium* anamorph of *Arthroderma curreyi*, *Myceliophthora* anamorph
>> of *Ctenomyces serratus*, *Chrysosporium pannicola* and *Trichophyton ajelloi*.
>> These species are typical for keratinolytic mycoflora in moderate
>> climate soils, and their abundance was certainly resulted from the
>> assembly of keratin remains in the soil environment. In the light of the
>> weak bacteriological and
>> mycological differentiation of the examined soil samples, however, it is
>> difficult to determine categorically the extent to which the
>> remains were originated from sewage via soil flooding by sewage or air
>> transportation, or from the local human and animal
>> population. Subsequently, the population of keratinolytic fungi in
>> sediments was found to be clearly dependent of the degree of
>> water contamination with sewage. In badly polluted sediments,
>> *Chrysosporium pannicola*, *Chrysosporium* anamorph of
>> *Aphanoascus fulvescens*, *Chrysosporium keratinophilum*, *Trichophyton*
>> *ajelloi* and *Microsporum cookei* were prevalent species. Keratinolytic
>> fungi were only a small part of *airborne fungal* population in sewage
>> bioaerosoles. *Geomyces pannorum*, a soil species better known by its
>> cellulolytic than keratinolytic properties, predominated in air samples.
>> Some pathogenic species, such as *Aspergillus flavus*, *Aureobasidium*

>> pullulans, Chysoorium anamorph of Aphanoascus fulvescens, Candida spp.,
>> Geotrichum candidum, Microsporium canis, Sporothrix schenckii and
>> Trichosporon beigellii, were recovered in the present study. *This
>> confirms that the sewage-contaminated environments in an important
>> storage place of pathogenic fungi, mostly from the opportunistic
>> subgroup.*

>>

>> Reference Type: Journal Article

>> Record Number: 12306

>> Author: Schomburg, I.; Muller, H. E.

>> Year: 1984

>> Title: [Significance of antibiotic-forming microorganisms in biological
>> waste water clarification]

>> Journal: Zentralbl Bakteriol Mikrobiol Hyg [B]

>> Volume: 179

>> Pages: 162-9

>> Abstract: Streptomyces spec. producing antibiotics were detected very
>> seldom in the wastewater pretreatment plant of

>> Braunschweig. However, Bacillus spec. producing antibiotics are common.

>> There are about one permille of the total population of bacteria in

>> wastewater (Fig. 1). Reflecting the total number of bacteria, the

>> psychrophilic microorganisms growing at 20 degrees C increase more

>> during the oxidation step of wastewater treatment than the mesophilic

>> bacteria growing at 30 or 37 degrees C. But reflecting the bacilli the

>> strains producing antibiotics growing at 30 or 37 degrees C propagate

>> stronger than the psychrophilic group (Fig. 2). About 90% or more of a

>> total of 194 isolated Bacillus strains producing antibiotics showed

>> antibiotic activity against the tested grampositive bacteria Listeria

>> monocytogenes and Staphylococcus aureus. Only few strains were active

>> against Candida albicans, E. coli, Klebsiella pneumoniae, Pseudomonas

>> aeruginosa, and Salmonella typhimurium (Fig. 3, 4, and Table 1). During

>> the summer (July) the percentage of strains producing antibiotics

>> against gram positive bacteria was higher than in the winter (January)

>> (Fig. 4). Also the deep freezing of samples increased the percentage of

>> antibiotic producers (Fig. 2). Some species were isolated even only from

>> freezed and again thawed samples (Table 1).

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[Controversy concerning optimal prophylaxis and empirical antifungal therapy in immunocompromised patients]

[Article in Polish]

Zielinska E.

This article presents actual major problem about a steady increase in frequency of opportunistic invasive fungal infections (IFIs) in immunocompromised patients. However, there still remains much uncertainty regarding the best methods for establishing the diagnosis of most IFIs. An international consensus, that defining opportunistic IFIs proposed three levels of probability: "proven", "probable", and "possible". Practising physicians approach this uncertainty by prophylaxis and antifungal empirical therapy. Unfortunately, up to now we dispose only few antifungals compounds and all have narrow of therapeutic windows. This article reviews the therapeutic options in chemoprevention and antifungal therapy. Fluconazole and itraconazole are the first durable alternatives to polyenes in chemoprophylaxis. However their use remains controversial as debate continues over both their effectiveness and their potential to select out resistant *Candida* sp. Amphotericin B is the "gold" standard for the treatment both empirical and proven IFIs, but this drug is frequently associated with severe nephrotoxicity. The lipid formulations of amphotericin B enable higher dosages to be administered with lower incidences of side effects but its effectiveness is not sufficient. It is to be hoped that rationally designed clinical trials with the new compounds, such as for example echinocandins will lead to improved prevention and treatment of IFIs. *Przegl Epidemiol.* 2003;57(2):299-307.

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Survival of *E. coli* and *Salmonella* populations in aerobic thermophilic composts as measured with DNA gene probes.

Droffner ML, Brinton WF.

Woods End Research Laboratory, Mt. Vernon, ME 04352, USA.

Aerobic, thermophilic composting is a widely practiced method for disposal of organic wastes. The wastes which are composted include biosolids from waste water treatment plants (WWTP), and biowastes (food scraps and yardwaste). Important hygiene issues are involved in composting since many potential pathogens may be present in the fresh wastes. In this study, the survival of *Salmonella* and *Escherichia coli* is examined during aerobic composting of municipal solid wastes, municipal wastewater sludge and biowastes. A laboratory compost was prepared by inoculating with 10(7) *Salmonella typhimurium* Q and *Escherichia coli* B. In both industrial and laboratory trials, gene probes were used to determine at what time during the composting and at what temperature these bacteria became undetectable. **It was observed that *Salmonella* and *E. coli* survived for 59 days at about 60 degrees C in an industrial compost. The bacteria became undetectable after the temperature decreased from 62 degrees C to about 40 degrees C in the compost curing. The bench scale trials showed that *E. coli* B survived for at least 9 days at 60-70 degrees C in a biowaste (food waste) compost or a waste water sludge compost. *Salmonella typhimurium* Q survived for at least 9 days over 60 degrees C in the food biowaste compost and at least 5 days in the waste water sludge compost.** Data collected show that the temperature or the time of high temperature is difficult to correlate to the destruction of the pathogen, *Salmonella*, or the pathogen indicator, *E. coli*. These results suggest that

the mechanism for removal of these microorganisms during aerobic composting is complex and not simply the result of a thermal physical environment. Zentralbl Hyg Umweltmed. 1995 Jun;197(5):387-97.

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Microbial disinfection capacity of municipal solid waste (MSW) composting.

Deportes I, Benoit-Guyod JL, Zmirou D, Bouvier MC.
GEDEXE, Meylan, France.

The disinfection capacity of a municipal solid waste (MSW) composting plant (Siloda) has been evaluated. In spring and summer, MSW was followed during the composting process from raw material to mature compost and long-term storage (1 year). Ascaris eggs, Salmonella, Shigella, total streptococci, faecal streptococci, total coliforms, faecal coliforms and Escherichia coli were studied. Disinfection was successful in terms of a decrease in faecal contamination indicators and disappearance of faecal pathogens. Faecal coliform concentration in raw waste reached 2.1×10^8 cfu g⁻¹ dry weight in spring (CI 95%: 5.2×10^7 - 3.4×10^8) and 7.2×10^8 cfu g⁻¹ dry weight (1×10^8 - 1.7×10^9) in summer, and fell to less than 100 cfu g⁻¹ dry weight within 20 d. Faecal streptococci concentrations reached 8.7×10^8 cfu g⁻¹ dry weight (3.7×10^8 - 1.3×10^9) in spring and 2.0×10^9 cfu g⁻¹ dry weight (5.6×10^8 - 3.4×10^9) in summer, and fell to 8.7×10^4 cfu g⁻¹ dry weight (6.9×10^4 - 1.0×10^5). No seasonal pattern of contamination, mainly of animal origin, was observed. Microbiological quality of finished compost depends on the storage conditions. Therefore, the storage stage should be viewed as part of the composting process. Monitoring disinfection capacity of MSW composting needs to combine several microbial populations. J Appl Microbiol. 1998 Aug;85(2):238-46.

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Data from Europe indicate that the field effect around such generating plants and their high tension lines can ionize the air and hence particulate matter within that air. The distances are impressive--400 feet for example. If wind then shifts this cloud, the distance can be extended. When ionized, these particles, once inhaled, are electrostatically attracted to lung tissue. The deeply respirable portion and even the larger particulates thus do not wash out on exhalation. The attached paper discusses the issue with vehicular emissions and tire dust. The relationship between EMF and vehicle generated dust is one that carries an association with increased rates of cancer. Children are at greater risk. Thus by not evaluating these relationships your agency may fall below the tests under CEQA as well as the ignoring the potential for added risks of cancers accruing to the interaction of air pollution and EMF. The Danish cancer group has noted an association between EMF, air pollutants and certain forms of cancer in children. The EMF at the site may accrue to at least two sources, the generators themselves and then the high tension lines. On top of that, the RF traffic that controls the remote site warrants consideration. There are several sources of air pollution: rail, highway, and non-highway roadway. The level of respirable particulate matter on moderately traveled roadways is about 5000 particles per cubic meter. Much of this is potentially dielectric rubber and of a size that will reach the deepest lung tissue. Thus, if ionized by the EMF, it becomes yet more risky for the children. EMF has now been demonstrated to break DNA. This then adds risk to the immune system. Thus the synergistic effects of air pollutants and EMF are additive to cancer risk factors.

Air Quality and retarded lung development and cancer in children—some thoughts related to the traffic..

Although generally unrecognized by many planners, air pollution arising from vehicular traffic, especially tire dust, has a major adverse effect on lung tissue, especially on the development of children's lungs. This has become a critical public health issue. Thus, the effects of city and county planning on traffic count and engineering, hence exhaust and tire dust, weigh heavily on the health of citizens.

The discussion below proposes that by allowing expanded development within Santa Barbara County, with accompanying increased air and surface traffic, there will follow increased health risks for the public, especially the children. The correlation between increased traffic and lung damage can no longer be ignored. In addition to setting the stage for heart, lung, and skin damage in children, it is also argued that there is an association with damage to the immune system in children and the unborn during pregnancy. This latter issue may set the stage for cancer. When discussing children in this situation, are we setting up conditions that will adversely affect our children's health? If we are, then we are robbing the future from those who can not defend themselves.

Allergic reactions to latex in general, and from tire dust in particular, may be increasing for several reasons. As California's population increased so did the cars, hence tires. Additionally the tires themselves have changed and this is a major factor. In the 1970s the tire industry along with USEPA had determined that the particle size of the rubber-dust was too large to be respired and cause pathology. That study preceded the issue of latex allergy. Additionally, with newer tire materials, the conclusions of 1970s study on particle size are no longer valid. Much of this change arrived with the radial tire. The dust particles from radials, as compared to the outmoded bias tire are characteristically smaller, hence more easily respired into the deep lung tissues. Further, the percent of latex in radial tires has been increasing. Accordingly, 60% of these particles can now reach the deep portions of the lungs, thus enhancing the risk for pathological damage.

Air pollution contributes to lung disease, including respiratory tract infections, asthma, and lung cancer. Lung disease claims close to 335,000 lives in America every year and is the third-leading cause of death in the United States. Over the last decade, the death rate for lung disease has risen faster than that of any of the top five causes of death. (cite: [American Lung Association Fact Sheet: Outdoor Air Pollution](#)-webpage).

An estimated 17 million Americans now have an allergic reaction to latex. Latex, as an allergen, cross reacts with several other ubiquitous materials—including certain common foods and pollens. The genetically engineered foods are designed with their built in "natural" pesticides. Some of the genetically engineered foods are now proving to have components that readily cross react with latex (cite: McGowan & Tesiorowski) and these cross-reactions effect those with latex allergies. Thus once sensitized to latex, the individual is subjected to a wide array of materials that can drive the allergic reaction to higher and more dangerous levels. As the background to latex allergies increases, which it is currently, these and other cross reactants, specifically tire dust may preclude a normal life for an increasingly large and growing number of citizens. At some point the allergic reaction can reach a critical point resulting in anaphylactic shock and death.

Each tire releases approximately 2.5 pounds of dust per year. In Los Angeles, it has been estimated that, at least 5 tons of tire dust is released into the air each day. In the early 1990s an analysis was conducted of air particulates near moderately traveled roads. The results indicated that each cubic meter of air (what one adult might consume in about 60 minutes) contained approximately 4000 to 7000 individual tire-dust fragments. Of these about 60% were of the size-range reaching the deepest portions of the lung. When these fragments were examined chemically, and by mass spectroscopy, they were shown to contain latex. Furthermore, they were

shown to produce allergic reactions, comparable in every way to the allergic reactions caused by dust from latex gloves. (cites: Williams PB, Buhr MP, Weber RW, Volz MA, Koepke JW, Selner JC. Latex allergen in respirable particulate air pollution. (J Allergy Clin Immunol 1995 Jan;95(1 Pt 1):88-95.) Williams PB, Akasawa A, Dreskin S, Selner JC. Respirable tire fragments contain specific IgE-binding and bridging latex antigens. (Chest 1996 Mar;109(3 Suppl):13S).

Pope, et al reported on fine particle air pollution which now kills an estimated 60,000 Americans in cities each year. (cite: Pope CA 3rd, Thun MJ, Namboodiri MM, Dockery DW, Evans JS, Speizer FE, Heath CW Jr. Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults. Am J Respir Crit Care Med 1995 Mar;151(3 Pt 1):669-74.)

There also appears to be an association between air pollution and the heart, as seen in cardiopulmonary death as well as lung cancer death. (cites: Pope CA 3rd, Verrier RL, Lovett EG, Larson AC, Raizenne ME, Kanner RE, Schwartz J, Villegas GM, Gold DR, Dockery DW. Heart rate variability associated with particulate air pollution. Am Heart J 1999 Nov;138(5 Pt 1):890-9. Pope CA 3rd, Burnett RT, Thun MJ, Calle EE, Krewski D, Ito K, Thurston GD. Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. JAMA 2002 Mar 6;287(9):1132-41.)

It is interesting also to review literature from nations that have governmentally supplied health care. These governments have a direct interest in reducing disease. Unlike the United States, these governments pay the majority of health care bills and thus have a vested interest in the health of their citizens.

Recent studies in Holland have suggested that long-term exposure to low levels of particulate matter air pollution is associated with increased mortality, especially due to cardio-pulmonary disease (cite: Hoek G, Fischer P, Van Den Brandt P, Goldbohm S, Brunekreef B. Estimation of long-term average exposure to outdoor air pollution for a cohort study on mortality. (J Expo Anal Environ Epidemiol 2001 Nov-Dec;11(6):459-69).

The Danish Cancer Society, Institute of Cancer Epidemiology entertained the hypothesis that exposure to traffic-related air pollution increases the risk of developing cancer during childhood. In its report, the risk of lymphomas increased by 25% and 51% for a doubling of the concentration of benzene and nitrogen dioxide, respectively, during the pregnancy. (cite: Raaschou-Nielsen O, Hertel O, Thomsen BL, Olsen JH. Air pollution from traffic at the residence of children with cancer. (Am J Epidemiol. 2001 Mar 1;153(5):433-43.)

A case-referral study to test the hypothesis that exposure to motor vehicle exhaust increases the risk of childhood cancer was also conducted by the Danish Cancer Society, Institute of Cancer Epidemiology. This study combined data on residential electromagnetic field exposure and childhood cancer. There were 142 cases of childhood cancer identified, including 39 cases of leukemia and 33 cases of central nervous system tumor. The results indicated an association between childhood cancer and motor vehicle exhaust, although the number of cases was small. (cite: Feychting M, Svensson D, Ahlbom A. Exposure to motor vehicle exhaust and childhood cancer. Scand J Work Environ Health 1998 Feb;24(1):8-11.)

A recent report, presented at the 10th Congress of the European Academy of Dermatology, looked at skin allergies in boys and girls. It indicated that girls living within 150 feet of a busy street (boys were not found to be effected) were almost twice as likely to develop allergic (atopic) skin reactions as those living beyond 150 feet. (Cite: Jancin B. Traffic Pollution Raises Atopic Eczema Risk in Girls. Skin & Allergy News 2002 Apr;33(4):48). This was preceded by a paper in the Journal of the American Academy of Dermatology on the costs in treating atopic skin diseases—i.e., allergic issues. The problem in children is estimated to include 17% of the population and persists into adulthood in 60% of these. Cost figures range up to \$ 3.8 billion annually. This figure, however, does not include direct and nondirect costs related to issues other than billed medical services, such reduced quality of life or diminished earning capacity. (cites:

Ellis CN, Drake LA, Pendergast MM, et al. Cost of atopic dermatitis and eczema in the United States. *J AAD* 2002 Mar; 46(3):361-70. See also: Kemp A. Atopic eczema: its social and financial costs. *J Paediatr Child Health* 1999;35:229-31. Su J, Kemp A, Varigos T. Atopic eczema: its impact on the family and financial costs. *Arch Dis Child* 1997; 28:159-62.)

Others discussing traffic dust, have reported on steroid resistant asthma and the associated mortality in children. Additionally, there seems to be a relationship between an inflamed respiratory tract tissues and ease of viral attachment to these raw tissues. For many parents and their children, there is the recurrent issue of acute otitis media. Virus-induced inflammation in the nasopharynx is crucial in the pathogenesis of acute otitis media.

I would also like to tie together two other recent publications in the medical and scientific literature. Both relate to air quality.

The first is a report in the *American Journal of Respiratory and Critical Care Medicine*, which demonstrated that children in increasingly dirty air show a progressive reduction in lung growth function. The major components were particulates and oxides of nitrogen (NOX), i.e., vehicle exhaust. The second paper from the *Journal of Environmental Health (JEH)* discusses exacerbation of allergies related to rubber products.

Bringing the above cited papers together, I can forcefully argue that vehicle exhaust or road dust which has a high content of tire particulate matter will be major factors affecting the health of children.

The issue arises from several aspects. Although the emission per vehicle may be dropping, the volume of vehicle related air pollution may not. This may accrue to the added fuel burned by SUVs, the increase in diesel engines, as well as a greater number of vehicles. The number of trips and distances traveled as we expand development and commerce into the Goleta/Elwood/Gaviota area and surrounding environs will increase the amount of road particulate matter, NOx from exhaust, and rubber dust. If there is further development, especially at the level envisioned by the airport and projected National Parks, the road dust would proportionately increase. Additionally, as the roads become yet more congested, the levels of pollution will rise, especially from the bumper to bumper stop and go we are now experiencing between Goleta and surrounding centers.

Here are some of the other associated costs. The impact on the developing lung is later seen in a higher susceptibility to adult chronic respiratory and heart problems. Thus, the cardio-pulmonary system is at higher risk.

As the severity of lung, heart and skin problems increases one would expect an added cost accruing to the county's health care program. Generally, the less affluent are housed closer to traffic arteries. These people have fewer resources and thus may rely to a greater extent on public systems for care. For the schools one may expect reduced academic achievement and attendance, and for those in later life (faculty) increased losses from work. Canizares, et al discuss the costs from nonattendance at dermatology clinics. The figure for missed appointments averaged 20%, and often reached one third. This detractor that must be recouped in higher overall health care costs. Thus again there are substantial added costs to the system arising from the externalities of traffic derived pollution. >From the aspect of quality of life, there would be an associated negative at some point, especially from increased cancers. Unfortunately these negative points are often reached only after considerable damage had occurred, at times irreversible damage.

The mechanisms that will reduce road trips and traffic will decrease the above potential problems. It would seem incumbent upon elected decision-makers to gain the necessary perspective to consider the eventuality and impact on children and other citizens. Without this perspective there

can be little guidance. No one can know at what point this will effect the health of children, but it would be reckless to ignore the prospect.

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Pope CA 3rd, Verrier RL, Lovett EG, Larson AC, Raizenne ME, Kanner RE, Schwartz J, Villegas GM, Gold DR, Dockery DW. Heart rate variability associated with particulate air pollution. Am Heart J 1999 Nov;138(5 Pt 1):890-9

Brigham Young University, Provo, Utah, USA.

BACKGROUND: Epidemiologic studies have linked fine particulate air pollution with cardiopulmonary mortality, yet underlying biologic mechanisms remain unknown. Changes in heart rate variability (HRV) may reflect changes in cardiac autonomic function and risk of sudden cardiac death. This study evaluated changes in mean heart rate and HRV in human beings associated with changes in exposure to particulate air pollution. **METHODS:** Repeated ambulatory electrocardiographic monitoring was conducted on 7 subjects for a total of 29 person-days before, during, and after episodes of elevated pollution. Mean HR, the standard deviation of normal-to-normal (NN) intervals (SDNN), the standard deviation of the averages of NN intervals in all 5-minute segments of the recording (SDANN), and the square root of the mean of squared differences between adjacent NN intervals (r-MSSD) were calculated for 24-hour and 6-hour time segments. Associations of HRV with particulate pollution levels were evaluated with fixed-effects regression models. **RESULTS:** After controlling for differences across patients, elevated particulate levels were associated with (1) increased mean HR, (2) decreased SDNN, a measure of overall HRV, (3) decreased SDANN, a measure that corresponds to ultralow frequency variability, and (4) increased r-MSSD, a measure that corresponds to high-frequency variability. The associations between HRV and particulates were small but persisted even after controlling for mean HR. **CONCLUSIONS:** This study suggests that changes in cardiac autonomic function reflected by changes in mean HR and HRV may be part of the pathophysiologic mechanisms or pathways linking cardiovascular mortality and particulate air pollution. Am Heart J 1999 Nov;138(5 Pt 1):890-9

Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution.

Pope CA 3rd, Burnett RT, Thun MJ, Calle EE, Krewski D, Ito K, Thurston GD.

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CONTEXT: Associations have been found between day-to-day particulate air pollution and increased risk of various adverse health outcomes, including cardiopulmonary mortality. However, studies of health effects of long-term particulate air pollution have been less conclusive. **OBJECTIVE:** To assess the relationship between long-term exposure to fine particulate air pollution and all-cause, lung cancer, and cardiopulmonary mortality. **DESIGN, SETTING, AND PARTICIPANTS:** Vital status and cause of death data were collected by the American Cancer Society as part of the Cancer Prevention II study, an ongoing prospective mortality study, which enrolled approximately 1.2 million adults in 1982. Participants completed a questionnaire detailing individual risk factor data (age, sex, race, weight, height, smoking history, education, marital status, diet, alcohol consumption, and occupational exposures). The risk factor data for approximately 500 000 adults were linked with air pollution data for metropolitan areas throughout the United States and combined with vital status and cause of death data through December 31, 1998. **MAIN OUTCOME MEASURE:** All-cause, lung cancer, and cardiopulmonary mortality. **RESULTS:** Fine particulate and sulfur oxide--related pollution were associated with all-cause,

lung cancer, and cardiopulmonary mortality. Each 10-microg/m(3) elevation in fine particulate air pollution was associated with approximately a 4%, 6%, and 8% increased risk of all-cause, cardiopulmonary, and lung cancer mortality, respectively. Measures of coarse particle fraction and total suspended particles were not consistently associated with mortality. CONCLUSION: Long-term exposure to combustion-related fine particulate air pollution is an important environmental risk factor for cardiopulmonary and lung cancer mortality. JAMA 2002 Mar 6;287(9):1132-41

Particulate air pollution as a predictor of mortality in a prospective study of U.S. adults.

Pope CA 3rd, Thun MJ, Namboodiri MM, Dockery DW, Evans JS, Speizer FE, Heath CW Jr.

Department of Environmental Health, Harvard School of Public Health, Boston, Massachusetts.

Time-series, cross-sectional, and prospective cohort studies have observed associations between mortality and particulate air pollution but have been limited by ecologic design or small number of subjects or study areas. The present study evaluates effects of particulate air pollution on mortality using data from a large cohort drawn from many study areas. We linked ambient air pollution data from 151 U.S. metropolitan areas in 1980 with individual risk factor on 552,138 adults who resided in these areas when enrolled in a prospective study in 1982. Deaths were ascertained through December, 1989. Exposure to sulfate and fine particulate air pollution, which is primarily from fossil fuel combustion, was estimated from national data bases. The relationships of air pollution to all-cause, lung cancer, and cardiopulmonary mortality was examined using multivariate analysis which controlled for smoking, education, and other risk factors. Although small compared with cigarette smoking, an association between mortality and particulate air pollution was observed. Adjusted relative risk ratios (and 95% confidence intervals) of all-cause mortality for the most polluted areas compared with the least polluted equaled 1.15 (1.09 to 1.22) and 1.17 (1.09 to 1.26) when using sulfate and fine particulate measures respectively. Particulate air pollution was associated with cardiopulmonary and lung cancer mortality but not with mortality due to other causes. Increased mortality is associated with sulfate and fine particulate air pollution at levels commonly found in U.S. cities. The increase in risk is not attributable to tobacco smoking, although other unmeasured correlates of pollution cannot be excluded with certainty. (Am J Respir Crit Care Med 1995 Mar;151(3 Pt 1):669-74.)

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As you all must know by now, the US EPA and waste industry are proposing to lump Class A sewage sludge in with your "green and clean" composts, and call them all **compost made from recovered organic materials."**

The problem is that sewage sludge composts contain significant concentrations of toxic metals, radionuclides and hazardous industrial chemicals. In addition to commercial and industrial wastes, official EPA policy is to dispose of landfill leachates and treated Superfund wastes in local sewage treatment plants where the wastewater treatment process partitions the chemicals to the sewage sludge. The EPA and waste industry have been trying for years to confuse the public so people won't realize all the euphemisms ("biosolids", "wastewater residuals", "condensed biologic solids", etc.) are actually sewage sludge as defined in 40 CFR part 503.9(w): "Sewage sludge is solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works."

Class A sludges must meet pathogen levels of either a fecal coliform limit of less than 1,000 fecal coliform/g dry weight of solids or a measure of less than 3 salmonella/4 g dry weight of solids. However, US EPA acknowledges significant problems with pathogen regrowth in Class A sewage sludge -- particularly in cool, damp climates -- because of the absence of competing microorganisms. Compounding the problem, the EPA weakened sludge testing requirements in 1999.

Furthermore, scientists and microbiologists have been telling the EPA for years that *Salmonella sp.* and fecal coliform are not adequate pathogen indicators because they are vegetative bacteria that are highly susceptible to both chemical disinfection and heat disinfection. Suggestions for more appropriate and hardier sludge pathogen indicators include Adenoviruses, Coliphage, Clostridium perfringens, Enterococci, Enteroviruses, and Escherichia coli.

So why should we care if Class A sewage sludge is lumped together with clean and green composts which are free of human pathogens and industrial wastes? Because there are certain places where it is inappropriate to use Class A sewage sludge --- such as on ballfields and playgrounds where children will be exposed (dermal and inhalation, plus all kids eat dirt -- and PICA kids eat lots of dirt !). Class A sewage sludge does not belong in home vegetable gardens - once again, dermal and inhalation exposure, plus sludge pollutants can be taken up by plants and pose an ingestion risk. Also, Class A sludge composts emit endotoxins which pose a respiratory/health risk.

USDA regulations prohibit the use of sewage sludge in organic gardening. How will organic gardeners know the "compost" is sludge-derived without appropriate labeling? And let's not forget, the use of "pathogen-free" Class A sludge has caused Staphylococcus Aureus infections.

Comprehensive Procurement Guideline V for Procurement of Products Containing Recovered Materials

[Federal Register: December 10, 2003 (Volume 68, Number 237)]

[Proposed Rules]

[Page 68813-68823]

From the Federal Register Online via GPO Access [wais.access.gpo.gov]

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Hospital effluent: A source of multiple drug-resistant bacteria
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The present work was carried out to study the spread of multiple drug-resistant (MDR) bacteria from hospital effluent to the municipal sewage system. The MDR bacteria population in hospital effluents ranged from 0.58 to 40% for ten hospitals studied while it was less than 0.00002 to 0.025% for 11 sewage samples from the residential areas. Further, the MDR bacteria carried simultaneous resistance for most of the commonly used antibiotics and obviously the spread of such MDR bacteria to the community is a matter of grave concern.

RESEARCH COMMUNICATIONS

Shigella dysentery outbreak of 1954 in Japan was documented through bacteria simultaneously resistant to several antibiotics. Watanbe¹ showed that the multiple drug resistance (MDR) was through extrachromosomal autonomous genetic elements. He rightly referred to MDR as infectious drug resistance, since it could be transferred en bloc to sensitive bacteria during their cell to cell contact and subsequently these plasmids have been referred to as resistance plasmids (R-plasmids). Presently R-plasmid carrying bacteria are a major cause of hospitalborne infections. The antimicrobial selective pressure through indiscriminate use of antibiotics has played a significant role in enriching the MDR R+ strains in the hospital practice. The situation has reached such an ugly state largely in developing countries like India, that a sizeable number of hospital strains have become resistant simultaneously to most of the available antibiotics². Hospitalized patients become heavily colonized with R+ strains mainly in their gut³. Infection with MDR bacteria may be transferred to other patients in the hospital resulting in cross-infections which are referred to as hospital-borne infections. The exact magnitude of hospital-borne infections is not precisely estimated for India but is expected to be around 10% and is much higher in intensive care units. Acquisition of MDR bacterial infections in hospitals may pose serious therapeutic difficulties.

The greatest fear was the transfer of resistance to pathogens like *S. typhi*, which came true in 1972 resulting in an epidemic of chloramphenicol-resistant *S. typhi* and in 1992 another epidemic with simultaneous resistance for chloramphenicol, co-trimoxazole and ampicillin⁴.

The transfer of R-plasmids has been shown to occur in extra intestinal environment like the sewage system⁵. The dangers of infectious hospital waste received a great deal of attention in the last decade and a main emphasis on hospital solid waste; but liquid waste in the form of sewage has not received much attention. The present work was carried out to estimate the magnitude of MDR bacteria in hospital effluent and to compare it with the sewage from residential areas in city of Indore.

Three effluent water samples from each of the ten hospitals in Indore city were collected at 9 a.m., 2 p.m. and 6 p.m. from the outermost chambers before the drainage flows to the municipal sewage. From hospital No. 4, thirty samples of effluent were collected

during the month. In addition, samples were collected 100 m and 2 km away from hospital No. 4 in the municipal sewage system. Triplicate samples from main chambers of sewage lines distributed in eleven major residential colonies of the city were also taken.

All the samples were subjected to viable count studies by spreading 100 ul of 10^{-1} to 10^{-4} dilution prepared in sterile saline over the nutrient agar plate. The plates were incubated overnight at 37°C and plates showing 50 to 200 colonies were used for expressing the total viable bacterial count.

990

The MDR problem encountered in hospital practice mainly involves Gram-negative bacteria. Hence for the estimation of the MDR bacteria, 100 u1 diluted samples were spread over MacConkey agar plates supplemented with 30ug/ml of chloramphenicol and 20ug/ml of gentamicin. Chloramphenicol and gentamicin were selected because they represent two of the commonly used antibiotics over the last thirty years and also have greater in vitro stability. Differentiation as lactose fermenter and non-lactose fermenter could be made on MacConkey agar for MDR isolates. A minimum of three colonies with similar morphology were selected individually and subjected to identification by standard biochemical methods and also subjected to drug susceptibility by the disk diffusion technique of Bauer et al.⁶.

The total viable bacterial and MDR bacterial counts (mean of three samples each) for hospital effluents and residential colony sewage samples are shown in Table 1. The per cent MDR bacteria population was significantly higher for hospital effluent samples than for the residential colony sewage samples ($P < 0.01$ by Student's t test). Another observation was the relatively higher total bacterial counts for sewage samples from residential colonies in contrast to hospital effluent samples. This could be due to greater usage of disinfectants and antibiotics in hospital

Table 1. Total and bacterial counts of domestic and hospital effluent samples

Source	Total count (CFU/ml) × 10 ⁴	MDR (%)
Domestic		
D1	40 + 7.07	Nil
D2	60000 + 100000	Nil
D3	10 + 4.27	Nil
D4	80 + 20	Nil
D5	600000 + 264575	0.0000011
D6	500000 + 115470	0.000004
D7	500000 + 100000	0.00002
D8	500000 + 264570	0.00002
D9	25000 + 13228	0.0004
D10	400 + 142.42	0.0175
D11	400 + 200	0.025

Hospital*

H1 (50)-----	60 + 10-----	0.58
H2 (80)-----	80 + 10-----	0.63
H3 (125)-----	8 + 1.3-----	1.33
H4 (400)-----	9 + 0.72-----	1.5
H5 (700)-----	3 + 0.866-----	2.88
H6 (200)-----	4 + 1.802-----	3.57
H7 (50)-----	68 + 31.432-----	4.41
H8 (50)-----	5000 + 264-----	10
H9 (200)-----	20 + 8.66-----	12.5
H10 (50)-----	5 + 2.12-----	40

*Numbers in bracket indicate beds in the hospitals. #Data are mean of 30 replicates. Data are mean of three replicates + standard deviation. Total count expressed from number of colonies on nutrient agar while MDR expressed from number of colonies of Gram-negative MDR on antibiotic supplemented Mackonkey agar.

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Table 2. Resistance patterns of MDR bacteria isolated from hospital effluents

Antibiotic group--- Antibiotic/(conc.)*----	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
Penicillins ---										
-Ampicillin (10ug)-----	R	R	R	R	R	R	R	R	R	R
Piperacillin (100ug)-----	R	R	R	R	R	R	R	R	R	R
Penicillin +B-lactamase inhibitor										
-Amoxicillin (20) + clavulanic acid (10ug)-	R	R	R	R	R	R	R	R	R	R
Ticarcillin (75) + clavulanic acid (10ug)---	R	S	R	R	R	R	R	R	R	R
Cephalosporins										
-Cefoperazone (75ug)-----	PR	R	R	R	R	R	R	R	R	R
Ceftazidime (30ug)-----	R	R	R	R	R	R	R	R	R	R
Cefuroxime (30ug)-----	R	R	R	R	R	R	R	R	R	R
Cephalexin (30ug)-----	R	R	R	R	R	R	R	R	R	R
Cefotaxime (30ug)-----	R	R	R	R	R	R	R	R	R	R
Quinolones										
-Ciprofloxacin (5ug)-----	R	R	R	R	R	R	R	R	R	R
Aminoglycoside										
-Amikacin (30ug)-----	S	S	S	S	S	S	S	S	S	S
-Gentamicin (10ug)-----	R	R	R	R	R	R	R	R	R	R
Netilmicin (30ug)-----	R	R	R	R	S	R	R	R	R	R
Others										
-Nitrofurantoin (300ug)-----	S	S	PR	S	S	S	S	S	S	S
Cotrimoxazole (23.75 + 1.25ug)-----	R	R	R	R	R	R	R	R	R	R
Chloramphenicol (30ug)-----	R	R	R	R	R	R	R	R	R	R

R = Resistant; S = Sensitive; PR = Partially resistant.

*Drug concentration in ug/disc mentioned in parentheses.

practice. Hospital effluents from hospital No. 4 had 1.5% MDR bacteria population, while after getting mixed with the municipal sewage stream, the MDR bacteria population persisted to an extent of 0.5% up to a length of 100 m and downstream to a level of 0.06% at a distance of 2 km. This clearly shows a higher influx and persistence of MDR bacteria from hospital effluents to the municipal sewage system.

The per cent MDR bacteria for hospital samples ranged widely from 0.58 to 40%, while for residential colony sewage it ranged between less than 0.00002 and 0.025%. A very high percentage of MDR in some of the hospitals could be due to excessive use of antibiotics resulting in increased selective pressure and in turn increase in the prevalence of MDR bacteria. Low loads of liquid waste generated due to scarcity of water in some of the hospitals might have as well given low dilution effect leading to an apparent rise in MDR bacteria population in the effluent.

The method of estimation of MDR bacteria clones in the effluent samples used in this study may have some limitations. The bacterial strains susceptible to gentamicin and chloramphenicol but resistant to other antibiotics must have been missed out during the estimation of MDR bacteria. Yet, the number of MDR bacteria was alarmingly high for the effluent samples from hospitals. More perturbing was the pattern of MDR (Table 2). Simultaneous resistance for ampicillin, amoxicillin + clavulanic acid, piperacillin, second and third generation cephalosporins, cotrimoxazole, gentamicin, netilmycin and quinolones like ciprofloxacin formed the common MDR pattern. The pattern was almost the same for the diverse species (*E. coli*, *Klebsiella*, *Enterobacter*, *Citrobacter* and *Pseudomonas*) grown from the effluent samples and strongly suggests prevalence of similar R-plasmids. The MDR pattern seen in the bacterial isolates from hospital effluent samples included most of the antibiotics used presently for treating human infections. The worst fear apprehended is the transfer of such resistance to bacterial pathogens causing infections in the community. In that case most of the presently available antibiotic will be futile against the infectious organisms. The origin of such MDR bacterial strains appears to be the hospital environment and the selective pressure responsible for expanding such bacterial populations in hospitals must have been through the use of drugs in humans and not from their use in the veterinary field or agriculture as pointed out by Walton⁷.

The present observations suggest that hospital effluents can be a potential health hazard by adding MDR bacteria to a city sewage pool. Similar studies need to be carried out in other cities to tackle the obnoxious problem of MDR being passed on from hospitals to the community.

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Environmental exposure assessment of fluoroquinolone antibacterial agents from sewage to soil.

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The behavior of fluoroquinolone antibacterial agents (FQs) during mechanical-biological wastewater treatment was studied by mass flow analysis. In addition, the fate of FQs in agricultural soils after sludge application was investigated. Concentrations of FQs in filtered wastewater (raw sewage, primary, secondary, and tertiary effluents) were determined using solid-phase extraction with mixed phase cation exchange disk cartridges and reversed-phase liquid chromatography with fluorescence detection. FQs in suspended solids, sewage sludge (raw, excess, and anaerobically digested sludge), and sludge-treated soils were determined as described for the aqueous samples but preceded by accelerated solvent extraction. Wastewater treatment resulted in a reduction of the FQ mass flow of 88-92%, mainly due to sorption on sewage sludge. A sludge-wastewater partition coefficient (log K_d approximately 4) was calculated in the activated sludge reactors with a hydraulic residence time of about 8 h. No significant removal of FQs occurred under methanogenic conditions of the sludge digesters. These results suggest sewage sludge as the main reservoir of FQ residues and outline the importance of sludge management strategies to determine whether most of the human-excreted FQs enter the environment. Field experiments of sludge-application to agricultural land confirmed the long-term persistence of trace amounts of FQs in sludge-treated soils and indicated a limited mobility of FQs into the subsoil. Environ Sci Technol. 2003 Aug 1;37(15):3243-9. (((((((((((((McGowan's note---cattle eat large amounts of soil as they graze, thus ingesting the antibiotics. Additionally, runoff from soils will carry these materials to distance niches))))))))))

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Determination of fluoroquinolone antibacterial agents in sewage sludge and sludge-treated soil using accelerated solvent extraction followed by solid-phase extraction.

Golet EM, Strehler A, Alder AC, Giger W.

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A method for the quantitative determination of humanuse fluoroquinolone antibacterial agents (FQs) ciprofloxacin and norfloxacin in sewage sludge and sludge-treated soil samples was developed. The accelerated solvent extraction was optimized with regard to solvents and operational parameters, such as temperature, pressure, and extraction time. A 50 mM aqueous phosphoric acid/ acetonitrile mixture (1:1) was found to be optimum in combination with an extraction temperature of 100 degrees C at 100 bar, during 60 and 90 min for sewage sludge and sludge-treated soil samples, respectively. A cleanup step using solid-phase extraction substantially improved the selectivity of the method. Overall recovery rates for FQs ranged from 82 to 94% for sewage sludge and from 75 to 92% for sludge-treated soil, with relative standard deviations between 8 and 11%. Limits of quantification were 0.45 and 0.18 mg/kg of dry matter for sewage sludge and sludge-treated soils, respectively. The presented method was successfully applied to untreated and anaerobically digested sewage sludges and sludge-treated soils. Ciprofloxacin and norfloxacin were determined in sewage sludges from several wastewater treatment plants with concentrations ranging from 1.40 to 2.42 mg/kg of dry matter. Therefore, contrary to what may be expected for human-use pharmaceuticals, FQs may reach the terrestrial environment as indicated by the occurrence of FQs in topsoil samples from experimental fields, to which sewage sludge had been applied. Anal Chem. 2002 Nov 1;74(21):5455-62.

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Carbamazepine as a possible anthropogenic marker in the aquatic environment: investigations on the behaviour of Carbamazepine in wastewater treatment and during groundwater infiltration.

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Sewage treatment plant (STP) effluents are significant sources of pharmaceutical residues in surface waters, where high concentrations of the antiepileptic drug Carbamazepine have been detected. The solids retention time (SRT) is the most important parameter for the design of STPs. It relates to the growth rate of microorganisms and to effluent concentrations. The influence of SRT on the removal of Carbamazepine was studied on lab-scale plants. The results from these tests were then

validated on several full-scale plants. Due to the lack of suitable receiving waters and groundwater resources, one of these STPs has to infiltrate the treated wastewater into unsaturated soil. Here, groundwater samples at equal distances from the infiltration point were taken to estimate the behaviour of Carbamazepine during soil passage and within the groundwater. This antiepileptic drug seems to be very persistent in the environment, therefore qualifying as a suitable marker for anthropogenic influences in the aquatic environment. *Water Res.* 2004 Feb;38(4):947-54.

+++++**Environmental antimicrobial contamination from terraccumulation and diffuse pollution pathways.**

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The fate of antimicrobial pharmaceuticals entering the aquatic environment has become an increasing concern for researchers and regulators in the past decade, and recent research has focused on antimicrobial contamination from point sources, such as wastewater treatment facility outfalls. Terraccumulation is the concentration of pollutants in soils from land application of contaminated biosolids generated by agricultural practices and water and wastewater facilities. The terraccumulation of antimicrobials and mobility in diffuse pollution pathways should not be overlooked as a contributor to the spread of bacterial resistance and the resulting threat to human drug therapy. This review critically examines recent global trends of bacterial resistance, antimicrobial contaminant pathways from agriculture and water treatment processes, and the need to incorporate diffuse pathways into risk assessment and treatment system design. Alignment of environmental scientific and engineering research with strategies applied in clinical situations could contribute to continued efficacy of antimicrobial therapies necessary for human health and welfare. *Sci Total Environ.* 2004 Jun 5;325(1-3):1-13.

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Sources of pesticides in surface waters in Switzerland: pesticide load through waste water treatment plants--current situation and reduction potential.

Gerecke AC, Scharer M, Singer HP, Muller SR, Schwarzenbach RP, Sagesser M, Ochsenein U, Popow G.

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Concentrations of pesticides in Swiss rivers and lakes frequently exceed the Swiss quality goal of 0.1 microg/l for surface waters. In this study, concentrations of various pesticides (e.g., atrazine, diuron, mecoprop) were continuously measured in the effluents of waste water treatment plants and in two rivers during a period of four months. These measurements revealed that in the catchment of Lake Greifensee,

farmers who did not perfectly comply with 'good agricultural practice' caused at least 14% of the measured agricultural herbicide load into surface waters. Pesticides, used for additional purposes in urban areas (i.e. protection of materials, conservation, etc.), entered surface waters up to 75% through waste water treatment plants. Chemosphere. 2002 Jul;48(3):307-15.

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Fate of synthetic organic chemicals in soil-groundwater systems.

Pancorbo OC, Varney TC.

Land disposal of municipal, industrial and agricultural wastes often leads to soil and groundwater contamination with synthetic organic chemicals. In this review, the fate of such organics in soils and the subsurface environment is discussed. In particular, the biodegradation of organic compounds in soils and the subsurface region, as well as the sorption of these compounds to soils is emphasized. Due to the disastrous impact of groundwater contamination on a community and the great cost of restoring a contaminated aquifer, a case is made for concentrating future efforts on isolating potential sources of groundwater contamination and instituting appropriate control measures. Vet Hum Toxicol. 1986 Apr;28(2):127-43.

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Point- and nonpoint-source pesticide contamination in the Zwester Ohm catchment, Germany.

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Reducing pesticide loads in surface waters implies identifying the pathways responsible for the pollution. The current study documents the pesticide contamination of the river Zwester Ohm, a 4917-ha catchment in Germany with 41% of the land used for crop production. Discharges and concentrations of 19 pesticides were measured continuously at three locations for 15 mo. The load detected at the outlet of the catchment amounted to 9048 g a.i. The losses represent 0.22% of the pesticides applied by the farmers. The contamination showed a seasonal pattern following the pesticide application times. The wastewater treatment plant system (WWTPS) in the catchment (two wastewater treatment plants [WWTP], 14 combined sewer overflows (CSO), four CSO tanks) emits during dry weather periods purified sewage and during storm events sewage mixed with stormwater runoff into the river. The contribution by the WWTPS to the pesticide load was defined as point-source pollution (PSP). The load was dominated by PSP with at least 77% of the total pollution. No significant interdependencies between intrinsic properties of the pesticides, hydrometeorological factors, and the loads occurring in the stream could be found. Therefore, it is not possible to predict PSP for other catchments based on the results from this study. Whereas 65% of the total load entered the river via the WWTP, a portion of 12% was

attributed to the CSO. The study points out that the influence of CSO on PSP should be taken into account in future catchment studies in areas with comparable agricultural structure. J Environ Qual. 2002 Jan-Feb;31(1):309-18.

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Hazards from pathogenic microorganisms in land-disposed sewage sludge.

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Sewage sludge is a complex mixture of organic and inorganic compounds of biological and mineral origin that are precipitated from wastewater and sewage during primary, secondary, and tertiary sewage treatment. Present in these sludges are significant numbers of microorganisms that include viral, bacterial, protozoan, fungal, and helminth pathogens. The treatment of sludge to reduce biochemical oxygen demand, solids content, and odor is not always effective in reducing numbers of pathogens. This becomes a public health concern because the infectious dose for some of these pathogens may be as low as 1 particle (virus) to 50 organisms (Giardia). When sludge is applied to land for agricultural use and landfill compost, these pathogens can survive from days (bacteria) to months (viruses) to years (helminth eggs), depending on environmental conditions. Shallow aquifers can become contaminated with pathogens from sludge and, depending on groundwater flow, these organisms may travel significant distances from the disposal site. Communities that rely on groundwater for domestic use can become exposed to these pathogens, leading to a potential disease outbreak. Currently, methods to determine the risk of disease from pathogens in land-disposed sludge are inadequate because the sensitivity of pathogen detection is poor. The application of recombinant DNA technology (gene probes and polymerase chain reaction) to environmental samples may provide increased sensitivity for detecting specific pathogens in land-disposed sludge and greatly improved risk assessment models for our exposure to these sources of pathogens. Rev Environ Contam Toxicol. 1993;132:55-91.

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Photodegradation of the endocrine-disrupting chemical 4-nonylphenol in biosolids applied to soil.

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There is increasing concern about the environmental fate and impact of biosolids-associated anthropogenic organic chemicals, among which 4-nonylphenol (4-NP) is one of the most studied chemicals. This is primarily because 4-NP is an endocrine disruptor and has been frequently detected in environmental samples. Due to its high

hydrophobicity, 4-NP has high affinity for biosolids. Land application of 4-NP-containing biosolids could potentially introduce large quantities of this chemical into the environment. A laboratory experiment was conducted to investigate the effect of artificial sunlight on 4-NP degradation in biosolids applied to soil. When exposed to artificial sunlight for 30 d, the top-5-mm layer of biosolids showed a 55% reduction of 4-NP, while less than 15% of the 4-NP was degraded when the biosolids were kept in the dark. Our results indicate that sensitized photolysis reaction plays an important role in reducing the levels of 4-NP in land-applied biosolids. Surface application rather than soil incorporation of biosolids could be effective in reducing biosolids-associated organic chemicals that can be degraded through photolysis reactions. However, the risks of animal ingestion, foliar deposition, and runoff should also be evaluated when biosolids are applied on the soil surface. J Environ Qual. 2004 Jul-Aug;33(4):1568-74.

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Efficiency of supercritical fluid extraction for determining 4-nonylphenol in municipal sewage sludge.

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When the sewage sludge containing the persistent, lipophilic, metabolite 4-nonylphenol (4-NP) has been disposed of in the environment it's toxic nature can lead to serious health risks to human beings and can also affect plants and aquatic organisms. Supercritical fluid extraction (SFE) is a new and powerful technique for extracting the organic contaminants from the solid phase. The present study was conducted to investigate optimal conditions for the quantitative extraction of 4-NP by SFE and to determine the concentration of 4-NP in municipal sewage sludge. The effect of several parameters such as temperature, pressure, static extraction time, dynamic extraction time, CO₂ flow-rate, sample mass and modifier on the extraction were investigated. The optimal conditions for the extraction of the spiked sample were fluid pressure 97 bar, temperature 40 degrees C, flow-rate 3.0 ml/min, static extraction time 2 min, dynamic extraction time 5 min and modifier methanol (0.5 ml). Extracts were analyzed by gas chromatography-mass spectrometry. Concentration of 4-NP in the anaerobically degraded sludge of the De-Haw Sewage Treatment Plant in Taiwan was found to be 243.9 mg/kg. The extraction efficiency of the SFE method was compared with the conventional Soxhlet extraction method. The overall recovery of the SFE method was found to be greater and the results indicate that SFE is an efficient method for extracting 4-NP from sewage sludge. J Chromatogr A. 1999 Apr 23;840(1):71-9.

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Phenolic xenoestrogens in surface water, sediments, and sewage sludge from Baden-Wurttemberg, south-west Germany.

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Nine structurally different phenolic chemicals, which have been reported to mimic estrogen effects, were determined in various aquatic environmental compartments. Twenty-three water samples from five streams and rivers showed levels up to 458 ng/l for 4-nonylphenol (4NP), 189 ng/l for 4-t-octylphenol (4tOP), 272 ng/l for bisphenol A (BPA) and 47 ng/l for 2-hydroxybiphenyl (2OHBiP). Elevated levels of these compounds in a stream with a high load of effluents of sewage treatment plants (STPs), compared to a brook free of sewage, identified STPs as major sources. With a similar order, 4NP (10-259 micrograms/kg dry matter), 4tOP (< 0.5-8 micrograms/kg), BPA (< 0.5-15 micrograms/kg), and 2OHBiP (2-69 micrograms/kg) were also detected regularly in riverine sediment (n = 11). Levels in sewage sludge were one order of magnitude higher than in sediments. 4-Hydroxybiphenyl and 4-chloro-3-methylphenol were found predominantly in sludge and sediment in the lower ppb range. Environ Pollut. 2001;115(2):291-301.

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Uptake and depuration of 4-nonylphenol by the benthic invertebrate *Gammarus pulex*: how important is feeding rate?

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The major exposure and uptake route for soluble toxins by aquatic organisms is generally considered to be through the water column. In the case of hydrophobic chemicals, exposure and uptake through diet often take on greater importance as the chemicals adsorb onto organic sediments and food. A chemical that has recently come under close scrutiny because of its toxicity and possible endocrine disrupting effects in aquatic life is 4-nonylphenol (NP). It has been detected in environmental water and sediment samples and is a persistent and hydrophobic (log KOW = 4.48) contaminant in many aquatic systems. In this study, the relative importance of NP uptake through accumulation from diet and water was examined for the detritus-feeding freshwater shrimp *Gammarus pulex*. Using a bootstrap nonlinear regression technique, the level of toxin present in *G. pulex* at any time during or after initial exposure was estimated. Heterogeneity, together with assumptions on feeding rate, was shown to affect the determination of NP uptake substantially. Because of its lifestyle as a benthic organism, the main exposure route was at first assumed to be through sediments and food. However, the results suggest that major uptake may also occur through water. The statistical and modeling methodology may be applied to uptake and depuration assessments for any aquatic organisms exhibiting a variable feeding phase. Environ Sci Technol. 2003 May 15;37(10):2236-41.

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The effect of 4-nonylphenol on the pigmentation of *Ocimum basilicum* (Basil).

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BACKGROUND, AIM AND SCOPE: Tests during the last few years have confirmed that 4-nonylphenol (4-NP) can have oestrogen-like effects (xeno-hormone) on animal organisms. The objective was to firstly evaluate the ecotoxicological effects of 4-NP on plants such as hydrocultures. To clarify how this substance interferes with the photosynthetic system of plants, various tests were carried out using the basil plant (*Ocimum basilicum*). **METHODS:** The effect of the pollutant 4-NP on the pigment content in the leaves of the basil plant was analysed with the use of High-Performance-Liquid-Chromatography (HPLC). **RESULTS AND DISCUSSION:** A general assessment of the HPLC data revealed that plants that came in contact with the 4-nonylphenol showed a change in pigmentation. More chlorophyll a and b was produced, although at the same time a higher production of degradation products and by-products of the chlorophylls was observed. These occurrences can therefore be seen as an impairment of the photosynthetic process. The contaminated plants produced less xanthophylls than the non-contaminated ones, though these differences were statistically not significant. **CONCLUSION AND PERSPECTIVE:** The variations on the pigment content in the leaves of the basil plant can be interpreted as a consequence of the 4-NP application. It was, however, not investigated whether the plants absorbed the pollutants directly. The effect could have been caused by adsorption of the oily substance to the roots, and this could have led to a hindrance of the uptake of nutrients and possibly water. In order to clarify this further, biochemical experiments are being conducted. *Environ Sci Pollut Res Int.* 2004;11(2):121-5.

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The food contaminants bisphenol A and 4-nonylphenol act as agonists for estrogen receptor alpha in MCF7 breast cancer cells.

Vivacqua A, Recchia AG, Fasanella G, Gabriele S, Carpino A, Rago V, Di Gioia ML, Leggio A, Bonfiglio D, Liguori A, Maggiolini M.

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Xenoestrogens are chemically distinct industrial products potentially able to disrupt the endocrine system by mimicking the action of endogenous steroid hormones. Among such compounds, the ubiquitous environmental contaminants bisphenol A (BPA) and 4-nonylphenol (NPH) may promote adverse effects in humans triggering estrogenic signals in target tissues. Following a research program on human exposure to endocrine disruptors, we found contamination of fresh food by BPA and NPH. More important, these contaminants were found to display estrogen-like activity using as a

model system the estrogen-dependent MCF7 breast cancer cells (MCF7wt); its variant named MCF7SH, which is hormone-independent but still ERalpha -positive, and the steroid receptor-negative human cervical carcinoma HeLa cells. In transfection experiments BPA and NPH activated in a direct manner the endogenous ERalpha in MCF7wt and MCF7SH cells, as the antiestrogen hydroxytamoxifen was able to reverse both responses. Moreover, only the hormone-binding domains of ERalpha and ERbeta expressed by chimeric proteins in HeLa cells were sufficient to elicit the transcriptional activity upon BPA and NPH treatments. Transfecting the same cell line with ERalpha mutants, both contaminants triggered an estrogen-like response. These transactivation properties were interestingly supported in MCF7wt cells by the autoregulation of ERalpha which was assessed by RT-PCR for the mRNA evaluation and by immunoblotting and immunocytochemistry for the determination of protein levels. The ability of BPA and NPH to modulate gene expression was further confirmed by the upregulation of an estrogen target gene like pS2. As a biological counterpart, concentrations of xenoestrogens eliciting transcriptional activity were able to stimulate the proliferation of MCF7wt and MCF7SH cells. Only NPH at a dose likely too high to be of any physiological relevance induced a severe cytotoxicity in an ERalpha-independent manner as ascertained in HeLa cells. The estrogenic effects of such industrial agents together with an increasing widespread human exposure should be taken into account for the potential influence also on hormone-dependent breast cancer disease. Endocrine. 2003 Dec;22(3):275-84

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Deuterium labelled nonylphenols in an in-vitro model of percutaneous absorption of environmental xenoestrogens.

Blume B, Kietzmann M, Kranke P, Moder M, Schrader S, Wahren M.

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A technical mixture of isomeric nonylphenols NP is formed as rather persistent degradation product of nonionic surfactants and has become widespread in the environment, e.g., in surface waters. Information about possible pathways for incorporation is needed for risk assessments, as NP has estrogenic properties. NP uptake after skin contact was determined using isolated and perfused bovine udders as models for human skin. NP-d2 labelled in the positions ortho to the OH-group was prepared by an exchange procedure which did not measurably change the relative amount of isomers. Samples of udder perfusate, milk equivalent produced during the experiments and skin tissue were taken immediately before administration of 500 mg or 50 mg NP-d2 on an udder skin area of 200 cm² and then for 5 h. They were analyzed by GC-MS for NP and NP-d2 after cleanup by steam distillation and final extraction with SPME fibres. The results are an unambiguous proof of the penetration of NP into the capillary system of living mammals after skin contact. Isotopes Environ Health Stud. 2000;36(1):3-9.

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Enhancement of lung carcinogenesis by nonylphenol and genistein in a F344 rat multiorgan carcinogenesis model.

Seike N, Wanibuchi H, Morimura K, Wei M, Nishikawa T, Hirata K, Yoshikawa J, Fukushima S.

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The modifying effects of nonylphenol and genistein on cancer induction were assessed in a multi-organ carcinogenesis model in male F344 rats initially treated with five different carcinogens. In experiment 1 rats received 250 or 25 ppm nonylphenol, or 250 or 25 ppm genistein in their diet for 28 weeks. The total incidences of adenomas and carcinomas in the lungs of animals treated with nonylphenol and genistein were significantly higher than in the control group. 5-Bromo-2'-deoxyuridine labeling indices, reflecting cell proliferation, were also significantly elevated in the lungs of rats given 250 and 25 ppm nonylphenol and 250 ppm genistein. In experiment 2, rats were treated with nonylphenol or genistein at concentrations of 250 ppm after DHPN initiation. In the lung, formation of 8-hydroxy-2'-deoxyguanosine, a marker of oxygen radical-mediated DNA damage, was significantly increased. These results indicate that nonylphenol and genistein have the potential to promote rat lung carcinogenesis, possibly via a mechanism involving stimulation of cell proliferation and DNA damage caused by oxygen radicals. *Cancer Lett.* 2003 Mar 20;192(1):25-36. (((((((((((McGowan's note---- dust from land applied sludge carrying 4-NP and other materials))))))))))))

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Phthalates, alkylphenols, pesticides, polybrominated diphenyl ethers, and other endocrine-disrupting compounds in indoor air and dust.

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Chemicals identified as endocrine-disrupting compounds (EDCs) have widespread consumer uses, yet little is known about indoor exposure. We sampled indoor air and dust in 120 homes, analyzing for 89 organic chemicals identified as EDCs. Fifty-two compounds were detected in air and 66 were detected in dust. These are the first reported measures in residential environments for over 30 of the compounds, including several detected at the highest concentrations. The number of compounds detected per home ranged from 13 to 28 in air and from 6 to 42 in dust. The most abundant compounds in air included phthalates (plasticizers, emulsifiers), o-phenylphenol (disinfectant), 4-nonylphenol (detergent metabolite), and 4-tert-butylphenol (adhesive) with typical concentrations in the range of 50-1500 ng/m³. The penta- and tetrabrominated diphenyl ethers (flame retardants) were frequently detected in dust, and 2,3-dibromo-1-propanol, the carcinogenic intermediate of a flame retardant banned in

1977, was detected in air and dust. Twenty-three pesticides were detected in air and 27 were detected in dust, the most abundant being permethrins and the synergist piperonyl butoxide. The banned pesticides heptachlor, chlordane, methoxychlor, and DDT were also frequently detected, suggesting limited indoor degradation. Detected concentrations exceeded government health-based guidelines for 15 compounds, but no guidelines are available for 28 compounds, and existing guidelines do not consider endocrine effects. This study provides a basis for prioritizing toxicology and exposure research for individual EDCs and mixtures and provides new tools for exposure assessment in health studies. Environ Sci Technol. 2003 Oct 15;37(20):4543-53.

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Trace organic contaminants, including toxaphene and trifluralin, in cotton field soils from Georgia and South Carolina, USA.

Kannan K, Battula S, Loganathan BG, Hong CS, Lam WH, Villeneuve DL, Sajwan K, Giesy JP, Aldous KM.

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Residues of organic contaminants--including toxaphene, DDT, trifluralin, hexachlorocyclohexanes, polychlorinated biphenyls, polycyclic aromatic hydrocarbons (PAHs) and nonylphenol--were measured in 32 cotton field soils collected from South Carolina and Georgia in 1999. Toxaphene, trifluralin, DDT and PAHs were the major contaminants found in these soils. The maximum concentration of toxaphene measured was 2,500 ng/g dry weight. Trifluralin was detected in all the soils at concentrations ranging from 1 to 548 ng/g dry weight. Pesticide residues were not proportional to soil organic carbon content, indicating that their concentrations were a reflection of application history and dissipation rates rather than air-soil equilibrium. Soil extracts were also subjected to in vitro bioassays to assess dioxinlike, estrogenic, and androgenic/glucocorticoid potencies. Relatively more polar fractions of the soils elicited estrogenic and androgenic/glucocorticoid activities, but the magnitude of response was much less than those found in coastal marine sediments from industrialized locations. Arch Environ Contam Toxicol. 2003 Jul;45(1):30-6.

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Environmental fate of alkylphenols and alkylphenol ethoxylates--a review.

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Alkylphenol ethoxylates (APEs) are widely used surfactants in domestic and industrial products, which are commonly found in wastewater discharges and in sewage treatment plant (STP) effluents. Degradation of APEs in wastewater treatment plants or in the environment generates more persistent shorter-chain APEs and alkylphenols

(APs) such as nonylphenol (NP), octylphenol (OP) and AP mono- to triethoxylates (NPE1, NPE2 and NPE3). There is concern that APE metabolites (NP, OP, NPE1-3) can mimic natural hormones and that the levels present in the environment may be sufficient to disrupt endocrine function in wildlife and humans. The physicochemical properties of the APE metabolites (NP, NPE1-4, OP, OPE1-4), in particular the high K_{ow} values, indicate that they will partition effectively into sediments following discharge from STPs. The aqueous solubility data for the APE metabolites indicate that the concentration in water combined with the high partition coefficients will provide a significant reservoir (load) in various environmental compartments. Data from studies conducted in many regions across the world have shown significant levels in samples of every environmental compartment examined. In the US, levels of NP in air ranged from 0.01 to 81 ng/m³, with seasonal trends observed. Concentrations of APE metabolites in treated wastewater effluents in the US ranged from < 0.1 to 369 microg/l, in Spain they were between 6 and 343 microg/l and concentrations up to 330 microg/l were found in the UK. Levels in sediments reflected the high partition coefficients with concentrations reported ranging from < 0.1 to 13,700 microg/kg for sediments in the US. Fish in the UK were found to contain up to 0.8 microg/kg NP in muscle tissue. APEs degraded faster in the water column than in sediment. Aerobic conditions facilitate easier further biotransformation of APE metabolites than anaerobic conditions. Environ Int. 2002 Jul;28(3):215-26.

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Degradation and mobility of linear alkylbenzene sulfonate and nonylphenol in sludge-amended soil.

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Degradation and mobility of the surfactants linear alkylbenzene sulfonate (LAS) and nonylphenol (NP) were investigated in a lysimeter study using a sandy loam soil and 45-cm soil columns. Anaerobically digested sewage sludge was incorporated in the top-15-cm soil layer to an initial content of 38 mg LAS and 0.56 mg NP kg⁻¹ dry wt., respectively. Spring barley (*Hordeum vulgare* L.) was sown onto the columns. The lysimeters were placed outdoors and therefore received natural precipitation, but were also irrigated to a total amount of water equivalent to 700 mm of precipitation. Leachate and soil samples from three soil layers were collected continuously during a growth period of 110 d. Leachate samples and soil extracts were concentrated by solid-phase extraction (SPE) and analyzed using high performance liquid chromatography (HPLC) with fluorescence detection. The concentrations in the top-15-cm soil layer declined to 25 and 45% of the initial contents for LAS and NP, respectively, within the first 10 d of the study. At the end of the study, less than 1% LAS was left, while the NP content was below the detection limit. Assuming first-order degradation kinetics, half-lives of 20 and 37 d were estimated for LAS and NP, respectively. The surfactants were not measured in leachate samples in concentrations above the analytical detection limits of 4.0 and

0.5 microg L(-1) for LAS and NP, respectively. In addition, neither LAS nor NP were measured in concentrations above the detection limits of 150 and 50 microg kg(-1) dry wt., respectively, in soil layers below the 15 cm of sludge incorporation, indicating negligible downward transport of the surfactants in the lysimeters.

J Environ Qual. 2004 Jan-Feb;33(1):232-40. ((((((((((McGowan's note---material appears not to migrate well into lower soil profile. Thus most remains in applied material. Accordingly, with half-life at around a month, top dressed pastures will see large amounts available to make it into the milk stream of dairy cattle, hence human food chain))))))))))

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Effects and risk assessment of linear alkylbenzene sulfonates in agricultural soil. 4. The influence of salt speciation, soil type, and sewage sludge on toxicity using the collembolan *Folsomia fimetaria* and the earthworm *Aporrectodea caliginosa* as test organisms.

Holmstrup M, Krogh PH, Lokke H, de Wolf W, Marshall S, Fox K.

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Sewage sludge applied to agricultural soils often contains linear alkylbenzene sulfonates (LAS) in the range of 1 to 10 g/kg dry weight, and their toxicity to relevant soil organisms should, therefore, be assessed to ensure safe use of sewage sludge as a fertilizer. Studies of LAS toxicity to soil organisms are few, and to our knowledge, factors that may influence the toxicity in the field have not been studied in detail. In this paper, we report on the influence of speciation of LAS in the test solution added to soil (soluble Na-LAS vs poorly soluble Ca-LAS or Mg-LAS), the influence of soil type, and the modifying effects of sludge amendment on the toxicity of LAS. These issues were investigated using reproduction of *Collembola* and growth of juvenile earthworms as test parameters. Speciation of the LAS added to test soil did not have any influence on toxicity for any of the test species. Likewise, in three different agricultural soils (sand, loam, and clay), we found almost equal toxicities. The LAS added to test soil in a sludge-water suspension was equally toxic as when it was added in an aqueous solution. However, anaerobic incubation for 7 and 14 d of the LAS-sludge suspension (with no decay of LAS) caused the toxicity to increase almost threefold in both collembolan and earthworm. The relationships between soil constituents, bioavailability, and toxicity are also discussed. Environ Toxicol Chem. 2001 Aug;20(8):1680-9.

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Linear alkylbenzene sulfonates (LAS) in the terrestrial environment.

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The occurrence of linear alkylbenzene sulfonates (LAS) in a series of soil samples originating from the municipality of Roskilde has been studied. The study includes soil samples from eight different locations with different histories: a preserved natural area that has not been cultured for 50-100 years, a soil that has been ecologically cultured for 40 years, a soil sustainably manured in ecologically culture for 5 years (formerly conventionally cultured) and a soil that has been conventionally cultured using artificial fertilizer. In addition, a soil was studied that had been sludge amended by applying medium amounts of sludge as well as a soil that has been amended with high amounts of sludge for a 25-year period. In the latter case, the sludge amendment was abandoned 6 years before the first sampling, followed by the application of artificial fertilizers. Finally, a meadow in the run-off zone from a sludge storage area was included in the investigations. In addition to the soil samples, selected samples of the applied sludge and other fertilizers were analyzed for their possible content of LAS. Apart from the location where the soil had been heavily sludge-amended and the location situated in the run-off zone of the sludge storage, concentrations of LAS in all soil samples were found to be below approximately 1 mg/kg, which is well below the proposed preliminary soil quality criteria for LAS of 5 mg/kg. On the other hand, the study unambiguously disclosed that in the case of heavy sludge amendment, the proposed soil quality criteria might well be exceeded. *Sci Total Environ.* 2002 May 6;290(1-3):225-30. ((((((((((McGowan's comment---Note runoff))))))))))

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Identification of the synthetic surfactant nonylphenol ethoxylate: a P-glycoprotein substrate in human urine.

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P-glycoprotein (Mdr1p) is an ATP-dependent drug efflux pump that is overexpressed in multidrug-resistant cells and some cancers. Mdr1p is also expressed in normal tissues like the kidney, where it can mediate transepithelial drug transport. A human urinary compound that reverses multidrug resistance and blocks [3H]azidopine photolabeling of P-glycoprotein was purified to homogeneity and identified by 1H-NMR and mass spectrometry as the synthetic surfactant nonylphenol ethoxylate (NPE). Multidrug-resistant Chinese hamster ovary (CHO) C5 cells accumulated less [3H]NPE than parental drug-sensitive Aux-B1 cells, and Mdr1p substrates, verapamil and cyclosporin A, increased this surfactant's accumulation in C5 cells. NPE blocked the net transepithelial transport (basolateral to apical) of [3H]cyclosporin A in epithelia formed by Madin-Darby canine kidney (MDCK) cells. Net transepithelial transport (basal to apical) of [3H]NPE was demonstrated in MDCK cells and was inhibited by cyclosporin A. These findings show NPE is a Mdr1p substrate excreted into urine by kidney P-glycoprotein. NPE is a widely used surfactant and a known hormone disrupter that is readily absorbed orally or topically. The current findings indicate the function of kidney Mdr1p may be to eliminate exogenous compounds from the body. *Am J Physiol.* 1998 Jun;274(6 Pt 2):F1127-39.

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Dangers of Sludge
A Citizens Forum on Environmental and Health Concerns
from Landspreading of Sewage and Paper Mill Sludges
November 15, 1997
Concord, NH

[partial]

PANEL I: Science and Public Policy

Hugh Kaufman (panel presentation): ... [L]et me tell you a little bit about myself and a little bit about the issue....

I was one of the people who started the Environmental Protection Agency in Washington, DC almost 27 years ago. In the 1970s I was the chief investigator of hazardous sites, and I helped write all the federal laws on waste management for the United States, including the Resource Conservation Recovery Act, Superfund Act, and related amendments and statutes.

Known as a whistle blower because of initially my testimony to Congress back in the late '70s about toxic waste hazards around the country, including Love Canal, and then again in the early '80s when my testimony to Congress led to then President Reagan firing all the top people at the Environmental Protection Agency, and sending my boss, Rita Lavelle to jail for six months and five years' community service.

My views on environmental issues, particularly this issue, are based on over a quarter of a century's experience--I probably have more experience than anyone else in the federal government as an investigator on hazardous sites--and [are] not necessarily the policies of the Clinton Administration. My views are grounded on the reality of science and engineering, and not on politics of saving major corporations millions of dollars or making millionaires of quick buck artists in the waste disposal business. We just deal with the issues....

The reality is, as you saw on CNN Money Line, there are billions of dollars each year for wastewater treatment plants to save, and billions of dollars each year for waste disposal companies to earn if they can find cheap disposal for sewage sludge. Sewage sludge is not just human waste. Sewage sludge is also industrial waste. Sewage sludge can contain, and does, radioactive materials, toxic organic materials, halogenated hydrocarbons, and toxic heavy metals, the preponderance of which come from industrial discharge.

On top of that, because industries can make a lot of money by transferring the liability of that waste from those industries to the taxpayers, there are companies like Wheelabrator, like RMI, like BFI, that get paid substantial amounts of money to transfer that liability to the lowest common denominator in the society today, and that lowest common denominator unfortunately are farmers. When push comes to shove, farm land and farmers end up at the end of the food chain. The health of farm land is not as important in public policy in the United States as fish in the Atlantic Ocean.

That is why you cannot dump this toxic material into the Atlantic Ocean anymore because NRDC, EDF, and the traditional environmental groups and the federal government and the state of New York felt that the health of the fish are more important

than the health of farm land. And so they're all promoting dumping this material on farm land, but the way to do it is there must be a massive public relations campaign to sell the farmers on doing this. And you see that, you see hundreds of thousands of dollars in every state of the Union being paid for subtle and direct advertising to convince farmers that this is good, low-cost fertilizer. There are, as Abby said, nutrients in this material but there is also toxic material.

On top of that, unfortunately, the federal government has a policy now of allowing the use of Superfund waste--Superfund, being the program where we have toxic facilities that are so dangerous, hundreds of millions of dollars have to be spent to dig them up--to run the Superfund waste through wastewater treatment plants where the plants basically take the Superfund waste out of the water and transfer it to the sludge, and then take that Superfund waste that's in the sludge and land apply it to grow food.

That's happening here in New Hampshire, it's happening all over the country.

In fact, outside of Denver, Colorado, plutonium waste, which is in the Superfund site, and it came from the Rocky Flats nuclear reservation, went to the Lowry landfill. That waste will be run through the wastewater treatment plant in Denver so that plutonium waste will then end up in the sludge, and that sludge will be used to grow wheat that will go into interstate and international commerce.

So what we have is we have federal government as a matter of public policy, not as a matter of science, promoting the least-cost disposal, which is putting the problem of liability of Superfund clean-up waste, which is industry's problem also, on the back of the farmers, as well as industries doing it directly.

I received in a plain brown envelope the plan from the industries here in New Hampshire on how they are going to promote using sludge on land. It's very interesting.

I got their secret plan. Now, remember: Superfund waste will be land applied, out-of-state industrial waste in the form of sludge will be land applied, and industrial waste generated in the state will be land applied. All the companies who have generated the waste will be off the hook for liability, the wastewater treatment plants will be off the hook for liability, the disposal companies will be off the hook for liability, and the long-term liability will be borne by the farmers who put the material on their land.

What's interesting about the project list that the industry has for fighting the public trying to protect the land of New Hampshire is there is no section to deal with science and engineering. They only talk about public education, media relations, and actions. Let me read you some of the things as part of their strategy. "Take out advertisements in large newspapers showing farmers saying, 'Thanks to my neighbors and community for supporting my use of biosolids. By so doing, I have improved my yield, reduced my use of chemical fertilizers, and saved my farm X dollars.' "

Here's another plan of the industry: "Develop clever promotional ideas, e.g., little recycling bin as a planter in which composted biosolids is provided as a growing medium. Identify key political and public opinion makers. Keep data on them. Provide them with critical information." Does that sound a little bit like the former J. Edgar Hoover? Keeping data on the elected officials, keep book on them and the opinion makers? So I just read you some of the things in the secret plan. None of it says spend money to do detailed independent technical analysis to determine what kind of harm we've caused. No, it's all PR.

This is a political battle, this is not a science battle. The science is in. A recent decision this summer by the Fifth Circuit Court of Appeals, the United States Government, has rendered the highest level U.S. Government opinion based on science on the issue of land application of sludge. They ruled, three judge panel, that there is no consensus among the experts on the safety of sludge, there is no consensus. That was based on three appellate court judge panel, and the Fifth Circuit Court of Appeals, is the most conservative appellate court in the United States. So they ruled there is no consensus. Now, the public has to determine, if there is no consensus about safety in the minds of the experts, whether they want to take the liability and the risk. And that is the politics of sludge.

You're going to hear later today specific discussions by scientists, there's going to be good questions, I'm sure, from the industry, from the audience, where all points of view will be heard. And I hope as we go through the conference you will have more facts and come to your own conclusions....

Question from the Audience: I'm a student at the University of New Hampshire, and it could be that more research will be done at the University on the application of the sludge and its effects. Is there a piece of information that you haven't seen yet from the scientific community that would be helpful in this work?

Hugh Kaufman: The most important thing from a scientific point of view that could be helpful would be to take samples of sludge from wastewater treatment plants around the country that take industrial waste and/or Superfund waste, and detect the chemicals and elements that are not regulated by the government of the United States, so that you further quantify what's happening.

Let me tell you why that's important. In 1989 EPA proposed sludge regulations that were very similar to the rest of the developed world--Canada, Germany, the European countries. As a result of that proposed regulation, politicians from all over the country started to pressure EPA--a young senator, Albert Gore from Tennessee, the head of the Environmental Agency in New York City--all of them implying and/or stating directly that they could not land apply their sludge if EPA promulgated the regulations that were similar to the rest of the developed world.

So what EPA did was, they did a survey of most of the big city sludges to determine the highest levels of contaminants in those sludges, and then they modified the proposal so that all the big city sludges would be allowed to land apply their sludge. And the first act of the new Clinton/Gore Administration was to publish in the Federal Register and implement those regulations that would allow New York City sludge to be land applied every other place. Only a few of the toxic materials that were in the sludge are regulated, and the levels that were set for land application were high enough so that all the cities--Knoxville, Nashville, New York--would pass.

And what's needed is an independent analysis of sludges to determine--especially now that Superfund waste is going to them--to identify all of the toxic materials in that sludge and what levels they're at. That will help provide further information. Now, EPA is doing some of that now, but they are not going to tell the public the names of the cities that they're doing the analysis on because the cities are concerned that if their names come out, there will be public pressure not to land apply their sludge, so they're going to mask

the names of the cities. So what's needed is an honest scientific analysis of those sludges.

Audience: I've been told that in regards to the Superfund sites, once waste leaves a Superfund site and enters whatever waste stream, which will turn it into sludge, that it is no longer the responsibility of the PRPs--the Potentially Responsible Parties--the waste that they originally dump there. But I'm also hearing from EPA officials in Denver that they are still responsible for the material, even if it's moved off site. And I'm wondering what the actual law is.

Hugh Kaufman: The reality of the law is once the material goes to the treatment plant, and then the sludge goes to a farmer containing that Superfund waste, the liability is transferred from the industries that dumped the waste to the farmer and the farmers in the area. And so the federal government at the behest of some of the major campaign contributors, has participated in laundering the liability from companies like Dow, Dupont, Shell, and the Department of Energy. The federal government is a big hazardous waste generator, and transferred that liability to the farmers. So the liability is transferred.

Ellen Harrison: I actually wanted to add one quick thing to the liability question. In the preamble to--I think it's in the CERCLA [Comprehensive Environmental Release and Liability Act, i.e., the Superfund] legislation, there's something that specifically says that agricultural fertilizers are exempt from the CERCLA liability. And that was presented to the group of us by EPA as something that, "See, agriculture, you needn't be worried because you're not going to be subject to Superfund liability if you apply a sludge because it's an agricultural fertilizer, regardless."

In fact, in talking to a lawyer with the California Farm Bureau, his interpretation was that, ... if there is some kind of a clean-up problem that might be associated with sludge--if there were, that farmer would likely be sued or prosecuted under a different piece of law, some kind of a state law or you couldn't sell the property for residential purposes.

Hugh Kaufman: Imminent hazard under RCRA Section 7003 [the federal waste disposal law].

Ellen Harrison: Okay. And then in fact what it would do, would prevent the farmer from going after the generators under Superfund.

Hugh Kaufman: That's correct. It's not as advertised.

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The following is a recorded conversation between Dr. David Lewis and Dr. Ed Mc Gowan on sewer sludge and sewer effluent. The reason behind this recording was the analysis of Cottage Hospital and the potential for sewer effluent to be contaminated with multi drug resistant bacteria and other pathogens as well as materials that could effect the human environment as well as the natural environment.

David called me from his office at the University of Georgia, School of the Marine Program. David is the leading scientist, formerly of the EPA, dealing with sewer sludge and the application of sewer sludge on land. I basically let him talk ad lib and he talked about half an hour on the subject. It is a subject that has some severe implications for human health. Because he is an expert in this field I think it is important to pay attention

to what he has to say. Now I will switch to that portion where we recorded the telephone.

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David: I've got your papers on that and I can send you the C.V., you asked about that

Ed: OK.

David: That gives me an idea of what basically we need to chat about here and turn on your recorder and I'll chat as long as you want to chat.

Ed: Let's do it then.

David: Alright.

Ed: So, I'll ask you the question. What we are looking at is a hospital which is a high producer of multi drug resistant bacteria and then they are going to have to use the materials to combat that. They are also going to have to keep the hospital clean so they are going to have to use some heavy duty stuff. All of this is going to go through their effluent stream into the sewer treatment plant which we feel, based on our research, is not designed to deal with that and so it is going to wind up either in the ocean through the outfall or it is going to wind up in the sludge. And so our sludge cooking temperatures I think are 98° and it is kept at that for a fairly limited period of time making Class B biosolids which then goes out onto farm land somewhere. There is some discussion that they are going to be putting it on the farm land here which means it is going to wash back down the rivers and creeks into the estuaries and marine environment. That is basically the loop that I want to discuss. So you can pick up anywhere along that loop and wax if you wish.

David: Alright. What is done with the sludge other than heating it to 98°? It is, I assume, centigrade, it is near the boiling point of water.

Ed: I think it is Fahrenheit.

David: Really?

Ed: Yeah. And I think they keep it at that for a few days. I don't know what else they do to it.

David: OK.

Ed: And then it becomes a Class B material. Basically they have some kind of cookbook recipe; if you follow this it is supposed to work and I don't know that they do really a lot of testing on it.

David: OK.

Ed: They cannot test for anything other than the normal material that they would test for. I don't believe they are testing for viruses. I am almost positive they are not testing for any genetic material that would confer resistance.

David: OK. So, I mean do you want me to just talk in general about the Class B process and what it does and does not do with regard to the organisms that might come from hospital waste and go through the system?

Ed: That would be helpful; and then what might have to be changed in the process of doing Class B to reduce the risk if in fact there is a risk. We don't know that.

David: OK.

Ed: But based on your work and all the reading that I have done I think there is a risk.

David: Yeah.

Ed: Yeah.

David: Are you recording right now?

Ed: I am.

David: OK. Well, basically, all Class B sewage sludge technologies that are normally used such as anaerobic digestion and aerobic digestion and heating at these levels and composting, land stabilization, that sort of thing, these issues were covered in a NIOSH report in 2002, I believe it was, where they looked at the issue of workers handling this and I worked with Joe Cocallis as they developed that report and they came to the same conclusion that I had come to. Namely that the indicator organisms used for Class B biosolids which most commonly involves E.Coli, sometimes Salmonella is used as an indicator, but these are organisms that are killed normally by low level disinfection. They are vegetative bacteria that are highly susceptible to both chemical disinfection and heat disinfection. If you look, however, at the composition of sewage sludge and the range or organisms that are present there, you have a wide range from things on the low end like the vegetative bacteria (E.Coli, Salmonella, Staphylococcus and whatever) that are in sewage and end up in the solids and then go through these processes and those organisms are fairly easily gotten rid of. The enveloped viruses are in that group of highly susceptible organisms, such as Hepatitis B., HIV, influenza.

Moving sort of up the ladder of organisms or groups of organisms that are commonly present in sewage sludge, you get into the fungi, including the yeast such as a Canida species that take low to intermediate level disinfection to kill them. Also, at the

intermediate level of disinfection you have micobacterium (tuberculosis for example), the protozoa (Cryptosporidium and Giardia), you have helminth parasites (Ascaris and Toxocara) and some of the non-enveloped viruses. So we are already moving into a range of organisms that is questionable whether or not the processes used to treat sludge will catch these groups of organisms. Then finally some of the most important pathogens that are commonly in sewage sludge, the bacterial endospores, such as the Bacillus species, and a lot of the non-enveloped viruses, norovirus is a re-naming of the Norwalk-like viruses that most people are familiar with, the rotoviruses which are significant public health problems for diarrhea in infants and the elderly, the Coxsackie viruses, these organisms require high level disinfection. Such as the type of disinfectants that are used on endoscopes, for example, semi-critical medical devices. These types of devices are contaminated with these organisms and standard CDC recommendations for getting rid of them require high-level disinfection.

So, my point is that when NIOSH took a look at this issue they concluded that even the vegetative bacteria, such as Salmonella and E.Coli, still present a risk associated with Class B biosolids based on what we know, which is basically the problem we have is we don't know a lot. The reason for that is that the industry has not been required to produce what we call efficacy data. The National Research Council report that came out in July of 2002 on land application of sewage sludge and the risk that it poses potentially to public health made a point out of this that we need to see if these treatment technologies actually work and how well they work. If these processes are not even reliably catching E.Coli and the other indicator organisms you still have for Class B biosolids the EPA still allows certain levels of the indicator organisms to be present in the sewage sludge. They are not required to kill them all off. If they did that would be called Class A sludge. So we are dealing with Class B biosolids here which by definition still has some E.Coli and Salmonella and the like left in it. That fact alone tells you that if these vegetative bacteria are still present then you can certainly assume that microbacterium tuberculosis, the protozoa, the parasitic worms, all of the non-envelope viruses and bacterial spores which are far more difficult to kill are also present there in even greater numbers by virtue of the fact that they are more difficult to kill.

So, given that backdrop, I think it is more than wise to assume, and there is no reason not to assume that many of the types of bacteria that would be in hospital waste, including all of the drug resistant forms, are going to make it into the Class B biosolids and be hauled out for land application. The argument from the industry side as far as antibiotic resistant bacteria is mainly that this should be of no greater concern here with land application of Class B biosolids than it is in agriculture in general where antibiotics are added to animal feeds and you end up with antibiotic resistant strains in animal manures and those are spread and have been spread for centuries and there is no overwhelming public health problem associated with that.

The difference here is that in agriculture the types of antibiotics that are used in animal feed, such as streptomycin, is one thing. With hospital waste where you are treating patients with vancomycin and other antibiotics that are our last line of defense

antibiotics, those organisms you don't want them going through some Class B biosolids process that is not even designed to get rid of a lot of these organisms and then turn around and spread them out on the land and, as you raised the question about marine environments, what goes on the land ends up in the coastal environment in any of these near coastal systems. In fact, there has been a whole shift in marine sciences over the last few years to where it has become widely recognized that to understand what is going on in the coastal environments even the open oceans you have to understand what is going on on the land -- the land-sea connections. There is probably the biggest shift in emphasis in marine sciences in recent years toward understanding pollution offshore. So, I think that is basically the jest of what we are dealing with here.

What I have recommended myself as a first-step in dealing with this issue is for the EPA, the federal EPA, to get rid of this Class A, Class B classification system that was developed back in the late 80's or early 90's and go to a universal, high level disinfection standard for retrieving sewage sludge. It is indisputed that we have a lot of organisms in sludge that require high level disinfection to kill the organisms. So that alone tells you that we need to go to a high level disinfection standard for treating sludge. Unfortunately, since efficacy data has not been required for any of these technologies to see how effective they are at killing non-enveloped viruses and such we simply don't know at this day and time whether any of these treatment processes can achieve high level disinfection. So that is basically where we are.

Ed: That is fantastic.

David: Yes, it is an amazing situation.

Ed: Yeah.

David: It is basically the kind of situation you end up with when you have an infection control issue handled by an agency, namely the EPA, that doesn't employ infection control experts. We should have had a system developed by the CDC to deal with an issue like this where you are talking about spreading pathogen containing waste on land and exposing the public to it. But the CDC was unfortunately left out of the loop on this one.

Ed: I think the CDC chimed in on this National Academy of Sciences report. I read somewhere where they were concerned that the setbacks for the application for biosolids from waterways was insufficient or not even considered from a pathogen movement standpoint. But, you know it has been a long time since I have read these things, so it might be my foggy memory.

David: The CDC got involved at the NIOSH level which just deals with workers. They discussed a lot of these questions. The committee of the National Academy of Sciences that oversees the CDC which has gotten a handful of new appointees to that committee within the last year made by President Bush, one of those committee members met with

me in Washington at dinner about four months or so ago and she mentioned that at their first meeting with CDC in Atlanta over this past year that she brought up the issue of land application of sewage sludge that she felt like that was an issue that should be addressed by the CDC and a couple of other committee members also chimed in and said yes. But, as of yet the CDC has not decided to officially get involved in it. I know that the EPA in April of this year responded to the NRC report in the Federal Register and they said that they intended to work with the CDC on this issue in the future. But my understanding is that they are still talking NIOSH and not the CDC in Atlanta.

Ed: Now Ed Kennedy....

David: You mentioned setbacks. This is an issue that comes up in local government meetings all the time at the county level as to what setback distance is appropriate. Scientifically that "one size fits all" approach has no scientific basis because, if I could sort of give two examples, in north Georgia where you have organic soil and lots of vegetation a setback of 300 feet may work in certain circumstances. If you set a setback in Arizona, Nevada, California or wherever you have an arid system with lots of sand that gets blown around that sand gets picked up in dust storms and it may be five miles away, ten miles away that you still have people who have chronic lung disease or whatever who are inhaling these organic dust which are full of endotoxins and pathogens mixed together and 300 feet doesn't do anything for them.

There is a whole area of marine science that is involved with looking at pathogen-laden dust originating with sewage in parts of China coming across the Pacific and landing in your area out there. We have the same problem with dust from the Sahara Desert coming across the Atlantic and settling in the Caribbean and it is well established now that those routes cause increase in respiratory infections in the Caribbean, for example. So, on the one extreme who have scientists who look at survival of pathogens on these materials from sewage that go into the upper atmosphere and spend two to three weeks moving through the upper atmosphere and settling out thousands of miles away versus this issue within the EPA and USDA locally where they argue that the same pathogens on the same kind of dust generated on a sludge field are dead by the time they go 300 feet to the neighbors property and it is just a ridiculous situation. Setbacks are meaningless unless you understand the local conditions and the transport problems that you are dealing with there.

What we are seeing in our work is that the primary problem we are dealing with here is organic dust that are laden with endotoxins and other bacterial toxins mixed in with low levels of a huge variety of pathogens that spend a whole spectrum from vegetative bacteria and viruses and protozoa and bacterial endospores and so forth, all of that mixed together and there are scores of occupational diseases that are so well documented like Bicinosis (sp?), Farmers lung, there is a long list of them that is well known that people did inhale organic dust that had traces of bacterial breakdown products, the cell walls of gram negative bacteria which form the endotoxins, that these cause very serious illnesses. The basic approach to treating that is that you put the

patient on corticosteroids to treat the underlying inflammation as well as put them on antibiotics to treat whatever infections are taking advantage of that condition. Basically you have an individual who has inhaled endotoxins, they have allergic reactions to that and some not allergic reactions. The end result of which is fluids build up in the airways and lungs and those fluids have proteins in them so things like Staph aureus start growing in them. That is the condition you are dealing with here. With a cotton mill worker what you do you get the person out of the cotton mill away from the source, you treat their immediate infections and put them on steroids. They normally recover.

Here we have a situation that the EPA and the sludge industry has devised an industrial process that is an endotoxin making process. You take the solids of a waste treatment plant that a large fraction of which contains primarily gram negative bacteria, the E.coli, etc., maybe a quarter of that wet biomass is bacterial biomass, and you have a process where you kill all of that so you basically convert that to endotoxins. Then you dry it out and you spread it in the field. It has undergone a process that if you are fortunate may achieve low level disinfection so you have got a wide variety of human pathogens mixed in with high levels of endotoxins on organic dust that you are going to let dry out somewhere and blow around and let people breathe that. So just think of the position that puts the physician in who one of these individuals comes to them. We have hundreds of these cases across the country where people living next to the land application sites develop the burning eyes, the burning lungs, the coughing, the difficulty in breathing, the sinusitis that becomes very chronic, they are coughing up these thick fluids from their lungs, the thick phlegm that begins to develop just reacting to the toxins they are inhaling and so all of these infections set in. So what is the physician going to do? He has got a patient who is developing serious respiratory problems that needs to be treated with some sort of inflammatory approach. He can't remove the patient from the exposure unless they want to sell the house and move somewhere else, and, if the patient is treated with corticosteroids, you are just opening them up to the infections from the low levels of pathogens that are in the sludge that they are breathing.

Ed: And if there are resistant pathogens...

David: And if you have resistant pathogens, you have a whole other problem on top of that. Taking hospital waste, from time to time we are going to have Vancomycin, Methacillin, you name it, resistant bacteria in there exposing these people to it. It is just a bad situation that I think that we have got to do something about other than the approach that has been taken so far of just blowing these cases off as they mount up and saying they are all anecdotal. I think there is ample evidence in what we have published and is in the process of being documented now to conclude that these cases are real and are what you would expect. Who could expect to take Class B biosolids that is full of endotoxins and a wide variety of viruses and bacteria and cover hundreds of thousands of acres of land with tons per acre of this sludge continually every few week in the middle of communities and nobody reacts to the endotoxins from breathing the dust, nobody gets infections, that is the approach they are taking. They are basically

doing this and saying "prove it to us, document the dead bodies in the medical literature and then we will talk with you". That is basically their approach at this point.

Ed: Well, there is hauler down in San Bernardino I guess who said he isn't going to do anything unless 80% of the people get sick.

David: Yeah. How absurd. With byssinosis and this same sort of problem that developed in the cotton mill industry only a small fraction of the workers that are exposed to the contaminated lint actually developed these hypersensitivity reactions to the organic dust. That is because with the cotton lint you just have a trace of E. coli on them. Here we are dealing with a product that a large fraction of that whole biomass is E. coli cell parts once you have killed a large fraction of the bacteria in the sludge in processing it, we have bot people breathing that and, in my experience going to these sites where people are breathing sewage sludge dust coming from these fields virtually everybody in the area has these problems.

They have the difficulty in breathing, the chronic sinusitis, the continuous opportunistic infections. So, if 80% is a criteria, which is ridiculous, 80% is what we are seeing at these sites across the country. Eighty percent of the people in neighbors with these large sludge fields next to them have these problems, more than 80% of them.

Ed: I don't know how to deal with this industry, but hopefully what we have recorded today, I will play it before the decision makers and they will get a tremendous educational value from it. Maybe some decent decisions will begin to be made, at least here.

David: Well, when the group gets together if they would like to give me a call and have any questions about it I would be glad to answer any questions.

Ed: OK. Well, you have been a prince. I really appreciate this....

David: ...have the opportunity, and wish you the best of luck there.

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Altered Alveolar Macrophage Function in Calorie-restricted Rats

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ABSTRACT

Alveolar macrophage functions associated with clearance of bacteria from the lung were assessed in male Fischer 344 rats maintained on a 25% calorie-restricted diet. Calorie-restricted and *ad libitum*-fed (control) rats were exposed to concentrations of ozone known to compromise phagocytic function of alveolar macrophages. Ozone suppressed alveolar macrophage phagocytosis of latex beads *in vitro* in *ad libitum*-fed rats, but not in calorie-restricted rats. In fact, caloric restriction enhanced phagocytic function in both control and ozone-exposed animals. *Ad libitum*-fed rats exposed to ozone and challenged with *Streptococcus zooepidemicus* experienced a prolonged infection and influx of polymorphonuclear leukocytes (PMN), whereas calorie-restricted rats exposed to ozone cleared the bacteria in 24 h without an inflammatory response. Bacterial endotoxin-stimulated *in vitro* production of nitric oxide and tumor necrosis factor (TNF)- as well as expression of TNF- and interleukin-6 messenger RNAs were all lower in alveolar macrophages isolated from calorie-restricted rats. Together, the data suggest that caloric restriction enhances resistance to gram-positive bacteria, while lowering the production of proinflammatory mediators elicited by endotoxin, a component of gram-negative bacteria. Although increased bacterial resistance is considered beneficial, reduction in the lung's ability to induce inflammatory mediators can have both positive and pathophysiologic consequences.

INTRODUCTION

Ample evidence exists that caloric restriction modulates homeostasis and impacts the sensitivity of host responses to various natural and environmental insults. For instance, caloric restriction retards age-associated pathophysiologic changes (1) as well as various types of degenerative diseases, including cancer in rodents (5). Although the subject has not been extensively investigated, several studies have shown that feed restriction or fasting enhances host defenses against infection in animals and humans. Feed restriction reduced the age-associated decline in antibody production following challenge with influenza virus (8) and dramatically decreased mortality caused by the cerebral malaria parasite in mice (9). Similarly, acute fasting has been shown to increase host resistance against *Listeria monocytogenes* challenge in mice (10, 11), enhance delayed cutaneous hypersensitivity to *Candida albicans*, increase serum monocyte bactericidal activity in obese patients (11), and increase the response to influenza vaccine in anorexia nervosa patients (12).

Feed restriction and/or fasting also affects nonspecific phagocytic responses and inflammation. Prolonged fasting decreases serum neutrophil chemotaxis (13) and reduces the intensity of inflammation and levels of proinflammatory cytokines such as tumor necrosis factor (TNF) and interleukin (IL)-6 in the salivary glands of NZBxNZWF₁ mice for an autoimmune disease model (14). Phagocytosis of opsonized sheep red-blood cells by alveolar macrophages (AM) in Fischer rats was studied on fasted or 20-95% restricted regimens (15). Phagocytosis increased shortly after fasting (2 d), but decreased after prolonged fasting (3-6 d). Increased phagocytosis also occurred in rats fed a 40% restricted diet.

Alveolar macrophages constitute the first line of defense against respiratory infections and are primarily responsible for clearance of gram-positive bacteria from the lung via phagocytosis and intracellular killing (16). Alveolar macrophages also elaborate proinflammatory mediators including reactive oxygen species, nitric oxide, and cytokines which regulate inflammatory responses (16). Previous studies have demonstrated that ozone exposure suppresses alveolar macrophage function in animals (17) and humans (20). Ozone-suppression of alveolar macrophage phagocytosis results in increased mortality in mice challenged with a relatively avirulent Group C *Streptococcus*. Delayed clearance of the bacteria in the lungs following ozone exposure has been demonstrated in both mice and rats (19, 21, 22). Recently, we have shown that dietary restriction mitigates ozone-induced lung inflammation in rats, in part, via increasing pulmonary storage of ascorbate (23). Thus, we hypothesized that caloric restriction might also mitigate the negative effects of ozone on alveolar macrophage function, enhance bacterial clearance, and prevent increased mortality from streptococcal challenge. In this study, we explored the effects of caloric restriction on alveolar macrophage functions thought to be important in the control of bacterial infections.

Ozone Exposure

Rats were housed in individual wire compartments and exposed for 3 h in the morning to either filtered air or 0.8 ppm ozone in Rochester-type chambers as described previously (24). Ozone was generated from oxygen using a silent arc discharge generator (OREC, Phoenix, AZ), and its entry into the chambers was controlled by a mass flow controller. The chamber concentration of ozone was monitored continuously using chemiluminescent ozone analyzers (Bendix, Lewisburg, WV), which were calibrated biweekly using a Dasibi transfer standard. Ozone levels were within 2% of the target concentration throughout the study. Temperature and relative humidity ranged from 69 to 73°F and 40 to 60%, respectively, for all exposures. In experiments which involved aerosol infection, the caged animals were subsequently placed in a similar chamber under negative pressure with respect to room air (25) and exposed to aerosolized bacteria as described below.

Bacteria and Infection

Batch slants of *Streptococcus zooepidemicus*, isolated from a pneumonic guinea pig lung and originally described as *Streptococcus pyogenes* or Group C *Streptococcus*, were obtained from lyophilized aliquots of the organism and stored at 4°C. Two days prior to infection, the bacteria were inoculated onto 5% blood agar plates and grown overnight at 37°C. Fresh colonies were then used to inoculate tubes containing 5 ml of Todd-Hewitt broth (THB). Following overnight incubation at 37°C, the bacteria were washed in phosphate-buffered saline (PBS; pH 7.2) and resuspended in THB at a concentration of $1-2 \times 10^9$ bacteria/ml. Aerosol infection of rats was carried out as previously described (19). Briefly, both groups of rats were placed together in an exposure chamber where 4 ml of the bacterial suspension were aerosolized in a nebulizer (No. 40; DeVilbiss, Somerset, PA) operating at 15 lb/sq in for 15-20 min followed by a 5-min purge. Deposition was determined by taking lungs at time 0 from both groups. As Figure 1 indicates, titers of bacteria in the lung at time 0 were the same for both groups. Flow rate through the chamber was 160 L/min (10 air changes/h). Animals were killed according to the schedule described below.

Bacterial Inactivation *In Vivo*

The intrapulmonary inactivation of the bacteria (*S. zooepidemicus*) was assessed in ozone-exposed control or calorie-restricted rats over a 48-h period after infection. Immediately, and 6, 24, and 48 h after infection, five animals from each treatment group were anesthetized with sodium pentobarbital (150 mg/kg, i.p.), the tracheas cannulated, and the lungs lavaged 3 times with warm saline (37°C, 35 ml/kg body weight). Lavage fluid was pooled for each rat, diluted 5-fold, and plated out (0.1 ml) in duplicate on blood agar. Following a 24-h incubation at 37°C, the resultant -hemolytic colonies were counted and the log₁₀ colony-forming units (CFU)/ml of lavage fluid was calculated. The minimal detectable level for this procedure is 10 CFU/ml.

Pulmonary Cell Populations

Cells obtained by lavage were enumerated on a hemocytometer and viability was assessed by trypan blue exclusion. Following dilution, 5×10^4 cells from each sample were prepared by cytopspin for Diff-Quik staining (American Scientific, Sewickley, PA). Differential counts were performed on 200 cells for identification of AM, polymorphonuclear leukocytes (PMN), and lymphocytes.

Alveolar Macrophage Isolation

Animals were euthanized with CO₂, the tracheas cannulated, the lungs resected, and bronchoalveolar lavage (BAL) performed by infusing the lung six times with a total of 40 ml of Ca²⁺/Mg²⁺-free PBS. BAL fluid was centrifuged (450 × g for 10 min) and erythrocytes were lysed with ammonium chloride lysing buffer. The pelleted cells were diluted to a concentration of 1×10^6 cells/ml in RPMI 1640 culture medium (GIBCO BRL, Gaithersburg, MD) supplemented with 10% fetal bovine serum (Hyclone, Logan, UT) and 2 mM L-glutamine (GIBCO BRL). Cell viability assessed by trypan blue exclusion was always greater than 98%. The cells were initially incubated for 30 min (5% CO₂, 37°C) to allow adherence of AM to the surface of microscope slides or culture plates. Non-adhered cells were then removed by rinsing three times with warm media. In pathogen-free rats, greater than 98% of the adherent cells obtained by this procedure are AM ([26](#)).

***In Vitro* Phagocytosis**

To assess the effect of caloric restriction on alveolar macrophage phagocytosis following ozone exposure, animals were exposed to 0.8 ppm ozone or chamber air (control) for 3 h and BAL cells were collected. Following centrifugation (450 × g, 10 min), the AM were resuspended to a final concentration of 5×10^5 cells/ml in serum-free RPMI 1640 medium containing 5 mM glutamine, and 0.5-ml aliquots were plated in quadruplicate in microscope slide tissue-culture chambers (Nunc, Naperville, IL). The cells were initially incubated for 30 min (5% CO₂, 37°C) to allow adherence of AM to the surface of microscope slides. Non-adhered cells were then removed by rinsing and inverting the chambers 3 times with warm medium. Fluorescent latex beads (1.46 μm in diameter; Coulter, Hialeah, FL) were then added at a cell-to-bead ratio of 1:50 in 0.3 ml of RPMI and the cultures were incubated on a revolving platform for 3 h (37°C, 5% CO₂). Following the incubation period, the culture chambers were inverted and the cells fixed and stained with Diff-Quik. Prior to examination, the slides were dipped 3 times in methylene chloride for a total of 15 s (5 s each time) to dissolve extracellular polystyrene

beads. A phagocytic index was determined by examining the number of beads in each of 200 cells.

***In Vitro* Alveolar Macrophage Culture**

Alveolar macrophages (5×10^5 cells/ml) were seeded in 1-ml volumes into 24-well culture dishes for supernatant collection, or in 3-ml volumes into 12-well culture dishes for RNA extraction. Following incubation at 37°C and 5% CO₂ for 1 h and the removal of nonadhered cells, the cultures were treated with lipopolysaccharide (LPS; Sigma, St. Louis, MO) and incubated for 2 h for RNA isolation or 18 h for supernatant collection. These time points were previously shown to be optimal for cytokine messenger RNA (mRNA) expression and secretion, respectively, in AM (26, 27). Each experiment was conducted with cells harvested from the BAL fluid pooled from five animals on each of the two dietary treatments.

Semiquantitative Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR)

Cells in each well were homogenized in 1 ml of Ultraspec RNA (Biotecx Laboratories, Houston, TX) and total cellular RNA was extracted according to the manufacturer's procedure. To synthesize complementary DNA, 1.0 µg of RNA was resuspended in a 20-µl final volume of the reaction buffer (25 mM Tris-HCl, 37.5 mM KCl, 10 mM dithiothreitol, 1.5 mM MgCl₂, 10 mM of each deoxynucleotide triphosphate, pH 8.3 [Perkin-Elmer Cetus, Foster City, CA]) containing 0.5 µg oligo d(T) 12-18 primer (GIBCO BRL). After the reaction mixture reached 42°C, 200 U SuperScript RT (GIBCO BRL) was added into each tube, incubated for 30 min at 42°C, and stopped by denaturing the enzyme at 99°C for 5 min. The reaction mixture was diluted with distilled water to 100 µl. PCR primers for rat glyceraldehyde-3-phosphate dehydrogenase (G3PDH), TNF-, and IL-6 were purchased commercially from Clontech (Palo Alto, CA). The sequences of the primers were as follows: (1) G3PDH (sense: 5'-TGAAGGTCGGTGTCAACGGATTTGGC-3', antisense: 5'-CATGTAGGCCATGAGGTCCACCAC-3'); (2) TNF- (sense: 5'-TACTGAACTTCGGGGTGATTGGTCC-3', antisense: 5'-CAGCCT-TGTCCCTTGAAGAGAACC-3'); and (3) IL-6 (sense: 5'-CAAGAGACTTCCAGCCAGTTGC-3', antisense: 5'-TTGCCGAGTAGACCTCATAGTGACC-3').

Amplified PCR products along with the molecular weight marker, X174 DNA HaeIII digest (Sigma), were separated electrophoretically on 1% agarose gel (UltraPure; Sigma) at 75 V for 60 min and visualized by ultraviolet illumination after staining with 0.5 µg/ml ethidium bromide. Gels were photographed with Type 55 positive/negative film (Polaroid, Cambridge, MA). The relative changes in mRNA transcripts were determined using the Eagle Eye II Still Video System (Stratagene, La Jolla, CA). Densitometric analysis of the captured image was performed using NIH Image 1.54 image analysis software. The area under the curve was normalized against G3PDH content (28).

TNF- Bioassay

TNF- activity was measured in culture supernatants using the L929 mouse fibroblast (ATCC, Rockville, MD) lysis bioassay in the presence of 6 µg/ml actinomycin D (29) as performed in this laboratory (26). The detection limit of the assay is 0.02 ng/ml.

Nitric Oxide Determination

Nitric oxide production by cultured AM was estimated by determination of nitrite, a stable derivative of nitric oxide, in the conditioned culture media. Briefly, 50 µl of supernatant was combined with 50 µl of Griess reagent (0.5% sulphanilamide and 0.05% naphthylethylenediamine), incubated for 10 min at room temperature, and read at 570 nm in a microtiter plate reader. The concentration was determined against a standard curve employing varying concentrations of sodium nitrite (30).

Lactate Dehydrogenase (LDH) Measurement

To assess cytoplasmic leakage, LDH in culture supernatants was measured immediately after supernatants were harvested using a single reagent system (LD-L 20; Sigma) and measured at 340 nm (27).

Statistical Analysis

Data were analyzed using analysis of variance. The explanatory variables were LPS concentrations, hours after bacterial challenge, feed regimen (*ad libitum* or calorie-restricted), and inhalation exposure (air or ozone). The response variables were bioassay endpoints, bacterial CFU, differential cell counts, and phagocytic index. When appropriate, pairwise comparisons were performed as subtests of the overall analysis. Statistically significant differences were reported when the *P* value was less than 0.05. The significance levels of multiple comparisons were adjusted from raw numbers using a modified Bonferroni correction.

RESULTS

The effect of caloric restriction on phagocytic activity was assessed in AM isolated from control and ozone-treated rats using latex beads (Figure 2). The phagocytic indices were significantly elevated in AM from calorie-restricted rats relative to *ad libitum*-fed controls in both air- and ozone-exposed groups. Ozone significantly decreased the phagocytic index in *ad libitum*-fed but not calorie-restricted rats.

Because suppression of alveolar macrophage phagocytic function by ozone can be associated with impaired clearance of *Streptococcus* from the lungs, the effects of caloric restriction on *in vivo* clearance of *S. zooepidemicus* from the lungs of animals exposed to ozone was assessed (Figure 1). Ozone impairment of bacterial clearance was evident within 24 h after exposure in the *ad libitum*-fed group, while no such impairment was found in the calorie-restricted group after exposure. Differences in bacterial clearance between *ad libitum*-fed and calorie-restricted groups were still evident at 48 h after infection. In addition to bacterial clearance, the influx of PMN into the lungs occurring in rats exposed to bacterial challenge has been used as an indicator of host resistance. Hence, the effect of caloric restriction on total and differential cell counts in BAL fluid from ozone-exposed rats was examined at 0, 6, 24, and 48 h after bacterial challenge (Table 2). There was a significant increase in pulmonary infiltration of PMN following infection in ozone-treated *ad libitum*-fed rats. In contrast, no such increase occurred in calorie-restricted rats, suggesting that enhanced susceptibility to *Streptococcus* usually associated with ozone exposure was mitigated in calorie-restricted rats via augmented alveolar macrophage phagocytic function. The effects of caloric restriction on bacterial clearance and inflammation in rats infected in the absence of ozone were not assessed because the bacteria are cleared rapidly (within 24 h) and there is no inflammatory response without ozone (19); hence, there is no opportunity for caloric restriction to improve the situation.

The effects of caloric restriction on the induction of inflammatory mediators in the lung was then examined. Alveolar macrophages from *ad libitum*-fed and calorie-restricted rats were cultured with LPS and the release of nitric oxide was determined. For both groups, nitric oxide production increased at LPS concentrations above 0.5 ng/ml compared with untreated controls (Figure 3). Nitric oxide production was significantly lower in the calorie-restricted group compared with that of the *ad libitum*-fed group for both the constitutive baseline (8.8 μ M) and LPS-stimulated level. It should be noted that at the concentrations of LPS tested there was no cytotoxicity, as evidenced by lack of LDH release (Figure 3, inset).

Bacterial endotoxin was also used to stimulate the expression and production of proinflammatory cytokines in AM. Alveolar macrophages from both dietary groups were incubated for 18 h with increasing concentrations of LPS and the supernatants collected for LDH and TNF- quantitation (Figure 4). TNF- secretion in culture supernatant was significantly increased by LPS at concentrations above 0.25 ng/ml in both *ad libitum*-fed and calorie-restricted groups compared with their respective controls. Again, no treatment-related change in LDH membrane leakage was found at LPS concentrations tested (Figure 4, inset). Both the basal (constitutive) and LPS-stimulated levels of TNF- were significantly lower in the calorie-restricted group than in the *ad libitum*-fed group, and this difference persisted with increasing concentrations of LPS up to 0.75 ng/ml. To determine the effect of caloric restriction and LPS on inflammatory cytokine gene expression, AM from *ad libitum*-fed and calorie-restricted groups were treated with increasing concentrations of LPS for 2 h and RT-PCR was conducted on isolated RNA. As previously shown (28), cytokine TNF- and IL-6 mRNA transcripts were present at low basal levels. Both basal and LPS-induced TNF- and IL-6 mRNA levels were reduced in AM from calorie-restricted animals compared with those isolated from *ad libitum*-fed rats (Figure 5).

DISCUSSION

Alveolar macrophages constitute the first line of defense against microbial infection in the lung (16). Previous studies have demonstrated that alveolar macrophage phagocytic activity is impaired by ozone exposure and that this is closely associated with enhanced disease following challenge with a relatively avirulent organism, *S. zooepidemicus* (19, 21). In rats, ozone-enhanced infection is characterized by a delayed clearance of bacteria from the lung and an influx of PMN. Compared with *ad libitum*-fed rats, ozone-induced suppression of bacterial clearance and the subsequent infiltration of PMN were largely prevented in calorie-restricted rats *in vivo*. Furthermore, phagocytic activity was higher *in vitro* in AM isolated from calorie-restricted rats. Based on our observations of differential responses *in vitro*, it is reasonable to assume that proinflammatory cytokine expression was lower in AM in calorie-restricted rats than in *ad libitum*-fed rats, thereby causing less infiltration of PMN into the lungs. Considered together, this suggests that caloric restriction enhanced phagocytic function of AM *in vivo*. It is possible, of course, that in addition to being more phagocytic, AM from calorie-restricted rats are inherently more bactericidal than those from *ad libitum*-fed rats. However, this study did not assess endpoints specifically related to bacterial killing such as nicotinamide adenine dinucleotide phosphate-reduced oxidase activity and iNOS-driven nitric oxide production. Because alveolar macrophage function was enhanced by caloric restriction

even in air-exposed rats, caloric restriction may increase resistance against more virulent, gram-positive infections independent of ozone exposure. Differences in basal phagocytic function (i.e., those exhibited in air controls) are evident in strains of mice exhibiting differential susceptibilities to ozone-enhanced diseases (21). The effect of dietary restriction on ozone dosimetry in the BAL environment measured by the binding of ^{18}O to protein and cells of BAL fluid was previously studied and discussed extensively (23). The reduced ozone deposition in diet-restricted rats may be attributed partially to the increased concentrations of ascorbate in BAL fluid. From our present study, we believe that protection of ozone-induced impairment of macrophage phagocytic function in calorie-restricted rats may also be attributed, in part, to the increased levels of antioxidants in the fluid bathing the lung surface, which minimizes the ability of ozone to reach significant biologic targets.

When phagocytosis of AM is sufficient, an inflammatory response to *S. zooepidemicus* apparently is not needed to clear this gram-positive organism from the lungs and does not occur as evidently in the calorie-restricted rats. However, the ozone-impaired phagocytosis in *ad libitum*-fed rats prompted a robust inflammatory response by recruiting PMN to the site of infection. Activated PMN facilitate bacterial clearance, but they can cause tissue damage as well. In contrast, an inflammatory response is usually an important component of the lung's defense against gram-negative bacteria as well as a source of lung injury. Endotoxin elicits many of the inflammatory events seen following gram-negative bacterial infection. A typical response to such an infection in the lung is characterized by three events: an increase in local blood supply; an increase in capillary permeability caused by retraction of the endothelial cells; and an increase in migration of inflammatory cells, especially neutrophils, from capillaries to the sites of infection (31). Chemotactic events are regulated largely by inflammatory mediators such as nitric oxide and cytokines including TNF- and IL-6. Systemic or pulmonary LPS challenge elevates plasma and lung TNF- and IL-6 levels. Similarly, LPS treatment of AM *in vitro* increases gene expression of proinflammatory cytokines and chemokines including TNF- and IL-6 (28). Macrophages are also able to generate large amounts of nitric oxide shortly after exposure to cytokines or LPS (32, 33). If overproduced during infection, nitric oxide precipitously causes local tissue damage and vasodilation, which increases blood flow to the site of infection. Since significantly lower levels of nitric oxide were found in calorie-restricted rats, it is reasonable to assume that nitric oxide-induced inflammation and tissue damage associated with a gram-negative infection would be greatly reduced in calorie-restricted rats; however, clearance of the bacteria might be impaired. The reduced production of nitric oxide in calorie-restricted animals is not due to lack of dietary arginine, the precursor of nitric oxide, because both dietary groups consumed similar levels of protein. Nor can these effects be attributed to reduction in any other nutrient because the consumption of all nutrients except carbohydrates were identical in both dietary groups (Table 1). We have previously shown that caloric restriction results in increased concentrations of ascorbate in the lung lavage fluid (23). In view of special energy requirements needed for oxidative burst, it is tempting to speculate that there may be interactions between extracellular ascorbate concentrations, glucose availability, and macrophage function. Indeed, interactions between transport of ascorbate/dihydroascorbate and glucose/hexose as a regulatory feature have been

suggested in work with rabbit ciliary epithelium (34), human neutrophils (35), and oocytes expressing mammalian transport proteins (36). Clearly, more work is required to elaborate on these possibilities.

TNF-, a primary proinflammatory cytokine, exhibits both paracrine and autocrine effects to activate macrophages, eosinophils, and neutrophils. Thus, TNF- stimulates its own expression as well as other cytokines and chemokines (28). TNF- also elevates the expression of endothelial and leukocyte adhesion molecules such as intercellular adhesion molecule-1, thereby facilitating the migration of inflammatory cells from capillaries to the sites of infection. Since both TNF- and IL-6 levels in calorie-restricted rats were lower than those in *ad libitum*-fed rats, we speculate that the concentrations of other proinflammatory cytokines, chemokines, and mediators may also be lower in calorie-restricted rats, thus further dampening inflammatory responses.

In summary, this study demonstrated that caloric restriction enhanced alveolar macrophage phagocytic activity and improved resistance to challenge with a gram-positive bacteria while also suppressing the production of inflammatory mediators such as nitric oxide and TNF-. While the latter observation may result in less tissue damage due to infection, it may also impair clearance of bacteria, particularly gram-negatives, from the lung as a result of depressed neutrophil recruitment or inability to develop a normal immune response. Interestingly, the effects of caloric restriction on alveolar macrophage phagocytosis and production of inflammatory mediators were observed *in vitro*. Hence, the reported changes represent a direct and memorable effect on the cellular physiology per se in addition to possible changes in the *in vivo* milieu. If this proves to be a general phenomenon, it suggests that energy-related set-points may be transduced via the immune system to amplify or attenuate host response to environmental stress.

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Particulate air pollution: possible relevance in asthma.

Glovsky MM, Miguel AG, Cass GR.

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The relative importance of air pollution in the pathogenesis of bronchial asthma has been of interest for several decades. Numerous studies on the role of gaseous air pollution containing ozone, nitrogen dioxide, sulfur dioxide, and carbon monoxide have been published. Very little attention has been focused on the role of respirable particles in the causation of asthma. In this article we summarize some of our ongoing investigations into the sources and composition of airborne particles in the Los Angeles and Pasadena atmosphere, including the search for biologically active particles that may induce asthma attacks. It is found that the urban atmosphere contains not only combustion-derived particles from diesel engine exhaust and gasoline-powered motor vehicle exhaust, but also particles formed from biological starting materials including plant debris, cigarette smoke, wood smoke, and meat smoke as well as tire debris containing some natural rubber and paved road dust. Paved road dust is a very complex mixture of particles including garden soil, tire dust, plant fragments, redeposited atmospheric particles of all types, and pollen fragments presumably ground up by passing traffic. We have shown previously that latex allergen can be extracted from tire dust, from roadside dust, and from respirable air samples taken at Los Angeles and Long Beach. At present, work is underway to identify the larger range of allergens that may be contributed by the entrainment of paved road dust into the atmosphere. The possible importance of pollen fragments present in paved road dust in very small particle sizes is discussed as well as their potential relevance in asthma. Allergy Asthma Proc. 1997 May-Jun;18(3):163-6. PMID: 9194943 [PubMed - indexed for MEDLINE]

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[Air pollution, asthma and allergy--the importance of different types of particles]

[Article in Norwegian]

Ormstad H, Lovik M.

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BACKGROUND: Particulate air pollution has been much discussed in Norway during the last few years. Coarse particles from asphalt are likely to have quite different properties than the far smaller particles from diesel exhaust. **MATERIALS AND METHODS:** On the basis of data from the literature and our own research, we discuss the health problem of different types of particles with a focus on allergy and respiratory symptoms. **RESULTS:** Diesel exhaust particles have well-documented adverse effects in relation to allergic airway disease. They increase symptoms load in already allergic individuals and also seem to contribute to the increased prevalence of allergy. PM10 is today measured on the basis of weight, not on number. Diesel exhaust particles are much smaller than road surface particles; hence PM10 measurements reflect road

surface dust pollution more than exhaust particles. INTERPRETATION: Focus should now be given to diesel exhaust particles in order to reduce the adverse health effects of particulate air pollution in Norwegian cities. Tidsskr Nor Laegeforen. 2002 Aug 10;122(18):1777-82.

Publication Types: Review Review, Tutorial PMID: 12362688 [PubMed - indexed for MEDLINE]

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Latex allergen in respirable particulate air pollution.

Williams PB, Buhr MP, Weber RW, Volz MA, Koepke JW, Selner JC.

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OBJECTIVE: Urban air samples contain numerous irregular respirable black particles, which may be airborne tire fragments. A major component of tires is natural latex. Proteins of natural latex can act as adjuvants and as antigens capable of eliciting immediate hypersensitivity, making their presence in particulate air pollution an important clinical issue. METHODS: Particulate air pollutants were collected by volumetric sampling devices and characterized by optical microscopy, chemical solubility tests, and mass spectrometry. Extracts of rubber tire fragments were tested for elutable latex antigens by antibody inhibition assays. RESULTS: Identification of latex in air samples and milled material from automobile tires was supported by mass spectrometry results and was further confirmed by physical appearance and chemical solubility studies. Competitive immunoassay confirmed the presence of extractable latex antigens from rubber tire fragments. CONCLUSIONS: Latex antigens are extractable from rubber tire fragments, which are abundant in urban air samples. Given the adjuvant and sensitizing effects of latex, these airborne particles could contribute, through direct and indirect mechanisms, to the increase in both latex sensitization and asthma. The impact of these particles should be considered in the issue of morbidity and mortality rates associated with respiratory diseases and air pollution. J Allergy Clin Immunol. 1995 Jan;95(1 Pt 1):88-95.

PMID: 7822669 [PubMed - indexed for MEDLINE]

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Latex condom deterioration accelerated by environmental factors: I. Ozone.

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Commercial non-lubricated latex condoms were unpackaged and exposed in an environmental chamber to ozone levels (0.3 ppm) commonly present in urban smog conditions. Deterioration was observed by scanning electron microscopy after 18 hours exposure. Loss of mechanical strength was quantitated by measurement of the air

pressures necessary to burst the condom and volumes at burst. After 24 hours exposure to ozone the latex surface was covered with craters and after 48 hours the pressure required to burst the condom was 44% that of control samples. Data suggest the need for study of the effectiveness of lubrication and packaging in protecting condoms from environmental factors which may accelerate deterioration.

PIP: Although condoms are subject to tests of strength and leakage, these tests do not predict dependability nor do they consider environmental factors that may increase the probability of breakage. A study of latex condom deterioration was conducted with commercial non-lubricated condoms exposed to ozone levels commonly present in urban smog conditions. Environmental conditions during transport and storage may weaken the latex and contribute to its corrosive effects. In this study, commercial non-lubricated latex condoms were exposed to ozone in an environmental chamber. Deterioration was assessed by scanning electron microscopy after 18 hours of exposure. Condom air burst test protocols from the International Organization for Standardization were used to assess mechanical strength. Results revealed that there was marked deterioration of the condom wall after exposure to ozone after 6-48 hours. Mechanical strength was also decreased after 24 hours' exposure according to air burst test criteria. 3 different brands were tested to ensure that the effects were not limited to 1 brand. The condoms were non-lubricated and unpackaged when exposed, which is important in the interpretation of these results because most condoms marketed in the U.S. are pre-lubricated. Packaging may also provide additional protection. But the study did reveal a fundamental ozone-latex reaction. Anti-ozonant treatments, used in tires and other rubber products, could be an option for the prevention of deterioration in latex condoms. Careful transport and storage of condoms is important to protect them from environmentally accelerated deterioration. Contraception. 1989 Mar;39(3):245-51. PMID: 2714087 [PubMed - indexed for MEDLINE]

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Photochemical products in urban mixtures enhance inflammatory responses in lung cells.

Sexton KG, Jeffries HE, Jang M, Kamens RM, Doyle M, Voicu I, Jaspers I.

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Complex urban air mixtures that realistically mimic urban smog can be generated for investigating adverse health effects. "Smog chambers" have been used for over 30 yr to conduct experiments for developing and testing photochemical models that predict ambient ozone (O₃) concentrations and aerosol chemistry. These chambers were used to generate photochemical and nonirradiated systems, which were interfaced with an in vitro exposure system to compare the inflammatory effects of complex air pollutant mixtures with and without sunlight-driven chemistry. These are preliminary experiments in a new project to study the health effects of particulate matter and associated gaseous copollutants. Briefly, two matched outdoor chambers capable of using real sunlight were

utilized to generate two test atmospheres for simultaneous exposures to cultured lung cells. One chamber was used to produce a photochemically active system, which ran from sunrise to sunset, producing O(3) and the associated secondary products. A few hours after sunset, NO was added to titrate and remove completely the O(3), forming NO(2). In the second chamber, an equal amount of NO(2) and the same amount of the 55-component hydrocarbon mixture used to setup the photochemical system in the first side were injected. A549 cells, from an alveolar type II-like cell line grown on membranous support, were exposed to the photochemical mixture or the "original" NO(2)/hydrocarbon mixture for 5 h and analyzed for inflammatory response (IL-8 mRNA levels) 4 h postexposure. In addition, a variation of this experiment was conducted to compare the photochemical system producing O(3) and NO(2), with a simple mixture of only the O(3) and NO(2). Our data suggest that the photochemically altered mixtures that produced secondary products induced about two- to threefold more IL-8 mRNA than the mixture of NO(2) and hydrocarbons or O(3). These results indicate that secondary products generated through the photochemical reactions of NO(x) and hydrocarbons may significantly contribute to the inflammatory responses induced by exposure to urban smog. From previous experience with relevant experiments, we know that many of these gaseous organic products would contribute to the formation of significant secondary organic particle mass in the presence of seed particles (including road dust or combustion products). In the absence of such particles, these gaseous products remained mostly as gases. These experiments show that photochemically produced gaseous products do influence the toxic responses of the cells in the absence of particles. Inhal Toxicol. 2004;16 Suppl 1:107-14.PMID: 15204799 [PubMed - indexed for MEDLINE]

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Caroline & helene, bits & pieces from various sources. The issue of **prevalence** is one of context within the NRC report. Are we talking about prevalence in disease or prevalence in spread amongst environmental niches? If the latter, then there is ample evidence. Thus the leap is but a short step to exposure of humans. In the paper immediately below, the Danes conclude that movement from sewage to background organisms is possible---pull up paper and see Section III.

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[PDF] [Occurrence and fate of antibiotic resistant bacteria in sewage](#)

File Format: PDF/Adobe Acrobat

... isolates obtained from raw and treated **sewage** allowed detection of a statistically significant increase in the **prevalence** of **antibiotic resistance** to only one ...

www.mst.dk/udgiv/publications/2002/87-7972-266-0/pdf/87-7972-267-9.pdf - [Similar pages](#)

U.S. Food and Drug Administration

The Rise of Antibiotic-Resistant Infections

by Ricki Lewis, Ph.D.

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Towards Solving the Problem

Antibiotic resistance is inevitable, say scientists, but there are measures we can take to slow it. Efforts are under way on several fronts--improving infection control, developing new antibiotics, and using drugs more appropriately.

Barbara E. Murray, M.D., of the University of Texas Medical School at Houston writes in the April 28, 1994, *New England Journal of Medicine* that simple improvements in public health measures can go a long way towards preventing infection. Such approaches include more frequent hand washing by health-care workers, quick identification and isolation of patients with drug-resistant infections, **and improving sewage systems** and water purity in developing nations.

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Caroline, although the discussion below relates to transgenic crops, note that in this economically driven industry, there is sufficient concern to develop methods to inactivate the resistance conferring material. Unfortunately, this type of caution is not well demonstrated within the sludge industry.

Recent studies ([Osterblad et al., 2001](#); [Routman et al., 1985](#)) on the prevalence of antibiotic resistance in the gut bacteria of wildlife indicate that mammals (moose, deer, voles, baboons) living in areas isolated from humans do not harbor resistant bacteria, while mammals living in human-populated areas do harbor such bacteria

The suggestion that human activities may contribute to the occurrence of antibiotic resistance in nearby organisms needs further study, but this effect appears to occur independently of transgenic crops.

While the risks from antibiotic resistance genes in transgenic plants appear to be low, steps are being taken to reduce the risk and to phase out their use.

- The FDA recommends that developers of transgenic crops use antibiotics that are not commonly used for treatment of diseases in humans. Thus, if horizontal gene transfer does occur, micro-organisms in the body are not likely to have acquired resistance to the antibiotics that a doctor might prescribe to fight infection.
- Scientists are changing their development methods. Other marker genes, such as green fluorescent protein, or mannose ([Joersbo et al., 1998](#)), may be able to do the job that antibiotic resistance markers have done.
- Scientists are also experimenting with methods for removing the antibiotic resistance genes before the plants are released for commercial use ([Dale and Ow, 1991](#); [Ebinuma et al., 1997](#); [Iamtham and Day, 2000](#); [Zuo et al., 2001](#)), so that these genes can be used during development and then eliminated from the final product
- European scientists have developed a method for inactivating the antibiotic resistance genes in the event that they are transferred to bacteria in the environment ([Libiakova et al., 2001](#)). A special DNA sequence inserted into the antibiotic resistance gene will prevent the gene from functioning inside a bacterium. Plants are able to snip out the special sequence to let the gene function correctly.

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Perspectives

Socioeconomic and Behavioral Factors Leading to Acquired Bacterial Resistance to Antibiotics in Developing Countries

Iruka N. Okeke,* Adebayo Lamikanra,* and Robert Edelman†

*Obafemi Awolowo University, Ile-Ife, Nigeria; and †University of Maryland School of Medicine, Baltimore, Maryland, USA

Residents of developing countries often carry antibiotic-resistant fecal commensal organisms (13,88). Visitors to developing countries passively acquire antibiotic-resistant gut *Escherichia coli*, even if they are not taking prophylactic antibiotics, which suggests that they encounter a reservoir of antibiotic-resistant strains during travel (89). Apparently healthy people in developing countries carry potentially pathogenic, antibiotic-resistant organisms asymptotically (90). Several factors, such as urban migration with crowding and **improper sewage disposal**, encourage the exchange of antibiotic-resistant organisms between people and the exchange of resistance genes among bacteria, thereby increasing the prevalence of resistant strains

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[PDF] [Presence of Class I Integrons in Multidrug-Resistant, Low ...](#)

File Format: PDF/Adobe Acrobat - [View as HTML](#)

... Su Tc 1.8, 1.0 Derby 1999 **Sewage** Ap Sm ... **resistance** genes within several low-prevalence

serotypes of ... the public health problem of **antibiotic resistance** diffusion ...

www.cdc.gov/ncidod/eid/vol7no3/pdfs/nastasi.pdf - [Similar pages](#)

Conclusions

The emergence of multidrug resistance in *Salmonella* serotypes is causing growing concern because of the high potential of human involvement through food and animal contact. We have detected integrons in MDR-resistant isolates of *Salmonella* identified in southern Italy in the last 3 years. Our findings confirmed not only that integrons are not confined to *S. Typhimurium* DT104 but also that they can be found in many less-prevalent serotypes with extensive reservoirs, encompassing animal species (swine, poultry, domestic pets) and environmental sites (rivers, **sewage effluents**). A further concern is the presumed location of integrons on the chromosome, detected in isolates of nine different serotypes. This resistance gene location has proved to be very efficient in acquiring and establishing resistance traits and in supporting spread of *S.*

Typhimurium DT104 through the food chain in western countries (17). Table 1.

Proportion of low-prevalence *Salmonella* serotypes resistant to three or more

antibacterial drugs

Serotype	No. (%)
Sandiego3	33.3
Blockley22	31.9
Heidelberg6	21.4
Thompson11	20.4
Stanley2	16.7
Saintpaul2	12.5
Muenchen1	11.1
Brandenburg6	10.7
Anatum5	10.0
Hadar1	7.7
Ohio2	7.1
Bredeney2	5.7
Paratyphi B1	5.0
Newport1	4.5
Panama1	4.3
Virchow3	3.3
Livingstone2	2.9

Table 2. Phenotypic and molecular characteristics of multidrug-resistant and class I integron carrying strains of *Salmonella*

Integron	Year	Plasmid	Integron	Resistance pattern	sizes	source of	Resistance pattern	sizes	of recipient(kb)	of
Serotype	isolation	pattern	(mDa)	(kb)	<i>Escherichia coli</i>	<i>E. coli</i>	Derby1997	Human	Ap	Cm

Sm Su Tc Tp Gm120b2.0Ap Cm Sm Su Tc Tp2.0Newport1997 Human Ap Cm Sm Su Tc Tp Gm1202.0Ap Cm Sm Su Tc Tp2.0Paratyphi B1997 Tropical fish Ap Cm Sm Su Tc1.2, 1.0Saintpaul1997 Poultry Ap Cm Sm Su Tc Tp1201.8Ap Cm Sm Su Tc Tp1.8SanDiego1997 PoultryAp Cm Sm Su Tc Tp Kf1.4Anatum1998 Food (not specified)Ap Sm Su Tc Tp F1.8Blockley1998 River waterCm Sm Su Tc Tp F Na1.8, 1.0Brandenburga1998 HumanCm Sm Su Tc Tp1201.0Cm Sm Su Tc Tp1.0Livingstone1998 River waterAp Cm Sm Su Tc Tp1201.8Ap Cm Sm Su Tc Tp1.8Ohio1998 River waterAp Cm Sm Su Tc Tp1201.8Ap Cm Sm Su Tc Tp1.8Ohio1998 SwineAp Sm Su Tc Tp1201.6Ap Sm Su Tc Tp1.6Panama1998 SwineAp Cm Sm Su Tc Tp1201.8Ap Cm Sm Su Tc Tp1.8Saintpaul1998 HumanAp Cm Sm Su Tc Tp Kf1401.8Ap Cm Sm Su Tc Tp1.8Anatum1999 SewageAp Sm Su Tc Tp1.8Anatum1999 River waterAp Su Tc Tp F1.8Anatum1999 River waterSu Tc Tp Na< 0.1Blockley1999 HumanCm Sm Su Tc F Na< 0.1Brandenburg1999 Tropical fishCm Su Tc Tp0.8, 0.2, <0.1Brandenburg1999 Tropical fishCm Sm Su Tc Tp1.8Brandenburg1999 PoultryCm Sm Su Tc Tp Gm F Na1201.8Cm Sm Su Tc Tp1.8Bredeney1999 SewageSm Su Tc1.8, 1.0Derby1999 SewageAp Sm Su Tc60, 351.0ApHeidelberg1999 HumanAp Sm Su Tc1.8, 1.0, 0.2Stanley1999 Tropical fishCm Sm Su Tc Tp1.8, 1.0aOutbreak strain.bNumbers in bold indicate the approximate molecular size of self-transferable resistance plasmids.

Page 3

Dispatches457Vol. 7, No. 3, May–June 2001Emerging Infectious Diseases We also recognized in different serotypes a pattern of resistance similar to the five-drug pattern typical of DT104, a phenomenon reported by Glynn et al. (10). The heterogeneous distribution and organization of resistance genes within sever allow-prevalence serotypes of Salmonella suggest the possible emergence of MDR-DT104-like patterns in serotypes other than S. Typhimurium that share a similar selective pressure because of intensive use of antimicrobial agents in farming. Moreover, tetG and flor resistance sequences in one S. Paratyphi B isolate from Singapore tropical fish suggest that the use of antimicrobial agents in aquaculture in Asia is contributing to the emergence and spread of multidrug resistance within fish pathogens and, subsequently, MDR-DT 104 strains (18).The association between emergence of MDR Salmonella strains and excessive use of antibiotics in animal husbandry(as growth promoters and for disease prevention and therapy)is receiving increasing attention in developed countries. The presence of integrons in zoonotic serotypes such as Blockley, Brandenburg, Derby, or Saintpaul, which in southern Italy are epidemiologically linked to farming practices, underscores the public health problem of antibiotic resistance diffusion. Surveillance and monitoring of antimicrobial-drugresistance, including screening for class I integrons as likely indicators of evolution of drug resistance mechanisms and acquisition of new resistance traits, are necessary steps in planning effective strategies for containing this phenomenon within foodborne infectious organisms. Dr. Nastasi is professor of hygiene at the Department of Public Health of the University of Florence, Italy. His research interests include epidemiology and surveillance of infectious diseases. Dr. Mammina is a physician at the Department of Hygiene and Microbiology of the University of Palermo, Italy. Her work focuses onepidemiologic investigation of infectious diseases by

molecular typing. References

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sult1 temoxa2aadA2ant(3'')-laaac(3)-
 IAdhfrItetGpasppflo-like (flor) Derby+++Newport++Paratyphi
 B++++Saintpaul++++Sandiego+++Anatum++Blockley++Brandenburga+++Livingstone+
 +Ohio+++Ohio++++Panama++++Saintpaul++++Anatum+++Anatum++Anatum+Blockle
 y+Brandenburg+Brandenburg++Brandenburg+++Bredeney+Derby+++Heidelberg++Sta
 nley+++a
 Outbreak strain.

 Page 4

Dispatches *Emerging Infectious Diseases* Vol. 7, No. 3, May–June 2001 458-13. Datta N. Transmissible drug-resistance in an epidemic strain of *Salmonella typhimurium*. *J Hyg* 1997;78:297-300.

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Antibiotic Resistance in *Acinetobacter* spp. Isolated from Sewers Receiving Waste Effluent from a Hospital and a Pharmaceutical Plant

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Received 6 April 1998/Accepted 17 June 1998

The possible increase of antibiotic-resistant bacteria in sewage associated with the discharge of wastewater from a hospital and a pharmaceutical plant was investigated by using *Acinetobacter* species as environmental bacterial indicators. The level of susceptibility to six antimicrobial agents was determined in 385 *Acinetobacter* strains isolated from samples collected upstream and downstream from the discharge points of the hospital and the pharmaceutical plant. Results indicated that while the hospital waste effluent affected only the prevalence of oxytetracycline resistance, the discharge of wastewater from the pharmaceutical plant was associated with an **increase in the prevalence of both single- and multiple-antibiotic resistance among *Acinetobacter* species in the sewers.**

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January 2001

Microbes:

What They Do & How Antibiotics Change Them

By Maura J. Meade-Callahan

Production. Antibiotic sales total more than \$8 billion worldwide each year. That is 50 million pounds produced each year, 25 million pounds of which are prescribed for human use. Discharge of wastewater from pharmaceutical plant has been associated with an increase in the prevalence of single- and multiple-antibiotic resistance in indicator organisms.

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Antibiotic resistant microorganisms in the River Barrow

Researchers Shona Stewart and Dominic Garvan in the Molecular Biology

Laboratory at Carlow IT.

The river Barrow has been of importance to the inhabitants of Ireland for over five thousand years and has recently been targeted as a priority resource for tourism. One essential factor in the successful tourist development of the river is high water quality.

At the Institute of Technology, Carlow, two microbial aspects of water quality are being investigated: the presence of microorganisms that indicate recent faecal contamination, and the prevalence of microorganisms that are resistant to antibiotics used in animal and human medicine. The significance of the antibiotic resistant microorganisms is that they may constitute a pool of drug resistances that could potentially transfer into human and animal pathogens, undermining successful antibiotic therapy.

Our investigations of selected sites from the Barrow have indicated recent ongoing faecal pollution resulting in introduced populations of microorganisms originating from the mammalian gut. This investigation is ongoing and a more complete picture of the faecal contamination and the resulting river microflora will be available.

When levels of river microorganisms resistant to antibiotics were analysed, between 20% and 59% were resistant to three or more antibiotics used in human and veterinary medicine. In addition, it was found that a sample of the multi-resistant bacteria identified could be stably maintained in the absence of selective pressure, suggesting a stable pool of antibiotic resistance genes in the bacterial population of the river.

The possibility of these antibiotic resistances being plasmid borne and therefore transmissible to other microorganisms was investigated, and we have detected transfer of resistances both in in vitro experiments and in non sterile microcosms into the enteric bacteria *Escherichia coli*. The significance of these results is the demonstration of the presence of a stable pool of transferable antibiotic resistance genes both in the indigenous and in the introduced microbial population in the river Barrow that could potentially enter the mammalian food chain.

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Antibiotic Resistance Genes as Emerging Contaminants: Studies in Northern Colorado

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Abstract:

This study explores antibiotic resistance genes (ARGs) as emerging environmental contaminants. The purpose of this study was to investigate the occurrence of ARGs in various environmental compartments in northern Colorado, including Cache La Poudre (Poudre) River sediments, irrigation ditches, dairy lagoons, and the effluents of wastewater recycling and drinking water treatment plants. Additionally, ARG concentrations in the Poudre River sediments were analyzed at three time points at five sites with varying levels of urban/agricultural impact and compared with two previously published time points. It was expected that ARG concentrations would be significantly higher in environments directly impacted by urban/agricultural activity than in pristine and lesser-impacted environments. Polymerase chain reaction (PCR) detection assays were applied to detect the presence/absence of several tetracycline and sulfonamide ARGs. Quantitative real-time PCR was used to further quantify two tetracycline ARGs (tet(W) and tet(O)) and two sulfonamide ARGs (sul(I) and sul(II)). The following trend was observed with respect to ARG concentrations (normalized to eubacterial 16S rRNA genes): dairy lagoon water > irrigation ditch water > urban/agriculturally impacted river sediments ($p < 0.0001$), except for sul(II), which was absent in ditch water. It was noted that tet(W) and tet(O) were also present in treated drinking water and recycled wastewater, suggesting that these are potential pathways for the spread of ARGs to and from humans. On the basis of this study, there is a need for environmental scientists and engineers to help address the issue of the spread of ARGs in the environment.

COMMENTS as printed in ES&T.

: [Environ Sci Technol.](#) 2007 Apr 1;41(7):2651-2.[Links](#)

Comment on:

[Environ Sci Technol.](#) 2006 Dec 1;40(23):7445-50.

Comment on "antibiotic resistance genes as emerging contaminants: studies in northern Colorado".

[McGowan E.](#)

PMID: 17438829 [PubMed - indexed for MEDLINE]

These comments are merely qualifications, not criticisms of Dr. Pruden's fine paper [1]. Resistance has been attributed to drug over-use. Pruden notes a less well-understood mechanism for the amplification of multi-drug resistance, sewage. The local sewer-treatment plant releases pathogens and resistance to the environment and

agriculture[2]. Wastewater treatment intermixes organisms otherwise seldom coming together. Selective pressures increase survival mechanisms [3].

Defense strategies include going dormant, entering the viable but non-culturable (VBNC) state. These VBNC organisms are essentially invisible to laboratory tests used in the wastewater industry. Higgins & Murthy recently reconfirmed this [4] in a paper that raises some serious questions about the efficacy of current standards. Those authors noted that during centrifuged dewatering of sewer sludge, indicators in a VBNC state were resuscitated. The results were several magnitudes greater than standard plate counts had indicated [4]. Such findings raise logical questions. If dewatering by centrifuge brought out the essence of VBNC, would other products of sewage that had not been subjected to the centrifuge also in the VBNC state? If so would they revive in the field following agricultural application of sludge or irrigation with reclaimed wastewater? This seems plausible but needs further study.

Additionally, as stresses increase organisms can acquire genes from or transfer genes to non-related organisms, organisms even within completely different kingdoms [5,6]. There are other materials dumped into the drain that confer resistance. This includes industrial chemicals, heavy metals, and disinfectants. Triclosan a ubiquitous biocide is suspected of inducing resistance, as are many other industrial materials found in sewage [7,8]. Changes to the cellular machinery afford the ability to deal with numerous insults, hence cross-resistance [9].

Many antimicrobials including metabolites enter sewage essentially unchanged to induce resistance in the environment [10]. Kummerer [11,12,13,14,15] and others [16] note levels of antibiotics/pharmaceuticals in sewage able to induce or maintain resistance, hence adding to the risks in crop production through irrigation.

Based on wastewater (sewage) industry and regulatory opinion, the standards, the released effluent, and its use for crop irrigation or the land application of sewage sludge are benign and beneficial activities [17]. If however, one reviews the current medical and scientific literature, a different picture emerges, one that raises serious questions about the benevolence of this activity and efficacy of the underlying standards [18]. Thus, the issue takes on aspects of a political and not a scientific argument [18,19]. In the interim, most regulatory agencies have backed off [20]. This leaves the citizens and patient base essentially standing naked.

In 2002 the NAS/NRC [21] called into question the U.S. EPA Part 503 guidelines for land application of sewage sludge (biosolids) and specifically EPA's failure to consider antibiotic resistance. As of writing this comment, EPA has shown little if any progress in investigating resistance. A Freedom of Information Act request to EPA on this subject was submitted in February 2005. The agency has not answered that request [20]. Additionally, the agency has not done health hazards risk analyses for pathogens.

Notwithstanding these shortcomings, the agency and the wastewater industry continue to promote the use of sewage byproducts in crop production. Salinas Valley is an example.

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The Importance of Municipal Sewage Treatment in the Spread of Antibiotic Resistance
106th General Meeting of the American Society for Microbiology

May 21-25, 2006, Orlando, Florida

For more information on any presentation at the 106th General Meeting of the ASM contact Jim Sliwa, ASM Office of Communications at jsliwa@asmusa.org

EMBARGOED UNTIL: Monday, May 22, 9:00 a.m. EDT

(Session 041/Q, Paper Q-032)

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Our study determined that substantial numbers of antibiotic-resistant bacteria were present in municipal wastewater, and that the existing treatment infrastructure did not adequately prevent release of antibiotic-resistant bacteria into the environment. Many of the bacteria found in the wastewater treatment plant and in the plant effluent were tentatively identified as potential pathogens and were also resistant to multiple antibiotics, raising public health concerns. We believe that wastewater treatment plants could be modified to further prevent the release of resistant bacteria to the environment. Sara Firl and Leslie Onan performed this study under the supervision of principal investigator Dr. Timothy LaPara at the University of Minnesota, Department of Civil Engineering. Funding was provided by the Center for Urban and Regional Affairs at the University of Minnesota and Geomatrix Consultants, Inc. The work is being presented as a poster at the 106th General Meeting of the American Society for Microbiology in Orlando on May 22.

The spread of antibiotic-resistant bacteria is a major public health concern. Infections previously treatable are increasingly resistant to antibiotics. Scientists believe that the spread of antibiotic resistance results from both misuse of antibiotics and transfer of resistance between bacteria. A potentially large reservoir for antibiotic-resistant bacteria is municipal wastewater. People release resistant bacteria with fecal matter into the

wastewater stream, which is collected and treated at municipal treatment facilities before release to the environment. The objective of this study was to investigate how many resistant bacteria were present at municipal wastewater plants and if the existing infrastructure of waste treatment was adequate to remove resistant bacteria before discharge.

In our study, the effect of effluent treatment (clarification and disinfection) and biosolids treatment (sludge digestion) on the removal of antibiotic-resistant bacteria was investigated at three wastewater treatment facilities. We found substantial numbers of resistant bacteria at the wastewater treatment facilities and that, although effluent treatment reduced the numbers of bacteria, large quantities of resistant bacteria were discharged. Numerous bacteria isolated from the effluent stream were resistant to multiple antibiotics and closely related to potentially pathogenic bacteria. Our research suggests that the existing wastewater treatment infrastructure should be modified to better prevent release of these potentially dangerous bacteria to the environment.

Appendix F

Response to Comments on the Draft EIR from Malzacher Ranch, Santa Paula dated December 20, 2007

The Ventura County APCD, the lead agency for the project (Rule 55, Fugitive Dust), has as one of its main missions, the protection of public health. Similarly, the comments from the Malzacher Ranch in Santa Paula indicate a concern with a public health issue, namely the emissions of fugitive dust, especially any pathogens which may be contained in the dust. Since the goal of the project is to reduce fugitive dust emissions (estimated at a six ton per day countywide reduction) via a new air pollution regulation, the proposed project directly addresses the concerns about pathogenic dust raised by the commenter.

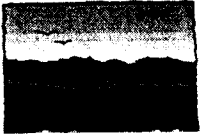
In particular, the Malzacher Ranch is concerned about contaminated dust from two sources near their farm in Santa Paula, namely the Santa Paula Wastewater Treatment Plant and the Toland Landfill. Since the proposed rule contains no exemptions for active operations from either of these two facilities, then the project (Rule 55) will directly reduce contaminated fugitive dust from these sources. In fact, Dr. McGowan's analysis of pathogens in sewage particulate emissions and attached references emphasizes another potential health implication of particulate emissions and the need for adoption of a fugitive dust rule to control them.

According to Dr. McGowan's comments, this EIR should discuss in considerable detail the adverse environmental impacts of dust generated by sewer plants. However, the subject of this EIR is a new air quality regulation (Rule 55) rather than a new sludge treatment facility. In fact, the proposed regulation will reduce impacts of pathogen-containing dust emissions by requiring sources of visible fugitive dust to meet effective, easily enforced air quality control standards. Also, by including Dr. McGowan's comments in Appendix E of the Final EIR, the decision-makers, namely the Ventura County Air Pollution Control Board, will be alerted to another potential health-harming attribute of fugitive dust emissions, and should better understand the need to adopt a regulation to control them.

Another request by Dr. McGowan is that the EIR should evaluate roadways as a source of particulate emissions, which contain pathogens, irritants, toxics and other harmful materials. In fact, the proposed rule does recognize roads as a source of particulate emissions and provides regulations which address two areas of most concern, private unpaved roads, and track-out on to public paved surfaces. The control of dust from public unpaved roads and street sweeping requirements will be the subject of future rulemaking by the district. Another concern by Dr. McGowan is the subject of the impact of particulate from a variety of sources and its interaction with ozone air pollution. The health impacts of particulate pollution are well documented in Chapter 3 (Environmental Setting) of this EIR. The harmful effects in humans include a variety illnesses including asthma, lung cancer, cardiovascular diseases, and premature death.

Appendix G.

Comment Letter from
California Construction and Industrial Materials Association (CalCIMA)
on Draft EIR



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December 28, 2007

Mr. Stan Cowen
Ventura County APCD
669 County Square Drive
Ventura, CA 93003

Re: **Draft Environmental Impact Report (DEIR)**
Proposed Rule 55 – Fugitive Dust (PR55)

CAL180

Dear Mr. Cowen:

West Coast Environmental and Engineering (WCE) has prepared the following comments on behalf of the California Construction and Industrial Materials Association (CalCIMA). CalCIMA would like to express gratitude for APCD's methodical and deliberate approach to rulemaking. CalCIMA supports implementation of fugitive dust rules within Ventura County and will continue to work with APCD to develop a sensible and effective PR55.

CalCIMA has the following comments:

1. Adverse impacts should be quantified.
2. APCD's final rule should balance adverse and beneficial air quality impacts.
3. Issues from the Advisory Committee Meeting on November 27, 2007 that result in a rule change need to be appropriately evaluated.
4. CalCIMA comments on revised PR55 (October 2007).

1.0 ADVERSE IMPACTS

The DEIR claims that PR55-related NOx emissions will eventually decrease to less than 25 lb/day. CalCIMA believes that PR55 will result in a significant adverse impact in the foreseeable future; even with phase-in of existing regulations and fleet turnover. This is particularly true when one considers that the 25 lb/day threshold should be compared to emissions that are predicted to occur on the peak day.

APCD states that "the proposed rule will reduce 6 tons per day of PM, allowing 25 lb/day seems like a reasonable tradeoff in the near term." (DEIR, P. 32). Although NOx emissions increases may be small when compared to PM emissions reduced, they have potential to be much greater than 25 lb/day. Thus, it appears that NOx impacts are not accurately portrayed.

On a peak day (i.e. Santa Ana winds, hot, dry), it is conceivable that all forty (40) Ventura County bulk material handling facilities described in the DEIR (P. 12) will have increased water truck activity. The DEIR presents quantification of water truck NOx emissions as submitted by CalCIMA showing that 10 hr/day of increased activity is approximately equivalent to the 25

lb/day threshold. Under the conservative assumption that water trucks at each of the 40 facilities will operate an additional two (2) hours on the peak day, PR55 would result in approximately 200 lb/day of NOx emissions (i.e. 80 hours of operation). Emissions from other PR55 related sources (e.g. street sweeping, watering at construction sites) are likely to substantially increase NOx impact on the peak day as well.

Short and long-term criteria pollutant and GHG emissions should be quantified in order to:

- Better understand the tradeoff between fugitive dust reduction and the lot of combustion related impacts.
- Provide substantial evidence for concluding that long-term NOx impacts will be less than significant.

2.0 BALANCING ADVERSE AND BENEFICIAL IMPACTS

CalCIMA believes that fugitive dust from natural, crustal sources is more of a nuisance than a health hazard. Contribution of fugitive dust to PM10 concentrations in APCD may be substantial but a balance between combustion pollutant impacts (ozone attainment, air toxics, and GHGs) and fugitive dust impacts needs to be struck.

The DEIR states:

Another important point is that proposed Rule 55 does not require the use of diesel watering trucks or street sweepers as the only methods to reduce fugitive dust emissions. Rather, the proposed rule sets standards that will reduce dust emissions, and provides a choice of control methods with watering trucks and street sweepers as one of the allowed methods. Alternative methods of control such as the use of dust suppressants, paving of unpaved roads, and covering of piles of bulk materials may be used to comply with the rule requirements. (DEIR, P. 32 - 33)

Although PR55 does not require the use of water trucks or street sweepers; it will most certainly result in an increase in those activities. The alternatives presented in the above quote will require watering for maintenance of dust suppressant treated unpaved roads and sweeping of formerly unpaved roads that have been paved. Covering of bulk material piles is not feasible for active piles at bulk material handling facilities and so watering will be necessary.

The DIER states:

The normal cost-effectiveness for adopting new rules, \$18,000 per ton of NOx reduced and \$10,000 per ton of PM reduced. (DEIR, P. 6).

Thus, a regulatory basis for balancing NOx impacts with PM reduction may already exist. However, this comparison would not account for potential air toxics and GHG impacts; and secondary formation of PM from NOx emissions.

It may be easier to consider impact on PM2.5 AAQS rather than attempt health risk assessment which is not feasible in this case. Such an approach should make a distinction between PM2.5 from natural crustal sources and PM2.5 from combustion by weighting each according to severity of health impact. Although SB656 has resulted in a mandate for fugitive dust rulemaking, its purpose is to reduce health risk by pushing areas towards PM10 CAAQS attainment.

CAAQs "define clean air, and are established to protect even the most sensitive individuals in our communities." In addition, SB656 was the direct result of The Children's Environmental Health Protection Act (CEHPA, California Senate Bill 25, Escutia, 1999) which "required the ARB and OEHHA to evaluate all ambient air quality standards by December 2000 to determine whether these standards adequately protect human health, particularly that of infants and children." (<http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm>). The focus on health risk should be preserved when balancing adverse and beneficial impacts of fugitive dust control under PR55.

GHG impacts should also be considered in light of the fact that carbon dioxide emissions will not be reduced by forecasted engine technologies and fleet turnover that is described in the DEIR to reduce criteria pollutant emissions. Unlike NOx impacts, GHG impacts will be similar in both the short and long-term because the same amount of watering/sweeping is required to comply with PR55 in 2008 as it will in future years.

Assembly Bill 32 requires that statewide GHG emissions be reduced to 1990 levels by the year 2020. GHG reductions are achieved by reduced fuel use and can not be achieved by add-on controls. Fuel use is reduced by either eliminating the use or designing a more efficient process/engine. Diesel use resulting from PR55 may be "infinitesimal" compared to total diesel use in the County (DEIR, P. 28), but it will contribute to an existing adverse cumulative impact.

The DEIR states:

More importantly from a CEQA perspective, the ARB has the primary task of further mitigating greenhouse gas emissions from mobile sources by developing tailpipe emission standards, regulations and programs. (DEIR, P. 28)

Although ARB overall has responsibility for regulating GHG emissions sources, APCD has a responsibility to disclose and mitigate significant impacts under CEQA for PR55. Given the limited options for reducing GHG emissions and the huge regulatory effort that has been undertaken by ARB; it seems appropriate to carefully consider any regulatory action that would result in GHG emissions increases.

In summary, fugitive dust regulation has the potential to cause a host of adverse air quality impacts. As discussed in Section 1.0, quantification of short and long-term criteria pollutant and GHG emissions is requested. In addition, review of control method energy/fuel intensities could be performed to better understand how PR55 balances its adverse and beneficial impacts.

3.0 ADVISORY COMMITTEE MEETING

Issues from the Advisory Committee Meeting on November 27, 2007 include:

- APCO reported anticipation of an EPA proposal to reduce the federal NOx AAQS. Thus, although the AQMP may forecast attainment at some near-future date (DEIR, P. 32); that analysis is likely to change to require further NOx emissions reductions. This would impact conclusions in the DEIR and provides additional basis for prioritizing NOx/combustion reductions over fugitive dust control.
- Committee members tended to have comments that would make PR55 more restrictive. Rule language changes that increase the severity of adverse impacts should be fully evaluated and may delay rulemaking.

4.0 CALCIMA COMMENTS ON PR55 RULE LANGUAGE

CalCIMA submitted comments in the letter dated March 16, 2007. CalCIMA requests that APCD reconsider comments that were not acted upon and proposes to open a dialogue with APCD so that both parties may gain greater understanding of the others' perspective and concerns. CalCIMA comments are summarized in the following list:

- Making operators responsible for load covering/freeboard requirements on trucks that they don't own or control is not appropriate.
- Test methods. Neither the 100' plume, nor the visible dust beyond the property line performance standard has an applicable test method. As discussed previously, performance standards that lack an applicable test method are of great concern to CalCIMA.
- Requirement to use only 1186-certified sweepers does not account for availability of those sweepers and cost effectiveness of their acquisition/use. CalCIMA suggests an approach similar to SCAQMD rules which require new sweeper purchases to be 1186-certified.

If you have any questions or wish to discuss these issues further, then please feel free to contact me or John Hecht at 805.644.7976.

Respectfully submitted,



Scott D. Cohen, P.E., C.I.H.
Managing Engineer
West Coast Environmental and Engineering

cc: Steve Bledsoe, CalCIMA
John Hecht, WCE

West Coast Environmental prepared comments on the Draft EIR on behalf of the industry association, CalCIMA, otherwise known as the California Construction and Industrial Materials Association. The goal of the APCD is to protect public health by taking steps to improve the air quality in the county. One goal of CalCIMA is to reduce the impact of air quality regulations on the operations of their member companies. The response to each comment in the December 28, 2007, letter (Appendix G) corresponds with sections from the letter.

1.0 ADVERSE IMPACTS

CalCIMA believes that proposed Rule 55 will result in significant adverse impacts in the foreseeable future; even with phase-in of existing regulations and fleet turnover.

APCD Response

The Draft EIR states that with existing and future regulations and fleet turnover, the NOx emissions will be reduced to a less than significant air quality impact. The Draft EIR provides a detailed technical analysis of the new technologies which will be mandated by state requirements which will reduce NOx emissions in the future. CalCIMA provides no analysis of future impacts except to point out their estimate of NOx emissions on a peak day when hot, dry Santa Ana winds are blowing.

The CalCIMA peak day emissions analysis provides no support for their projection of future events and its peak day air quality analysis is flawed. According to APCD meteorologist, Mallory Ham, a hot, dry, windy Santa Ana condition day, the air pollutant of most concern is usually Particulate Matter, which is reduced by Proposed Rule 55, not ambient ozone, which is formed from NOx emissions. Another aspect to this comment is that West Coast Environmental previously argued for an average day analysis instead of a peak day analysis when one of the CalCIMA members was applying for Conditional Use Permit for the Diamond Rock Sand and Gravel Mining and Processing Facility. The quote below is from their letter dated June 26, 2007 to Mr. John Baker, Santa Barbara County Planning Department.

AVERAGE DAY VS. PEAK DAY

“It has long been the practice in VCAPCD to use the average daily trips (ADT) in calculating emissions for comparison to their CEQA thresholds. The FEIR’s use of ADT in the peak year is consistent with “maximum average day” as it is referred to in the Best Rock EIR (SCH #2003111065) which is the most recent mining EIR completed in Ventura County and approved by VCAPCD. Use of ADT also is consistent with the California Air Pollution Control Officers Association software URBEMIS (Urban Emission model) that is accepted to conduct air quality analysis in California. This fact is discussed on Page 5-1 of the Ventura County Air Quality

Guidelines (October 2003) which states, "Motor vehicle trip rates in URBEMIS are based primarily on the average daily trip data." Thus use of ADT comports with well-established guidelines for conduction air quality analyses."

Beside being an inappropriate analysis, the emissions estimate on the peak day is also inaccurate. The CalCIMA emissions analysis assumes incorrectly that all water trucks should be considered off-road equipment. In fact, most of the water trucks in the county have diesel engines that are certified to on-highway emission specifications. These trucks typically travel from one construction site to another via public highways. The emission factors are several times lower for on-highway trucks versus off-road water carriers. These trucks are required to use ultra low sulfur diesel fuel which enables the use of catalytic control equipment and are required to meet much more stringent EPA and ARB emission standards. This is another reason that future on-road regulations and fleet turnover will further reduce NOX emissions from these vehicles.

CalCIMA requests that APCD quantify short and long term criteria pollutant and GHG emissions in order to better understand the tradeoff between fugitive dust reduction and the lot of combustion related impacts and to provide substantial evidence for concluding that long-term NOx impacts will be less than significant.

APCD Response

The Draft EIR focuses on the air quality impact of one criteria pollutant, NOx, because it is the only pollutant that has the potential to have a significant impact. This response includes an analysis of the potential NOx emissions from the bulk material handling facilities having to comply with proposed Rule 55. The most cost-effective method of controlling unpaved road dust at permanent facilities, such as those at sand and gravel or concrete batch plants, is the once-per-year dust suppressant application rather than daily applications of water. One such dust suppressant, Durasoil¹ (manufactured by Soilworks of Gilbert, Arizona), is able to effectively control dust from an unpaved road for nine to sixteen months on one application.

Durasoil, a synthetic organic fluid, can be sprayed with a typical watering truck, and is effective at controlling dust emissions for at least nine months before any re-application is needed. It is sprayed at full strength (no dilution with water or anything else) at a rate of 1452 gallons per acre. A typical facility can be treated in one 10 hour application using a used 1997 watering truck certified to on-road emission specification of 4 grams per brake horsepower hour. Assuming that 40 bulk handling facilities in the county used this form of dust control, the estimated additional NOx emissions and PM emission reductions are calculated below. The results from this table indicate that the unpaved road dust control

¹ Mention of trade names is to demonstrate product availability, and not considered to be an endorsement by APCD

measure will reduce over 500 pounds of PM per day while emitting less than 3 pounds of NOx per day. This analysis corroborates the emission analysis in the Draft EIR and the conclusion that proposed Rule 55 will benefit air quality on an overall basis.

**Comparison of PM Reductions and NOx emissions from Dust Control Measures
for Bulk Handling Facilities in Ventura County**

PM Emissions	NOx Emissions
Assume Durasoil applied 10 hrs/year per facility using 1997 400 Hp Water Truck at 40 facilities	
Truck Emission Factor = 0.15 g/bHP-hr of PM and 4.0 g/bHp-hr of NOx	
Truck PM (lb/day) = $\frac{0.15 \times 400 \text{ hrs/yr} \times 0.72 \times 400\text{Hp}}{454 \text{ g/lb} \times 365 \text{ days/yr}}$ = 0.1 pounds of PM per day	Truck NOx (lb/day) = $\frac{4 \times 400\text{hrs/yr} \times 0.72 \times 400\text{Hp}}{454 \text{ g/lb} \times 365 \text{ day/yr}}$ = 2.78 pounds of NOx per day
PM Emission Reduced = PM10 Inventory X % Unpaved Roads X % Bulk Facilities X % control = 26 tons/day X 12% X 10% X 90% = 0.28 tons/day or 562 lb/day PM reduced	
Comparison of PM Reductions vs NOx Emissions 562 lbs PM Reduced vs 2.8 pounds NOx emitted	

2.0 BALANCING ADVERSE AND BENEFICIAL IMPACTS

CalCIMA believes that fugitive dust is more a nuisance than a health hazard. They concede that contribution of fugitive dust to the PM10 ambient levels may be substantial. They also believe that a balance between combustion pollutant impacts (ozone attainment, air toxics, GHGs) and fugitive dust impacts needs to be struck.

APCD Response

As stated in the Draft EIR, the health impacts from PM are well documented resulting in asthma, other lung diseases, heart disease, and premature death. The Draft EIR also describes the known danger from dust emissions of Valley Fever. The APCD is required under state law to reduce PM emissions in the county to help attain the state PM air quality standard. Other Air Districts, including the South Coast AQMD and San Joaquin Valley APCD have already adopted fugitive dust regulations. South Coast AQMD first adopted their dust rule in 1976.

The draft 2007 Ventura County Air Quality Management Plan (AQMP) projects that the county will reach attainment with the 8 hour ozone standard by June 15, 2013. The proposed Rule 55 is consistent with the AQMP and will not interfere with that attainment goal. As stated in the Draft EIR, Greenhouse Gas (GHG) emissions from implementing Rule 55 are a less than significant impact. The diesel fuel consumed by watering trucks, especially if they dispense dust suppressants once every year instead of daily watering applications, will be less than 0.0001 percent of the total diesel fuel combusted in the county.

CalCIMA states that watering will be required in spite of the fact that the proposed rule allows other control options to be used. They insist that watering will be required for maintenance of dust suppressant-treated unpaved roads.

APCD Response

However, according to Chuck Conner of Soilworks (Gilbert, Arizona), his synthetic oil-based suppressant, Durasoil, requires no watering maintenance (oil and water do not mix). One year after the original application, only 30 percent of the original volume needs to be re-applied. Three applications of this dust suppressant will provide 5 years of fugitive dust control, including particulates as small as 2.5 microns.

CalCIMA is concerned about the health risk from Particulate Matter, and both the PM2.5 and PM10 air quality standards should be addressed. The PM2.5 standard measures particulate matter that is 2.5 microns and smaller while the PM10 standard measures particles smaller than 10 microns. CalCIMA asserts that health risk should be analyzed based on health risks based on PM2.5 from crustal sources (dust) and PM2.5 from combustion sources.

APCD Response

APCD staff agrees with CalCIMA that Senate Bill 656 focuses on health effects, and it should be noted that this legislation requires the District to adopt all feasible measures to reduce both PM2.5 and PM10. APCD staff also agrees that the focus on health risk should be preserved when balancing adverse and beneficial impacts of fugitive dust control under proposed Rule 55.

CalCIMA contends that GHG impacts should be considered in the light of the fact that CO₂ emissions will not be reduced by forecasted engine technologies and fleet turnover as described in the Draft EIR to reduce criteria pollutant emissions.

APCD Response

APCD staff disagrees with this contention because future engine technologies will be more efficient and emit fewer carbon dioxide emissions. One of the main reasons for this efficiency gain is the advent of ultra low sulfur diesel fuel. This new fuel allow manufacturers to install 3-way catalysts on trucks that will reduce both carbon monoxide and NOx similar to the catalyst on your passenger car. The use of these oxidation/reduction catalysts will allow truck manufacturers to re-tune their engines for greater efficiency using more fuel-efficient air fuel ratios. Previously, these engines were tuned for NOx control which often

hurt engine performance or mileage. Therefore, fleet turnover will reduce GHG impacts since more efficient newer vehicles will replace older less efficient models.

According to CalCIMA, APCD has the responsibility to disclose and mitigate significant impacts under CEQA for proposed Rule 55. CalCIMA further states that although diesel use resulting from proposed Rule 55 may be “infinitesimal” compared to the total diesel use in the county, it will still contribute to an existing adverse cumulative impact on GHG emissions.

APCD Response

According to the Draft EIR and not disputed by CalCIMA, the impact of GHG emissions from the implementation of proposed Rule 55 is less than significant. Since this impact is less than significant, APCD is not required to implement any mitigation measures. However, new engine technologies and fleet turnover will lessen these GHG impacts over time as explained earlier.