State of California—Health and Human Services Agency
Department of Health Services

California Department of Health Services

SANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

May 5, 2005

Dear Petitioner:

The Environmental Health Investigations Branch (EHIB) of the Department of Health Services (DHS) is writing in response to your request for assistance in addressing health concerns related to operations at the Nursery Products, LLC (hereafter "Nursery Products") biosolids (sewage sludge) composting facility in Adelanto, California. In April 2004, you contacted the federal Agency for Toxic Substances and Disease Registry (ATSDR) for assistance in addressing potential exposure and health concerns from the facility. DHS works under a cooperative agreement with ATSDR and is following up on your request.

Since April 2004, DHS staff has spoken with you on several occasions about health concerns you believe to be related to airborne exposures from Nursery Products. In July 2004, Tivo Rojas, a Health Educator with DHS, met with you along with other members of the Nursery Products Citizens Oversight Committee and participated in a tour of the Nursery Products facility. DHS staff noted that a great deal of dust was being generated during the windrow (piles of compost) turning process. Some odors were smelled in areas where the windrow turning was being conducted, but overall odors were characterized as being minimal.

To evaluate potential exposures, DHS staff obtained and reviewed the following data/information:

- U.S. Environmental Protection Agency (USEPA) Plain English Guide to the EPA Part 503 Biosolids Rule, September 1994;
- Nursery Products Annual Report (2004) and February 2005 monitoring results;
- San Bernardino County Environmental Health monthly inspection reports (February 2002 – January 2005);
- Final Report: Air Monitoring at the Adelanto Converter Station, Los Angeles Department of Water and Power, January 12, 2005;
- Laboratory report of runoff water from Adelanto Nursery: Los Angeles Department of Water and Power, March 31, 2005; and
- Limited review of the scientific literature as related to biosolids composting and land application.

General concerns about biosolid composting and land application:

In 1993, the USEPA established regulations (Code of Federal Regulations Title 40, Part 503— commonly referred to as Rule 503) governing composting and land application of biosolids. Public health concerns related to these activities are increasing as facilities and land application sites become more prevalent. In 2002, the National Research Council (NRC) of the National Academy of Sciences released a report concluding that the potential adverse human health impact from exposure to biosolids is uncertain and there is a need for the USEPA to update the scientific basis of Rule 503. The NRC recommended the USEPA conduct additional studies looking at potential chemicals of concern in sewage sludge that are not currently regulated. The NRC also recommended that a number of activities be conducted related to

pathogen/disease causing microorganisms (bacteria, viruses, and parasites) standards, as there is question to whether "current management controls are adequate to maintain minimal exposure concentrations over an extended period of time." Rule 503 was implemented without an evaluation of the health risks from exposure to pathogens. The NRC stressed the need for USEPA to develop effective ways to monitor specific pathogens and evaluate the potential for regrowth of pathogens and bacterial toxins (endotoxin and exotoxins) that may occur after the waste treatment process (NRC, Gattie 2004). Concerns have also been raised about exposure to volatile chemical emissions, which are not regulated under Rule 503.

In studies discussing potential exposure to pathogen-contaminated dust and runoff water from land-applied biosolids and composting (biosolids and green/yard waste), the health concerns reported by the adjacent communities show similar patterns (NRC 2002, Herr 2002). Symptoms commonly reported include respiratory infections, skin rashes, burning eyes, burning lungs, difficulty breathing, and gastrointestinal effects. These effects can be more severe in immunocompromised individuals, individuals with chronic disease, and other sensitive populations. Similar health effects have been observed in workers at composting and sewage treatment facilities. In some studies, workers have been shown to have higher rates of airway mucous membrane complaints, respiratory inflammation, skin rashes, and diseases involving immunological hypersensitivity reactions (Gattie 2004, Herr 2002). In a cross-sectional study, researchers investigated effects of bioaerosol (organic dusts - mixtures of air and microorganisms) polluted outdoor on airways of residents living next to a composting facility in Germany. Researchers compared self-reported health complaints to measurable bioaerosol pollution in residential outdoor air. The microorganisms measured in the study included, total bacteria, molds, thermophilic and thermotolerant actinomycetes. The study found detectable levels of bioaerosol pollution at a distance of 550 meters (maximum distance sampled in study), with the highest levels measured closest to the site. All exposure groups, including residents living the furthest away from the site (> 400-500 meters / ~$^1/_3$ mile) reported higher rates of health complaints compared to the unexposed controls. Researchers concluded, "this bioaerosol exposure in turn could be associated, as far as concentrations of bioaerosols and duration of exposure were concerned, with symptoms suggestive of airway inflammation also reported in respective workplaces" (Herr 2002).

Specific concerns about Nursery Products

In February 2002, Nursery Products was permitted and operations began in November of that same year. Based on the Nursery Products' permit, the facility generates/prepares up to 1,440 cubic yards per day of compost. The facility uses green waste and mostly [1] Class B (designation with respect to pathogens) biosolids in their process. Pathogen levels in Class B biosolids are partially reduced (~90%) at the sewage treatment plant of origin. Through the composting process, pathogen levels are further reduced so that the finished product meets Class A designation. Under Rule 503, if pathogens are below detectable levels, then the biosolids meet the Class A designation.

DHS is aware that there have been numerous (in the hundreds) community complaints about odors, flies, and dust due to operations at Nursery Products. There have also been anecdotal reports of nausea, increases in bloody noses and respiratory effects in school children at Bradach Elementary School, believed to be due to releases from Nursery Products. According to county staff, Nursery Products addressed the fly and odor issue by changing their composting process (J. Adams, San Bernardino County Environmental Health, personal communication, February 24, 2005). We were also informed that Nursery

[1] Some of the biosolids accepted by Nursery Products would not meet the Class B designation due to operational processes at the POTW (Publicly Owned Treatment Works) of origin (L. Fondahl, USEPA, personal communication, May 4, 2005)

Products is relocating its operation at some point this coming summer or fall. It is unclear whether the current location in Adelanto will be used for storage of composted material.

CDHS reviewed available data (listed above), in an effort to understand whether operations at the Nursery Products facility could be impacting public health. The first step is to determine whether there is a pathway for people to be exposed to contaminants from the site. DHS identified two potential pathways of exposure: 1) airborne releases of contaminants and 2) dust surface water runoff.

The only surface water sampling obtained by DHS was collected by the Los Angeles Department of Water and Power, at the Adelanto Converter Station (ACS) on February 12, 2005 and February 24, 2005. The ACS is located on the adjacent property directly north of Nursery Products. Six samples of runoff water from four locations on the ACS property were collected and measured for total coliforms, fecal coliforms, and Escherichia coli (E-coli). The laboratory analysis revealed high levels of these pathogens in all of the samples—total coliforms ranged from 300,000 to 1,100,000 MPN/100 ml (most probable number per 100 milliliters of water); fecal coliforms ranged from 50,000 to 800,000 MPN/100 ml, and E-coli ranged from 50,000 to 280,000 MPN/100 ml.

There are no health-based standards that directly apply to this situation. As a means of comparison, we reviewed draft water quality standards for pathogens that apply to recreational waters (places where people swim or are likely to come into contact with water). The DHS Draft Guidance for Fresh Water Beaches[2] describes bacteria levels that may require posted warning signs in order to protect public health. The closest scenario provided in the guidelines applies to storm drain waters adjacent to a "public beach," which includes rivers, streams, and creeks. The following table lists the guidelines for "fresh water beaches" and adjacent storm drains and the range of pathogens detected in runoff water samples collected on the ACS property:

Pathogen	Range of Pathogens Detected in Runoff Water (MPN/100 ml)	Fresh Water Beach Standards (MPN/100 ml)	Strom Drain Standards (MPN/100 ml)
Total Coliform	300,000 – 1,100,000	1,000	10,000 1,000 (if ratio of fecal/total exceed 0.1)
Fecal Coliform	50,000 – 800,000	200	400
E. coli:	50,000 – 280,000	126	

As shown, the levels of pathogens detected in runoff water collected at the ACS exceed guidelines for fresh water beaches and adjacent storm drains. It is possible that if someone (most likely ACS employees) were to have come into contact and ingest the runoff water (during the days and at the locations the samples were collected) they could have experienced flu like symptoms such as gastrointestinal distress, nausea, and vomiting. Since the facility is located in an area that is fairly remote with respect to residential populations, it is not likely that these types of exposures occurred to residents, but possibly to ACS employees.

[2] These guidelines have not been adopted as a standard at this time, which means both that they may change and that they are not enforceable.

From May 11, 2004, to October 21, 2004, Applied Measurement Science a consultant hired by the Los Angeles Department of Water and Power conducted air monitoring at the ACS property. The main purpose of the air monitoring was to understand the magnitude of dust impacts from Nursery Products on the ACS property. The air monitoring activities included collection of meteorological (MET) data (wind patterns), continuous hourly PM 10 (particulate matter less than 10 microns in aerodynamic diameter) measurements, directional integrated PM 10 (24 hour or longer periods) when ASC was determined to be downwind of Nursery Products, conductivity and ionic composition of dust. There were no samples measured for volatile chemicals. The authors of the report did note that on many days they smelled odors "immediately upon entering the ACS property on the north side of the site, several hundred yards from the Nursery Products facility."

The ACS property is considered downwind of Nursery Products, as the prevailing wind direction is from the south / south-south west. At the ACS property, the 24-hour average California Ambient Air Quality Standard of 50 $\mu g/m^3$ (micrograms per cubic meter air) was exceeded 74% of the time. At times, hourly concentrations were measured in excess of 1000 $\mu g/m^3$, with an average hourly PM 10 concentration of 123 $\mu g/m^3$. The report shows that 68% of the hourly PM 10 measurements were for sectors originating at Nursery Products. The average PM 10 concentration at all the other locations (non-downwind) was 48.8 $\mu g/m^3$.

From a public health perspective, PM 10 is considered among the most harmful of all air pollutants, that "when inhaled, these particles evade the respiratory system's natural defenses and lodge deep in the lungs." (CARB). Potential health effects include exacerbation of asthma, reduced immune function, bronchitis, and other lung diseases. Sensitive populations (children, people with chronic disease, the elderly, and exercising adults) are more susceptible to these effects. According to the California Air Resources Board, recent studies suggest a link between PM 10 exposure and premature death in people suffering from heart and lung disease, especially the elderly.

It is not possible to determine whether PM 10 concentrations were elevated in other areas of Adelanto. The data does show that during the time period measured, operations at Nursery Products were responsible for generating a great deal of dust. Studies on the global transport of dust have shown that dust, especially small particles, have the ability to travel great distances.

As mentioned earlier, there is a concern about potential exposure to pathogen-contaminated dust. There is no site-specific air monitoring data measuring pathogens in dust. The monitoring data (finished compost and temperature data collected during the composting process) that is available indicates the facility is in concurrence with requirements under Rule 503 at the time of those sampling/monitoring events. However, while these data may indicate that the finished compost meets pathogen requirements, it does not rule out the possibility for pathogens present in pre-composted materials to become airborne on dust and other particulates.

Another potential exposure concern relates to inhalation of volatile chemicals. A number of volatile chemicals, ammonia, hydrogen sulfide, and other sulfur and nitrogen based compounds are released from composting facilities. Currently, there are no monitoring requirements for these chemicals under Rule 503. In the Los Angeles area, the South Coast Air Quality Management District recognized the composting industry as a significant source of air pollution for criteria air pollutants and adopted measures (regulations) to reduce composting emissions. The City of Adelanto falls with in the jurisdiction of the Mojave Desert Air Quality Management District (MDAQMD). The MDAQMD has not adopted any volatile chemical emission standards associated with composting. Given the numerous odor

complaints documented, it is clear that airborne releases of certain compounds occurred. However, DHS could not evaluate these exposures and potential health implications due to a lack of data.

In summary, we could not quantify exposures to site-related compounds due to a lack of data. However, there is sufficient information both site-related and in the scientific literature to suggest the possibility for some Adelanto residents (depending on time and location) to have been exposed to airborne contaminants (volatile chemicals), and dust originating from Nursery Products. While it is not possible to determine whether the health effects you have experienced were/are caused by exposures from Nursery Products, some of the symptoms you have expressed to DHS are consistent with biosolid-related exposures documented in the scientific literature.

Next Steps

DHS plans to make further inquiry with the various agencies (city, county, state, and federal), along with experts in the field, to explore ways in addressing public health concerns around this issue. As acknowledged by the NRC, the USEPA, and other experts in the field, many uncertainties need to be addressed in understanding the full range of public health issues associated with land application and composting of biosolids. We recognize that it may take years to answer these important questions. Thus, we believe it is prudent to explore the possibility for implementing precautionary measures at the local level.

We will keep you informed of our progress. If you have any questions, please do not hesitate to call Tracy Barreau (510) 622-4489.

Sincerely,

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