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**An Assessment of Potential Impacts to Public and Worker Health
Posed by the
Cold Canyon Landfill and Composting Facility
San Luis Obispo County, Ca.**

Occupational Safety and Health Audit of the Composting Facility

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Introduction

The Cold Canyon Landfill and composting facility (see photo 1) is the subject of community concern regarding human health risks, composting activities, and odors. Two phases of investigations have been initiated in a step-wise approach to ascertain a basis for these concerns. This report constitutes Task 3 of three tasks that are part of Phase 1 designed to document existing conditions at the landfill composting facility. Task 1 consisted of the review and evaluation of obtainable air, surface water, and groundwater monitoring data from the RWQCB, SLO County Air Pollution Control District, SLO County Environmental Health, Cold Canyon Landfill, the California Department of Resources Recycling and Recovery (Cal Recycle), and scientific articles addressing potential hazards from composting activities. Task 2 included the preparation, administration, and evaluation of a questionnaire designed to determine the frequency and spatial location of persons claiming symptoms, the types and frequency of symptoms alleged, and the alleged observable impacts to eco-receptors. The questionnaire has been developed and administered and the responses are now being evaluated. Phase 2 consists of additional environmental monitoring (if appropriate) and the preparation of a human health risk assessment addressing the potential hazard and risk posed by the facility.

Occupational Safety and Health Audit of the Composting Facility

A site visit and audit of the composting facility was conducted on August 25, 2010. It was initially proposed that this audit would serve to identify potential sources of worker exposure, include interviews with workers and management, and determine if Cal-OSHA regulations pertaining to a composting activity were being followed. If worker exposure above Cal OSHA standards was suspected, a sampling and analysis plan would be recommended in Step 2.

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During the audit, Mr. Lacy Ballard answered all questions posed and accompanied the auditor around the composting facility and landfill. Also present during the initial questioning was Mr. Randy Friedlander, IWMS, CalRecycle, State of California. It was by coincidence that Mr. Friedlander was on the site during the time of the audit and his presence was most beneficial.

The following topics were reviewed and evaluated during the audit:

Site Design:

- It is well established in the composting industry that the presence and location of berms, windbreaks, trees, and windrows greatly aids in the composting activity and in the prevention of potentially hazardous bioaerosols.
 - During the site tour via an enclosed vehicle, it was clear while berms existed on the north, east, and west sides of the composting area (see photo 2; all directions are approximate as the compost area is not laid-out in a direct N-S alignment), no artificial windbreaks or trees were strategically placed to assist in the diminution of odors moving off-site and no berms were located on the south end thus allowing free movement of air onto or from the composting area (see photo 3).
 - The windrows, however, were placed at appropriate separation distances and were of appropriate height.
- Recommendations:
In order to better control the off-site migration of bioaerosols, dusts, and odors, any compost facility at the Cold Canyon Landfill should have wind breaks and vegetation on all four sides.

Operations:

- The application of a fine water spray when “turning” compost windrows is important to maintain odor control.
- This practice was conducted at the site although no “turning” was conducted during the time of the audit.
- Reduction or cessation of compost windrow “turning” during periods of increased wind speeds also helps keep odors from migrating off-site as “turning” causes a significant increase in odors.
- Although this facility’s SOP is to “turn” the windrows in the morning when wind speeds tend to be lower, it does not have any wind-speed cut-off limit.
- Maintaining a compost moisture content at ~55% is the best for composting activity and shortens the composting time.
- The stated practice is a moisture range of 50-60%, determined by the “hand test”.
- Maintaining the compost windrows at a height of no more than 10 ft. high and a temperature of not more than 140 °F is optimum for composting activity which also decreases odor production.
- The facility keeps its windrows at 8 ft. or less (see photo 4) and monitors the temperature during the pathogen cycle so that it is less than 140 °F.

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- During the tour of the compost facility, moderately strong odors were noticed downwind close-in (within 50 ft.) of a compost windrow but not upwind. (Wind direction that morning was toward the landfill – N by NW – and wind speed was light, estimated at <3 mph.) The odor was only considered “strong” when observing a front-end loader moving a pile of screened-out waste into a haul vehicle. This waste also was dry and a considerable dust cloud was generated when the pile was disturbed and loaded into the haul vehicle (see photo 5).
 - Dust was also generated during the “screening” procedure when the compostable material was dropped onto the site for movement to the windrows. The material was dry and dust could be seen coming from the pile (see photo 6).
- Recommendations:
- Generation of dust during any movement of compost material or green waste should be kept to an absolute minimum by adding additional moisture via a water spray and establishing a “high wind” shut-down level for activities that generate dust. Visible clouds of dust should be avoided. While the “hand test” for soil moisture is adequate on some days, actual soil moisture should be measured by instrument on most days.

PPE (Personal Protective Equipment):

- NIOSH and other occupational safety and health institutes recommend the use of environmental cabs on heavy equipment used to move composting material around a facility. Environmental cabs have climate control, HEPA filters, and special door seals that are regularly inspected and replaced to ensure a controlled environment for the operator.
 - This facility has no environmental cabs but does operate front-end loaders with an operator cab. One cab is newer and is equipped with AC and HEPA filters (photo 5) but not with advanced door seals and there is no seal inspection and replacement program. The other cab is enclosed but it is an older model that lacks AC and HEPA filters. All workers have N95 dust mask respirators available which are approved for use at composting facilities but none of the workers or management seen during the audit wore these respirators. It was stated that the workers are not required to wear them and most workers do not wear them during loading, screening, turning, or while in the cab. They usually wear them when grinding. (The auditor wore a N95 dust mask when stepping outside the vehicle at the compost facility.)
 - It was stated that no air monitoring has been conducted in the history of the compost facility.
 - The potential for workers to contract ODTS (Organic Dust Toxic Syndrome) is real.
- Recommendations:
- The cabs of heavy equipment should be inspected for poor window and door seals and worn seals replaced. Workers should be required to wear N95 dust masks when not inside a heavy equipment cab, auto, or truck if at the compost

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facility when turning, grinding, screening, or the movement of any compost or green waste material is occurring. A baseline air monitoring evaluation program should be implemented and follow-up programs established based upon the results of the baseline program.

Training and Education and Medical Surveillance:

- Workers were shown a respiratory protection video.
 - Only a hearing protection program is administered; no other programs.
 - Annual fire training is conducted.
- Recommendations:
- Workers should be trained in better housekeeping procedures and encouraged to change clothes at the facility. A medical surveillance program for workers should be established to ensure early identification of symptoms related to ODS. This program should include, among other components, tetanus and Hepatitis A vaccinations, health checks prior to commencing employment to identify predisposing conditions, instructions to report any unusual respiratory symptoms to management, and annual medical exams.

Housekeeping:

- Workers at the compost facility and at the landfill have lockers and changing rooms available. However, according to Mr. Ballard, the lockers are seldom used and while some workers do change out of work clothes before heading home after their shifts, most compost site workers wear their work clothes home. This is poor housekeeping practice as it is well known that workers can bring toxic substances, mold, bacteria, and viruses home and spread them to household members.
 - The compost facility is kept neat and the dirt areas around and between the windrows and the area around the screening are kept clear of significant amounts of compost materials.
- Recommendations:
- Workers should be required to change out of their work clothes before leaving for home.

Fire Detection and Suppression:

- Water trucks and 20-lb fire extinguishers are present on-site.
 - Annual fire training of employees is conducted.
 - There have been no fires at the compost facility since its start (there was a fire at the working face of the landfill last spring).
- Recommendations:
- none

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Vector control:

- It was stated that little vector control is needed or used because no food waste goes into the compost material.
- Recommendations:
none

Odor Control:

- Control consists of maintaining reduced moisture content and maintenance of compost windrows at temperature less than 140 °F.
- An odor suppressant was tried and discontinued.
- Recommendations:
In order to better control the off-site migration of odors, any compost facility at the Cold Canyon Landfill should have wind breaks and vegetation on all four sides. Generation of dust during any movement of compost material or green waste should be kept to an absolute minimum by adding additional moisture via a water spray and establishing a “high wind” shut-down level for activities that generate dust. Visible clouds of dust should be avoided. Actual soil moisture should be measured by instrument.

Public Health Issues:

It is well documented in the scientific literature that composting operations are sources of ammonia, respirable dust, and bioaerosols that contain bacteria, endotoxins, and molds at varying times of the year and at varying concentrations. Monitoring data from other composting facilities across the country show that the airborne concentrations of dust, ammonia, bacteria, endotoxins and molds in bioaerosols coming from green waste are often many times higher than those coming from composting piles made from food wastes and sewage sludges (NIOSH 1999. Health Hazard Evaluation of Springfield MO composting facility). Since acceptable levels of bacteria, molds, and endotoxins have not been established, maintaining practices that limit the production, dispersion, and public exposure are to be emphasized. However, additional studies have shown that the airborne concentrations of the pathogens in the compost bioaerosols diminish greatly over distance (down to background at 200 m or 656 feet or ~ 1/10 mile) and present an insignificant risk to the off-site public (The Composting Association of Great Britain and The Health and Safety Executive of the United Kingdom. 2003. Occupational and Environmental Exposures to Bioaerosols from Composts and Potential Health Effects – A Critical Review of Published Data). According to this report, the public which comes on the compost site, either to drop off green waste or pick up compost material for personal use, experiences greater exposure than on-site workers and hence the greatest risk of contracting ODS.

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➤ Recommendations:

Although data concerning on-site airborne concentrations of bioaerosols is somewhat limited, existing studies demonstrate that occupational on-site exposures can be effectively limited by engineering controls, administrative controls, and PPE. On-site public exposure, however, has not been widely studied but those that have addressed this issue show that the risk of ODS can be significant. The public dropping-off green waste should be directed to keep their vehicle windows closed and have the climate control on interior air recirculation when in the composting area. The public should also be educated and encouraged to purchase and use a NIOSH N95 dust mask when outside their car while in the compost area. Regarding off-site public exposure, although the data is sparse, the existing studies that included sampling off-site have indicated a low risk to the off-site public is posed by bioaerosols emanating from the compost piles. If an additional level of certainty or comfort is desired, or if specific monitoring is desired for the Cold Canyon Composting facility, on-site and off-site monitoring can be conducted.

Discussion

The composting facility was started in 1996 and has been operating under a modified permit since 2004. At the time of the audit, the composting operation had ceased grinding new green waste for composting. The existing compost windrows were being turned, watered, monitored, and allowed to complete the compost process but no new windrows were being added. The existing composting was expected to be completed by the end of October. As per the RWQCB Order, all compost material must be removed from the site unless the project owner complies with the drainage repair order or obtains a variance to allow it to continue to sell the compost. It was estimated that at the current compost sale rate, it would take into 2011 to sell all of it. The landfill continues to accept green waste as it now goes to the grinder which was moved to an area near the open face of the landfill operation and ground green waste was being used as alternative daily cover.

Odor complaints from the neighbors have been verified by Mr. Randy Friedlander of CalRecycle. One such verified complaint resulted in the issuance of a Notice of Violation (NOV). Mr. Friedlander described the odors as “burnt wood” and “fresh green waste”. He has not confirmed an odor of “dog poop”.

A discussion of enclosing the composting activity disclosed that the landfill had considered doing that but that past experience with an enclosure at a landfill in Washington State led the parent company to decide against enclosing compost operations. It was stated that the high levels of ammonia produced by the composting action caused corrosion on the inside of the building. Instead, the landfill is considering relocating the composting activity to a higher location near the middle of the landfill.

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Conclusions and Recommendations

This compost facility is aware of and follows what can be considered Best Management Practices (BMPs) for maximizing composting action and minimizing odors with a few notable exceptions. [note: BMPs for composting operations are in the process of development by CalRecycle. This audit refers to BMPs developed by New York State Department of Environmental Conservation, U.S. EPA office of Solid Waste, Cornell University Waste Management Institute, and the Department of Environment and Conservation of New South Wales Australia.] The facility also adheres to Cal OSHA standards regarding safety and health of the workers but also with a few notable exceptions. It is highly recommended that if composting is continued at the landfill, that the recommendations made in this report be implemented, especially those designed to control odors and public exposure to bioaerosols.

Photo 1



Photo 2



Photo 3



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Photo 4



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Photo 5



Photo 6



