Odor Evaluation of the Western Placer Waste Management Authority Composting Facility

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BACKGROUND

The Western Placer Waste Management Authority (Authority) complex includes solid waste diversion, processing, and disposal facilities. The Authority facilities also include the Western Regional Sanitary Landfill (WRSL). SCS Engineers conducted a Preliminary Odor Study for the Authority in the summer of 2007. The SCS study indicated that the two primary sources of odor at the facility were the landfill and the compost facility. The SCS study contained two near-term recommendations relating to the compost facility addressed in the following report:

1. Conduct a detailed review of the Odor Impact Minimization Plan (OIMP) for the compost facility;

2. Conduct a detailed evaluation of potential design and/or operational changes the compost facility with respect to odor minimization.

The following report describes a review of the compost facility and the OIMP with respect to mitigating compost-related odors.

Site Description

The Authority's Composting Facility is operated by Nortech Waste, LLC under contract to the Authority. The facility accepts curbside collected and self-haul green material from the surrounding communities. The facility uses a turned windrow composting method, typical of green material composting facilities in California.

REVIEW OF FACILITY ODOR IMPACT MINIMIZATION PLAN

The current OIMP for the Compost Facility is written as a compliance document, not as a useful tool for facility staff and regulators. At a minimum it needs to be revised to match current facility operations. It is unclear who wrote the OIMP, or who manages its use. All operators of the Compost Facility should be familiar with the OIMP and the OIMP process. The OIMP process evolved from the concept of a "Progressive Odor Management Plan" first demonstrated by consultant Jeff Gage for a troubled compost facility in Washington State. The underlying philosophy is that there are design and operational practices one can use to minimize offensive odors from composting using fairly straightforward management practices. Not all of these should be used at all times, but the level of management increases as the potential for or actual complaints increases.

The OIMP contains five major sections: an Odor Monitoring Protocol, a Description of Meteorological Conditions, an Odor Complaint Response Protocol, a Description of Design

Considerations to Minimize Odors, and Operating Procedures to Minimize Odors. IWMC has reviewed the composting facility with respect to these five areas. A draft OIMP is attached as Appendix B including some of our recommendations. Additional recommendations are in the text below and summarized at the end of this section.

Odor Monitoring Protocol. The odor monitoring protocol in the OIMP does not accurately reflect the odor monitoring protocol at the facility. A description of the receptors and competing odor sources in each direction should be included in the OIMP. The facility has a reasonably good odor monitoring protocol and should describe it fully in the OIMP. Clearly there are odor receptors beyond the site perimeter as noted in the Odor Complaint Log (See Appendix C). In addition, the odor monitoring protocol should be updated to better reflect current conditions.

Meteorological Conditions. The description of meteorological conditions is adequate, but should also describe the on-site weather station, what it is monitoring, and how it is used to manage or direct facility operations. A description of the most common weather conditions leading to odors from the compost facility should also be described (i.e., during stagnant wind periods).

Odor Complaint Response Protocol. The text in the OIMP is inaccurate or incomplete, for example, "We are not aware of any citizen complaints regarding odors generated by the composting or chipping and grinding facilities." This section needs to be re-written to describe that complaints are received, logged, and followed up on by Authority staff. A clear protocol for how this occurs and who is responsible should be included in the OIMP.

Design Considerations to Minimize Odors. This section of the OIMP is vague and doesn't really address all of the items required by statute. This section should be expanded so that the OIMP is less a compliance document and more an operations manual for managing odor at the composting facility.

Operating Procedures to Minimize Odors. Similarly, this section is fairly vague about details and the items required in an OIMP. This section especially needs to be re-written to reflect actual operations and address contingency plans for handling odorous conditions. Many OIMPs include a "Mitigation Menu" which includes a number of options facility operators can use to address odors in a specific section of the facility or under certain conditions. Not all of the menu items are intended to be used simultaneously, but are there to address specific conditions. A Mitigation Menu is included as Table 1 in the Draft revised OIMP contained in Appendix B. In addition, this section should address odor-specific training for compost facility operators and MRF staff.

REVIEW OF ODOR-RELATED COMPOST FACILITY OPERATIONS

IWMC has reviewed several aspects of compost facility design and operations to discover possible design and/or operational changes that could minimize odors. The review included interviewing facility staff (both Nortech staff, Authority staff, and their consultants). In addition IWMC conducted several on-site visits to the composting facility to identify and confirm operational practices. IWMC also accompanied Authority staff on a detailed visit to the nearest receptors to further understand the odor conditions at the facility.

During the operations review, Nortech took delivery of a new specialized compost turner. The turner is significantly different then the previous straddle type turner and should provide some improvement to the compost process and resulting odors. The new turner required some operational changes which are detailed below.

Overview of Compost Facility Operations

Feedstock Receiving

All of the compost feedstock is delivered to the grinding pad, located just to the southern edge of the compost pad. The receiving pad is paved and seems well managed. Two types of feedstock were identified which require special handling: bi-weekly collected yard trimmings and commercial debris box loads. The City of Lincoln collects yard trimmings biweekly. These loads are often more odorous then weekly loads as the material decomposes in the can prior to arriving at the compost facility. In addition some commercial debris box loads from certain customers often sit for two weeks or more before being delivered. These loads can lead to odors during grinding, and during transport to the compost site. Special handling procedures should be developed for these loads so that the operators can identify when these loads arrive and can expedite their processing and incorporation into a windrow. If these loads cannot be expedited towards grinding, mixing them with other, non-odiferous loads may decrease odor releases. If possible, the City of Lincoln should be encouraged to move to weekly collection. Similarly if commercial debris box loads are sitting too long with putrescible material the owners of the boxes should be encouraged to dump them more frequently.

Feedstock Storage

The operator reports that all feedstock is processed within 24 hours of receipt. This time frame (if followed) is adequate for most green material loads, but may not be adequate for the potentially odiferous loads from Lincoln and from certain commercial drop-box loads. During peak times when these loads cannot be rapidly incorporated into a windrow for composting (within 1 to 2 hours), the operator could consider "blanketing" these loads with compost overs, which could be watered slightly to help absorb some odors. If green material feedstock is

sitting too long prior to processing due to insufficient grinder capacity, additional grinding capacity should be brought in, either by increasing the size of the grinder or adding grinder capacity.

There are also strong hydrogen sulfide and other strong decomposition odors from the grinding pad, which is shared with the C&D line. Hydrogen sulfide is not expected from green material, especially from the grinding process. These odors are most likely coming from the adjacent C&D line, which handles significant amounts of drywall. When drywall gets wet it can release hydrogen sulfide. Some of the odor monitoring conducted for SCS's analysis may have mischaracterized hydrogen sulfide odors to the compost facility.

Processing/Grinding

All of the green material feedstock is processed using an electric grinder. The grinder is typical of grinders used in California, though electric grinders are not as common at composting facilities. In the event the grinder was to go down or need extended maintenance, there are a number of diesel-powered back-up grinders (operated by contract operators) that could be used. The OIMP should identify back-up grinders or alternate facilities that could receive particularly odiferous loads if the grinder is down or if excessive peak load conditions exist.

The grinder has a minimal water spray at the out feed conveyor to minimize dust. The use of the water spray for dust control is a good idea and should be continued. If odors from the grinding appear to be a major cause of odors, the operator could consider using a topical odor neutralizer (such as those listed in Appendix D) mixed with water to add to this water spray system.

During the summer months of 2007, the operator was using the grinder during off-peak hours (6:30 a.m. to noon, and 6:30 p.m. to 11:00 p.m.). This leads to peak grinding times during those times that neighbors and nearby receptors are outside and in a prime location to observe odors (going to and returning from work, walking dogs, playing with children, etc.). It is not clear that this off-peak grinding was leading to off-site, grinding type odors (which are generally quite distinct from composting odors). However, if this practice is to be continued, it should be evaluated to see if it correlates with off-site odor complaints. The facility had a weather station installed in August 2007, and is rapidly gaining experience in using this data to direct facility operations. In general, any activity that significantly volatizes particles (like grinding, screening, and especially turning) should be done ideally when there is a light wind in the direction away from the closest receptors, and should be avoided when there are stagnant conditions. The closest receptors at the Crocker Ranch subdivision, to the south and southeast, are just slightly down gradient from the facility. Under stagnant wind conditions, odors will travel downhill.

Figure 1 shows a chart comparing roughly two months of operations (screening and turning) with odor complaints during the same period. This type of chart should be completed regularly to try to match specific operational activities with logged odor complaints to try to identify trends. In the period of time shown, it seems likely that "after-hours" processing (in this case screening and most likely turning) led to early evening complaints.

Processed Material Storage

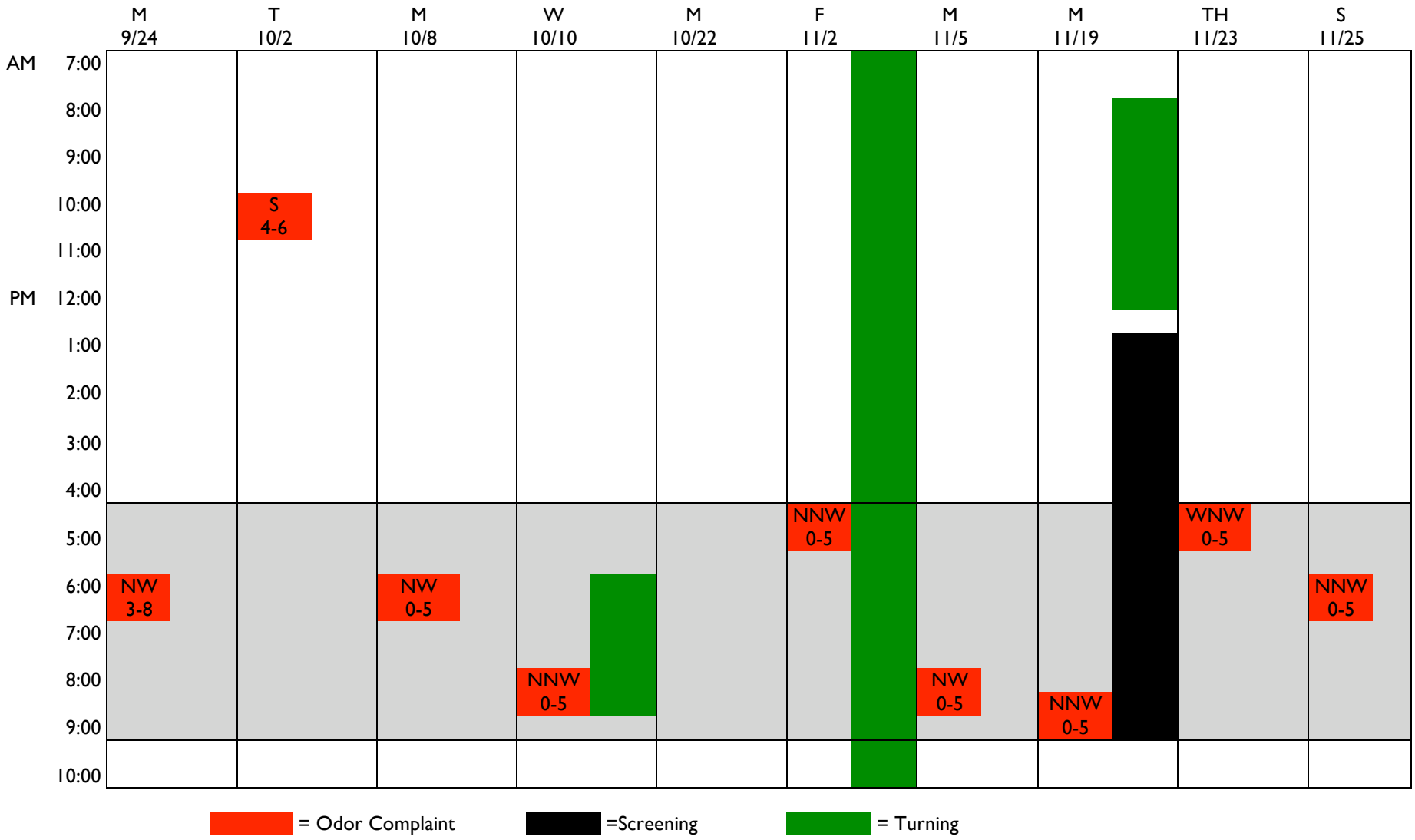
The operator reports that ground material is moved to a windrow within a maximum of 48 hours. Again, this may be adequate for "normal" loads of green material, but may not be sufficient for particularly odiferous loads. In addition much of the woodier material is ground for boiler fuel, reducing the carbon fraction of the feedstock mix, and potentially reducing pile porosity. During certain times of year (when lots of grass comes in) the operator may want to sample carbon to nitrogen ratio and bulk density/porosity on the incoming feedstock and adjust accordingly. This will reduce odors in the processed material stockpile and also in the windrows. Woody overs can also be stockpiled in order to increase porosity in high grass loads or to be used as a blanket for processed material or for windrows.

Composting

The facility uses a turned windrow method of composting and recently installed a specialized side-discharge turner to replace the older turner. This will allow the facility to better utilize available windrow space and hopefully increase compost residence time. It is also believed that the new turner will turn the entire pile (the older turner often missed the bottom 4 to 6 inches of the windrow, potentially leading to incomplete composting of that portion of the windrow).

The operator is also adding some screened "overs" back onto the top of the pile of the initial windrows. This is reportedly to increase porosity, but also may serve to reduce some odors (it would be more effective if the overs were watered lightly before placement) and also serves to inoculate the pile once the overs are turned back into the windrow. Research (Büyüksönmez, 2007) has shown that utilizing a "pseudo-biofilter" (basically a 6" to one-foot layer of finished compost over composting materials) reduces the odorants being emitted from the composting materials. A similar effect may be possible with other stable organic materials (like screened overs). Watering the "blanket" materials allows more odorants to be absorbed onto the woody particles.

Figure 1: Example Odor/Operations Chart



The operator reports an ideal starting carbon to nitrogen ratio of 30 to 1, but it is unclear how often this is monitored or adjusted. This is typical of many green material composters who have little control over the type of material that is received. However, periodic sampling of C:N ratio might indicate seasonal fluctuations which might require feedstock adjustments (e.g., adding woody overs during periods of high grass deliveries).

Mixing

In general, the only mixing that is done is incidental to the processed material being delivered to the windrow pad and formed into appropriate windrows for the new turner. This is typical and given the relatively homogenous nature of Northern California green material is probably acceptable. During periods of high feedstock fluctuation (like high grass deliveries in the Spring) the facility may want to stockpile woody compost overs to add porosity and carbon to the initial mix.

Windrow Formation

Once the green material is processed, it is transported to the windrow pad via truck. The trucks unload and a front-end loader is used to form and shape the initial windrows. The windrow pad is paved, but is split by a drainage channel that serves to drain both the grinding pad and the windrow pad. Issues regarding drainage are discussed below under stormwater management.

Turning Frequency/Scheduling

With the advent of the new turner, windrows are turned every two days. This turning frequency appears to be driven by a desire to "speed up" the composting process, but may be actually slowing or interrupting the composting process. It is unclear whether or not pile temperatures have adequate time to re-establish themselves between turnings. The primary driver for the turning schedule is a desire to optimize the composting variables to speed up the process. This is acceptable as long as it does not come into conflict wit odor mitigation needs. Some facilities use temperature for an indication of turning, though other methods are also valid. Turning frequency is also sometimes based on bulk density. A simple bulk density test using a five gallon bucket can be performed to give an indication of pile porosity, the main variable for determining level of aeration in a pile.

According to the operator, the windrow retention time is approximately 8 weeks. If every pile is turned every 2 days, each pile will have been turned approximately 28 times. This is on the high side (more frequent turning) for most windrow composting facilities in CA.

Turning is perhaps the single most important material handling activity that should be scheduled to coincide with favorable weather conditions (odor dispersing conditions). As piles are turned

significant amounts of particles are volatized and odor compounds are released. Most importantly turning should be minimized during periods of stagnant wind conditions.

Equipment Reliability/Capability

The new turner is highly specialized and manufactured in Germany. Parts and availability of service may be an issue as it ages. The facility appears to have kept the old turner as a back up in case the new turner goes down, though it is unclear how the old turner would fare with the new windrow configuration.

Water Addition

Water is added initially as the windrow is formed. The new turner also has the capability to add water as it is turning, though this was not operational during the site visit. In the past, water was added by a water truck. The new turner, if operational should improve water addition to the composting process. Adding water is one of the biggest challenges to western composters. The operator reports desired starting moisture of 40 to 45 percent and lists an ideal starting moisture as 55 percent. The material appeared on the dry side during the site visit, but was within the optimal range (40 to 60 percent). Paying closer attention to windrow moisture content may be a more effective means of optimizing the composting process (rather then very frequent turning). In the early stages with the new turner, weekly moisture monitoring of each windrow might be advisable, at least until a predictable pattern can be established and a water balance can be created. Maintaining adequate moisture may also reduce odor issues. A simple moisture test can be done using a microwave or other relatively inexpensive field equipment.

An odor neutralizer (like those included in Appendix D) could be added to the water truck and/or the windrow turner either as a topical application (via the water truck) or into the windrow (via the windrow turner).

Retention Time

As discussed above, the operator reports an approximate 8-week windrow retention time. This is relatively fast compared to most California green material composters, who generally have more available space. Available pad space largely determines the length of time on the compost pad or in a windrow. This is acceptable as long as it does not conflict with odor mitigation needs. It seems likely that some of the compost that was made prior to the new turner being installed was not adequately completing the composting process prior to it being moved to curing, which most likely led to odors from the curing pile, especially when the curing pile was "broken into" for screening.

Windrow Aisles

The aisles between windrows can be sources of odor if incomplete compost is allowed to collect in the aisles without the benefit of the biological activity of the composting process. The facility was undergoing a transition from straddle-type turning to side-discharge turning during the site visits. In general the aisles appeared well-maintained and did not appear to be a major source of odor. Any material spilled into the aisles should be cleaned.

Curing

The curing pile is located on the northeast side of the compost pad near the screen. According to the operator; the material in the curing pile is "curing" for three to four weeks. If material is moved to the curing pile too soon odors can develop as the curing pile has less optimum conditions then the windrow for composting. If the compost must be moved to curing before it is adequately composted, smaller, discrete curing piles should be made to increase natural aeration. The curing pile can also be 'turned" with loaders (under favorable wind conditions) to release some odor by-products. The facility has also experimented with adding passive aeration to the curing pile, which seems to have been successful in increasing aeration to the curing pile and decreasing curing time

Screening

The screen is located on the North end of the compost pad. During the time of the site visit, the screens were being operated in two eight-hour shifts. As discussed earlier, screening during the "off-hours", especially in the early evening hours, would appear to be correlated with odor complaints received in November. The on-site weather station could be used to help schedule screening for favorable conditions, (light winds or winds in the direction of the least, or furthest receptors).

Finished Product Storage

The screened finished compost is stored on the north end of the pad adjacent to the screen. No odors were detected in the finished compost. Finished compost could be a source of odors if the compost was not sufficiently composted prior to it's being screened and stored. Having an active marketing plan with a diverse selection of market alternatives will also help ensure that compost continues to move off site and does not create backlogs.

Overall Site Management/Housekeeping

Overall the site appears well managed and litter free. The MRF equipment that once took up a portion of the windrow pad has been moved, increasing the overall area of the windrow pad. The site is very close to its practical site capacity, given the volume of feedstock that is currently handled.

Stormwater Management Practices

Run-on prevention. The compost pad is below the grade of the grinding pad and run-on to the compost pad is prevented by the drainage channel that drains the upper grinding pad and bisects the compost pad.

Leachate pond. The compost site primarily drains to the center drainage channel, which bisects the windrow area. This drains via gravity to the leachate pond. The drain is a grated, paved ditch which is open (via the grating) and as such has the potential to accumulate significant amounts of particulate matter and wood chips drawn through the channel. During the site visit, the drain was being constantly flushed with a low volume of water to keep particulate moving. The drainage channel could be a source of odor if it were allowed to pond or get blocked by sediments. During low rainfall periods, particulate will build up in the drain and become anoxic or anaerobic and potentially be a source of odors. According to the operator, the drainage ditch is cleaned out once per month. This schedule may need to be increased depending on rain patterns and odor characteristics. In addition, the operator could consider installing filter socks at key points along the drainage channel to minimize the amount of sediment carried into the leachate pond.

RECOMMENDATIONS

Short-Term Recommendations

Odor Monitoring. The Authority should continue its practice of regular odor self-monitoring and working with the facility staff, the neighborhood, the LEA and surrounding odor sources to log, investigate, and evaluate complaints. The Authority needs to develop a means of sharing this information with the operators so that it can inform and guide operations. Weekly odor meetings (between Authority staff and Nortech staff) could be scheduled during periods of likely odors or odor dispersing weather.

Logging Actual Operations Against Odor Complaints. The Authority staff track and respond to odor complaints. Nortech logs actual operations at the facility. These two data points (odor complaints and operations – i.e., grinding, screening, turning, etc.) need to be regularly charted (as in Figure 1) to try to develop possible correlations. If correlations can be made, operational practices can be managed to potentially reduce or avoid odor complaints, or at least the conductance of certain tasks at certain times may need to be mitigated.

OIMP Document and Training. The facility should revise and expand its current Odor Impact Minimization Plan (A Draft Revised OIMP is contained in Appendix B). The OIMP should

be considered a living document and be used in training of all personnel assigned to the compost facility. In particular a mitigation matrix (as contained in the Draft Revised OIMP) should be developed that operators can refer to, to guide operations. The "Mitigation Matrix" table lists a number of operation-specific management practices that alone or in concert with other mitigations should reduce off-site odors.

Implement the Odor Mitigation Matrix. The Odor Mitigation Matrix in the OIMP should be used to determine solutions to odor issues as they arise. The Matrix should be updated regularly as new practices are developed. Not all mitigations are meant to be used simultaneously. It is up to the operator to determine which mitigations will best fit a given situation.

Implement Improved Marketing Plan. The operator is developing an improved marketing plan which will serve to better move finished compost off-site. This will help take pressure of the space-limited pad. It is important that the marketing plan identify a wide range of potential and contingency markets.

Seasonal "off-peak" Grinding, Turning, and Screening. The facility should consider the impacts of grinding, turning, and/or screening during off-peak hours (i.e., early morning or early evening times). Under ideal circumstances, any activity which volatizes particles should be conducted under favorable weather conditions, or at least under the conditions least likely to cause odors. Electricity pricing is driving the facility to grind materials during off-peak hours, which is a time when the majority of the residential receptors are in a position to detect odors. The benefits of operating during "off-peak" hours (cost savings) needs to be weighed against the potential to create nuisance level odors at the nearest receptors.

Visual Screening. The Authority could consider planting a significant vegetative wind block or row of trees on the southern perimeter of the overall facility (at the property line) to help facilitate mixing of odors emanating from the facility towards the nearest receptors.

Continue to Identify Off-site Feedstock Options. The operator has identified a few options for diverting raw feedstock from the site to handle peak loading situations. Additional options, such as direct land application of processed green material should be investigated to allow for peak loading and other unforeseeable situations (equipment breakdown, etc) that would otherwise put a strain on the composting system

Long-Term Recommendations

Investigate Forced Aeration. The Authority should evaluate the costs and odor mitigation potential of an aerated static pile composting facility. A system with negative aeration exhausted to a biofilter or other odor control device would provide significantly more odor control then could be had with a turned windrow system.

Investigate Additional Composting Area. The current compost site is adequate to manage the current feedstock volumes without creating a significant odor nuisance if the odor mitigation matrix is used and all feasible steps are taken to manage the facility for odor mitigation. However, feedstock volumes are expected to continue to grow. Eventually the facility will need to investigate adding additional compost facility capacity to the site.

Appendix A
Existing OIMP for WPWMA

The existing OIMP for the Western Placer Waste Management Authority follows this page.

(n) An Odor Impact Minimization Plan pursuant to Section 17863.4.

Introduction - This Odor Impact Minimization Plan (OIMP) has been developed in accordance with 14 CCR 17863.4. This OIMP will be revised as necessary to reflect any changes in the design or operation of the composting and green/wood waste processing facility. A copy of the revisions will be provided to the LEA within 30 days of the changes. In addition, this OIMP will be reviewed annually by the operator to determine if any revisions are necessary.

Proximity of Possible Odor Receptors - The closest odor receptors are the WPWMA and Nortech on-site employees. Other on-site receptors would be commercial haulers and individuals hauling materials to the site. The closest off-site receptors would be WPWMA employees, Madera Waste Inc. employees, and waste haulers on the WPWMA-owned landfill to the east and south of the facility. Also located on the landfill property is the Red Barons Flying Club. There are no other off-site receptors in the immediate vicinity of the facility.

As previously noted the composting and green/wood waste processing facilities are located on the same property as the WPWMA MRF. Placer County has designated the properties within 1,000 feet of the MRF for agricultural or industrial uses. The properties to the west and north within 1,000 feet of the MRF are currently used for agricultural purposes. A Draft Environmental Impact Report for a proposed industrial development has been circulated for the property to the north of the MRF. The adjacent properties to the east and south of the MRF are owned by the WPWMA and are used as a sanitary landfill. Currently, the Red Barons Flying Club leases approximately 17.6 acres on the landfill site, within 1,000 feet of the MRF and operates a radio controlled model airplane flying club. There are no residences within 1,000 feet of the MRF. The closest residence is located on WPWMA property approximately 1,200 feet from the MRF property line. The next closest residences are located approximately two miles to the west of the facility. Upon implementation of the MRF expansion project the Red Barons Flying Club will be relocated to an undetermined location.

Odor Monitoring Protocol - Each day the operator evaluates on-site odors and operations for potential release of objectionable odors. In addition, WPWMA staff conducts a routine odor monitoring program to monitor and record the occurrence of any off-site odors in the vicinity of the facilities to insure compliance with odor and nuisance regulations. Monthly, a WPWMA staff member observes and records the existence of any malodors at a minimum of four established locations in close proximity to the facilities. The observations are conducted on staggered days of the week and at various times of the day. If odors are observed the staff will attempt to determine the source of the odor, since there are numerous other potential odor generators in the area. If the odors are emanating from the WPWMA site an attempt is made to

determine how far from the site the odors can be observed. A monitoring report form is completed and kept on file at the WPWMA offices. When necessary, appropriate corrective actions are required to be implemented by the contract operator.
Meteorological Conditions Effecting Migration of Odors or Transport of Odor-Causing Materials - The facility site experiences moderate temperatures and humidities. Temperatures average 62° F annually, ranging from average January low temperatures in the high 30s to average July high temperatures in the low 90s. Rainfall averages approximately 21 inches annually in the area and occurs generally from October to April. Based on available wind data, winds in the area average 7.5 miles per hour and prevail predominantly from the south-southeast. Seasonal variations in wind velocity and direction do occur but the prevailing southeasterly winds occur mainly in the spring and summer.

Complaint Response Protocol - We are not aware of any citizen complaints regarding odors generated by the composting or chipping and grinding facilities. Upon receipt of a complaint regarding odors from the facility, staff (WPWMA or Nortech) will record the following information on an odor complaint form:

Complainants name, address and telephone number (if possible)

Date and time the complaint was received

Specific nature of the complaint, including type of odor, time odor observed, duration of odor, odor intensity, etc.

Other pertinent information

WPWMA staff will respond to any odor complaint as soon as reasonably possible, but no later than the next normal working day following receipt of the complaint. When possible, staff will review, in the field, the area in which the odor was observed by the complainant to assess the complaint. If a WPWMA facility is found to be the cause of the odor appropriate corrective actions will be taken. At the conclusion of the investigation the complainant will be notified of the results of the investigation. The results of the investigation will be documented in the facility complaint log which is maintained by Nortech.

Facility Design Features to Minimize Odors - In order to minimize the development of conditions that could lead to odor problems, the WPWMA facilities were designed based on the nature and quantity of materials to be received and stored, climatological factors, adjacent land uses, grading and drainage controls.

Feedstock for the composting and chipping and grinding operations consist of source-separated green waste from commercial and residential haulers and green waste recovered from the MSW sorting process. The composting process is a turned windrow process. The turning provides aeration to minimize odors. The composting and chipping and grinding operations are conducted on concrete pads that were constructed to minimize ponding and graded to drain to properly designed drainage containment ponds. All existing finished product storage areas are concrete pads that drain to properly designed ponds. Drainage facilities are designed so that all contact water and leachate is directed to a compost retention basin. All other drainage is directed to a stormwater detention basin. Future expansions to the composting and chipping and grinding operations will consist of all-weather surfaces with proper drainage facilities. As discussed in the RCSI the facilities were constructed with adequate feedstock, processing and finished product storage capacity.

Operational Practices to Minimize Odors - Odor control at the site includes controlling the feedstock. Only green/wood wastes are utilized in the composting and chipping and grinding operations. Contaminants in the feedstock are minimized by a load checking program. Contaminants removed from the feedstock or at point in the process are placed in containers for proper disposal. Feedstock is normally processed within 48 hours of receipt. The compost windrows are approximately 280 feet long, 18 feet wide and 8 feet high. Compost is maintained at a moisture content of 50-55 %, minimizing airborne emissions. The windrows are turned a minimum of five times during the composting process to provide aeration. Water spraying is used to control emissions during the wood waste processing operations. Designated Nortech crews sweep and clean all areas of the site as necessary to prevent the accumulation of materials that could generate odors. Litter is collected on a daily basis. Drainage facilities are routinely inspected and repaired to prevent areas of ponded water and to insure that contact water, leachate and process water is properly disposed of.

Contingency Plans - Nortech maintains a supply of spare parts on-site or can readily obtain spare parts to handle routine equipment maintenance and repair. Two back-up loaders are available on-site. If necessary, back-up equipment could be rented from a rental company, such as Nations Rentals, which is located on Industrial Avenue. Also, Nortech has a working agreement with Capitol Disposal, located on Athens Avenue, to provide back-up composting and wood waste processing equipment.
In the event of a power failure most composting operations could continue. If the sorting lines and equipment were inoperative for a period of time green/wood waste would be stockpiled until operations could continue. If the storage areas became full waste would be diverted to the landfill for disposal until normal operations could resume.

Training - In addition to the standard safety training, sorters that work on the green/wood waste sorting line are trained to recognize and remove contaminants. A

compost technician is responsible for maintaining the proper temperature and moisture content of the compost in the windrows. The technician receives training on the composting process and the use of the instruments for monitoring. In addition an HHW technician is trained to perform the visual observation and load sorting checking required by Section 17868.5

Appendix B
Revised OIMP for WPWMA Composting Facility

A Revised Odor Impact Minimization Plan follows this page.

Odor Impact Minimization Plan

Western Placer Waste Management Authority Compost Facility

June 2008

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1.0 INTRODUCTION

California Integrated Waste Management Board (CIWMB) regulations, Title 14, CCR Section 17863.4 require that all compostable material handling operations and facilities prepare and maintain a site-specific Odor Impact Minimization Plan (OIMP). The following OIMP has been developed to meet regulatory requirements and to serve as a documentation of site-specific operating procedures designed to minimize the potential for nuisance-level off-site odors.

1.1 BACKGROUND INFORMATION

Project Name: Western Placer Waste Management Authority
Green Material Compost Facility

Project Location: 3033 Fiddyment Road
Roseville, CA 95747

Mailing Address: 3033 Fiddyment Road
Roseville, CA 95747

Landowner: Western Placer Waste Management Authority
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2.0 ODOR IMPACT MINIMIZATION PLAN

The following provides specific information on compliance with §17863.4 (b) – (d). The text from Title 14 is presented in *italics* followed by the Facility's proposed method of compliance.

(b) Odor impact minimization plans shall provide guidance to on-site personnel by describing, at a minimum, the following items. If the operator will not be implementing any of these procedures, the plan shall explain why it is not necessary.

2.1 ODOR MONITORING PROTOCOL

(1) an odor monitoring protocol which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors; and

The closest receptors are WPWMA staff and the operators that work at the compost facility, the buy back facility, MRF, scalehouse, and the landfill. On-site staff is the best source of real-time information regarding odors.

Directly one mile south and southeast of the WRSL property boundary is a residential development referred to as the Crocker Ranch (the composting facility is approximately 3/4 mi. further north). This development includes residential housing and schools. These are the primary off-site receptors.

Other potential receptor locations that are not in the primary path of air movement but are also of concern since the wind direction sometimes moves towards these locations in relation to WPWMA are established residential neighborhoods approximately 2 miles north of WPWMA and a casino approximately 1.5 miles to the northeast of WPWMA. All of the land to the west within a close proximity of WPWMA is designated as agriculture/pasture and no residential, commercial, or industrial developments exist, though some are being contemplated for the future.

It is important to note that there are a number of potentially competing odor sources within a reasonable vicinity of the composting facility as well. Approximately 2.5 miles to the southeast of the composting site is a composting and soil blending facility (Mallard Creek). The Rio Bravo wood-burning power plant is located approximately 2 miles to the east. Both of these sources stockpile significant amounts of organic materials. These receptor locations are directly in the primary path of the air movement in relation to compost facility. To the North of the composting facility are a chicken farm and a dairy which are other competing odor sources. The

aforementioned casino, in addition to being a potential receptor is also a potential odor source as the facility operates its own on-site wastewater treatment plant.

Approximately 1.5 miles to the east and southeast of WPWMA are various industrial plants, including a propane dealer. Although these locations are not in the primary path of the air movement in relation to WPWMA, they are of interest since wind blows this direction a small percentage of the time.

Please see Figure 1 to see the relationship of the facility to nearby receptors and competing odor sources.

As discussed above, there are a number of potentially competing odor sources on the WPWMA site and in the vicinity. These include:

<u>On-Site</u>
Western Regional Sanitary Landfill
C&D sort line
Material Recovery Facility
LFG to Energy plant (Energy 2001)
Composting Facility

<u>Off-Site</u>
Rio Bravo wood waste to energy power plant facility
- 1.5 miles southeast of the WPWMA
- 0.35 miles northeast of Crocker Ranch;

Mallard Creek composting facility
- 1.75 miles southeast of the WPWMA
- 0.70 miles east of Crocker Ranch;

Placer Propane – propane dealer
- 1.75 miles southeast of the WPWMA
- 1.0 mile east of Crocker Ranch;

Invirotec –accepts and processes septage
- 1.5 miles northeast of the WPWMA
- 2.0 miles north-northeast of Crocker Ranch;

Thunder Valley Casino WWTP
- 1.5 miles to the northeast of the WPWMA
- 2.0 miles to the north, northeast of Crocker Ranch

Chicken farm
- 0.75 miles northwest of the northwestern corner of the WPWMA
- 2.4 miles north-northwest of Crocker Ranch;

Dairy farm

- 2.75 miles west-northwest of the northwestern corner of the WPWMA
- 3.6 miles northwest of Crocker Ranch.

Each day the operator will evaluate on-site odors and evaluate planned operations to minimize the potential release of objectionable odors. These include good composting practice as described in the Report of Composting Site Information (RCSI) (appropriate C:N ratio, sufficient moisture content, adequate porosity, etc.) to minimize production and persistence of odors; and good housekeeping measures (like clearing spilled materials between piles, eliminating areas where water could pond, and maintaining reasonably sized stockpiles of feedstock and finished compost). Additional site-specific odor-minimization practices are detailed in Table 1.

If the operator detects an objectionable on-site odor, they will follow the following protocol:

1. Investigate and determine the likely source of the odor.

2. Determine if on-site management practices could remedy the problem and immediately take steps to remedy the situation. Potential odor sources and likely management actions are shown in Table 1.

3. Determine whether or not the odor is traveling beyond the site by patrolling the site perimeter and noting existing wind conditions.

4. Enter observations in the Odor Log.

In addition, to the observations made by the compost facility operator, WPWMA staff monitors odors from the compost facility. The frequency of WPWMA observations varies, but include monitoring of the facility and off-site potential odor sources and the nearest receptors, based on wind and weather conditions. Any observations are included in the Odor Tracking log.

2.2 DESCRIPTION OF METEOROLOGICAL CONDITIONS

(2) a description of meteorological conditions effecting migration of odors and/or transport of odor causing material off-site. Seasonal variations affect wind velocity and direction shall also be described; and

The geographic proximity of the compost facility is classified as an Intermediate/Semi-Mediterranean climate. It is Mediterranean in the sense that there is a dry season and a wet season. The length of the "wet" and "dry" seasons can be highly variable. Typically rain can fall

from October to May, and is far less likely in June through September. Average yearly rainfall for the nearby town of Lincoln is 24.62 inches.

Summers are much like coastal Southern California, only slightly warmer, when "Delta" maritime breezes are present - ocean breezes flow from the southwest to the northeast, traveling up the Sacramento River delta. Because of the river delta and the absence of coastal mountains blocking ocean maritime breezes, cooling takes place during the normally hot summer months in the Sacramento Valley and Sierra Nevada Foothills. When Delta breezes aren't blowing, and the winds come overland from the north, generally hot conditions prevail.

Winters are more characteristic of Oregon and Washington, with rain and fog. The difference is slightly warmer temperatures, due to more southerly latitude. Winter storms can come from three different sources. The first and the most common of storms, is the North Pacific Storm. This type of storm brings rain and fog to the coast, and then they track right through the Sacramento River Delta and on up into the foothills. The second type of winter storm comes from the Gulf of Alaska. These are much colder storms than the first type. The third type of winter storm comes from Canada and is rare. These are very cold. When storms manage to make it across Idaho, Montana and Nevada and the barrier mountains to the east, snow can fall as low as the Sacramento Valley floor.

Historical wind directional data has been compiled for the surrounding area near the WPWMA. Wind roses for the project area showing the wind speed and direction for each month with direction estimated as emanating from a particular direction are contained in Appendix D. The general direction of the wind during the winter months is to the south-southeast (from the north-northwest) and to the south-southwest (from the north-northeast) in the summer months.

With ambient air as the pathway, three different mechanisms may be causing odor complaints within the surrounding residential areas: inversion, diffusion, and advection.

Inversions are stable atmospheric conditions resulting in limited vertical air movement. Certain atmospheric conditions can cause a temperature inversion to occur, trapping odors near the ground. A temperature inversion is a situation where a warmer body of air is located above a colder air mass, inhibiting the vertical movement of gases. One situation in which a low level, or surface inversion, might take place is on a clear night, when the earth's surface radiates heat away rapidly. If the air is clear, the ground and the air directly above it can be cooler than the air at higher altitudes. In many cases, temperature inversions are most prevalent from the evening to the early morning. This is a likely explanation as to why odor complaints are typically more prevalent at these times.

Diffusion is the process whereby compounds move from a region of higher concentration to one of a lower concentration. Diffusion would cause odors to be detected even upwind of the Compost Facility. When odor complaint data shows odor complaints while the wind is coming from varying directions, this could be an indication of diffusion causing dispersion of odors.

The third pathway is advection. Odors can be carried large distances by the wind. Based upon the review of meteorological data in the vicinity of Compost Facility, the wind generally blows from the facility toward the residences, indicating that advection may be causing the dispersion of odors and impacts to residents.

The facility has an on-site weather monitoring station to monitor wind speed and direction, temperature, and other meteorological functions. The on-site weather system is consulted prior to scheduling major material handling activities. Daily records are logged to generate site-specific historical weather pattern information.

2.3 COMPLAINT RESPONSE PROTOCOL

(3) a complaint response protocol; and

Facility management will use the following protocol in responding to citizen complaints.

Response to Citizen Complaints

It is expected that the majority of complaints will be received, not by the operator (Nortech) or the LEA, but by the owner (WPWMA). Historically most of the odor complaints are received by WPWMA staff.

Upon receipt of a complaint regarding odors, WPWMA staff will:

1. Record the complainant's description of the odor and contact information in the Odor Complaint Log, which is available to the LEA, upon request.

2. Check and record weather conditions (especially wind direction) at the time of the compliant.

3. Visit the location of the compliant (when possible) and attempt to characterize the odor.

4. If the complainant location is downwind of the WPWMA facility, staff will contact the compost facility operator to verify the operating conditions and activities at the time of the complaint.

5. Staff will document all of the information gathered and potential source (s) of the odor in the Odor Complaint log.

6. Respond to the complainant within 24 hours of receiving the complaint, or within 48 hours should the complaint be received after operating hours or during weekends or holidays.

Upon receipt of a complaint or notification of a complaint by the WPWMA staff, the compost facility operator will:

1. Promptly provide information needed to assess the nature and source of the odor.

2. Consider implementing one or more of the management practices (if deemed feasible, given the time of year, particular source of the odor, etc.) listed in Table 1.

3. Monitor and adjust management practices and report results to WPWMA staff.

4. The Operator will document all odor-related actions and results in the Odor Complaint Log (See Appendix C).

2.4 DESIGN CONSIDERATIONS FOR MINIMIZING ODORS

(4) a description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns; and

Method and Degree of Aeration

The facility uses a turned windrow method of composting using a specialized windrow turner. Aeration is largely a function of the particle size of the feedstock, the moisture content and the height of the pile; collectively this is often referred to as "porosity".

Moisture Content of Materials

Most of the material received consists of mainly woody material (shrubs, trees, bushes, etc.) with a small percentage of materials that have high moisture content, like grass clippings. It has

historically been necessary to add significant amounts of water to maintain the minimum amount of moisture for effective composting.

Feedstock Characteristics

The feedstock consists of green material, yard trimmings, and wood waste, as they are defined in 14 CCR §17852. Typical green material is relatively brushy with seasonal amounts of leaves and grass. Water will be added to achieve the desired moisture content.

Airborne Emission Production

The main sources of dust and potentially odor-carrying particles at the facility are from material handling, grinding, windrow turning, screening, and traffic. All access roads to the site are paved and are properly maintained to minimize dust. Proper moisture management during the compost process and in the compost products while onsite also will help to prevent dust generation. Because of these measures, the storage and transfer of feedstock does not increase ambient levels of dust around the site. To the extent possible dust generating-activities will be scheduled based on current wind conditions.

Process Water Distribution

Process water is moved around the site using water trucks. In addition the windrow turner is equipped with a mechanism to add water directly to the windrows as the piles are turned.

Pad and Site Drainage and Permeability

The MRF drainage system (including the compost site) consists of ditches, berms, culverts, a stormwater detention basin and a compost retention basin. With the exception of the compost retention basin, the drainage system is designed to accommodate 10-year, 12-hour storm per the requirements of the Placer County Stormwater Management Manual. The compost retention basin design is based on a 100-year, 24-hour storm event, with no discharge. All non-contact water from the MRF is directed to the stormwater detention basin for eventual discharge off-site. All contact water/leachate from the green and wood waste receiving, processing and storage area is directed to the compost retention basin.

The entire compost site is paved and is bisected by a drainage channel which drains the grinding pad and the compost pad into the leachate pond.

Equipment Reliability

All equipment shall be maintained per manufacturer recommendations. The compost facility has an on-site back up windrow turner. The facility has additional front-end loaders and manpower that could be directed to the composting operation in the event of a failure.

Personnel Training

Personnel assigned to the compost facility have been trained in subjects applicable to the compost site operation and maintenance, load checking procedures, and heavy equipment operations. Monthly safety meetings occur on various topics to ensure proper and safe procedures are followed. All heavy equipment operators must go through a training period before they are able to run each different piece of machinery (loaders, roll-off, water truck, etc.). The training records and safety meeting attendance are kept on file.

Weather Event Impacts

Inversions are probably the most likely weather event to impact the facility (see discussion under meteorological conditions). Occasional severe rains would limit production at the compost site, but rarely last long enough to severely interrupt operations. The facility can be impacted by peak loads that can arrive after wet periods in the winter. As described in Table 1, the facility has developed contingency measures for these conditions.

The facility is equipped with a recording weather station and also has a prominently displayed windsock to direct on-site operations.

Utility Service Interruptions

Most mobile equipment is powered by diesel engines, with the exception of the horizontal grinder, which is electric. During an extensive outage a contract grinder could be brought in, though this would be an unlikely occurrence. Incoming green material could also be run across the adjacent C&D processing line, which also has an electric grinder.

Water Source

Potable water is available via on-site wells.

2.5 OPERATING PROCEDURES TO MINIMIZE ODOR

(5) a description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel) weather impacts, biofiltration, and tarping.

The Facility manages all odor-producing areas of the facility so as to minimize the development of conditions that could lead to odor problems. A key management tool in this effort will be the use of a recording weather station and the windsock. Other possible management tools are summarized in Table 1.

Areas with the potential for odor generation include:

Feedstock Receiving Area. Incoming feedstocks can generate odors if they are stored for excessive periods of time. Feedstocks left unprocessed or un-mixed at the site can also generate significant odors, particularly during the rainy season. In order to minimize these potential odors, the Facility will process material regularly and within regulatory limits. Odors from incoming materials can also be generated upstream of the facility, depending on collection practices.

Aisles between Processing Areas. Aisles between processing areas and windrows can be sources of odor if raw, uncomposted, or improperly mixed material is left for excessive amounts of time without being exposed to the high temperatures of composting. The facility practices good housekeeping methods which include regular patrolling of all aisles to clean any spilled materials. Additionally, all surfaces from the receiving area through the composting pads have been designed and graded so that contact water moves efficiently into the leachate pond, which will minimize any potential ponding in raw feedstock areas.

Composting Piles. Odors emanating from windrows typically indicate problems in the initial mixing, turning frequency, pile porosity, and/or moisture content of the pile. The operator strives to manage its windrows with appropriate carbon to nitrogen ratio, assure adequate initial mixing, and maintaining adequate moisture within the piles. Piles are turned every 2 to 3 days. Any odors detected from the windrows will be corrected using the techniques described in Table 1.

Curing Piles. Curing piles have the potential to create odors if material that is not stable is moved to curing too soon. In order to minimize curing odors, the operator will ensure that material is adequately composted prior to moving it into the curing pile.

Storm Water Retention Basin/Compost Leachate Pond. The compost leachate pond could cause odors if it were overloaded with sediment or nutrients. The pond is aerated allowing some volatile particles to be released in a controlled manner.

Aeration

The facility does not use forced aeration but relies on the particle size of the feedstock to allow for natural aeration. The spaces between the particles is referred to as porosity. A rough measure of porosity can be obtained by measuring bulk density. Piles are turned regularly which may help to reestablish porosity. The literature reports ideal bulk density of between 700 and 1100 pounds per cubic yard.

Moisture Management

The majority of the feedstocks processed at the facility are relatively low moisture content feedstocks. The site is adequately graded and paved to minimize ponding of water that could lead to odors.

Feedstock Quality

The WPWMA Compost Facility only accepts clean, source separated green material. As these collection programs are relatively mature, contamination is relatively low. However, in some cases the frequency of collection can have an impact on odor generation. The operator will work with the green material haulers to identify loads which may have been left sitting for substantial time periods prior to collection and delivery to the facility. When possible these loads should be expedited to assure that they are processed in a timely manner and that the processed material is rapidly incorporated into a windrow.

Drainage Controls

As discussed above, the facility separates stormwater from "contact" water. Any water that contacts incoming wood or green waste or compost is directed to the central channel drain which bisects the entire compost pad and ultimately leads to the compost leachate pond. The drain could become a source of odors from entrapped sediment if it were not cleaned out regularly.

Pad Maintenance

The pad is maintained regularly on an as needed basis.

Wastewater Pond Controls

Regular maintenance of the stormwater pond and the leachate pond should minimize potential odors from these features. The leachate pond is more likely to be a source of odors. The leachate pond is aerated regularly to provide oxygen to the pond.

Storage Practices

The facility has limited storage space and has developed contingency plans for those periods where existing storage is inadequate. These primarily include the identification of off-site locations that could receive processed, but not composted green material (see below).

2.6 CONTINGENCY PLANS

The following provides information on contingency planning for facility equipment, water, power, personnel, weather impacts, and storage.

Equipment. All equipment is maintained per the manufacturer recommendations. The facility has a fulltime mechanic who does scheduled maintenance and repairs on the composting equipment. In the event of equipment breakdown, composting services can be contracted out or equipment could be rented to continue operations. The compost facility does have an on-site back up turner and additional front-end loaders are also on-site as part of other operations.

Water. If needed, water could be brought in by tanker truck, but this is an unlikely situation. In the short term the facility could re-use water stockpiled in either of the retention basins during periods when the regular water supply was interrupted.

Power. Most mobile equipment, except for the horizontal grinder is powered by diesel engines. During the unlikely event of a prolonged power outage a contract grinder could be contracted to provide grinding services.

Personnel. Additional trained personnel could be made available from other Nortech operations.

Weather impacts. The only severe weather event impacts are heavy rainfall or high wind conditions that could temporarily impede processing activities.

Biofiltration. The facility has no provisions for biofilters. However the facility is experimenting with the use of a "pseudo-biofilter" or "compost blanket" to reduce odors in the initial windrows. This may include adding compost "overs" into the initial compost mix to increase porosity or may include using finished compost as a windrow blanket during the first few weeks.

Tarping. WPWMA does not anticipate the use of tarps as part of its regular operations.

Storage. Given the current throughput, the facility is limited by the amount of available pad space. Under peak loading conditions, it may be desirable to re-direct processed green material to an off-site location rather than try to force a large throughput through the system. The operator has identified the potential for off-site receiving locations, such as direct land application of green material.

2.7 PLAN REVISION

(c) The odor impact minimization plan shall be revised to reflect any changes, and a copy shall be provided to the enforcement agency, within 30 days of those changes.

A copy of this Odor Impact Minimization Plan will be kept at the Facility's on-site Administration office. The OIMP will be revised to reflect significant changes to operations that affect the OIMP.

TABLES

Table 1, describing sources of possible odor and potential management techniques, follows this page. The mitigation measures contained in Table 1 are not necessarily cumulative, i.e., not all measures will be implemented simultaneously. It will be up to the operator to determine the applicability of a given technique to a given situation.

Table 1
Sources of Odor and Possible Management Techniques

Source of Odor	Possible cause	Management approach
Feedstock receiving	Material sitting too long prior to processing	Reduce size of processed material stockpiles. Create discrete feedstock stockpiles with greater surface to volume ratio. Consider blanketing odiferous materials with one-foot layer of woody overs (water lightly to reduce odor releases).
Feedstock receiving	Material arrives with odors	Expedite material processing. Develop load-specific handling measures Consider blanketing odiferous materials with one-foot layer of woody overs (water lightly to reduce odor releases). Develop alternative processing option for odiferous loads. Consider treating odiferous loads with an odor neutralizer added to the water truck or otherwise sprayed on.
Material processing (Grinding)	Grinding volatizes particles	Expedite material processing. Increase operating shifts or grinder capacity. First in, first out, processing. Consider using odor neutralizer in the water spray for the grinder. Use the weather station, windsock, and/or operational experience to curtail grinding operations during unfavorable weather conditions.
Processed material storage	Storing processed materials for extended periods can cause odors.	Move processed material to a windrow within 48 hours. Stockpile woody overs for use in adjusting porosity and/or for blanketing material stockpiles and/or windrows.

Table 1 (Continued)
Sources of Odor and Possible Management Techniques

Source of Odor	Possible cause	Management approach
Material Handling (during composting)	Material handling releases odorous gases. Anaerobic conditions can form odorous compounds. Ammonia odor (high nitrogen level). Sulfur odor (anaerobic conditions). Varying odors in pile. Odors generated after turning. Excessive temperature.	Reduce handling activities during stagnant air conditions. Check and correct carbon to nitrogen ratio and porosity in windrows. Maintain adequate moisture in piles. Avoid over-watering piles. Increase turning frequency, check temperatures, check pH, increase porosity, increase additive. Increase surface to volume ratios of active piles. Consider using "Pseudo-biofilter" to reduce emissions.
Material Handling (Turning)	Turning releases odorous gases and volatizes particles	Reduce or avoid turning activities during stagnant weather conditions. Reduce turning activities when light winds are in the direction of sensitive receptors Consider adding an odor neutralizer to the water truck to be used as a topical odor neutralizer (after windrows are turned) and/or into the windrow via the turner.
Curing piles	Excessive temperatures	Decrease curing pile size (height). Increase compost residence time prior to moving to curing. Review moisture content of in-process compost. Use passive aeration to add oxygen to the curing pile

Table 1 (Continued)
Sources of Odor and Possible Management Techniques

Source of Odor	Possible cause	Management approach
Material processing (Screening)	Screening volatizes particles.	Reduce screening activity during stagnant air conditions. Reduce screening activity when wind is in direction of sensitive receptors. Mist water or neutralizer at dust generation points.
Aisles	Storm water allowed to pond Uncomposted material in aisles	Clean or sweep aisles of spilled material. (Particularly at the end of each day). Remove and replace woody overs and spilled materials from the pad on a regular basis. Mechanically sweep paved areas at the end of each day. Apply water and/or neutralizer to reduce dust conditions.
Drainage channel	Channel can become saturated and overloaded with sediment	Increase cleaning frequency of the drainage channel Install filter socks at the upstream end of the windrow pad, especially during the rainy season.
Leachate pond	Standing water overloaded with nutrients or sediment	Install filter berm before pond, Consider increasing aeration and/or chlorinating as necessary. Clean leachate pond during the dry season.

Appendix A
CIWMB REGULATIONS REGARDING OIMPs

California Integrated Waste Management Board (CIWMB) regulations regarding Odor Impact Minimization Plans follow this page.

COMPOSTABLE MATERIALS HANDLING OPERATIONS AND FACILITIES REGULATORY REQUIREMENTS

April 4, 2003

Chapter 3.1 Compostable Materials Handling Operations and Facilities Regulatory Requirements

Article 1. General

Section 17863.4. Odor Impact Minimization Plan.

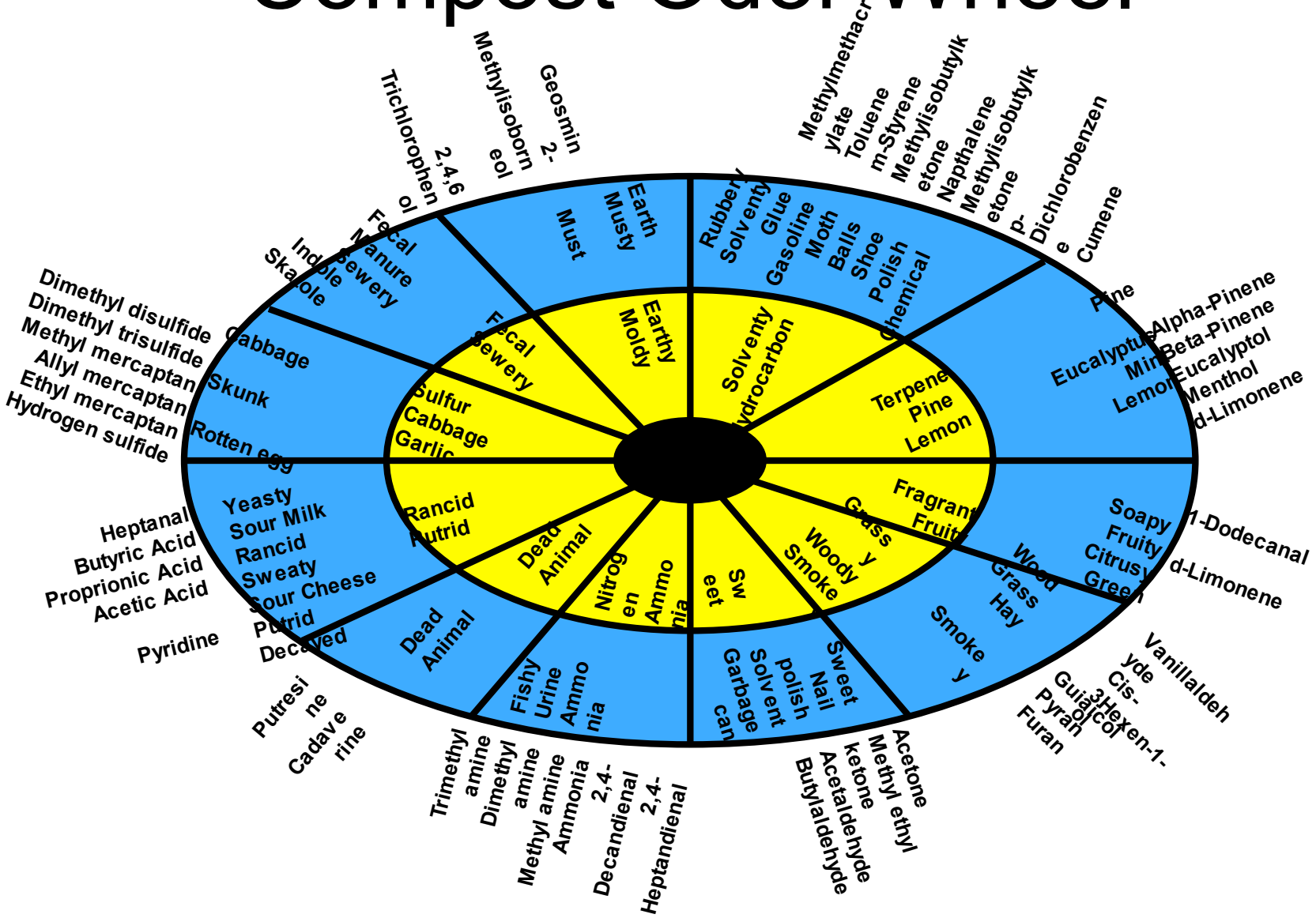
(a) All compostable material handling operations and facilities shall prepare, implement and maintain a site-specific odor impact minimization plan. A complete plan shall be submitted to the EA with the EA Notification or permit application.
(b) Odor impact minimization plans shall provide guidance to on-site operation personnel by describing, at a minimum, the following items. If the operator will not be implementing any of these procedures, the plan shall explain why it is not necessary.
(1) an odor monitoring protocol which describes the proximity of possible odor receptors and a method for assessing odor impacts at the locations of the possible odor receptors; and,
(2) a description of meteorological conditions effecting migration of odors and/or transport of odor-causing material off-site. Seasonal variations that effect wind velocity and direction shall also be described; and,
(3) a complaint response protocol; and,
(4) a description of design considerations and/or projected ranges of optimal operation to be employed in minimizing odor, including method and degree of aeration, moisture content of materials, feedstock characteristics, airborne emission production, process water distribution, pad and site drainage and permeability, equipment reliability, personnel training, weather event impacts, utility service interruptions, and site specific concerns; and,
(5) a description of operating procedures for minimizing odor, including aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices (e.g., storage time and pile geometry), contingency plans (i.e., equipment, water, power, and personnel), biofiltration, and tarping.
(c) The odor impact minimization plan shall be revised to reflect any changes, and a copy shall be provided to the EA, within 30 days of those changes.
(d) The odor impact minimization plans shall be reviewed annually by the operator to determine if any revisions are necessary.
(e) The odor impact minimization plan shall be used by the EA to determine whether or not the operation or facility is following the procedures established by the operator. If the EA determines that the odor impact minimization plan is not being followed, EA may issue a Notice and Order (pursuant to section 18304) to require the operator to either comply with the odor impact minimization plan or to revise it.
(f) If the odor impact minimization plan is being followed, but odor impacts are still occurring, the EA may issue a Notice and Order (pursuant to section 18304) requiring the operator to take additional reasonable and feasible measures to minimize odors.

Authority cited: Sections 40502, 43020, 43021 and 43209.1 of the Public Resources Code
Reference: Sections 43020, 43021 and 43209.1 of the Public Resources Code.

Appendix B
COMPOST ODOR WHEEL

A Compost Odor Wheel, used to help determine the nature and therefore the cause of typical compost odors follows this page.

Compost Odor Wheel



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Appendix C
ODOR COMPLAINT LOG

The Odor Complaint Log kept for the facility follows this page.

Complaint Info							Observations / Results (Add description of operations at time of monitoring)						
	Date of Odor	Time	AM/ PM	Name	Location Odor Detected	Description	Weather	Deg.	Wind Dir.	Wind Speed	MRF / WRSL Ops	Possible Source / Conditions	Notes:
1	1/1/08	9:00	am	[redacted]	[redacted]	Sour Trash	Cloudy	36	Landfill: NNE Rocklin:	0-3		Other Source	Inversion conditions; winds not blowing from landfill to Rocklin. Responded to caller; she is 2-3 miles directly west of landfill, Rio Bravo (RB)
2	1/12/08	8:00	pm	[redacted]	[redacted]	[redacted]		51	Landfill: w, NW - 5 Rocklin: W, NW - 2	0-5		RB	Reported odor strength bad - 8/10; describes as "sour" smell in isolated areas; comes and goes as she walks the neighborhood or drives around. Not cold enough for inversion; caller not downwind of WRSL.
3	1/13/08	6:30	pm	[redacted]	[redacted]	[redacted]		48	WNW	0-5		WPWMA	Reported unbearable odors past few weeks. Responded to caller that we are still implementing improvements and mitigation measures. This resident
4	1/14/08	9-9:30	pm	[redacted]	[redacted]	[redacted]		40	Landfill: NW, SSW nearly nill Rocklin: W	0-3		RB	Reported odor strength bad - 8/10. Wind speeds low; could be inversion conditions due to cold temps. In Rocklin, winds from W from 6pm til midnight, directly downwind of RB (and ~3 miles from landfill).
5	1/15/08	8:00	am	[redacted]	[redacted]	[redacted]		35	Landfill: WSW Rocklin: NW. W	0-3		Inversion Conditions	Reported odor strength bad - 8/10. Winds not blowing from direction of the landfill toward that location (location is directly west of the landfill 2-3 miles)
6	1/15/08	6:30	pm	[redacted]	[redacted]	[redacted]		50	Landfill: W Rocklin: Calm			RB	Reported odor strength bad - 8/10. Responded to caller: unclear.
7	1/15/08	all last week		[redacted]	[redacted]	[redacted]							Via phone message; reported bad odors past week. Left message with caller; have not heard back.
8	1/15/08	5:05	pm	[redacted]	[redacted]	[redacted]		52	NNW	6		WPWMA	Reported unbearable odor. Could be our facility due to wind direction. Responded to caller.
9	1/18/08	lately		[redacted]	[redacted]	rotton garbage						Unknown	Caller could not provide exact times odors were detected. Responded to caller; described our facility, explained our study, and the fact there are other odor sources in the area possibly contributing.
10	1/25/08	6:16	pm	[redacted]	[redacted]	rotton garbage	Rain	48	Scattered	10 to 15		?	Reported "gross" odor. Could be WPWMA odors and/or other sources due to scattered winds.
11	1/31/08	lately		[redacted]	[redacted]	Landfill			SE most of last week (24th - 31st)			RB	Discussed with caller the other odors sources that may be contributing. During SE winds, coming from direction of other sources including Rio Bravo.
12	2/5/08	last few months		[redacted]	[redacted]	Landfill						RB	[redacted]
13	2/7/08	various		[redacted]	[redacted]	Trashy			very scattered past			?	Stated odors have gone from a compost smell to a trashy smell.
14	2/8/08	1:45	pm	[redacted]	[redacted]	Strong sewage	Clear	40's	N to NW	0-5		RB	Complaint via CEO's office. Reported odors that morning. Discussed that may be too far to detect LF odors and that there are other sources in the area that may be contributing to the odors. Location is not directly downwind of our facility.
15	2/8/2008?			[redacted]	[redacted]	Landfill						Other Source	Msg. forwarded by wpwma. Caller repored odors near Riverside in Roseville. Says is familiar with landfill odors since she works at the Casino. Left message; no response from caller.
16	2/10/08	lately		[redacted]	[redacted]	Unpleasant / sweet odor			Scattered			Other Source	This location is directly west of both RB and WPWMA. Without exact dates and times, cannot presume source however they are much closer to RB than WPWMA.
17	2/12/08	daily		[redacted]	[redacted]	[redacted]			NW winds most of week			WPWMA	

Complaint Info						Observations / Results (Add description of operations at time of monitoring)						
	Date of Odor	Time	AM/ PM	Name	Location Odor Detected	Description	Weather	Deg.	Wind Dir.	Wind Speed	MRF / WRSL Ops	Possible Source / Conditions	Notes:
18	2/13/08	#####		[redacted]		Strong dump			NW winds most of week			RB	Caller is certain odor is from the dump; location is directly downwind from RB when winds are from the NW.
19	2/13/08	1:56	pm			disposal site odor		60	NW, NNW all day	10 to 25		RB	
20	2/14/08	1:10	pm			Strong dump			NW winds most of week			RB	
21	2/26/08	8:00	am			compost / garbage	Sunny	41	ESE, SE	1			Will: Reported odors in the Rocklin area; smelled like garbage/compost. Winds from east all morning, but nearly still.
22	2/27/08	11:24	am			Strong dump	Sunny	61	W	4	Operator was turning compost from 8:10 AM till 4:00 PM.	?	Eric investigated: Industrial: strong odors 100 yards southeast of RB (compost-sweet) and brief sour smell 400 yds further south on Ind. Formica? RB not running today. No odors at Mallard Creek. Spoke with someone next to Ecologic; said could smell "dump"; couldn't explain any clearer. Will come out again tomorrow to investigate.
23	2/27/08	9:16	pm			Stinks	Clear	55	NNW	1	The only compost activity going on after 7:00 PM was screening finished compost. LF closed.	Compost Screening?	Responded to caller by phone.
24	2/29/08	10:00	am			Dump	Clear	61	S then W	2		RB	[redacted]
25	3/3/08	6:35	am			Sour Wood Chips	Clear	48?	Calm	0	E2001 engines running	Rio Bravo	Staff on bicycle noted odor riding along Athens in front of Thunder Valley Casino. No odors noted near WRSL or MRF.
26	3/3/08	various eves				naseous gas	warm weather typically					LFG? Sewer?	Caller reports "naseous gas" odor in the evenings (6-8 pm), typically in warm weather the last 6 mos or so. We discussed the possibility of sewer odors and landfill gas; told her I would check on our gas system and she plans to call Roseville to check on the sewers.
27	3/4/08	7:15	am			Compost	Clear	50?	Calm	0	E2001 engines running	MRF Compost	Drove through Crocker Ranch this am and smelled MRF compost (not an unpleasant odor).
28	3/9/08	various mornings	am			Sweet organic smell	Clear	60	Calm		N/A	Rio Bravo	Over 4 miles from landfill. Discussed other sources of odor and he was agreeable and just wanted to know that someone was investigating.
29	3/21/08	7:30	pm			Stinks	Clear	60	NW	3	Screened finished compost 3:00pm-10:00pm	Screening?	Forwarded complaint to MRF operator and LF engineer. LF engineer reports ongoing gas odors on site, but rarely detectable off-site. Responded to caller.
30	3/23/08	10:30	am			Stinks	Clear	60	NNW	4	No compost activity, accepting only	?	Forwarded complaint to MRF operator and LF engineer. Responded to caller.
31	3/25/08	6:40	am			Smelled like MFR compost	Clear	50	SE	4		Rio Bravo	Because of the wind I'm certain this smell was from Rio Bravo. It smelled just like MRF compost.
32	3/31/08	8:28	am			Smells	Ptly Cldy	59	NNW	2	8:20am Roseville delivered sludge to landfill. Turned 1st compost row at 9:00am-11:30am. Screened Compost 9:10am-11:15pm	Sludge?	Forwarded complaint to MRF operator and LF engineer. Responded to caller.
33	3/31/08	7:38	pm			Smells	Ptly Cldy	59	NNW	1		Screening?	Forwarded complaint to MRF operator and LF engineer. Responded to caller.

Complaint Info						Observations / Results (Add description of operations at time of monitoring)						
	Date of Odor	Time	AM/ PM	Name	Location Odor Detected	Description	Weather	Deg.	Wind Dir.	Wind Speed	MRF / WRSL Ops	Possible Source / Conditions	Notes:
35	4/14/08	last 3-4 wks		[redacted]		Sewage	various		Very fluctuating / random over past few weeks			Lincoln WWTP	Reported odors from Lincoln WWTP; she has "tracked the odor" right to their site. I told her to call the City of Lincoln and let me know what she finds out. CH: Visited the WWTP the following week; learned that their "greenhouse" (sludge drying building) fans were blowing odorous air out the vents (malfunction of automated system). Operators are adjusting the system to correct the problem.
36	4/24/08	7:00	pm			Sweet smell	Clear	68	NW	6	Grinding Green waste 3:00pm-10:30pm, Screening Compost: 3:00pm-10:30pm	Screening, Grinding	She said odor was sweet and so strong she thought they were being gassed and her 2 dogs are sick today. Responded to caller after checking MRF ops.
37	4/25/08	7:45	am			Stinks	Clear	48	W, NNW	2	Residue delivered to landfill: (2) loads at 7:27am from the MRF, and (1) at 7:45am public z-wall residue.Grinding Wood waste 7:00am-10:00am	WPWMA	Resident downwind from WPWMA; likely our operations. Responded to caller.
38	4/30/08	6:03	am			Stinks	Clear	43	NW	3	No LF, MRF, or compost activity at this time.		Compost operator was cleaning the drainage trench Sunday May 4th. I am told this will be completed this Sunday 11th. Trench may have been odorous before cleaning. APCD reports that crops across the street from Lincoln WWTP are spreading turkey manure lately.
	5/15/08	9:41	am			Worst ever	Clear	80	NW	"5-15	All compost ops; sludge.		Compost operator records indicate that all production, turning, screening and grinding was occurring. LF engineer reported garbage - esp. sludge - odors that week. Not certain if manure is still being spread on nearly ag areas.

[redacted]

http://www.sunrisemountainsports.co

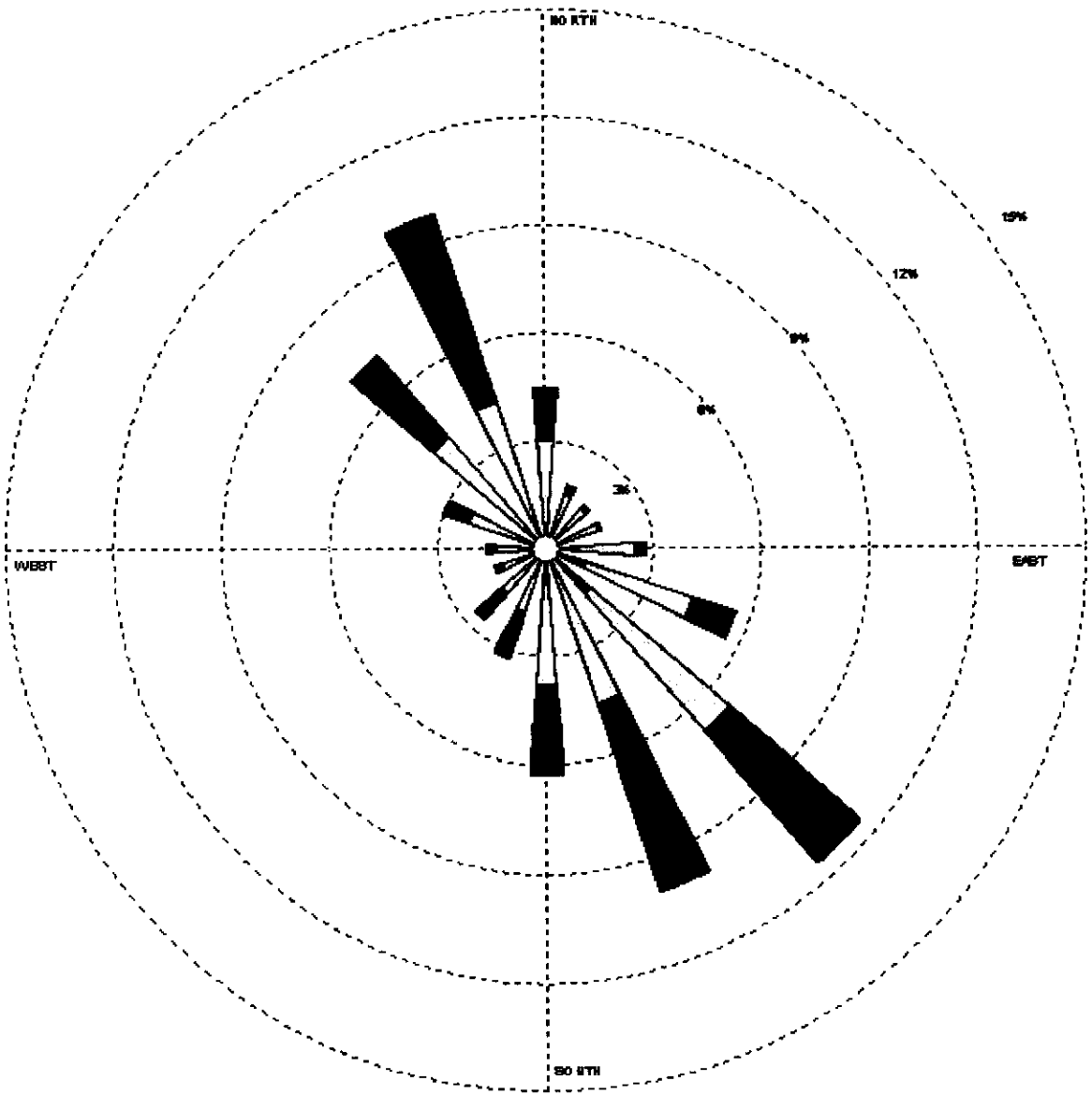
Complaint Info						Observations / Results (Add description of operations at time of monitoring)						
Date of Odor	Time	AM/ PM	Name	Location Odor Detected	Description	Weather	Deg.	Wind Dir.	Wind Speed	MRF / WRSL Ops	Possible Source / Conditions	Notes:

Appendix D
HISTORIC WIND INFORMATION

Monthly wind roses for the project location follow this page. This information can be supplemented by printouts from the on-site weather station.

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



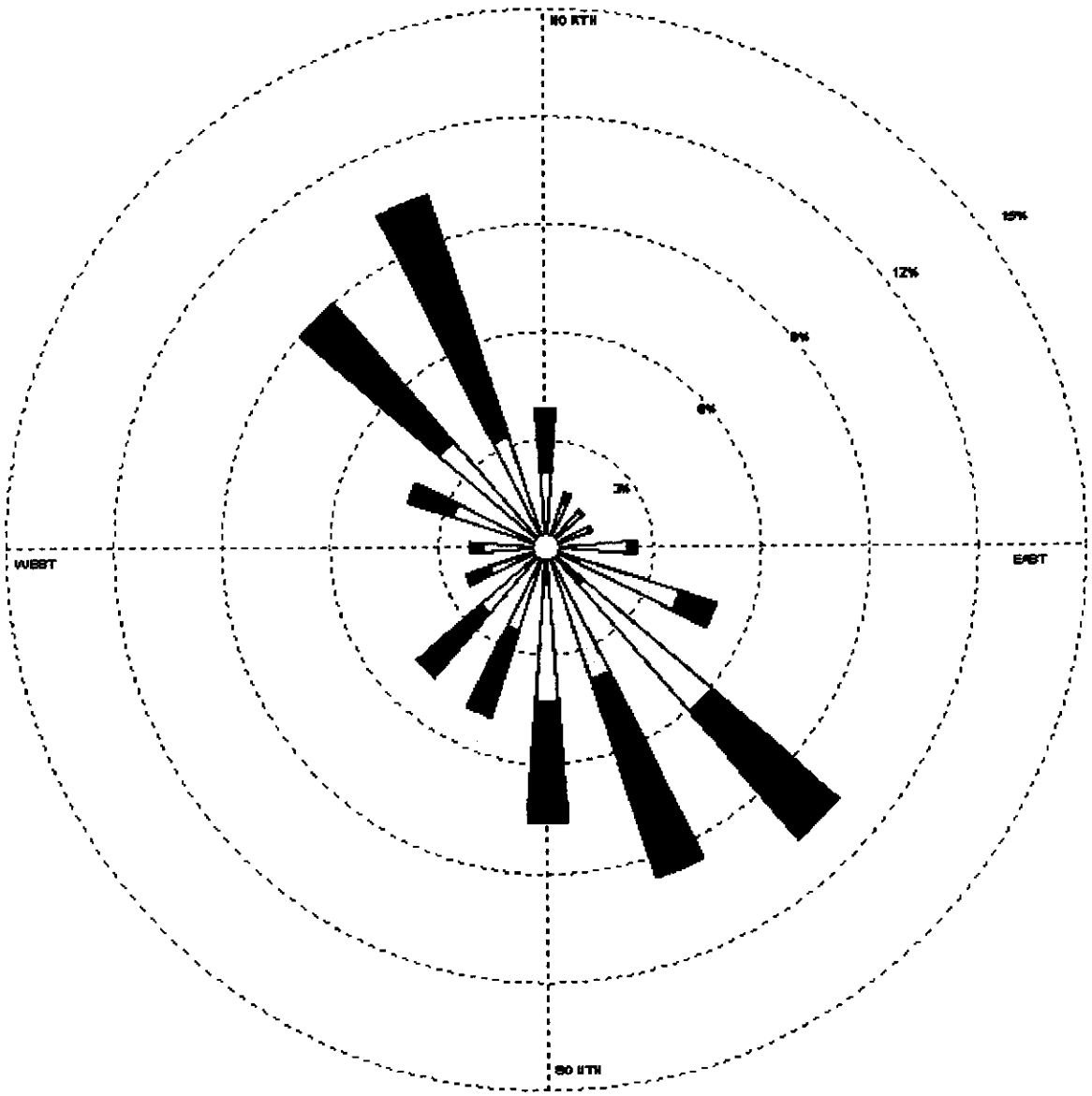
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER Sara West		DATE 8/19/2002	COMPANY NAME USDA-ARS
DISPLAY Wind Speed		UNIT m/s	COMMENTS Rose Diagram for Month of January
AVG. WIND SPEED 3.47 m/s		CALM WINDS 25.31%	
ORIENTATION Direction (blowing from)		PLOT YEAR-DATE-TIME 1961 Jan 1 - Jan 31 Midnight - 11 PM	Figure 3a

WIND ROSE PLOT

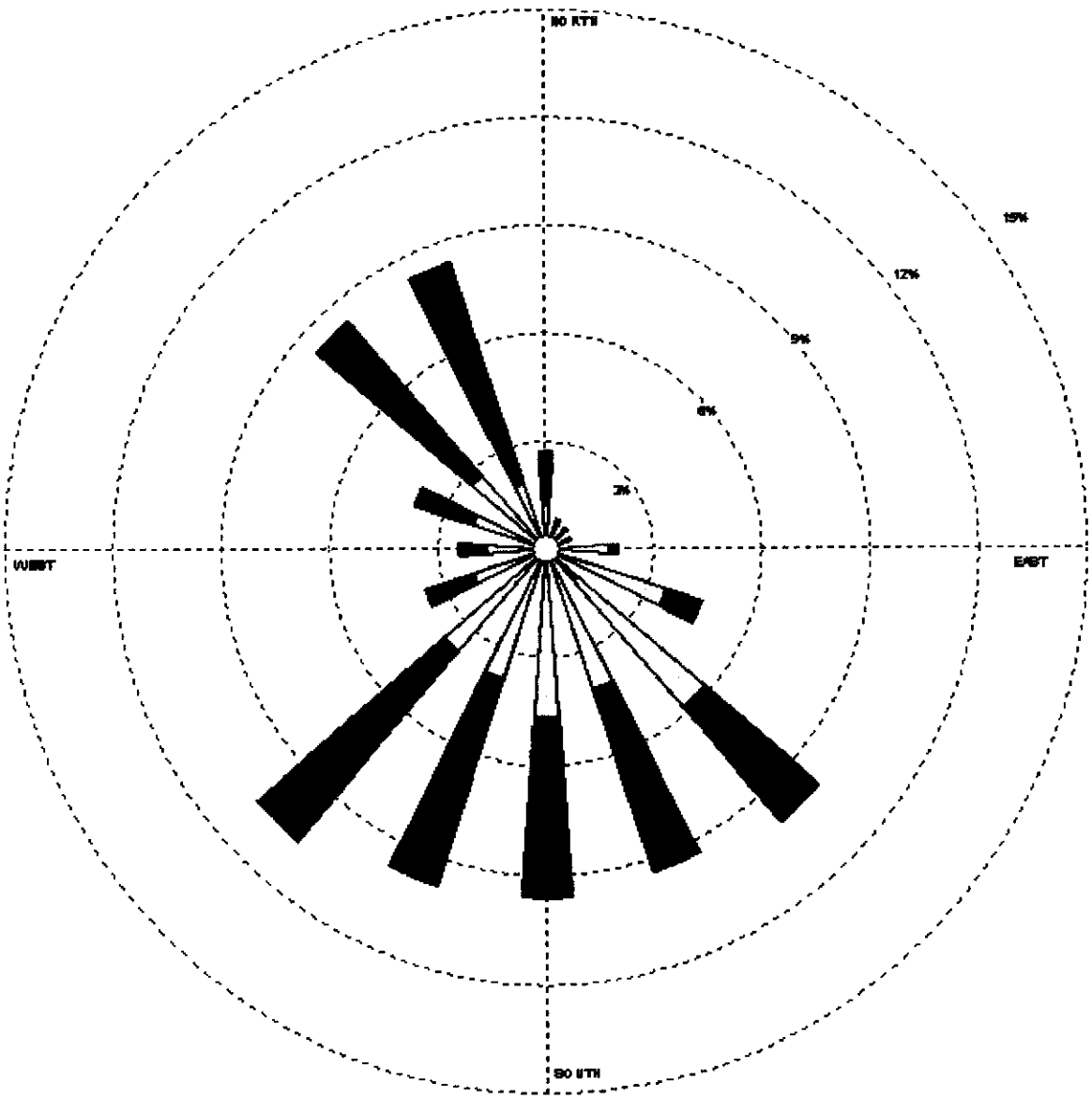
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s) > 11.05 8.49 - 11.05 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for month of February
	AVG. WIND SPEED 3.78 m/s	CALM WINDS 18.74%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Feb 1 - Feb 29 Midnight - 11 PM	Figure 3b

WIND ROSE PLOT

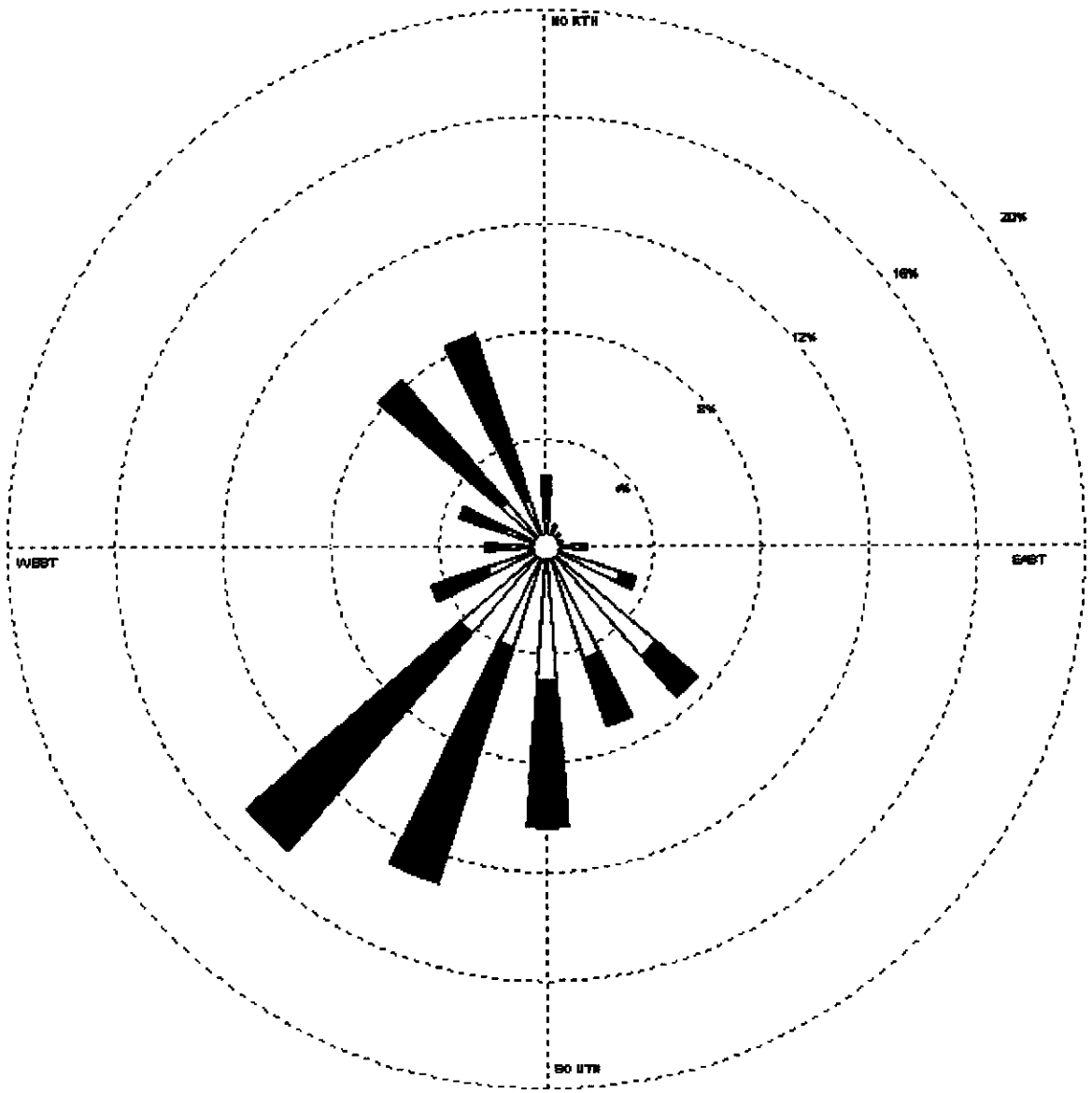
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of March
	AVG. WIND SPEED 4.01 m/s	CALM WINDS 12.31%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Mar 1 - Mar 31 Midnight - 11 PM	Figure 3c

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)

> 11.05

8.49 - 11.05

5.40 - 8.49

3.34 - 5.40

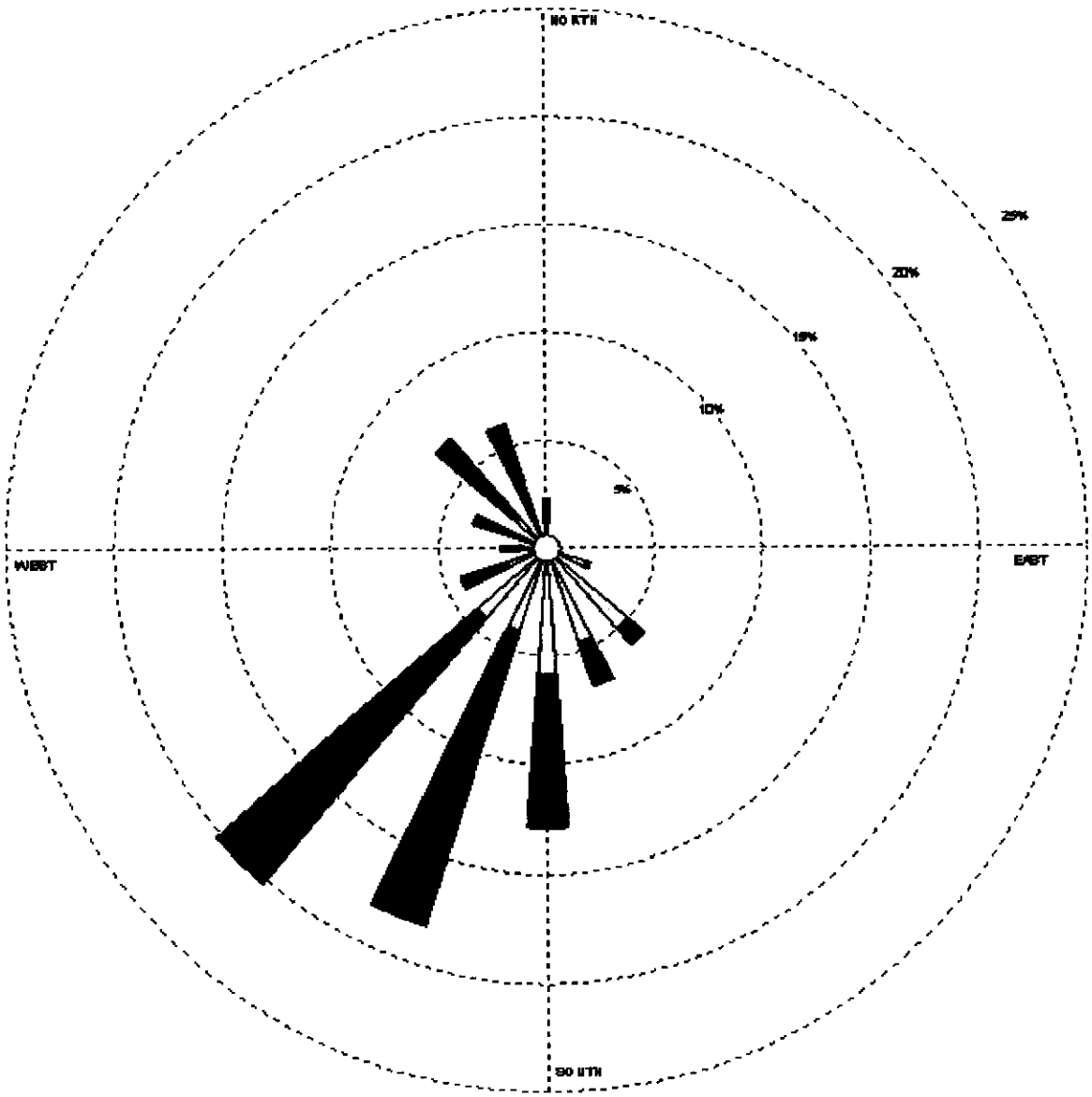
1.80 - 3.34

0.51 - 1.80

MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of April
AVG. WIND SPEED 4.09 m/s	CALM WINDS 10.68%	
ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Apr 1 - Apr 30 Midnight - 11 PM	Figure 3d

WIND ROSE PLOT

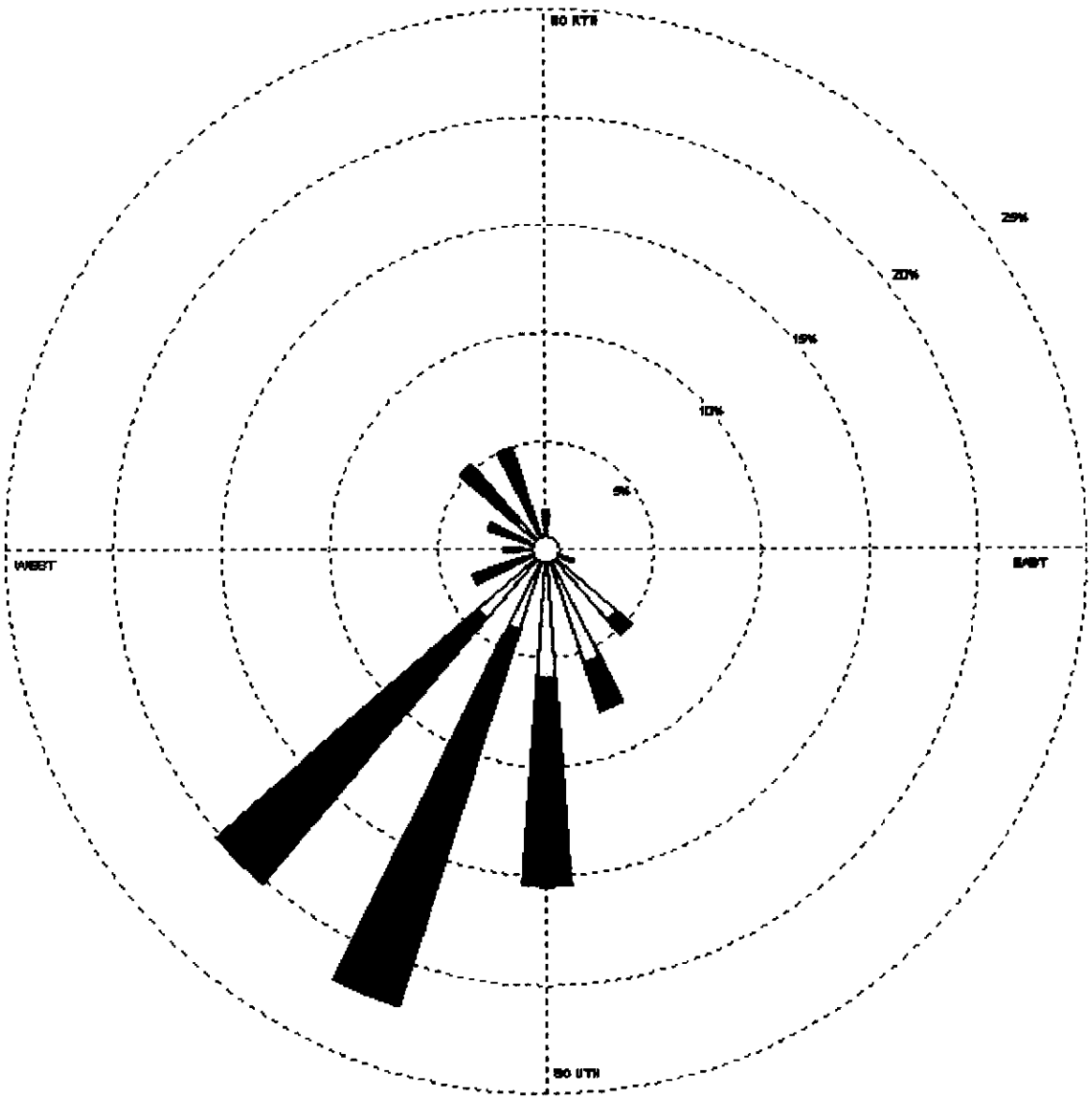
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of May
	AVG. WIND SPEED 4.20 m/s	CALM WINDS 6.55%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 May 1 - May 31 Midnight - 11 PM	Figure 3e

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



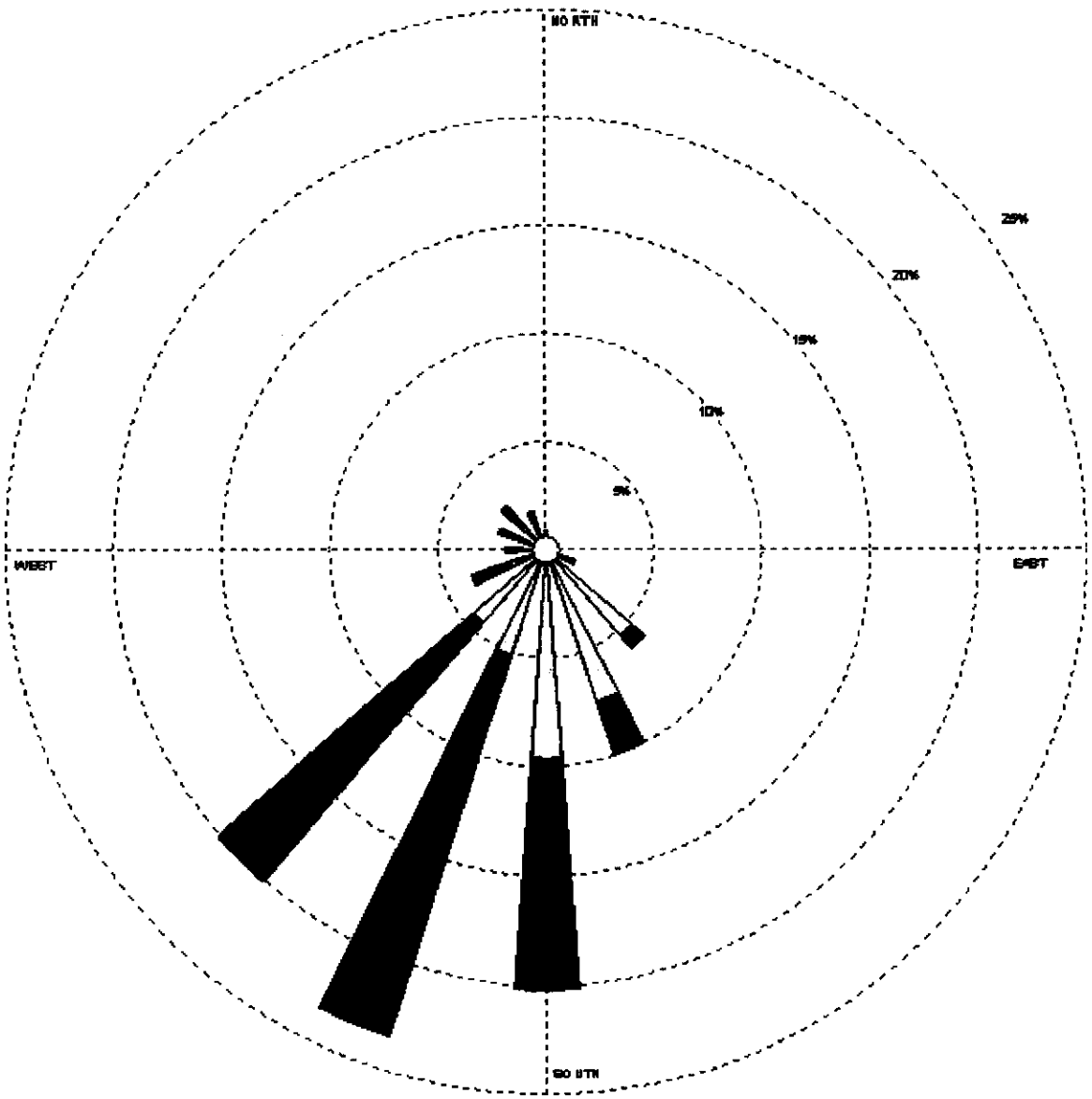
Wind Speed (m/s)

- > 11.05
- 8.49 - 11.05
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER: Sara West	DATE: 8/19/2002	COMPANY NAME: USDA-ARS	
DISPLAY: Wind Speed	UNIT: m/s	COMMENTS: Rose Diagram for Month of June	
AVG. WIND SPEED: 4.29 m/s	CALM WINDS: 5.59%		
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1961 Jun 1 - Jun 30 Midnight - 11 PM	Figure 3f	

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



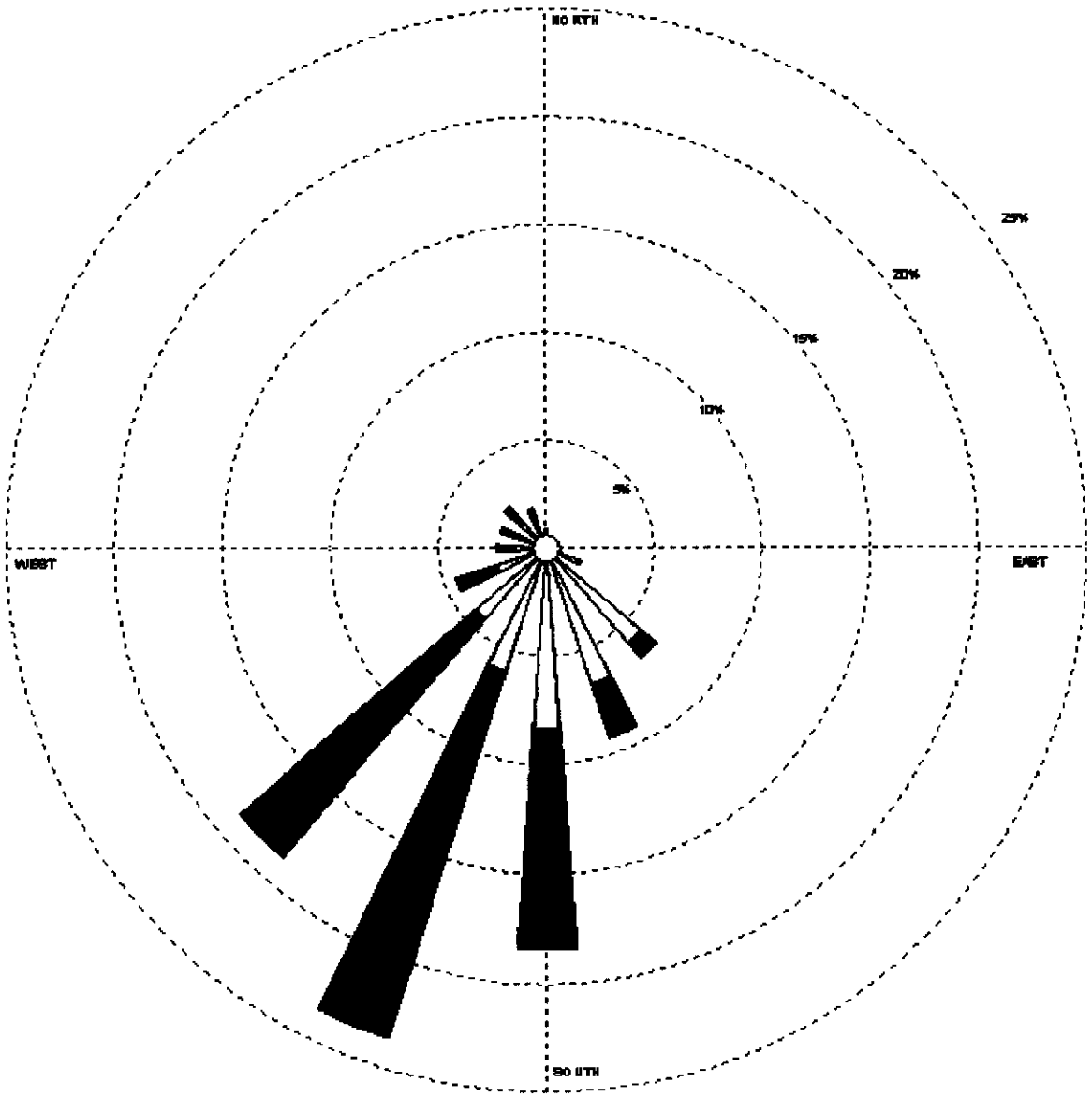
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER: Sara West	DATE: 8/19/2002	COMPANY NAME: USDA-ARS
DISPLAY: Wind Speed	UNIT: m/s	COMMENTS: Rose Diagram for Month of July
AVG. WIND SPEED: 3.92 m/s	CALM WINDS: 4.29%	
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1961 Jul 1 - Jul 31 Midnight - 11 PM	Figure 3g

WIND ROSE PLOT

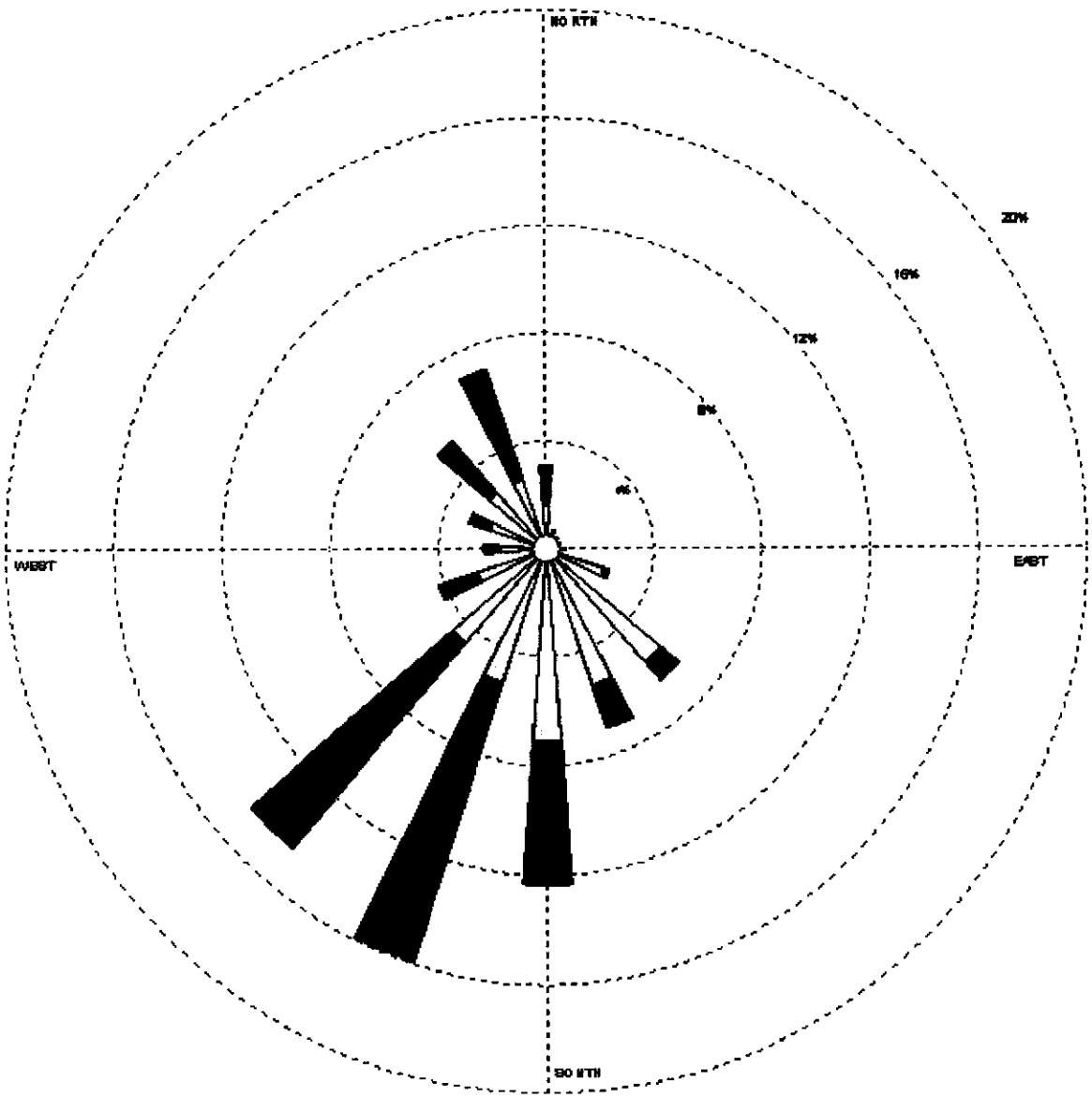
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)	MODELER: Sara West	DATE: 8/19/2002	COMPANY NAME: USDA-ARS
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	DISPLAY: Wind Speed	UNIT: m/s	COMMENTS: Rose Diagram for Month of August
	AVG. WIND SPEED: 3.84 m/s	CALM WINDS: 6.18%	
	ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1961 Aug 1 - Aug 31 Midnight - 11 PM	Figure 3h

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



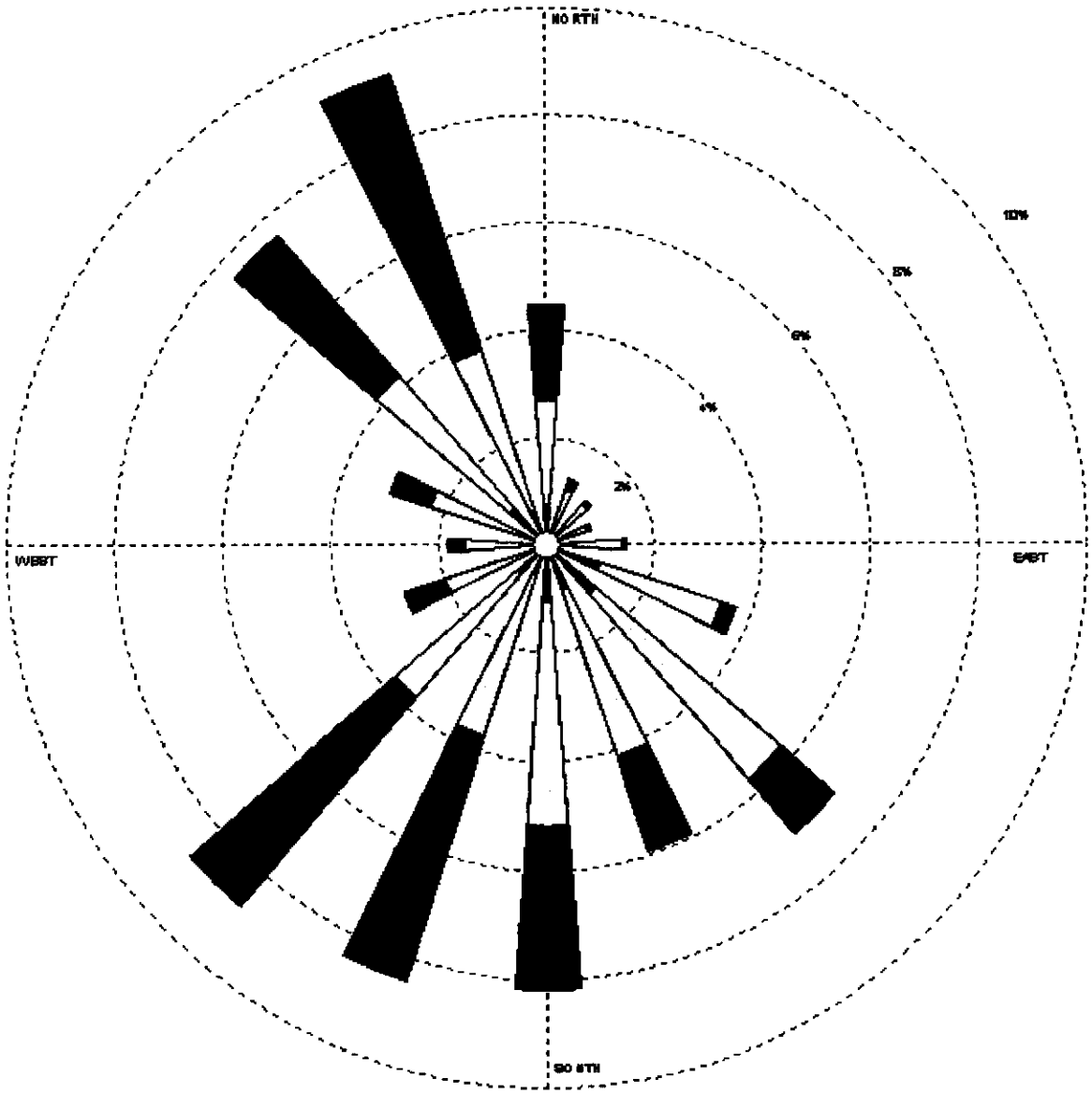
Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER: Sara West	DATE: 8/19/2002	COMPANY NAME: USDA-ARS	
DISPLAY: Wind Speed	UNIT: m/s	COMMENTS: Rose Diagram for Month of September	
AVG. WIND SPEED: 3.65 m/s	CALM WINDS: 13.59%		
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1961 Sep 1 - Sep 30 Midnight - 11 PM	Figure 3i	

WIND ROSE PLOT

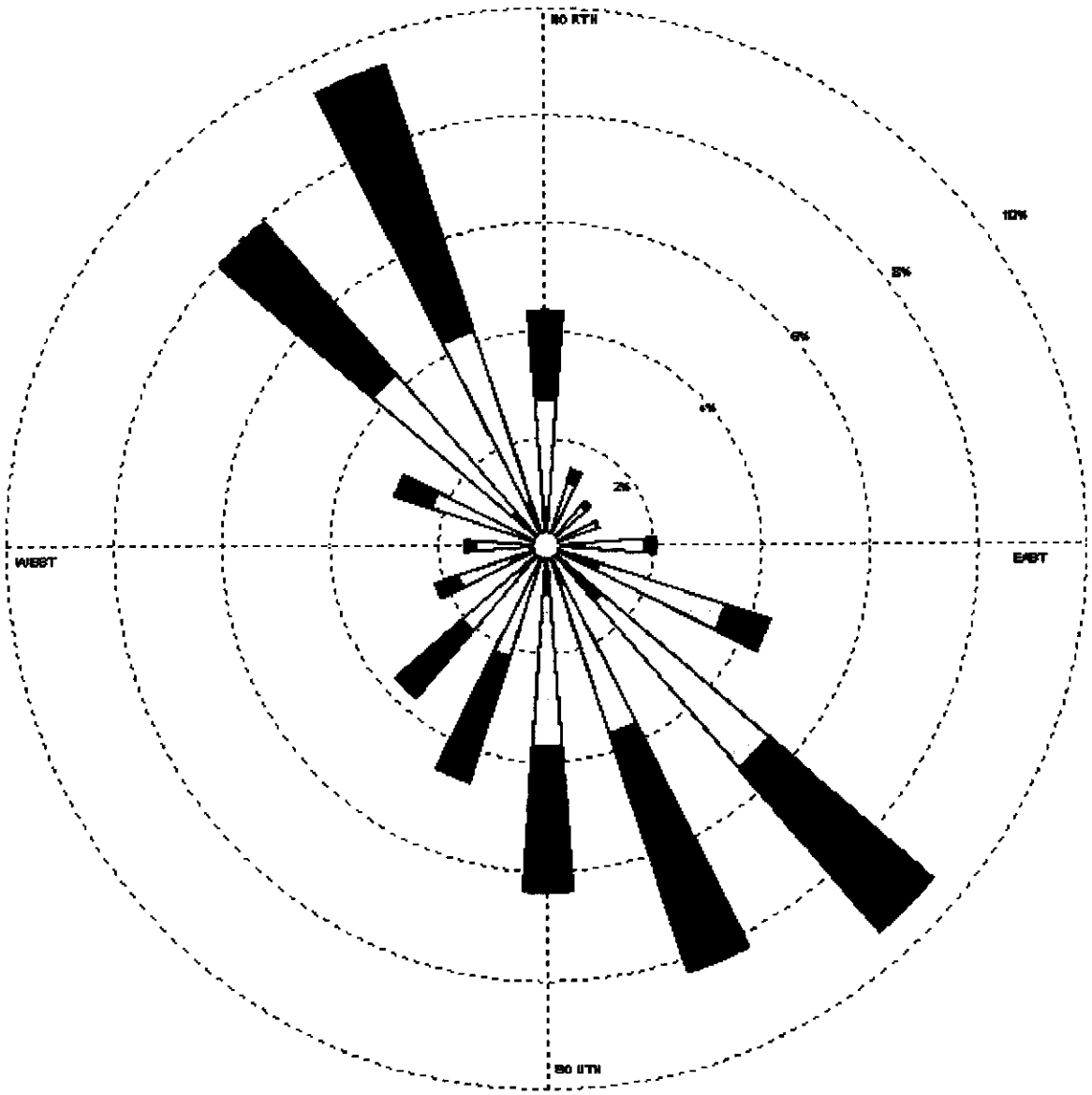
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of October
	AVG. WIND SPEED 3.39 m/s	CALM WINDS 24.25%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Oct 1 - Oct 31 Midnight - 11 PM	Figure 3j

WIND ROSE PLOT

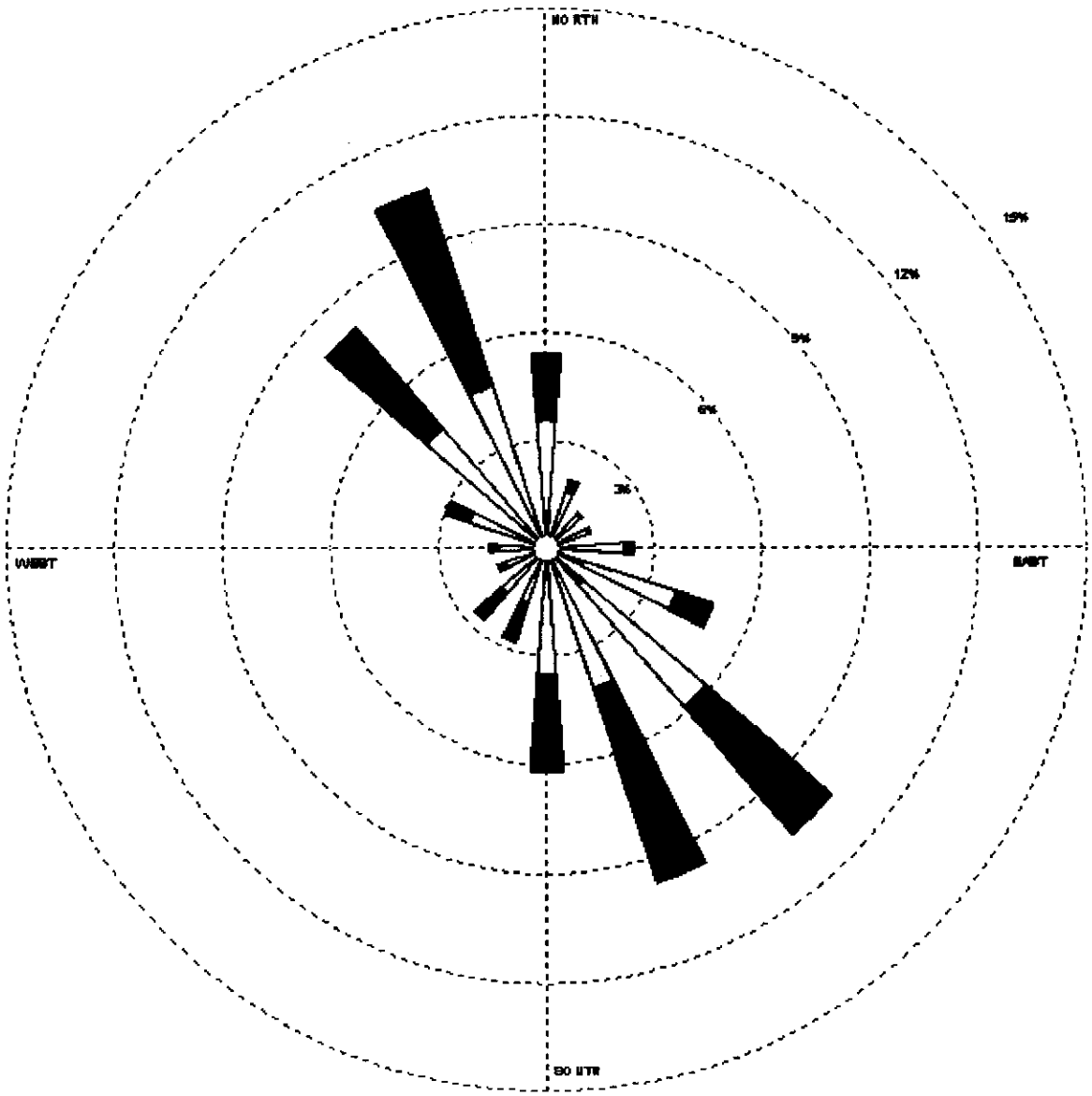
Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s) > 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	MODELER Sara West	DATE 8/19/2002	COMPANY NAME USDA-ARS
	DISPLAY Wind Speed	UNIT m/s	COMMENTS Rose Diagram for Month of November
	AVG. WIND SPEED 3.47 m/s	CALM WINDS 29.14%	
	ORIENTATION Direction (blowing from)	PLOT YEAR-DATE-TIME 1961 Nov 1 - Nov 30 Midnight - 11 PM	Figure 3k

WIND ROSE PLOT

Station #23232 - SACRAMENTO/EXECUTIVE ARPT, CA



Wind Speed (m/s)

- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER: Sara West	DATE: 8/19/2002	COMPANY NAME: USDA-ARS
DISPLAY: Wind Speed	UNIT: m/s	COMMENTS: Rose Diagram for Month of December
AVG. WIND SPEED: 3.52 m/s	CALM WINDS: 26.30%	
ORIENTATION: Direction (blowing from)	PLOT YEAR-DATE-TIME: 1961 Dec 1 - Dec 31 Midnight - 11 PM	Figure 31

Appendix E
COMMERCIALLY AVAILABLE ODOR NEUTRALIZERS

The following pages include information on commercially available odor neutralizers. IWMC does not warrant or endorse any of these products, but they are shown merely as examples of possible neutralizers that might be used. Any odor neutralizer should be experimented with prior to purchasing a large quantity.

SUPPRESS®

ORGANIC ODOR CONTROL

For the Control of Odors from Manure, Compost, Lagoons, & Standing Water

Product Information

SUPPRESS® is a complex blend of nontoxic and non-hazardous organic nutrients that increase microbial activity and reduce the production of offensive odors from manures, composts, stagnant water and bio-solids.

SUPPRESS® creates a safer and more pleasant environment by reducing the emissions of ammonia and other nitrogen containing odoriferous compounds common to compost piles, green waste, lagoons, manure, fertilizers, and livestock.

Contents

TSRN* 80100406-5001p ◆ Water

***Trade Secret Registration Number**

OMRI™ Listed

Directions For Use

DILUTE BEFORE USING

To control odors from composts: Dilute 1 gallon of SUPPRESS® in 2000 gallons of water and spray into the compost while it is being turned, or alternatively, dilute 1 gallon of SUPPRESS® into backpack sprayer and treat surface of compost windrows and green waste piles as above.

To control odors from landfills and garbage dumps: Dilute 1 gallon of SUPPRESS® in 2000 gallons of water and apply to the waste surface whenever new waste is added. Alternatively, dilute 1 gallon of SUPPRESS® into backpack sprayer and treat waste surface as new waste is added.

To control odors from manure, lagoons or standing water: The amount of SUPPRESS® to apply to various strength wastewaters can be determined using a simple jar test. Start by adding 0.5 ml of SUPPRESS® to 1 liter of odor causing waste, shake for 30 seconds and then check for odor. If the odor is gone, reduce SUPPRESS® and repeat test. If the odor is still present, increase SUPPRESS® and repeat test.

Caution

KEEP OUT OF REACH OF CHILDREN

Avoid contact with eyes and prolonged contact with skin. If irritation occurs, flush thoroughly with water. Do not ingest.

Net Volume

1 QUART
1 GALLON
2.5 GALLONS
55 GALLONS

Manufactured By

Westbridge
1150 Joshua Way
Vista, CA 92083
(800) 876-2767
www.westbridge.com

010921
Suppress Show Label

GOC Technologies

BAT 506 Technical Intro

BAT 506 is a remarkable product for odor control in decomposing organic masses. Due to its mode of operation, it is effective against ammonia, amines, alcohols, volatile fatty acids, ketones, mercaptans, and sulfides. **BAT 506** is incorporated into the substrate to be treated using water as a carrier. While it's typical use is in composting, versions of **506** are also used in barns and stables, arenas, animal confinement areas, and even in public facilities.

How BAT 506 Works

506 is a combination of amino acids, nucleic acids, sulfates, other minerals, various protein derivatives, natural carbohydrate surfactants, and special nitrates. This combination provides everything necessary for the metabolization of organic compounds. **BAT 506** works best when mechanical aeration activities are diminished. The nitrates included are synthetically manufactured and contain up to 6 times the compound oxygen of a typical nitrate. This means the recommended dosage of **506** (2 ounces per ton) increases the compound oxygen in the mass by as much as 3.5 parts per million. By increasing the reductive potential of the mass, **506** promotes anaerobic and facultative activity throughout the interior of the mass. Concurrently, facultative microbes are encouraged as follows:. **506** provides sulfur reducing anaerobes with a preferential replacement for sulfates as a source of oxygen. When the synthetic nitrates in **506** are reduced, nitrogen is formed instead of sulfides and mercaptans. As this nitrogen makes its way to the surface of the mass, nitrogen fixing bacteria have the opportunity to oxidize it back into nitrate, creating an additional oxygen source, keeping the nutrient nitrogen in the mass, and limiting odorous volatilization.

Limiting the amount of mechanical aeration facilitates even temperatures and degradation rates. Mechanical aeration, much like fanning a fire, causes temporary temperature spikes and dramatic changes in biological population. Because much of this temperature increase is not biological, the mass reaches temperature levels toxic to the microbes. Thus, heavily aerated materials kept at high temperatures break down as much from chemical (thermal) decomposition as from biological decomposition.

Additionally, anaerobically produced compounds and partially decomposed compounds are exhausted during aeration, producing many odor problems. **506** increases anaerobic and facultative activity to levels allowing decomposition times consistent with the needs of most facilities. Because less carbon dioxide is generated (since less oxidation occurs), more weight (density) remains in the finished product. Because more ammonia and other free nitrogen compounds are fixed rather than exhausted from the pile, and because sulfates are not reduced to sulfides, nutrient values in **506** treated compost tend to be higher, and the nutrients are often attached in complex organic compounds providing long term nourishment to plants and soil microbes.

506 decreases ammonia, amine, indole, and other nitrogenous odors by improving conversion rates to nitrate and decreasing the need for aeration and the associated volatilizations. (Improved temperature conditions increase nitrifier populations.) **506** decreases sulfide and mercaptan production by supplying the reducing bacteria with an alternative compound oxygen source. Other odors which are chemically rather than biologically formed, such as aldehydes and ketones, are further degraded by oxidation because they are maintained in the mass rather than prematurely exhausted. Volatile acids released from bio-solids and manures are less of a problem because they remain in the mass longer, allowing more thorough degradation prior to exhaust.

BAT 506 requires specific management practices in conjunction with its application to be most effective. These practices typically save the operator labor, maintenance, and fuel costs because they decrease the amount of external handling and processing the material receives. **506** is mixed with water in any quantity desired. (Water acts as the carrier.) **The 506** should be added when the feedstocks are mixed and formed into windrows or piles, or when they are placed in a vessel or container. The **506** should be as thoroughly mixed into the material as is possible. Two ounces of **506** concentrate are required per ton of compost. (Each ton includes feedstock and carbon amendment.) Overdosing will not improve performance. In animal bedding or barn treatment, the 506 is mixed with water and applied directly to the floor and into the bedding.

BAT 506 has been in use since November, 1998. This year, well over 1 million tons of compost will be treated with **BAT 506**. Since its introduction in 1998, over 5 million tons of materials have been treated with **506**.

BAT 506 is environmentally friendly, and requires no special care in handling. It is user friendly, completely water soluble, and totally biodegradable.