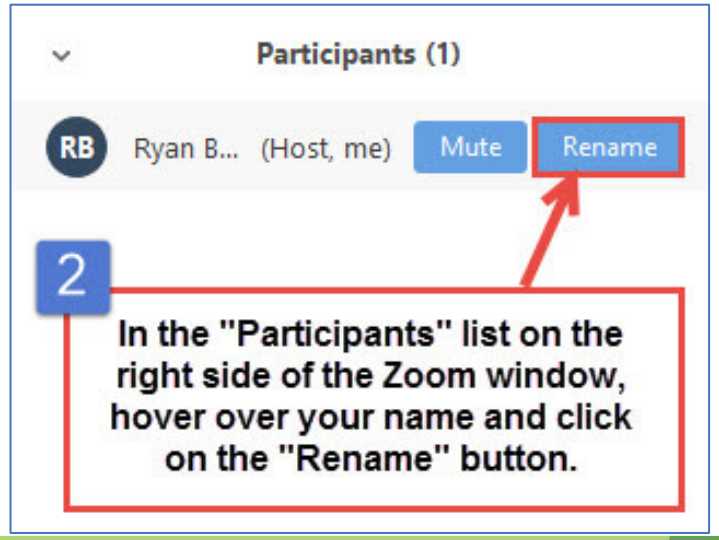
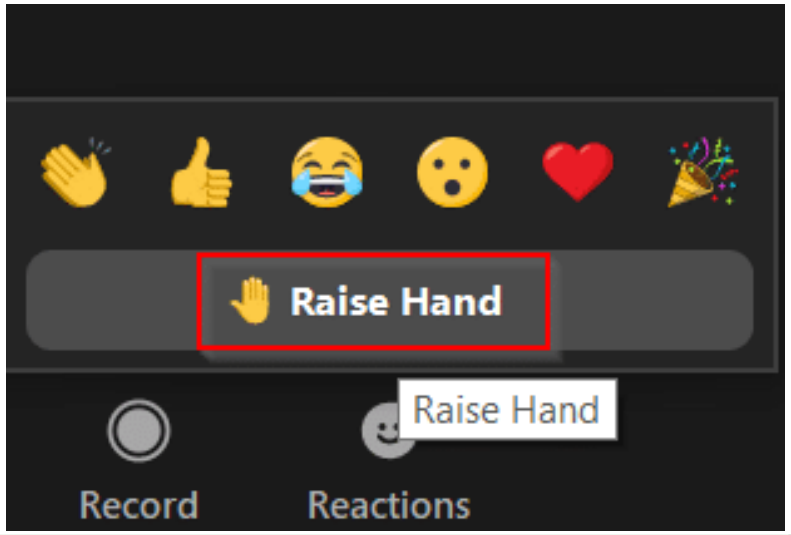
Introduction to Compostable Material Handling Sites

Reminder

- Check your name in Zoom (First, Last, county/city)
- Please mute your microphone when not talking
- Raise your hand or use the chat box to ask questions or request help





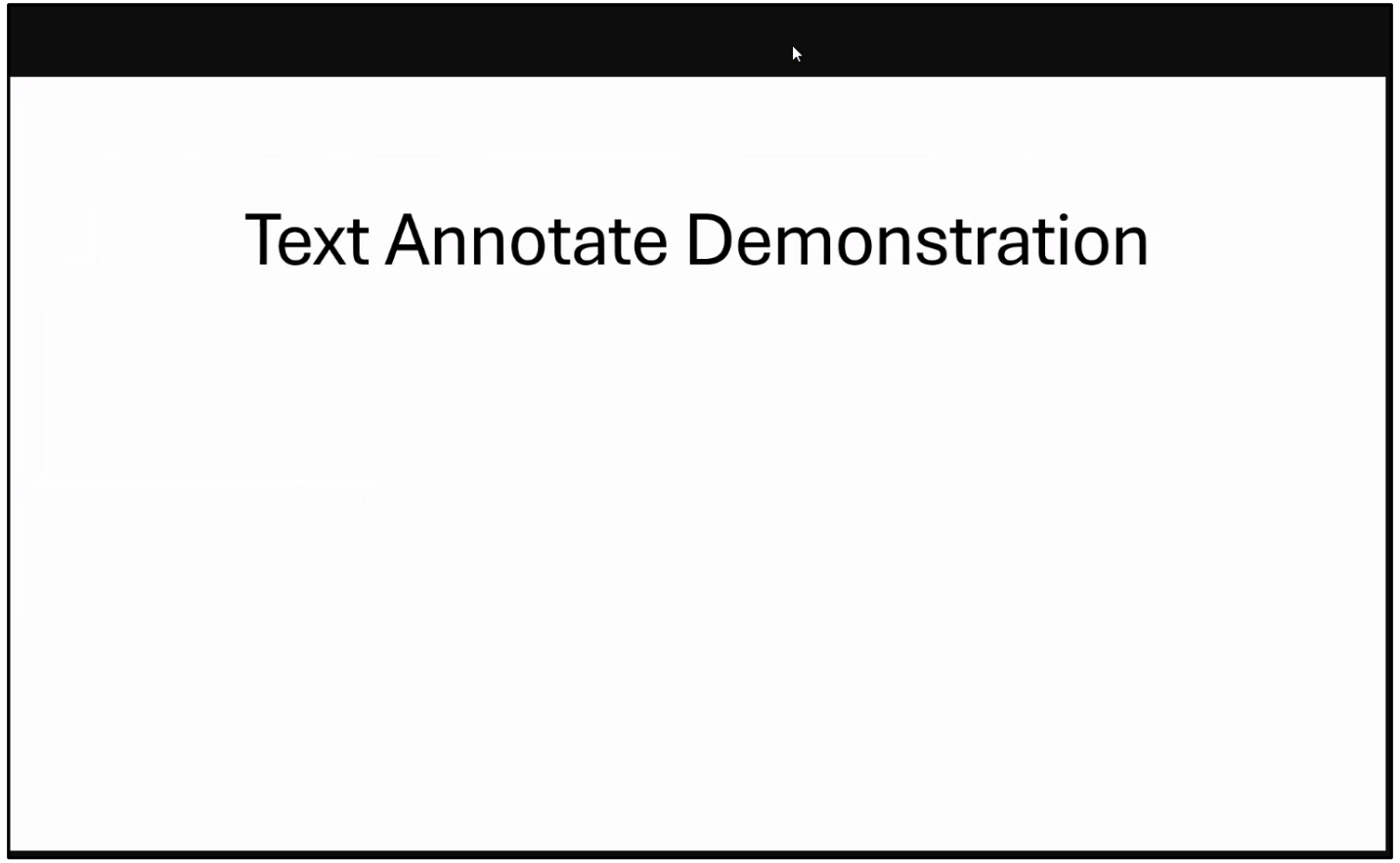
Objectives

- After this training, LEAs should understand:
  - Compostable Material Handling Operation and Facility regulations
  - Permitting
  - State minimum standards
  - Odor impacts

- This training will reference the following Regulations:
  - Title 14, Chapter 3.1 Compostable Materials Handling Operations and Facilities Regulatory Requirements

Using Text Annotate

- Hover over the screen, click the icon, then select Text
- Or, click the icon at the top of the screen, select Annotate, then select Text
- Or, use chat if needed



Annotate Activity

- What are some reoccurring issues you have observed at compostable material handling facilities and operations?

Overview of Composting

What is Compost?

- Compost
  - The product resulting from controlled biological decomposition of organic waste
- Active Compost
  - Feedstock in the process of rapid decomposition, generating at least 122 º F
- Aerobic Composting
  - Composting with oxygen present
- Anaerobic Composting
  - Composting with no oxygen present

Composting Site Process

- Collection
  - Feedstock receiving and storage
  - Load checks
  - Remove contaminants
- Grinding, sizing, and mixing
  - Grinding to reduce size and increase surface area
  - Mixing to balance carbon, nitrogen, water, and oxygen
  - Can use rotating drums or front loaders
- Placement in aerated piles or windrows
- Monitor Composting
  - Maintain aerobic conditions (if applicable)
  - Monitor temperature, odors and anaerobic conditions

Composting Process

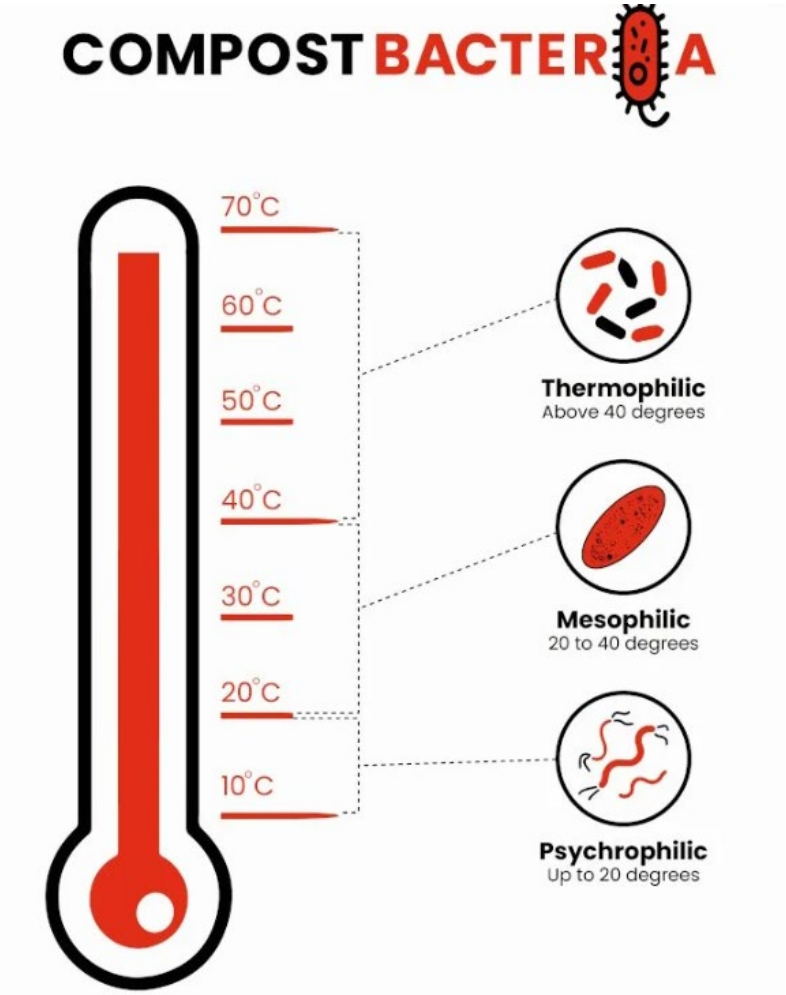
- Curing/Final product processing
  - Turning when necessary
  - Ensure final compost is free of pathogens
  - Screening
- Leachate control and treatment
  - Can be source of odor
  - Caused by weather or overwatering
- General housekeeping
  - Clean/Maintain equipment
  - Remove unusable material

Effects of Oxygen

- Aerobic Composting
  - Higher oxygen levels (5%-16%)
  - Faster decomposition
  - Higher temperature
  - More effective pathogen control
  - Generally, less odor
  - Creates carbon dioxide
  - More maintenance
  - Requires frequent turning or aeration
- Anaerobic Composting
  - Lower oxygen levels (under 5%)
  - Slower decomposition
  - Lower temperature
  - Less effective pathogen control
  - Generally, stronger odor
  - Creates methane
  - Less maintenance

Effects of Temperature

- Bacterial Decomposition
  - Mesophilic bacteria
    - Thrive at 70º - 100º F
    - Give off heat
  - Thermophilic bacteria
    - Thrive at 115 º - 140 º F
    - Require oxygen via turning or aeration
- Fungal Decomposition
  - Also break down materials
  - Begin to appear during thermophilic period
  - Important during maturing stage



Effects of Water

- Effect of Water Content
  - Moisture needed for beneficial decomposers (40-60%)
  - Too wet (80%+): compost can become anaerobic
    - Water takes up free air space, forcing oxygen out of the pile
  - Too dry (under 40%): harder to accept moisture

Hand Squeeze Test

Under 40%

Over 60%

CalRecycle

Effects of Pile Composition

- Carbon
  - Dry twigs, hay, wood chips, “brown materials”
  - Provides energy and produces heat
- Nitrogen
  - Grass, fruits, manure, biosolids, “green materials”
  - Sustains growth and reproduction of organisms
- Ideal mixture of 30 Carbon : 1 Nitrogen




Pathogen Reduction

- Pathogens are organisms which can cause a wide range of illnesses
- High temperatures and beneficial organisms kill pathogens and weed seeds
- To ensure pathogen reduction:
  - Windrows must reach at least 131 º F for a period of 15 days, turned at least 5 times
  - Aerated static pile must reach at least 131 º F for a period of 3 days

Compost Training Poll 1

- Ideally, should there be more carbon-rich or nitrogen-rich materials in a compost pile?

A) More Carbon
B) More Nitrogen
C) Equal Amounts
D) Doesn’t matter

Compost Training Poll 2

- What is the minimum temperature compost must reach for pathogen reduction?

A) 151 F
B) 113 F
C) 131 F
D) 115 F

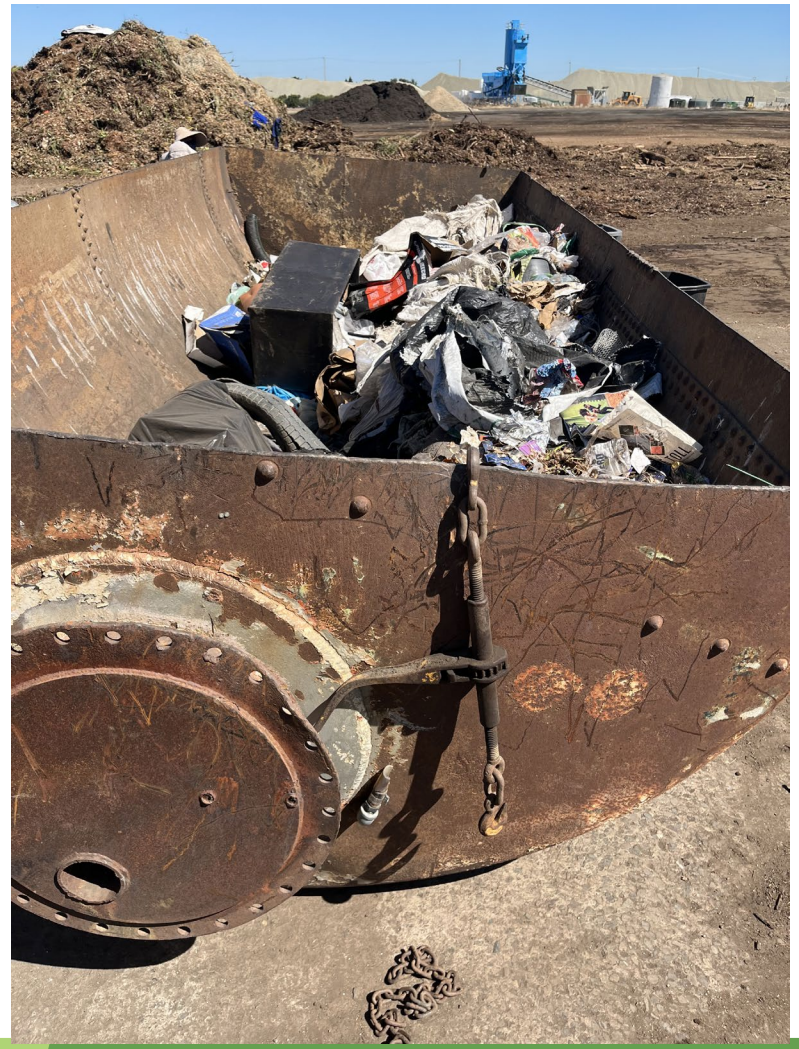
Equipment & Materials

Unloading Area

Unsorted Piles

Sorting Line

Removed Debris



Windrows

Compost Turners

Aeration Systems

Covered Aerated Piles

Water Trucks

Temperature Gauge

Retention Pond

Trommel

Finished Compost

Roles and Responsibilities

CalRecycle

- Certify and evaluate LEAs
- Provide LEAs with technical support and training
- Concur or object to issuance of full solid waste facilities permits
- Inspect facilities as needed to evaluate
- CalRecycle point of contact may provide:
  - Guidance
  - Answers to questions
  - Review of draft documents

LEA

- Authorize eligibility of notification sites
- Process and issue permits
- Inspect facilities and operations
- Document compliance status
- Investigate complaints
- Conduct enforcement actions when needed

Permitting Tiers and Requirements

Excluded

- Agricultural material derived and returned to that same site
- Vermicomposting
- Mushroom Farming
- Small scale operations (Under 100 yd^3 and 750 ft^2)
- AB 411
  - Allows carcass composting up to 100 yd^3 on Ag land
- SB 279
  - Increased green, agricultural, food, and/or vegetative food material feedstock and compost onsite to 200 yd^3 or 500 yd^3 for public agencies
  - Increased the amount of compost product that excluded activities intend to sell or give away from 1,000 yd^3 to 5,000 yd^3 annually
  - Composting of ag materials from a large-scale biomass management event at an agricultural facility

EA Notification Tier

- Agricultural material composting operations
- Green material composting (< 12,500 yd^3)
- Chipping and grinding operations (< 200 TPD)
- Biosolids Composting Operations at POTWs
- Research Composting (≤5,000 yd^3)
- Land Application Activity (Section 17862.3)

Requirements for EA Notification

- Name, address, phone number of Operation/Owner/Operator
- Eligibly for this tier
- Description of facility's operations
- Notify local planning department
- Owner/Operator Certification
- Notification sent to EA

Registration Permit Tier

- Chipping and Grinding Facilities (between 200 and 500 TPD)
- Vegetative food material composting (< 12,500 yd^3)

Requirements for Registration Permits

- CIWMB 83 “Registration Permit Application”
- Name, address, phone number of Operation/Owner/Operator
- Eligibly for this tier
- Facility information and operations
- Conformance finding
- Owner/Operator Certification
- Application sent to local planning department
- Public hearings and notices

Full Solid Waste Facilities Permit

- Composting Facilities
- Green Material Composting Facilities (> 12,500 yd^3)
- Chipping and grinding facilities (over 500 TPD)
- Vegetative Food Material composting (>12,500 yd^3)

Requirements for Full Solid Waste Facilities Permits

- Permit Application form (CalRecycle Form E-1-77)
- Name, address, phone number of Operation/Owner/Operator
- Report of Composting Site Information
- Odor Impact Minimization Plan
- CEQA Information
- Conformance Finding Information
- Owner/Operator Certification
- Public Meetings
- Contact local jurisdictional agencies

Report of Composting Site Information

- Required for full SWFP and Registration permits
- Outline processes and operations
- Schematic of facility layout and general dimensions of all processes
- Odor, leachate, litter, dust and vector control
- Emergency procedures
- Storage capacity, feedstock pile sizes, additives, amendments and maximum/average time compostable materials will be stored
- Equipment type, capacity and number
- Annual capacity
- Provisions to handle unusual peak loadings
- Proposed method for storage and final disposal of unrecoverable items
- Proposed site restoration activities
- Odor Impact Minimization Plan (OIMP)

Odor Impact Minimization Plan

- Required for Full, Registration, and EA Notification tiers
- Operating procedures for minimizing odor
  - Aeration, moisture management, feedstock quality, drainage controls, pad maintenance, wastewater pond controls, storage practices, contingency plans, biofiltration and tarping
- Odor monitoring and proximity of receptors
- Complaint investigation procedure
  - Include 24-hour phone hotline for odor complaints
  - Investigate onsite and offsite
  - Contact LEA and neighbors if offsite odors detected
  - Record events for further review
- Proactive steps if initial plan is ineffective
- Reviewed annually

Odor Best Management Feasibility Report

- Can be voluntary or required by LEA after multiple complaints
- Contains odor data
  - Severity, characteristics, complaints
  - Identify and rank contributing areas or operations
- List Best Management Practices currently used
  - Effectiveness
  - Timeline to implement more extensive BMP
- Must be submitted to LEA and approved or require specific changes within 30 days

Compost Training Poll 3

- Which of the following documents is not always required for a full solid waste permitted composting facility?

- A) Permit Application form (CalRecycle Form E-1-77)
- B) Report of Composting Site Information
- C) Odor Impact Minimization Plan
- D) Odor Best Management Feasibility Report

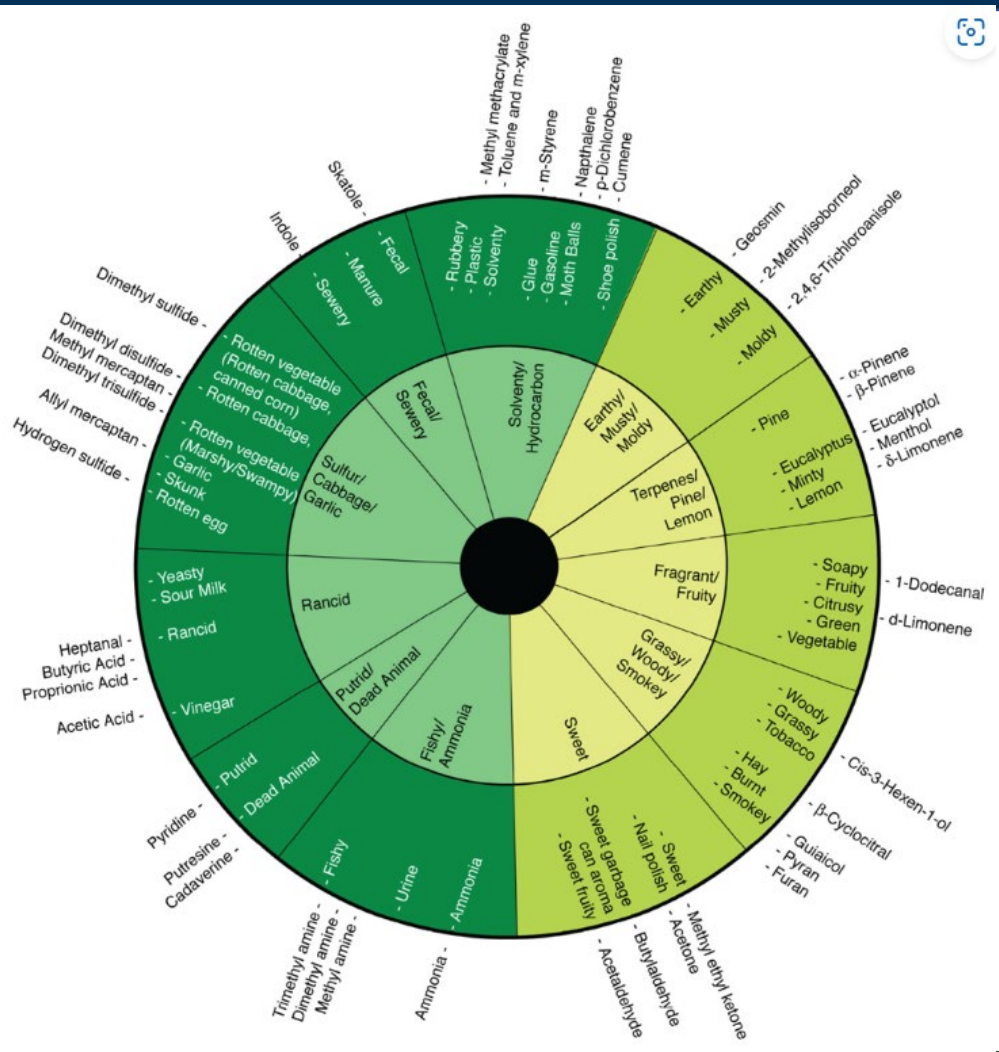
Odor Impacts

Annotate Activity

- How or where are odors created on a composting site?

Odor Characteristics

- Odor wheel to describe odor types
- Strength of smell
  - 0 – no odor
  - 1 – very weak
  - 2 – weak
  - 3 – easily detected
  - 4 – strong
  - 5 – very strong
  - 6 – intolerable



How Odor is Created

- Feedstock
- Sulfur imbalance
  - Manure, mixed foods
- Nitrogen imbalance
  - Manure, grass, fish, meat
- Feedstock Degradability
  - Faster decomposition can lead to anaerobic conditions
- Oxygen
  - Aeration systems or turning of piles ensure sufficient oxygen
- Moisture
  - Over 80% occupies free air space, limiting oxygen

Odor Sources

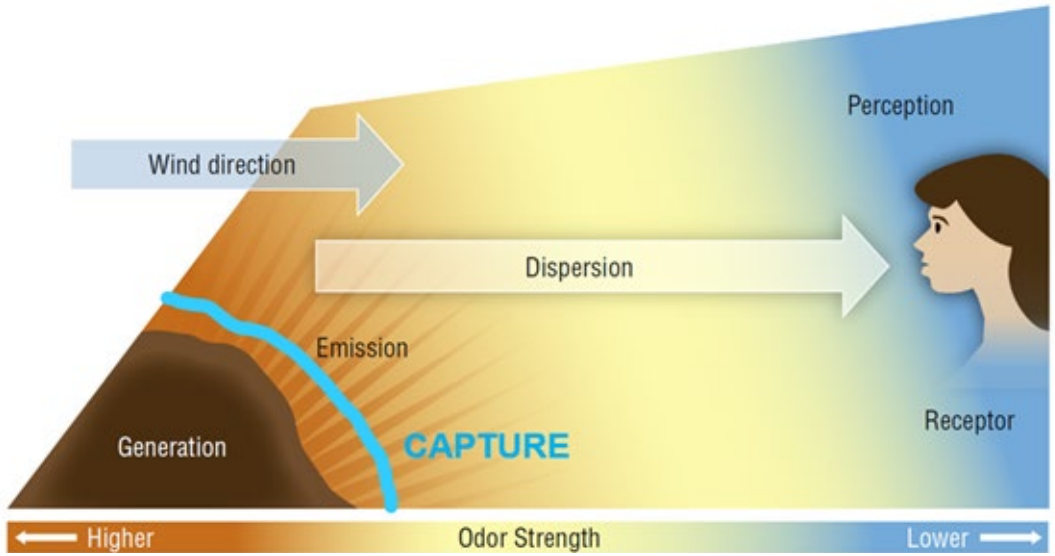
- Raw feedstock piles
  - Materials can arrive in anaerobic conditions
- Active compost piles
- Curing piles
- Grinding areas
- Leachate
- Water Ponding
  - Can be overloaded with decomposing organics
- Retention Pond

Odor Detection Methods

- Detection tubes
  - Measure concentrations in a fixed volume of gas
- Lab assessment
  - Gas chromatography
  - Mass Spectrometry
- Odor circuits
  - Human detection
  - Sniff test at the same multiple locations, upwind and downwind
  - Note weather conditions

Odors Moving Offsite

- Wind
  - Can carry odors offsite or disperse odors
- Temperature
  - Lower temperatures limit vertical mixing
- Topography
  - Air flows based on elevation, wind channels, mountains and other features
- Operations



Annotate Activity

- What methods can be used to minimize odors?

Comprehensive Compost Odor Response Project – Best Management Practices

- Materials sitting too long before processing
  - Expediate processing
  - Reduce incoming materials
  - First in, first out processing
  - Pile size
  - Increase grinding/processing capacity

Comprehensive Compost Odor Response Project – Best Management Practices

- Materials arrive with odor
  - Increase collection frequency
  - Mix materials
  - Smaller piles
  - Enclose or aerate receiving floor
  - Reject odiferous loads
  - Eliminate/reduce troublesome feedstock
  - Incorporate odorous loads into active piles

Comprehensive Compost Odor Response Project – Best Management Practices

- Mixing, grinding, screening and material handling
  - Create sufficiently blended piles with good porosity
  - Monitor carbon and nitrogen ratio
  - Incorporate feedstock into windrows as quick as feasible
  - Enclose mixing, grinding or screening area
  - Mist water or odor neutralizer
  - Mix, grind, and screen during favorable weather conditions
  - Extra equipment

Comprehensive Compost Odor Response Project – Best Management Practices

- Composting
  - Turn regularly
  - Reduce turning during unfavorable weather
  - Monitor temperature, moisture, pH, porosity and oxygen
  - Smaller windrows if relying on passive aeration
  - Adopt forced aeration if possible
  - Treat exhaust gases with biofilter or other methods

Comprehensive Compost Odor Response Project – Best Management Practices

- Curing Piles
  - Decease curing piles size
  - Increase processing time prior to curing
  - Review moisture content when in-process
  - Screen after curing for porosity
  - Aerate pile

Comprehensive Compost Odor Response Project – Best Management Practices

- Retention Pond
  - Remove particles before entering pond
  - Filter storm water
  - Clean basin in dry season
  - Aerate retention pond
- Overall Site
  - Inspect piles regularly, especially after rain
  - Grade site to avoid puddles
  - Clean aisles, piles, and equipment

Compost Training Poll 4

- What areas of a compost handling site can odors generate from?

A) Receiving area
B) Retention Pond
C) Active Compost Area
D) All of the above

State Minimum Standards for Compostable Materials Handling Operations

Operating Standards

- Minimize odor, dust and vectors
- Random load checks, traffic monitoring and attendants
- Signage (name, operator, hours, materials, charges)
- Fire prevention
  - Fire lanes, temperature monitoring, and adequate water supply for fire suppression
- Leachate control
- Prevent unauthorized people and animals
- Physical contaminants removed and transported to appropriate facility
- Compost does not exceed maximum acceptable pathogen concentration
- All personnel trained in operations and maintenance
- Safety equipment

Record Keeping

- All records kept in one location and accessible for 5 years
- Daily incoming and outgoing weights sent for recovery and disposal
- Special occurrences
- Complaints
- Load checks
- Feedstock quantity and type
- Metal/Physical contaminants
- Pathogen reduction
- Temperature monitoring and turning dates
- Trainings
- SB 1383 and land application requirements

Facility Siting and Design Standards

- Minimize differential settlement, ponding and failure of pads
- Design should be based on data regarding:
  - Service area
  - Nature and quantity of materials received
  - Climate factors
  - Types and number of vehicles
  - Drainage control
  - Hours of operation

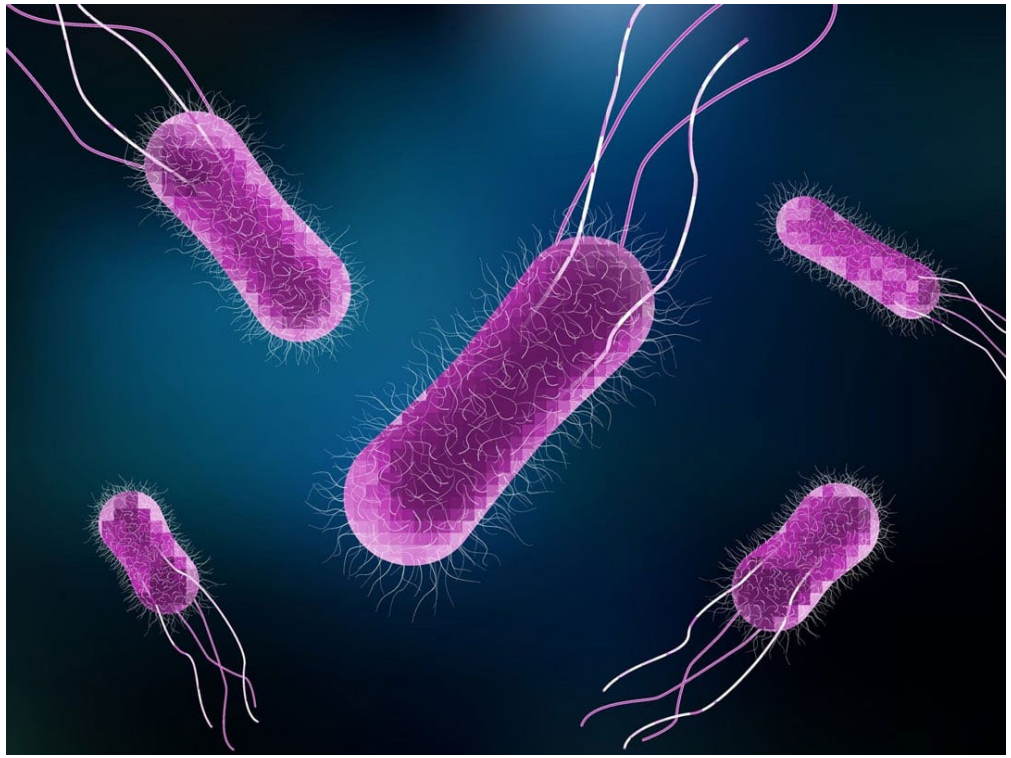
Environmental Health Standards

- Sampling Requirements
- Physical contaminant limits
  - Less than 0.5% by dry weight of contaminants greater than 4 millimeters
  - Less than 20% by dry weight of that limit can be film plastic greater than 4 millimeters
- Maximum Metal Concentrations
- Material Sent for Land Application (14 CCR 17868.6)

Maximum Acceptable Metal Concentrations	
Constituent	**Concentration (mg/kg) on dry weight basis**
Arsenic (As)	41
Cadmium (Cd)	39
Chromium (Cr)	maintain records of all chromium concentrations
Copper (Cu)	1500
Lead (Pb)	300
Mercury (Hg)	17
Nickel (Ni)	420
Selenium (Se)	100
Zinc (Zn)	2800

Environmental Health Standards

- Sampling Requirements, cont.
  - Pathogen reduction
    - Fecal coliform
      - Less than 1,000 Most Probable Number per gram of total solid dry weight
    - Salmonella
      - Less than 3 Most Probable Number per 4 grams of total solid dry weight



Composting Facility Site Restoration

- Restoration when necessary to protect public health, safety and environment
- Machinery cleaned and stored securely
- Structures and facility grounds cleaned of residues, dust and particulates
- Notify LEA at least 30 days prior

Compost Training Poll 5

- Which of the following is **not** an operating standard?

A) Load Checks
B) Must process over 12,500 $yard^3$
C) Safety equipment
D) Signage

Investigating Odor Complaints & SMS Compliance

Receiving an Odor Complaint

- Where do complaints come from?
  - Written Complaint
  - Verbal Complaint
  - CalEPA complaint system
- What should a complaint include?
  - Name, Address and Phone Number
  - Facility/Operation/Location of odor source
  - Nature of problem/violation
  - Known facts relevant to alleged violation

Investigating Odor Complaints

- Investigate as soon as possible at compost site and complainant site
- Record date, weather, locations odor is detected, characteristics, intensity, and duration
- Verify odor source
  - Inspect compost site and rule out other possible sources
- Review OIMP, RCSI, and Permit
- Inform compost site if odor is confirmed
- Inform complainant of actions taken

Things to Consider

- Strength and duration of odors?
- Are they operating in accordance with their OIMP and RCSI?
- Are there sensitive receptors nearby?
- Is the odor an irritant?
- Are all SMS being followed?
- How often/many complaints have beer received?
- What else would you consider?
  - Put your suggestions in the chat

Address adequacy of OIMP

- If operator is taking all reasonable steps, determine if it is appropriate to implement new methods to address odor
- OIMP should be revised until reoccurring odors are addressed

Preparing for Enforcement

- Must be founded on good documentation
  - Photos of the AOC/Violations
  - Videos
  - Take detailed notes
  - Submit detailed inspection reports to display a history of the issue
    - Include what is required in regulations
    - Describe how the site is not meeting regulatory requirements
    - Provide steps and timeline for compliance

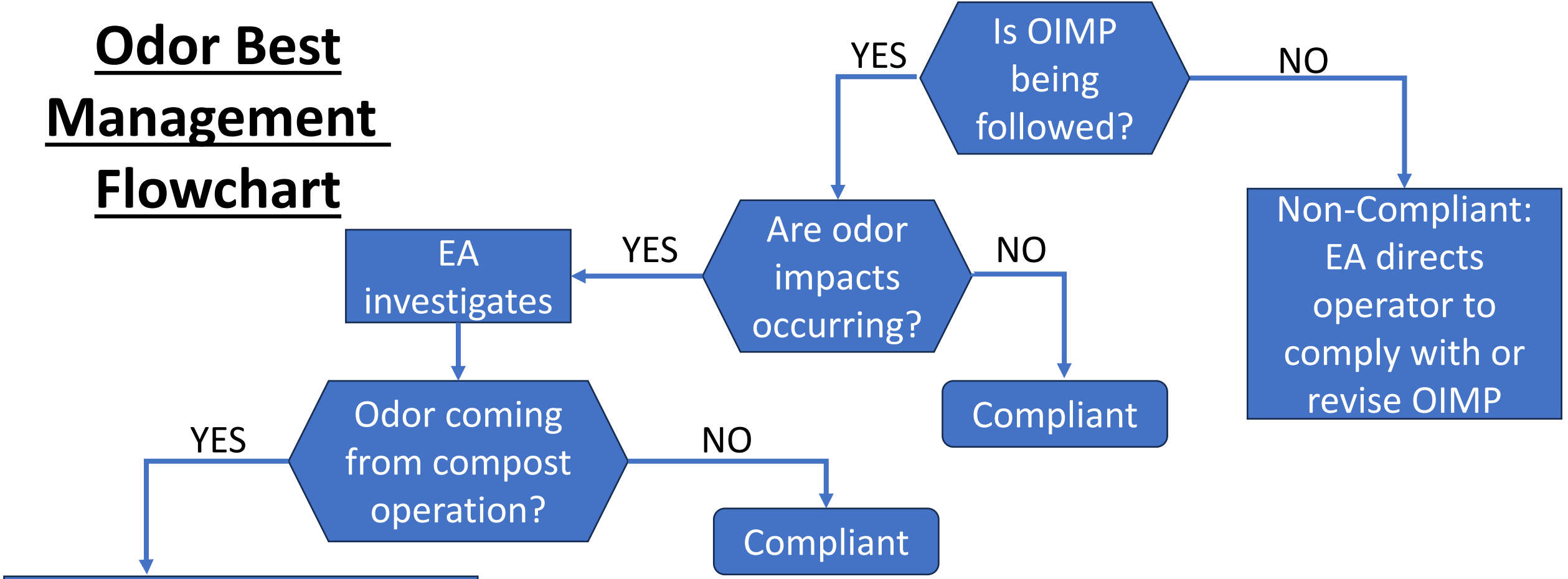
Example: Area of Concern

- Regulation: 14 CCR 17867(9)
- Comment:

  Fire lanes towards the south side of the facility blocked by stored vehicles and equipment. 14 CCR 17867(9) requires "fire lanes be provided to allow fire control equipment access to all operation areas.“ Fire lanes were provided but access to operational areas were blocked. Access to all operational areas should be provided. When discussed with the operator, the equipment was moved and all operational areas were noted to be accessible. To prevent this situation from reoccurring, do not store equipment in fire lanes and provide additional training for equipment operators within 7 days.

  Attached photo showing fire lane being blocked, photo taken with an iPhone 13 using a standard lens at (Date and Time).

Odor Best Management Flowchart



The EA shall consider the results of the odor best management practice feasibility report prior to issuing a N&O unless:

1. An immediate action would reduce the odor impacts
2. Imminent threat to public health, safety or the environment
3. A nuisance has occurred

Compost Training Poll 6

What should an LEA do to support possible AOC or Violations?

A) Include Photos and Videos
B) Take detailed notes when on inspection
C) Refer to previous inspection reports for reoccurring issues
D) All of the above

Composting Sites and SB 1383

SB 1383 Goals

- Most significant waste reduction mandate in California in the last 30 years
- Statewide goals to:
  - Reduce organic waste sent to landfills
  - Reduce green house gas emissions
  - Recover edible food

Compost sites: Jurisdiction requirements

- Jurisdictions will be required to procure specified levels of:
  - Compost
  - Renewable gas
  - Electricity
  - Heating applications
  - Electricity from biomass conversion
- More composting sites help meet procurement target

Measurement Requirements for Composting

- Operator will determine quarterly percentage of organic waste sent to landfill disposal
  - Sampling at least 10 consecutive operating days for each reporting period
  - A random composite sample of at least 200 pounds
- LEA can request to be present for sampling or increase frequency of measurements

Composting Measurements (14CCR 17869)
Daily incoming weights by material type
Daily outgoing weights of material sent to disposal
Daily outgoing weights of compost
Daily outgoing weights of chipper and ground material produced
Weight of compostable material sent offsite to any destination other than an authorized permitted solid waste facility or operation
Quarterly percentage of organic waste contained in materials sent to landfill disposal (Calculate per 14 CCR 17867)

Material Sent for Land Application / Land Application Activity

Material Sent for Land Application 14 CCR 17868.6

Material that is sent offsite for land application must be sampled prior to the material leaving the site.

- Ensure meets Land Application Requirements (14 CCR 17862.4)

Sampling Frequency:

- Initial stockpile -> One (composite) sample
- For each subsequent 5,000 cubic yards (cy) -> One sample
- < 5,000 cy of material in a 12-month period -> At least one sample

Material Sent for Land Application Continued

- Sampling results shall be provided to the person receiving the material for land application.
- A record of the location where material was sent for land application must be kept by the operator
- Non-compliant material land application requirements (14 CCR 17862.4):
  - Shall not be sent offsite for land application.
  - This material shall be:
    - Reprocessed onsite,
    - Sent offsite for further processing, or
    - Sent to disposal

Land Application Activity (EA Notification required) 14 CCR 17862.3

- Not subject to Articles 3 through 9 of this Chapter 3.1
- >4,040 cubic yards of compostable material/digestate during a 12-month period
- Land apply / Remove material within 48 hours of receipt
  - EA can approve alternative timeline
- Provide proof of material compliance to EA prior to receipt
- Maintain records
- No mixing of compostable material/digestate with non-organic materials
- Inspected by EA within 90 days of receipt of the evidence

Switch to Activity Powerpoint

QUESTIONS?

THANK YOU FOR ATTENDING

PLEASE REMEMBER TO COMPLETE THE SESSION EVALUATION