

# 17<sup>th</sup> Technical Training Series



**April 3-6, 2017 · Long Beach Hyatt**  
200 South Pine Avenue · Long Beach, California, 90802



# In-Vessel Digestion

General Terms and Conditions/Facility with Multiple Operations

# In-Vessel Digestion - Overview

- Previously regulated under the Compostable Materials Handling or Transfer/Processing regulations
- What is an In-Vessel Digestion facility or operation?
- Which permit is required for In-Vessel Digestion facilities or operations?
- What permit requirements are unique to In-Vessel Digestion facilities or operations?
- Five year permit review - Responsibility and timing

# What's new?

In-Vessel Digestion Is Regulated Like Composting

# Statutes

- ▶ PRC 40116. “Compost” means the product resulting from the controlled biological decomposition of organic wastes that are source separated from the municipal solid waste stream, or which are separated at a centralized facility

# Current CalRecycle Regulations (Title 14, CCR)

- ▶ Previously regulated under the Compostable Materials Handling or Transfer/Processing regulations depending on nature of feedstock and how it is handled
- ▶ If feedstock is compostable material, the facility is regulated as a compostable material handling facility
- ▶ If feedstock is not compostable material, the activity is regulated as a transfer and processing facility

# Strategic Directive

## Diverting Organics from Waste Stream

- Difficult and costly for compost facilities to comply with increasingly stringent air and water quality regulations
- Anaerobic digestion and/or in-vessel digestion is a promising technology for managing organic material

# What is an In-Vessel Digestion Facility or Operation?

- Standards adapted from both Transfer/Processing & Compostable Material Handling
- During formal rulemaking, noted several in-vessel digestion technologies that do not utilize Anaerobic Digestion (AD)
- Current regulations broadened the scope of regulations to cover other types of “in-vessel” digestion activities, including AD
- Handling of feedstock and residual waste materials subject to transfer/processing-like requirements
- End products (digestate, compost) subject to compostable material handling-like requirements



# What is an In-Vessel Digestion Facility or Operation

continued...

- Anaerobically digestible materials at POTWs\*
- Co-digestion of waste water and vehicle-transported anaerobically digestible material
- Anaerobically digestible material includes inedible kitchen grease, food and vegetative food material
- Material must be pumped or off-loaded directly into a covered, leak-proof container and then pumped, or diluted or slurried and then pumped
- The POTW must implement Standard Operating Procedures

*\*Publicly Owned Treatment Works*

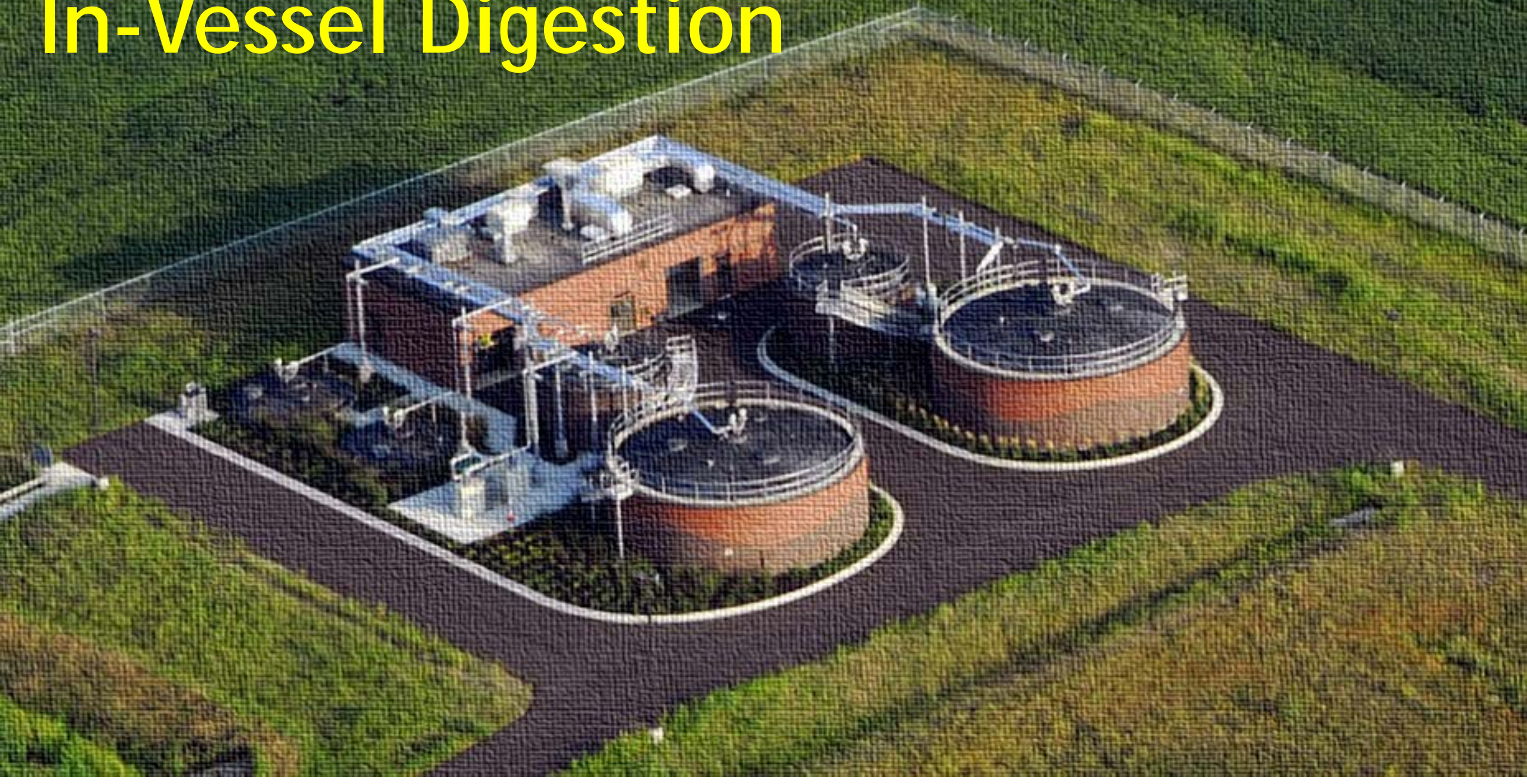
Transfer/Processing		Compostable Materials Handling
<ul style="list-style-type: none"> <li>§ Authority and Scope</li> <li>§ Definitions</li> <li>§ Pre-Existing Permits and Notifications</li> <li>§ Regulatory Tiers</li> <li>§ Excluded Activities</li> <li>§ Limited Volume In-Vessel Digestion Operations</li> <li>§ Medium Volume In-Vessel Digestion Facilities</li> <li>§ Large Volume In-Vessel Digestion Facility</li> <li>§ In-Vessel Digestion Facility Plan</li> <li>§ In-Vessel Digestion Report</li> <li>§ Applicability of State Minimum Standards</li> <li>§ Siting On Landfills</li> <li>§ General Design Requirements</li> <li>§ Cleaning</li> <li>§ Drainage Control</li> <li>§ Dust Control</li> <li>§ Hazardous, Liquid, and Special Wastes</li> <li>§ Litter Control</li> <li>§ Load checking</li> <li>§ Maintenance Program</li> <li>§ Medical Wastes</li> <li>§ Noise Control</li> <li>§ Non-Salvageable Items</li> <li>§ Nuisance Control</li> </ul>	<ul style="list-style-type: none"> <li>§ Parking</li> <li>§ Personnel Health and Safety</li> <li>§ Protection of Users</li> <li>§ Roads</li> <li>§ Sanitary Facilities</li> <li>§ Scavenging and Salvaging</li> <li>§ Signs</li> <li>§ Supervision and Personnel</li> <li>§ Training</li> <li>§ Vector, Bird and Animal Control</li> <li>§ Record Keeping Requirements</li> <li>§ Documentation of EA Approvals, Determinations, and Requirements</li> <li>§ Communications Equipment</li> <li>§ Equipment</li> <li>§ Fire Fighting Equipment</li> <li>§ Housekeeping</li> <li>§ Lighting</li> <li>§ Site Attendant</li> <li>§ Site Security</li> <li>§ Traffic Control</li> <li>§ Visual Screening</li> <li>§ Water Supply</li> </ul>	<ul style="list-style-type: none"> <li>§ Research In-vessel Digestion Operations</li> <li>§ Odor Minimization Plan</li> <li>§ Prohibitions</li> <li>§ Digestate Handling</li> <li>§ Sampling Requirements</li> <li>§ Maximum Metal Concentrations</li> <li>§ Pathogen Reduction</li> <li>§ Physical Contamination Limits</li> <li>§ Site Restoration</li> </ul>

## In-Vessel Digestion

# Permits 101

What Is Required when Permitting an In-Vessel Digestion Facility or Operation?

# In-Vessel Digestion



Excluded Tier	Enforcement Agency Notification Tier	Registration Permit Tier	Full Solid Waste Facility Permit
Anaerobically Digestible Materials at POTW	Research In-Vessel Digestion Operations	Medium Volume In-Vessel Digestion Facilities [average between 15 tpd, not to exceed 700 tpw]	Large Volume In-Vessel Digestion Facilities <i>[average &gt; 100 tpd, average &gt; 700 tpw]</i>
Ag material derived from ag site & returned to same site	Dairy In-Vessel Digestion Operations		
In-vessel digestion at a dairy	Distribution Center In-Vessel Digestion Operations		
In-vessel digestion activities with less than 100 cubic yard on-site capacity	Limited Volume In-Vessel Digestion Operations <i>[average &lt; 15 tpd, not to exceed 105 tpw]</i>		
Handling activities that are already subject to more stringent handling requirements under Federal or State law			

In-Vessel Digestion Tier Chart

# Excluded

Agricultural Material

Small-Scale

Rendering Activities

Co-digestion of Aerobically Digestible Material with Wastewater at a POTW

Co-digestion of Agricultural Material or Vegetative Food Material with Manure at a Dairy

Excluded Tier	Enforcement Agency Notification Tier	Registration Permit Tier	Full Solid Waste Facility Permit
Ag material derived from ag site & returned to same site			
In-vessel digestion at a dairy			
In-vessel digestion activities with less than 100 cubic yard on-site capacity			
Handling activities that are already subject to more stringent handling requirements under Federal or State law			

Tier Chart - Excluded Tier

# In-Vessel Digestion - Excluded

- ▶ Anaerobically digestible materials at POTWs\*
  - Co-digestion of waste water and vehicle-transported anaerobically digestible material
  - Anaerobically digestible material includes inedible kitchen grease, food and vegetative food material

*\*Publicly Owned Treatment Works*



# In-Vessel Digestion- Excluded

- ▶ Anaerobically digestible materials at POTWs
  - Material must be **pumped or off-loaded** directly into a covered, leak-proof container and then pumped, or diluted or slurried and then pumped
  - The POTW must implement Standard Operating Procedures



# In-Vessel Digestion- Excluded

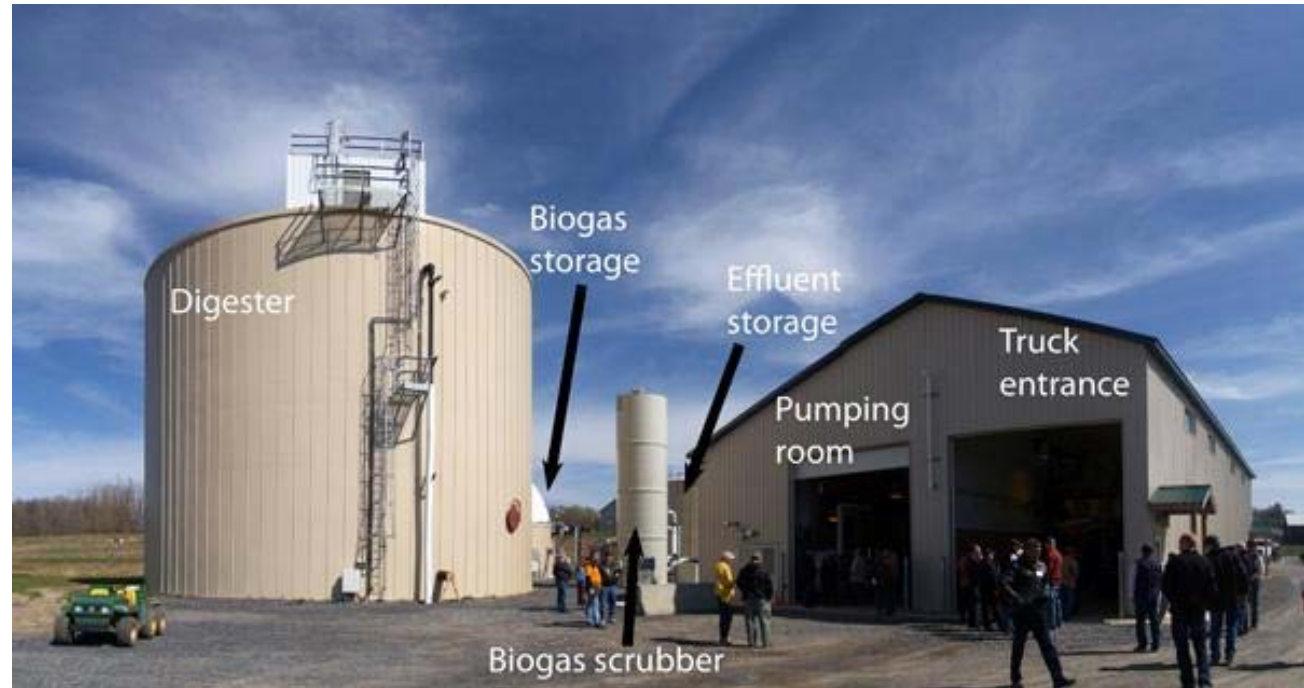
- ▶ In-Vessel digestion at a dairy
  - ▶ Co-digestion of agricultural material or vegetative food material with manure at a dairy



# Manure Digester

*random fun fact*

The digester tank (right) has a capacity of one million gallons. It is estimated that 40-43,000 gallons will be added to the digester per day when it reaches full production capacity. The trucks carrying raw (undigested) manure from the farms enter on the right side of the building (right) and the manure is pumped into a holding tank (not visible in photo) and mixed with food waste.



# In-Vessel Digestion- Excluded

## ▶ Small-scale Digestion

- The in-vessel digestion of less than 100 yd<sup>3</sup> of solid waste feedstock and digestate on site



× 100

# In-Vessel Digestion- Excluded

## ▶ Other Exclusions

- Any handling activities subject to stricter state or federal laws
- Rendering activities authorized by California Department of Food and Agriculture in which no solid waste feedstock bypasses the rendering process

Excluded Tier	Enforcement Agency Notification Tier	Registration Permit Tier	Full Solid Waste Facility Permit
Anaerobically Digestible Materials at POTW	Research In-Vessel Digestion Operations	Medium Volume In-Vessel Digestion Facilities [average between 15 tpd, not to exceed 700 tpw]	Large Volume In-Vessel Digestion Facilities <i>[average &gt; 100 tpd, average &gt; 700 tpw]</i>
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Handling activities that are already subject to more stringent handling requirements under Federal or State law			

In-Vessel Digestion Tier Chart

# Notification

Research

Dairy In-Vessel Digestion Distribution Center

In-Vessel Digestion

Excluded Tier	Enforcement Agency Notification Tier	Registration Permit Tier	Full Solid Waste Facility Permit
	Research In-Vessel Digestion Operations		
	Dairy In-Vessel Digestion Operations		
	Distribution Center In-Vessel Digestion Operations		

Tier Chart - Enforcement Agency Notification

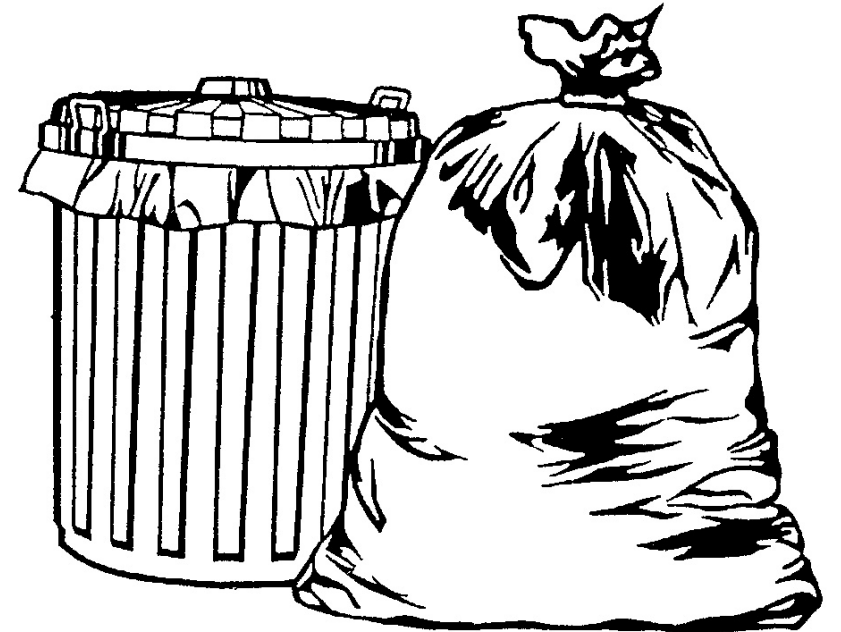


# In-Vessel Digestion- Notification

- ▶ Research In-Vessel Digestion Operations
  - Initial two year research period
  - Additional two year extension if further research is needed
  - Additional requirements for unprocessed mammalian tissue including record keeping, site security plan, feedstock generated and used on-site, etc.

# In-Vessel Digestion- Notification

- ▶ Dairy In-Vessel Digestion
  - Dairy importing solid waste feedstock



# In-Vessel Digestion- Notification

## ▶ Dairy In-Vessel Digestion

- Material must be pumped or off-loaded directly into a covered, leak-proof container and then pumped, or diluted or slurried and then pumped
- Monthly inspections for first year
- EA may approve quarterly inspections after first year

# In-Vessel Digestion- Notification

- ▶ Distribution Center In-Vessel Digestion
  - ▶ Unsold products from retail (grocery) stores to which the products were originally sent



# In-Vessel Digestion- Notification

- ▶ Distribution Center In-Vessel Digestion
  - Products must be collected and processed in covered, leak-proof containers, and remain in the custody of the owner at all times
  - Putrescible products must be refrigerated at the retail store and maintain a core temperature of 55 degrees Fahrenheit during transport to the operation

# In-Vessel Digestion- Notification

- ▶ Limited Volume In-Vessel Digestion Operations

- EA Notification Tier

- Less than 15 tons/day

- Or, 105 tons/week



Excluded Tier	Enforcement Agency Notification Tier	Registration Permit Tier	Full Solid Waste Facility Permit
Anaerobically Digestible Materials at POTW	Research In-Vessel Digestion Operations	Medium Volume In-Vessel Digestion Facilities [average between 15 tpd, not to exceed 700 tpw]	Large Volume In-Vessel Digestion Facilities <i>[average &gt; 100 tpd, average &gt; 700 tpw]</i>
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Handling activities that are already subject to more stringent handling requirements under Federal or State law			

In-Vessel Digestion Tier Chart

# Registration

Medium Volume

In-Vessel Digestion Facilities



Excluded Tier	Enforcement Agency Notification Tier	Registration Permit Tier	Full Solid Waste Facility Permit
		<p>Medium Volume In-Vessel Digestion Facilities            [average between 15 tpd, not to exceed 700 tpw]</p>	<p>Large Volume In-Vessel Digestion Facilities  <i>[average &gt; 100 tpd, average &gt; 700 tpw]</i></p>
	<p>Limited Volume In-Vessel Digestion Operations  <i>[average &lt; 15 tpd, not to exceed 105 tpw]</i></p>		

Tier Chart -Registration and Full Permit

# In-Vessel Digestion- Registration

- ▶ Medium Volume In-Vessel Digestion Operations
  - Registration Permit Tier
  - Between 15 tons/day and 100 tons/day
  - Or, 700 tons/week



# Full

Large Volume

In-Vessel Digestion Facilities

# In-Vessel Digestion- Full

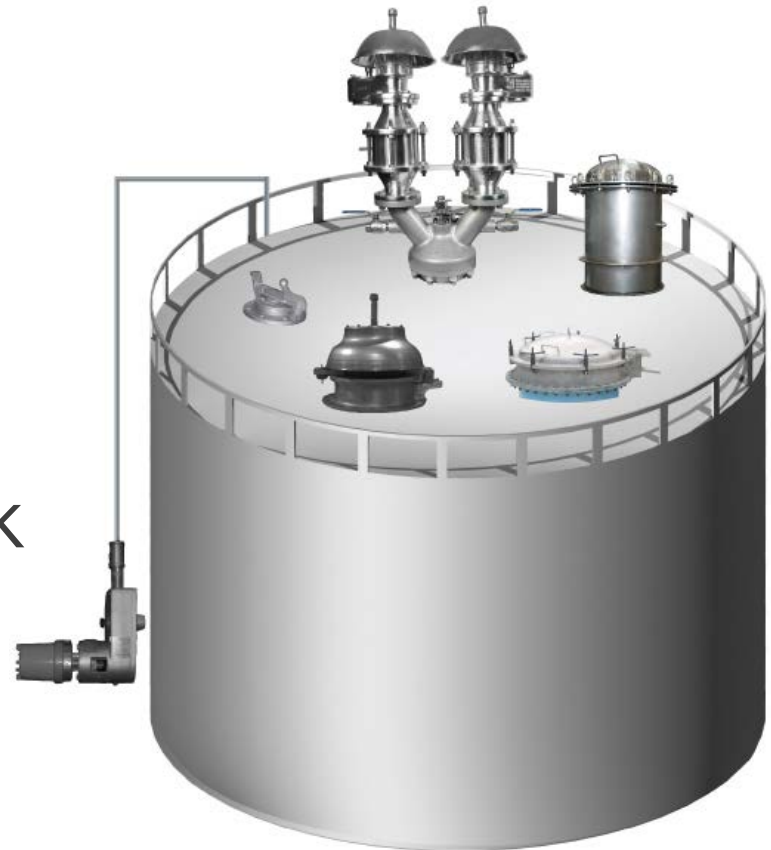
- ▶ Large Volume In-Vessel Digestion Operations

- ❑ Full Permit Tier

- ❑ Greater than 100 tons/day

- ❑ Or, greater than 700 tons/week

- ❑ Can compost digestate



# In-Vessel Digestion

## ▶ Digestate Handling

- Digestate removed from a digester must within 24 hours be:
  - Stored or processed in a sealed container or sealed structure,
  - Incorporated in an on-site aerobic compost process, or

# In-Vessel Digestion

## ▶ Digestate Handling

- Removed from the site and:
  - transported to another solid waste facility
  - used in a manner approved by local, state, and federal agencies, or
  - properly disposed

# FORMS

The E-1-77 form is completed by a solid waste facility operator and submitted to their EA to apply for a new solid waste facility permit, waste discharge permit, revision of a permit, exemption or waiver of a permit or permit review. It can also be used to submit documents to amend an application or to submit report of facility information amendments.



# Application Form E-1-77

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## Part 3. FACILITY INFORMATION

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### A. FACILITY INFORMATION:

#### 1. INFORMATION APPLICABLE TO ALL EXISTING FACILITIES:

a. MAXIMUM DAILY TONNAGE  
OR CUBIC YARDS

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b. AS-DESIGNED DAILY TONNAGE  
OR CUBIC YARDS

---

c. FACILITY SIZE (acres)

---

d. MAXIMUM TRAFFIC VOLUME PER DAY  
(vpd)

---

e. DAYS AND HOURS OF OPERATION

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#### 2. PROPOSED CHANGE(S) OR INFORMATION APPLICABLE TO NEW SWFP AND/OR WDRs

a. MAXIMUM DAILY TONNAGE  
OR CUBIC YARDS

---

b. AS-DESIGNED DAILY TONNAGE  
OR CUBIC YARDS

---

c. FACILITY SIZE (acres)

---

d. MAXIMUM TRAFFIC VOLUME PER DAY  
(vpd)

---

e. DAYS AND HOURS OF OPERATION

---

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f. OTHER

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# Application Form E-1-77

## ▶ Permit Application

- Part 3 now includes two sections: existing facility information and proposed facility information

## ▶ Proposed changes must be consistent with:

- Report of Facility Information (RFI)/Transfer Processing Report (TPR)
- Supporting documents (i.e. CEQA) submitted as part of the application

# NEW IN-VESSEL DIGESTION INSPECTION FORM 104

CalRecycle developed inspection form 104 for In-Vessel Digestion in response to the regulatory changes that took effect on January 1, 2016. The inspection form is implemented in the CalRecycle SWIS DIP/Online Portal and is available to EAs entering inspections via the portal's web forms.

In-Vessel Digestion Operation and Facility Inspection Report (##)			
Enforcement Agency:		Inspection Date:	
SMS Facility File Number (99-xx-9999)			
LEA Periodic LEA Focused	CalRecycle Closed Sites CalRecycle Enforcement Agent	CalRecycle Focused CalRecycle Periodic	
Inspection Time	Time In	Time Out	
Facility Name		Received By	
Facility Location		Owner Name	
Inspector		Also Present (Name)	
No Violations or Areas of Concern			
V	A	Permits - Full	Comments
		PRC 44002 - Operator Authorized by SWF Permit	
		PRC 44004 - Significant Change	
		PRC 44005 - Transfer of Owner or Operator	
		PRC 44014(b) - Operator Complies with Terms & Conditions	
		17896.13 - Large Volume In-Vessel Digestion Fac. Pmt.	
		17896.15 - In-Vessel Digestion Report Filed	
		21640 - Permit Review Application	
		18221.6.1 - In-Vessel Digestion Report Requirements	
V	A	Permits - Registration	Comments
		17896.12 - Medium Volume In-Vessel Digestion Pmt.	
		17896.14 - In-Vessel Digestion Facility Plan Filed	
		18104.7 - Registration Pmt. Review	
		18221.5.1 - In-Vessel Digestion Facility Plan Requirements	
V	A	Filing Requirements - Operations	Comments
		18103.1 - Enforcement Agency Notification Filed	
V	A	Research In-Vessel Digestion Operations	Comments
		17896.8(b) - Description and Completion Timeframe	
		17896.8(c) - EA Notification (every 2 years)	
		17896.8(d) - Research of mammalian tissue	
		17896.8 - Other	
V	A	Dairy In-Vessel Digestion Operations	Comments
		17896.9(a)(2) - Delivery of Imported Materials	
V	A	General Operating Standards	Comments
		17896.19 - Biogas Control	
		17896.20 - Cleaning	
		17896.21 - Drainage and Spill Control	
		17896.22 - Dust Control	
		17896.23 - Hazardous, Liquid, and Special Wastes	
		17896.24 - Litter Control	
		17896.25 - Load Checking	
		17896.26 - Maintenance Program	
		17896.27 - Medical Wastes	
		17896.28 - Noise Control	
		17896.29 - Non-Salvageable Items	
		17896.30 - Odor BMP Feasibility Report	
		17896.31 - Odor Minimization Plan	
		17896.32 - Odor and Nuisance Control	

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		17896.26 - Maintenance Program	
		17896.27 - Medical Wastes	
		17896.28 - Noise Control	
		17896.29 - Non-Salvageable Items	
		17896.30 - Odor BMP Feasibility Report	
		17896.31 - Odor Minimization Plan	
		17896.32 - Odor and Nuisance Control	
		17896.33 - Parking	
		17896.34 - Personnel Health and Safety	
		17896.35 - Pre-Digestion Solid Waste Handling	
		17896.36 - Protection of Users	
		17896.37 - Roads	
		17896.38 - Sanitary Facilities	
		17896.39 - Scavenging and Salvaging	
		17896.40 - Signs	
		17896.41 - Site Restoration	
		17896.42 - Supervision and Personnel	
		17896.43 - Training	
		17896.44 - Vector, Bird, and Animal Control	
V	A	Digestate Handling Standards	Comments
		17896.57 - Digestate Handling	
		17896.58 - Sampling Requirements	
		17896.59 - Maximum Metal Concentrations	
		17896.60 - Pathogen Reduction	
		17896.61 - Physical Contamination Limits	
V	A	Additional Operating Standards (Facilities Only)	Comments
		17896.47 - Communications Equipment	
		17896.48 - Equipment	
		17896.49 - Fire Fighting Equipment	
		17896.50 - Housekeeping	
		17896.51 - Lighting	
		17896.52 - Site Attendant	
		17896.53 - Site Security	
		17896.54 - Traffic Control	
		17896.55 - Visual Screening	
		17896.56 - Water Supply	
V	A	Record Keeping Requirements	Comments
		17896.45 - Record Keeping Requirements	
		17896.46 - Documentation of EA Approval, Determination, and Requirements	

# Uniquely Digestate

What Permit Requirements Are Unique to In-Vessel Digestion Facilities or Operations?

# Definition

## ▶ Digestate

- Solid and/or liquid residual material remaining after organic material has been processed in an in-vessel digester

# What Permit Requirements are Unique to In-Vessel Digestion Facilities or Operations?

- All in-vessel digestion facilities and operations are required to comply with the state minimum standards set forth in Articles 1, 2, 3, 4, and 6, except as noted in 14 CCR §17896.1(a).
- Article 5 set forth additional minimum standards that apply only to in-vessel digestion facilities.
- A medium-volume in-vessel digestion facility is required to file with the enforcement agency (EA) an “In-Vessel Digestion Facility Plan” pursuant to 14 CCR §17896.14 and §18221.5.1.

# What Permit Requirements are Unique to In-Vessel Digestion Facilities or Operations?

- A large-volume in-vessel digestion facility is required to file with the EA an “In-Vessel Digestion Report” pursuant to 14 CCR §17896.15 and §18221.6.1.
- An Odor Minimization Plan is required for all in-vessel digestion operations and facilities as specified in 14 CCR §17896.31.
- An Odor Best Management Practice Feasibility Report may be required as specified in 14 CCR §17896.30.

# Five Year Permit Review

Responsibility and Timing





# In-Vessel Digestion- Five Year Permit Review

- Definition
- Purpose and Authority
- Process and Roles

# In-Vessel Digestion- Five Year Permit Review

- An “in-vessel digestion facility or operation” is a site that receives solid wastes for the purpose of digestion in an in-vessel digester.
- “Digestion” means, pursuant to Public Resources Code section (§) 40116.1, the controlled biological decomposition of organic solid wastes. Digestion includes: A) aerobic digestion; B) anaerobic digestion; and C) other controlled biological decomposition processes.
- “In-Vessel Digester” means the sealed container(s) or sealed structure in which the entire digestion process occurs.

# In-Vessel Digestion- Purpose and Authority

Document planned or actual changes in design and operation of facility required for:

- Full Permits
  - Standardized Permits
  - Registration Permits
- ▶ Not Required: *Notification Tier (not a permit)*

# In-Vessel Digestion- Process and Roles

- EA notifies the operator of pending permit review 180 days in advance
- Operator submits permit review application form and other documents to EA 150 days before report is due
- EA reviews permit and documents
- EA writes report
- EA submits permit review report to operator and copies CalRecycle

# In-Vessel Digestion - Minimizing Odors

*Odors, Odors, Odors....*



# Minimizing Odor Issues through the Permitting Process

- Operators of in-vessel digestion facilities and operations are required to describe the methods of operating the facility in a manner that will maintain compliance with the state minimum standards.
- Prior to obtaining a SWFP to operate, in-vessel digestion facility operators (operators) are required to submit an in-vessel digestion Report (Report) as part of an application for SWFP to the EA.
- Similar to composting facilities, operators are required to have an Odor Minimization Plan as part of the Report.

# Minimizing Odor Issues through the Permitting Process

- If an in-vessel digestion operator is complying with the odor minimization plan, but odors are still occurring, then the operator may voluntarily prepare an Odor Best Management Practice Feasibility Report or the EA may require the operator to prepare the Report

# In-Vessel Digestion - Minimizing Odors

Since in-vessel digestion facilities and operations receive/handle materials similar to what a composting facility or operation would receive, odor characteristics can also be expected.







# Summary

- In-vessel digestions is a combination of existing transfer/processing and composting-like regulations
- New in-vessel activities are subject to these similar standards
- Digestate handling is most significant new standard
- The EA is responsible for notifying existing facilities of the Five Year Permit Review (< 1 year to notify)

Questions?