SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Preliminary Draft Staff Report
Proposed Rule 415 – Odors from Rendering Facilities

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BACKGROUND

Proposed Rule (PR) 415 – Odors from Rendering Facilities is designed to reduce odors from facilities conducting rendering operations. Rendering is a process that converts waste animal tissue into stable, value-added commodities, including fat commodities such as yellow grease, choice white grease, and bleachable fancy tallow and protein commodities, such as meat and bone meal and poultry byproduct meal. Industries that use the commodities produced during rendering include animal feed, fertilizer, biofuels, cosmetics and other industries.

Rule development of PR 415 is the result of an issue that was identified by the working group for the Clean Communities Plan (CCP) in the pilot study area of Boyle Heights. In November 2010, the SCAQMD Governing Board approved the CCP. SCAQMD staff began implementing the CCP in the pilot study area of Boyle Heights, a community near the City of Vernon rendering facilities, by meeting with a stakeholder working group beginning in July 2011. The purpose of this working group was to identify air quality issues of importance to the community in Boyle Heights and surrounding communities. The prevalence of odors from four rendering facilities in Vernon, directly south of Boyle Heights, was of great concern to the working group. As a direct result of the CCP pilot study process, SCAQMD staff undertook rulemaking to address these odors in 2014.

Rendering Facilities in the South Coast Air Basin

There are four existing facilities that conduct inedible rendering operations in the Basin. All four are located in Vernon in close proximity to each other. Three of the four facilities are independent, and one is integrated with a slaughterhouse and meat-packing plant. The differences between independent and integrated rendering facilities are described on page 1-2. Three of the four use a continuous rendering process and one uses a batch rendering process. All four facilities would be subject to PR 415. In addition, one planned facility may be subject to the proposed rule if permitted, once it becomes operational.

Rendering Industry Characterization

According to the National Renderers Association (NRA), the US livestock sector slaughters more than 150 million head of cattle, calves, hogs, and sheep and more than 55 billion pounds of poultry annually[1]. The rendering industry consists of more than three-dozen firms operating more than 200 plants across the US and Canada[2]. Rendering facilities serve animal industries by using the by-products produced in these industries. By-products amount to more than half the total volume produced by animal agriculture. By live weight, approximately 49% of cattle, 44% of pigs, 37% of chicken broilers and 57% of fish are not consumed by humans[3]. By-products from animal agriculture include hides, skins, hair, feathers, hoofs, horns, feet, heads, bones, blood, organs, glands, intestines, muscle and fat tissue, and entire carcasses. Many of these by-products are processed in rendering facilities. Organic by-products are highly perishable, and may include some laden with microorganisms that are pathogenic to humans and animals. Rendering offers a system of handling and processing of animal materials that complies with the requirements of disease control.

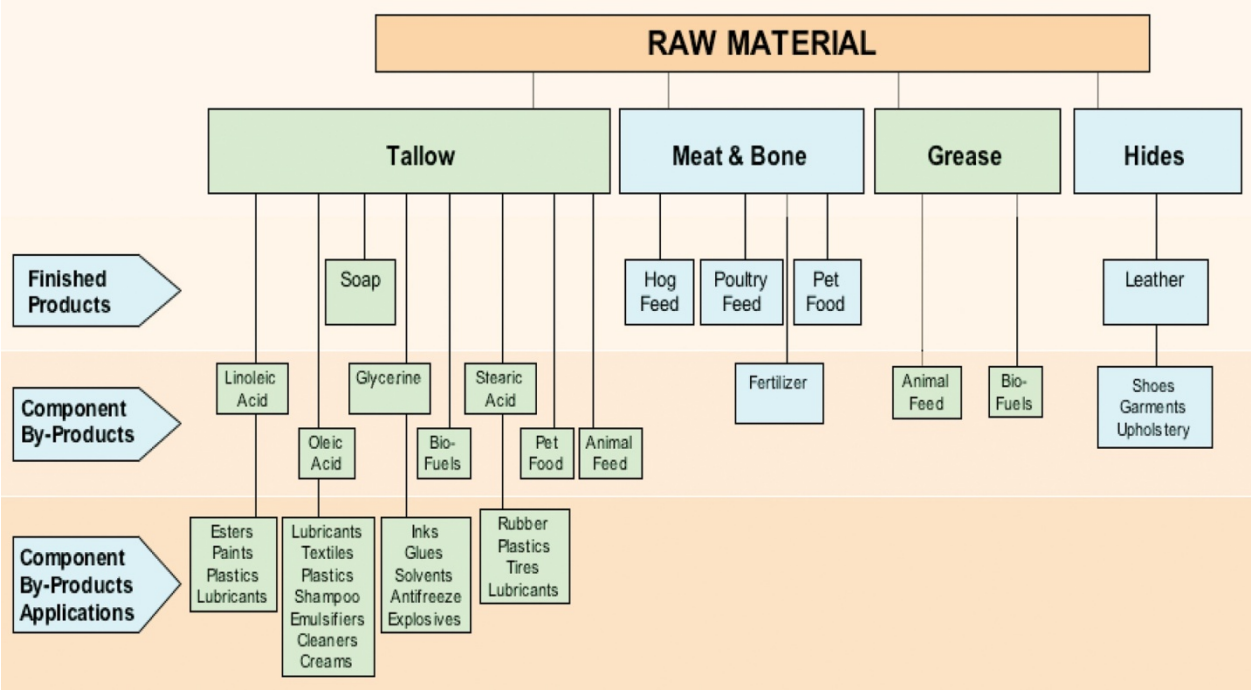
[1] NRA Website: http://www.nationalrenderers.org/
[2] NRA Website: http://www.nationalrenderers.org/
[3] An Overview of the Rendering Industry and its Contribution to Public and Animal Health; Meeker, Hamilton

In addition to disease prevention, processing of by-products from various animal industries results in nearly 20 billion pounds of animal feed and industrial products in the form of fat and protein commodities[4].

Value and Use of Rendered Products

The nearly 20 billion pounds of ingredients that renderers produce each year have been valued at more than $3 billion, of which about $900 million is exported. Meat and bone meal accounted for 6.6 billion pounds of this, poultry byproducts 4 billion pounds, and blood meal 226 million pounds[5]. These ingredients are valued for their nutrients - high protein content, digestible amino acids, and minerals — and their relatively low cost. Poultry operations and pet food manufacturers accounted for 66% of the domestic meat and bone meal market of nearly 5.7 billion pounds in 2000, while hog and cattle operations accounted for most of the remaining market. Figure ES-1 shows the products and by-products of the rendering process.

Figure ES-1 – Products and By-products Produced During Rendering



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RENDERING OPERATIONS

The Rendering Process

In most facilities, raw materials are ground to a uniform size and placed in cookers, which evaporate moisture and free fat from protein and bone. A series of conveyers, presses, and a centrifuge continue the process of separating fat from solids. The finished fat (e.g., tallow, lard, yellow grease) goes into separate tanks, and the solid protein (e.g., meat and bone meal, poultry

[4] "Survey Says: A snapshot of Rendering", Jekanowski, Render Magazine, 2011

[5] "Animal Rendering: Economics and Policy", CRS Report for Congress, Becker, 2004

meal) is pressed into cake for processing into feed. Other rendering systems may be used, including those that recover protein solids from slaughterhouse blood or that process used cooking oil from restaurants. This cooking oil is recovered (often in 55-gallon drums) for use as yellow grease in non-human food products like animal feeds.

Potential for Odors from Rendering Operations

Odor control remains one of the rendering industry's greatest challenges. Research in the early 1970s indicated that untreated rendering plant emissions could be detected up to 20 miles away from rendering plants[6]. As for the sheer number of odorous compounds in rendering odors, 110 volatile compounds can be identified in rendering odors, with about 25 contributing most noticeably to rendering plant odors[7]. Most of these organic compounds are generated from the breakdown of proteins and fats during the cooking process[8] or during decay of raw material prior to cooking.

Besides organic compounds, other odor compounds of concern from rendering operations include hydrogen sulfide and ammonia. Because of the wide variety of chemical compounds contributing to rendering plant odors, current strategies for odor control rely on destroying all volatile compounds being emitted. However, the most offensive odor compounds may not necessarily be the most prevalent in a mixture of volatiles[9].

There are several operations and processes within a rendering facility that have noticeable odors associated with them. These include, in no particular order of odor intensity: raw material receiving; raw material size reduction; cooking; fat processing; and wastewater treatment. High intensity odors from the cooker are currently required to be incinerated at 1202^{o}F for at least 0.3 seconds under SCAQMD Rule 472 – Reduction of Animal Matter. Incineration at this temperature is a highly effective odor control method for organic compounds, the composition of most substances in rendering odors.

Since the high intensity odors emitted from the cooking process are already required to be controlled, the nature of odors that continue to be present at a rendering facility from the processes noted are fugitive in nature. There are many points both in a batch cooking process as well as in a continuous cooking process where fugitive odors can escape. Collectively, this large number of sources of fugitive odors can create odors which are emitted from a rendering facility and can travel beyond the facility's property line.

Odor Complaints in Communities Surrounding Vernon

Odor complaints in the communities surrounding the Vernon rendering facilities were evaluated over a ten-year period. Complaints and NOVs were evaluated from January 2002 through October 2011. An average of 35 odor complaints per year were received by SCAQMD during this ten year period. Many of these complaints could not be verified by an SCAQMD inspector

[6] "Odor Controls for Rendering Plants." *Environmental Science and Technology* 7 (6):504-510. Bethea, Murthy, Carey; 1973.

[7] "Gas Chromatography/Mass Spectrometry Identification of Organic Volatiles Contributing to Rendering Odors." *Environmental Science and Technology* 16 (12):883-886. Van Langenhove, Van Wassenhove, Coppin, Van Acker, Schamp; 1982

[8] http://www.rendermagazine.com/articles/2012-issues/august-2012/development-of-new-odor-control-methods/

[9] http://www.rendermagazine.com/articles/2012-issues/august-2012/development-of-new-odor-control-methods/

as the odors could not be traced back to a specific facility, due to the distance rendering odors can travel and the close proximity of rendering facilities relative to each other.

SCAQMD staff has received comments in working group meetings from the regulated industry that the relatively modest number of annual odor complaints from areas surrounding the rendering facilities does not justify rulemaking. However, staff feels the number of complaints is not good indicator of the impact of odors on area residents, for several reasons. First, stockyards, meat packing houses and slaughterhouses that supplied animal carcasses to rendering facilities have existed in the Vernon area for nearly one hundred years. As a result, odors from rendered animal carcasses have long been part of the landscape in the communities surrounding Vernon, impacting the quality of life for area residents. Many area residents have lived with these odors their entire lives. Furthermore, SCAQMD staff has learned from conducting community meetings in the area that proactive complainants didn't perceive a reduction in odors after repeated complaints, and became discouraged, resulting in a general sense from community members that reporting odors does not yield results.

PROPOSED RULE 415 REQUIREMENTS

Purpose

Proposed Rule (PR) 415 will establish odor best management practices and requirements to reduce odors from facilities rendering animals and animal parts. The proposed rule will be implemented in addition to continued enforcement of public nuisances under Rule 402.

Applicability

The proposed rule applies to new and existing facilities that cook raw rendering materials; facilities that process trap grease in addition to rendering, and treatment of wastewater from processes associated with rendering or processing of trap grease at these facilities.

Applicability is to facilities that conduct inedible rendering operations, whether or not these facilities also conduct edible rendering. If an integrated facility conducts both edible and inedible rendering operations, the edible rendering operations are not subject to the requirements of PR 415. Inedible rendering means that the products and by-products of the rendering process are not intended for human consumption.

Edible rendering processes are essentially meat processing operations; producing lard or edible tallow for use in food products consumed by humans. Edible rendering is generally carried out in a continuous process at low temperature, less than the boiling point of water. The process usually consists of heating edible fats (fat trimmings from meat cuts), followed by two or more stages of centrifugal separation. The first stage separates the liquid water and fat mixture from the solids. The second stage further separates fat from water. The solids may be used in food products or pet foods, and fat may also be used in food products, or soap making operations. Most edible rendering is done by meat packing or processing companies.

Trap grease is collected at three of the four rendering facilities. Trap grease is pumped from restaurant and other food service establishment grease traps; also known as grease interceptors. Grease interceptors are used by restaurants to reduce the volume of fats, oils and grease (FOG) from entering the city sewer systems and prevent blockages of that system as well as the accidental discharge of wastewater into the storm drain system.

The proposed rule does not apply to:

- Facilities that collect, store or process trap grease that are not located at a rendering facility. It should be noted that odors from these facilities will be addressed under a separate rule-making.
- Facilities conducting only edible rendering operations (products for human consumption) that do not also conduct inedible rendering.
- Collection centers for animal carcasses and parts that do not also conduct inedible rendering operations (products not for human consumption) or process trap grease.

Definitions

Refer to the proposed rule language or Chapter 2 for key definitions.

Core Requirements for New and Existing Facilities

Odor Best Management Practices

All facilities are required to implement Best Management Practices (BMP) for odor control. This requirement is applicable to new facilities upon startup, and to existing facilities within 90 days after rule adoption. There are four BMP that are no longer required after an existing facility begins operating certain processes within a permanent enclosure or closed system. Since these processes occur within a permanent enclosure, any odors emitted from these processes will be captured by odor control equipment serving the permanent enclosure. These BMPs include:

- Preventing Accumulation of Processed Materials within Enclosures
- Washdown of Receiving Area
- Washing of Floor Drains
- Repair of Leaking Components

Permanent Enclosure/Operate in Closed System Requirement

All facilities are required to operate certain odorous processes within a permanent enclosure or within a closed system. This requirement is applicable to new facilities upon startup and to existing facilities within approximately 3 to 4 years after rule adoption. Existing facilities are required to submit a permit application to the SCAQMD within 12 months after rule adoption for odor control equipment, to be evaluated in combination with a permanent enclosure.

If an existing facility owner/operator currently operates all applicable processes within a closed system, no permit application needs to be submitted, as there is no requirement for a permanent enclosure or an odor control system in this case. However, it is anticipated that all existing rendering facilities subject to PR 415 will need to construct or retrofit one or more permanent enclosure(s) under the rule proposal.

The SCAQMD will issue a Permit-to-Construct (P/C) for the proposed enclosure or retrofit of an existing non-compliant enclosure. As described above, the permanent enclosure and odor control system will be evaluated together. The timing for issuance of the P/C by SCAQMD is within 180 days after the permit application is deemed complete. This will occur approximately 18 months or later after rule adoption, depending on the date a permit application is deemed complete. A rendering facility then has 24 months

after the date of P/C issuance to construct and commission the permanent enclosure, ventilation system and odor control system.

Ventilation of Permanent Enclosure to Odor Control Equipment

All permanent enclosures are required to be ventilated to odor control equipment. The purpose of this requirement is to prevent release of odorous or foul air from a permanent enclosure directly into the environment. The timing for this requirement is the same as the timing for a permanent enclosure – upon startup for new facilities, and 24 months after a Permit to Construct (P/C) is issued for the combined permanent enclosure/odor control system for existing facilities.

Wastewater Treatment

Certain wastewater treatment processes are required to be enclosed within a permanent enclosure (ventilated to odor control) or operated in a closed system. This includes screens, skimmers, clarifiers (including dissolved air flotation), settling tanks, sludge dewatering equipment and the outlet of wastewater treatment to the city sewer.

Installation of Odor Complaint Contact Sign

All rendering facilities are required to display a sign with contact information for area residents and businesses to phone in odor complaints. This requirement is applicable upon startup for new facilities and within 6 months after rule adoption for existing facilities.

The sign must list the SCAQMD's 1-800-CUT-SMOG number as the first contact for odor complaints. If desired by the rendering facility owner/operator, a secondary contact at the facility may be listed on the sign.

Submittal of Odor Mitigation Plan

In the case of pervasive and ongoing odorous emissions from a rendering facility, the owner or operator may be required to submit an Odor Mitigation Plan (OMP). There are two situations that can trigger this requirement, as follows:

1. A Notice of Violation (NOV) is received for Public Nuisance subject to Rule 402
2. 3 or more confirmed odor events are received in a consecutive 180-day period.

Specific Cause Analysis

If a facility receives a Rule 402 Notice of Violation (NOV) for public nuisance, or if a confirmed odor event is declared for a facility, an analysis of the specific cause(s) surrounding the NOV or odor event is required to be conducted. The analysis is a process used by a facility subject to this rule to investigate the cause of a confirmed odor compliant, identify corrective measures needed, and corrective measures taken to prevent recurrence of a similar event.

Odor Best Management Practices

There are 18 Best Management Practices (BMP) under PR 415 that will assist in reducing odors from various points or processes within a rendering facility. These include:

1. Covering of Incoming Transport Vehicles – cover truck bed.

2. Spilled Raw Rendering Materials – put into receiving area within 30 minutes.
3. Direct Transfer of Raw Rendering Materials – directly into permanent enclosure.
4. Standards for Washing – using hot water (>120^{o}F and high pressure (1000 psi).
5. Washing of Outgoing Transport Vehicles – prior to leaving facility.
6. Washing of Drums and Containers – prior to leaving facility.
7. Holding Time of Incoming Raw Rendering Materials – no more than 4 hours.
8. Cleanup of Spilled Raw Rendering Materials – no more than 1 hour.
9. Repair of Facility Grounds (all areas of broken concrete or asphalt where rendering materials are unloaded, stored or otherwise handled) – no more than 180 days.
10. Holding Time of Raw Materials after Size-reduction – no more than 1-hr after grinding.
11. Holding Time of Cooked Materials – no more than 1-hr after removing from batch cooker.
12. Transfer of Raw or Cooked Rendering Materials between Enclosures – by closed system of conveyance or odor-tight containers.
13. Trap Grease Delivery Trucks – in a closed system.
14. Venting Trap Grease Delivery Vehicles to Odor Control Equipment – unless truck is unloaded inside a permanent enclosure.
15. Preventing Accumulation of Processed Materials within Enclosures – no standing water or other liquids.
16. Washdown of Receiving Area – at least once per shift.
17. Washing of Floor Drains – maintain drains to prevent accumulation of rendering materials.
18. Repair of Leaking Components – within 72 hours.

BMP 15 through 18 are no longer required after the deadline for a permanent enclosure or closed system(s) becomes effective.

Enclosure and Odor Control Standards

Certain operations and processes at a rendering facility are required to be enclosed within a permanent enclosure, or to be operated within closed systems under PR 415. These include:

- Raw material receiving areas at rendering facilities;
- Conveyors associated with raw material transfer operations that are not completely covered;
- Size reduction and conveying equipment, including but not limited to: breakers, crushers hoggers, grinders and conveyors associated with raw material sizing that are not completely covered;
- Raw material cookers; and,
- Process equipment for separating rendered fat from protein materials (meat and bone meal), including but not limited to: centrifuges, presses, separators, pumps, screens, tanks that aren't completely enclosed, bins and hoppers, and conveyors used to transport materials between equipment that are not completely covered.

A permanent enclosure must meet certain requirements. These include:

- The combined area of all routine enclosure openings through which odors can escape from a permanent enclosure must not exceed 5% of the enclosure envelope.
- A permanent enclosure must be ventilated by a system designed and operated to maintain a minimum inward face velocity through all routine enclosure openings of at least 200 feet per minute (fpm).
- Alternative standard - In lieu of meeting the requirements for minimum inward face velocity, it is allowable for the permanent enclosure to be ventilated such that each routine enclosure opening is continuously maintained at a negative differential pressure of at least 0.02 mm of Hg (0.011 inches H2O) as indicated by a digital differential pressure monitor.

Wastewater Treatment

Certain wastewater treatment processes at a rendering facility are required to be enclosed within a permanent enclosure, or to be operated in a closed system. These include:

- Screens
- Skimmers
- Clarifiers, including dissolved air flotation
- Settling tanks
- Sludge dewatering equipment
- Sludge drying equipment, and
- Wastewater treatment outlet to city sewer.

Equipment and Procedures Currently Used by Vernon Area Rendering Facilities

During site visits to each rendering facility in Vernon, it became apparent that there is a wide range of odor control efforts used by the four Vernon-area rendering facilities. These are described below.

Enclosures

Enclosure of odorous rendering operations may provide the most effective means of odor control. However, only one facility had a completely enclosed raw material receiving operation. The enclosed building had roll-up doors to allow delivery truck access. This building is kept under negative pressure and vented to odor control equipment.

Two rendering facilities have partial enclosures around the receiving area. One consists of a roof with three walls and the fourth wall open. The other has only a roof structure over the receiving pit.

The fourth facility has an asphalt/concrete slab, where raw materials are directly deposited, with no covering. This method of receiving raw material does not offer any protection from the sun or wind, allowing accelerated decomposition to occur in the sun during warm days and allowing odors to be readily transported off-site.

All four facilities have at least partially enclosed cooking and fat processing areas, consisting of a roof with one or more walls. However, in order to meet the proposed enclosure requirements,

all four facilities would be required to do additional construction to completely enclose these operations. One facility would need to replace or repair the sheet metal sheathing which contains a number of holes.

One facility has an enclosure around the wastewater treatment area. It is an older masonry building and some additional work would need to be performed for the building to be compliant with the rule proposal. In addition, the wastewater outlet to the city sewer connection was open to the atmosphere, allowing odors from the treated wastewater to be released. The other three rendering facilities have open wastewater treatment processes that would need to be enclosed and vented to odor control (or converted to closed systems) in order to be compliant with the rule proposal.

Odor Control Equipment

All four rendering facilities have a means of controlling high-intensity odors from cookers, and currently comply with the requirements of Rule 472 – Reduction of Animal Matter. One facility has a packed-bed scrubber that controls odors from the raw material receiving building. It is not known whether this scrubber has the capacity to accommodate additional airflow from enclosures that the facility would be required to construct and ventilate under the rule proposal. The other three rendering facilities would likely need to install additional control equipment to comply with the rule proposal.

PUBLIC PROCESS

Development of PR 415 is being conducted through a public process. A working group was established for this rulemaking, consisting of representatives from industry, the surrounding community, environmental groups and other interested parties. Throughout the rulemaking process, the SCAQMD staff met with the Working Group twice, in July 2014 and December 2014. A third working group meeting is planned for February 24, 2015. A Public Workshop will be conducted in March 5, 2015 to solicit comments on the staff proposal. Responses to comments received at the Public Workshop will be included in an Appendix to the Draft Staff Report.

CHAPTER 1: BACKGROUND

INTRODUCTION

RENDERING OPERATIONS

REGULATORY HISTORY

INTRODUCTION

Proposed Rule (PR) 415 – Odors from Rendering Facilities is designed to reduce odors from facilities conducting rendering operations. Rendering is a process that converts waste animal tissue into stable, value-added commodities, including fat commodities such as yellow grease, choice white grease, and bleachable fancy tallow and protein commodities, such as meat and bone meal and poultry byproduct meal. Industries that use the commodities produced during rendering include animal feed, fertilizer, biofuels, cosmetics and other industries.

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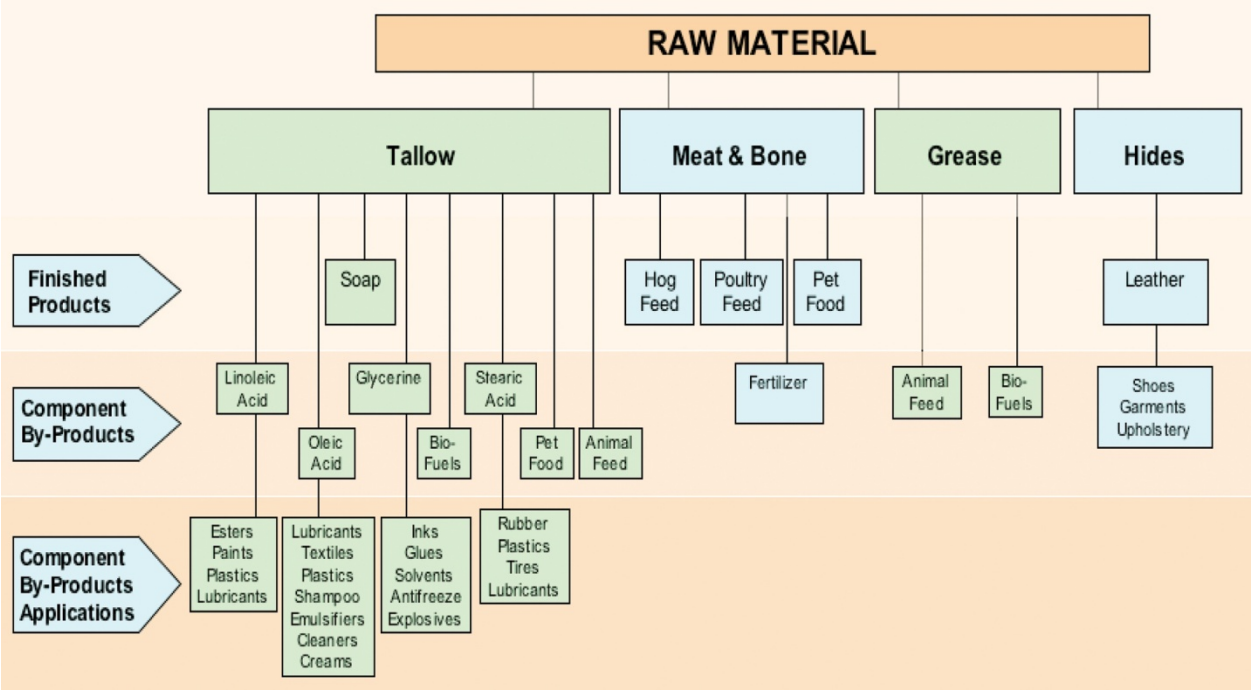
The nearly 20 billion pounds of ingredients that renderers produce each year have been valued at more than $3 billion, of which about $900 million is exported. Meat and bone meal accounted for 6.6 billion pounds of this, poultry byproducts 4 billion pounds, and blood meal 226 million pounds[5]. These ingredients are valued for their nutrients - high protein content, digestible amino acids, and minerals — and their relatively low cost. Poultry operations and pet food manufacturers accounted for 66% of the domestic meat and bone meal market of nearly 5.7 billion pounds in 2000, while hog and cattle operations accounted for most of the remaining market. Figure 1-1 shows the products and by-products of the rendering process.

Figure 1-1 – Products and By-products Produced During Rendering



http://www.sec.gov/Archives/edgar/data/916540/000091654010000031/ex99_1.htm

Integrated vs. Independent Rendering Facilities

Integrated plants operate in conjunction with animal slaughter and meat processing plants and handle 65%-70% of all rendered material. The estimated 95 U.S. and Canadian facilities (NRA) render most edible animal byproducts (i.e., fatty animal tissue), mainly into edible fats (tallow and lard) for human consumption. Edible rendering is subject to the inspection and safety standards of USDA's Food Safety and Inspection Service (FSIS) or its state counterparts. In California, that agency is the California Department of Food and Agriculture (CDFA). These

[4] "Survey Says: A snapshot of Rendering", Jekanowski, Render Magazine, 2011

[5] "Animal Rendering: Economics and Policy", CRS Report for Congress, Becker, 2004

plants also render inedible byproducts (including slaughter floor waste) into fats and proteins for animal feeds and for other ingredients.

Because a meat plant typically processes only one animal species (such as cattle, hogs, or poultry), its associated rendering operations likewise handle only the byproducts of that species. The inedible and edible rendering processes are segregated.

Independent operations handle the other 30%-35% of rendered material. These plants, estimated by NRA at 165 in the United States and Canada, usually collect material from other sites using specially designed trucks. They pick up and process fat and bone trimmings, inedible meat scraps, blood, feathers, and dead animals from meat and poultry slaughterhouses and processors (usually smaller ones without their own rendering operations), farms, ranches, feedlots, animal shelters, restaurants, butchers, and markets.

As a result, the majority of independent renderers are likely to handle mixed species. Nearly all of the resulting products of the rendering process from independent facilities are intended for nonhuman consumption (e.g., animal feeds, biofuels, industrial products). The U.S. Food and Drug Administration (FDA) regulates animal feed ingredients, but its presence in rendering facilities, or in feed mills that buy rendered ingredients, is not a legal requirement if the facility does not conduct edible rendering operations.

RENDERING OPERATIONS

The Rendering Process

In most facilities, raw materials are ground to a uniform size and placed in cookers, which evaporate moisture and free fat from protein and bone. A series of conveyers, presses, and a centrifuge continue the process of separating fat from solids. The finished fat (e.g., tallow, lard, yellow grease) goes into separate tanks, and the solid protein (e.g., meat and bone meal, poultry meal) is pressed into cake for processing into feed. Other rendering systems may be used, including those that recover protein solids from slaughterhouse blood or that process used cooking oil from restaurants. This cooking oil is recovered (often in 55-gallon drums) for use as yellow grease in non-human food products like animal feeds.

Batch vs. Continuous Rendering

Batch Rendering

A batch cooker is designed to be loaded in discrete batches; then the raw materials are processed as a batch to a target moisture content percentage. Batch processing times vary due to moisture content of the raw material and the operator can adjust the temperature of the cooker as needed to achieve the desired moisture content at the end of the cycle. The batch is then unloaded for fat separation. A batch cooker can function as a cooker, dryer, hydrolyzer, or processor.

Continuous Rendering

Note: The numbers in the following description of a continuous rendering process correspond to process points indicated on Figure 1-2 – Schematic Diagram of a Typical Continuous Rendering Process.

In a typical continuous rendering process, raw material from receiving bins (1) is conveyed from the bins by a conveyor (2) and discharged across a magnet (3) that removes ferrous metal. A raw

material grinder (4) then reduces the raw material to a uniform particle size for material handling and improved heat transfer during cooking. The ground raw material is then metered from a bin (5) at a constant rate into a continuous cooker operating at a constant temperature (6).

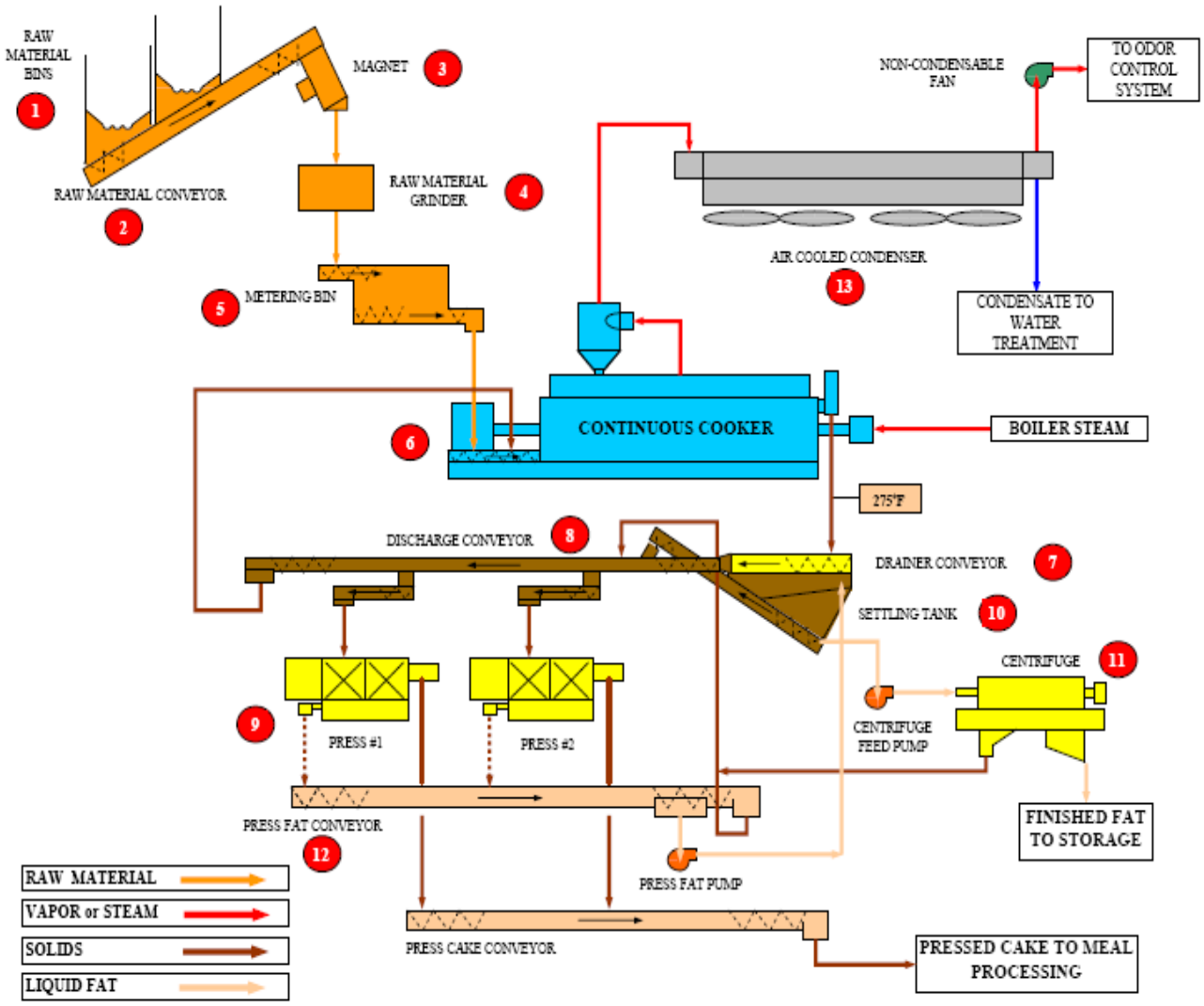
The continuous cooker is generally heated by boiler steam. The cooker brings raw material to a temperature between 240º and 290ºF, evaporating moisture and freeing fat from protein and bone. A dehydrated slurry of fat and solids is discharged from the continuous cooker and transported to a drainer conveyor (7) that separates liquid fat from solids. Solids from the drainer conveyor are combined with solid discharge from the settling tank (10) and centrifuge (11) and conveyed via discharge conveyor (8) to screw presses (9), which mechanically reduce the solids' fat content. Solids discharged from the screw presses as a pressed cake (12) are further processed into meal.

The fat removed in the screw presses (9) is pumped to a settling tank (10), along with fat discharged from the drainer conveyor. In the settling tank, heavier bone and protein particles settle to the bottom. Liquid fat from the settling tank is pumped to a centrifuge (11), which removes solid impurities from the fat. The clarified fat is further processed or stored as finished fat[6].

Water vapor exits the continuous cooker (6) through a vapor duct system that generally includes an entrainment trap to separate entrained solids and return them to the cooker. A duct system then transports vapor to a condenser (13). Non-condensable gases are removed from the condenser and routed to an odor control system (not shown). Odorous gases from other parts of the process are also routed to the odor control system through a ductwork system. Figure 1-2 is a schematic diagram of a typical continuous dry rendering process.

[6] Essential Rendering – Rendering Operations; Anderson

Figure 1-2 – Schematic of Typical Continuous Dry Rendering Process



From Rendering: A Proven Disposal Technology; Hamilton, R. (2003). Kansas City, Missouri: Midwest Regional Carcass Disposal Conference.

Potential for Odors from Rendering Operations

Odor control remains one of the rendering industry's greatest challenges. Research in the early 1970s indicated that untreated rendering plant emissions could be detected up to 20 miles away from rendering plants[7]. As for the sheer number of odorous compounds in rendering odors, 110 volatile compounds can be identified in rendering odors, with about 25 contributing most

[7] "Odor Controls for Rendering Plants." *Environmental Science and Technology* 7 (6):504-510. Bethea, Murthy, Carey; 1973.

noticeably to rendering plant odors[8]. Most of these organic compounds are generated from the breakdown of proteins and fats during the cooking process[9] or during decay of raw material prior to cooking.

Besides organic compounds, other odor compounds of concern from rendering operations include hydrogen sulfide and ammonia. Because of the wide variety of chemical compounds contributing to rendering plant odors, current strategies for odor control rely on destroying all volatile compounds being emitted. However, the most offensive odor compounds may not necessarily be the most prevalent in a mixture of volatiles[10].

There are several operations and processes within a rendering facility that have noticeable odors associated with them. These include, in no particular order of odor intensity; raw material receiving, raw material size reduction, cooking, fat processing, and wastewater treatment. High intensity odors from the cooker are currently required to be incinerated at 1202^{o}F for at least 0.3 seconds under SCAQMD Rule 472 – Reduction of Animal Matter. Incineration at this temperature is a highly effective odor control method for organic compounds, the composition of most substances in rendering odors.

Since the high intensity odors emitted from the cooking process are already required to be controlled, the nature of odors that continue to be present at a rendering facility from the processes noted are fugitive in nature. There are many points both in a batch cooking process as well as in a continuous cooking process where fugitive odors can escape. Collectively, this large number of sources of fugitive odors can create odors which are emitted from a rendering facility and can travel beyond the facility's property line.

Character of Odors from Rendering Operations

Humans perceive odors when sensory neurons inside the nose are stimulated by one or more odorants. An odorant is any substance that has a noticeable odor. There are 350 possible odorant receptor genes that are responsible for the perception of odors in the neurons within the nose, and the odor receptors on each neuron are activated by one, two or more odorant compounds. The activation of multiple sensory neurons means that there are a large number of unique odors that humans can perceive[11]. Odors can be described by several qualities, including:

- Character – the qualitative property of the odor (burnt, fishy, sweet, etc.)
- Intensity – weak, mild, strong
- Frequency – how often the odor appears
- Duration – the length of time an odor is present

Together, all of these qualities define the hedonic tone of the odor, or how pleasant or offensive the odor is perceived to be. Not everyone perceives odors the same way. Sensitivity to different odors can vary widely between people.

[8] "Gas Chromatography/Mass Spectrometry Identification of Organic Volatiles Contributing to Rendering Odors." *Environmental Science and Technology* 16 (12):883-886. Van Langenhove, Van Wassenhove, Coppin, Van Acker, Schamp; 1982

[9] http://www.rendermagazine.com/articles/2012-issues/august-2012/development-of-new-odor-control-methods/

[10] http://www.rendermagazine.com/articles/2012-issues/august-2012/development-of-new-odor-control-methods/

[11] Characterization of Odor Nuisance; Curren, 2012

Table 1-1 on page 1-8 shows 25 common chemical compounds that contribute noticeably to rendering facility odors, and includes the odor detection threshold for each, if known. The odor detection threshold is a measure of the lowest concentration of an odorant that is perceptible by the human sense of smell. This threshold is given in parts per billion (PPB). As evident from Table 1-1, some of these compounds can be detected at very low concentrations; 1 PPB or lower.

Table 1-1 – Character of Odors from Rendering Operations

Chemical Abstract Service (CAS) No.	Odorant	Chemical Formula	Comments	Odor Threshold (ppb)	Odor Character	Odor Threshold References
Aldehydes and Ketones						
75-07-0	acetaldehyde	CH_3CHO	Occurs naturally in coffee, bread, and ripe fruit, and is produced by plants	50	lemon, alcohol	1
16423-19-1	geosmin (trans-1,10-dimethyl-trans-9-decalol)	$C_{12}H_{22}O$	Earthy odor contaminant in fish, beans and water	0.1	earthy-muddy odor	2
623-37-0	3-hexenal	$C_6H_{14}O$	Eye irritant	0.25	horseradish, fruity, fishy, sweaty	3
557-48-2	2,6-nonadienal	$C_9H_{14}O$	Used to flavor water.	0.01	powerful cucumber	3
18829-56-6	2-nonenal	$C_9H_{16}O$	Odor is perceived as orris, fat and cucumber. Has been associated with human body odor alterations during aging.	0.1	paper odor	3
4312-99-6	1-octene-3-one	$C_8H_{14}O$	Odorant responsible for the typical metallic smell of metals and blood coming into contact with skin. Strong metallic mushroom-like odor with a low odor detection threshold	0.005	mushroom and musky	3
Amines (Nitrogen Compounds)						
7664-41-7	ammonia	NH_3	Trace quantities in the atmosphere; produced from the putrefaction (decay process) of nitrogenous animal and vegetable matter.	17	very sharp, pungent	4
multiple	butyl amine	$C_4H_{11}N$	One of four isomeric amines of butane. Liquid having the fishy, ammonia-like odor common to amines.	1,800	fishy	5
124-40-3	dimethyl amine	$(CH_3)_2NH$	Found widely in animals and plants; present in many foods at the level of a few mg/kg. Ammonia-like odor.	37	pungent fishy	4
75-04-7	ethyl amine	C_2H_7N	Strong ammonia-like odor.	950	fishy	6
74-89-5	methyl amine	CH_3NH_2	Simplest primary amine. Has a strong odor similar to fish.	2.1	pungent fishy	4
462-94-2	cadaverine (1,5-diaminopentane)	$C_5H_{14}N_2$	Toxic in large doses.	N/A	cadaver	N/A
120-72-9	indole (2,3-benzopyrrole)	C_8H_7N	Can be produced by bacteria as a degradation product of the amino acid tryptophan. Occurs naturally in human feces and has an intense fecal odor.	1.0	fecal	4
110-60-1	putracene (1,4-diaminobutane)	$C_4H_{12}N_2$	Toxic in large doses.	N/A	putrid	N/A
83-34-1	skatole (3-Methyl-1H-indole)	C_9H_9N	Mildly toxic organic compound belonging to indole family. Occurs naturally in feces (produced from tryptophan in the digestive tract); strong fecal odor	1.2	putrid, fecal	4
121-44-8	triethylamine	$N(CH_2CH_3)_3$	Strong fishy odor reminiscent of ammonia; smell of the hawthorn plant.	480	strong fishy	7
75-50-3	trimethylamine	$N(CH_3)_3$	Product of decomposition of plants and animals. Odor associated with rotting fish, some infections, bad breath	0.8	pungent, fishy, saline odor	8
Organic Acids						
107-92-6	butyric acid (butanoic acid)	$C_4H_8O_2$	Product of anaerobic fermentation (including in the colon and as body odor). It has an unpleasant smell and acrid taste. Distinctive smell of human vomit.	1.0	sour milk, rancid butter	4
Sulfur Compounds						
109-79-5	butyl mercaptan	$C_4H_{10}S$	Fetid (extremely foul-smelling) odor, commonly described as "skunk" odor.	1.0	ode to skunk	9
624-92-0	dimethyl disulfide	$C_2H_6S_2$	Flammable liquid with an unpleasant, garlic-like odor.	12	sour, onion like odor	10
75-18-3	dimethyl sulfide	C_2H_6S	Becomes highly disagreeable at even quite low concentrations.	1.0	cabbage like	3
75-08-1	ethyl mercaptan	C_2H_6S	Strongly disagreeable odor that humans can detect in minute concentrations. Intentionally added to butane and propane to impart an easily noticed smell to these normally odorless fuels.	1.0	sour, garlic odor	11
7783-06-4	hydrogen sulfide	H_2S	Often results from the bacterial breakdown of organic matter in the absence of oxygen gas, such as in swamps and sewers; process is known as anaerobic digestion.	4.7	rotten eggs	4
74-93-1	methyl mercaptan	CH_4S	Released from decaying organic matter.	2.2	sour, garlic odor	12
Other Compounds						
2371-42-8	2-methyl-iso-borneol	$C_{11}H_{20}O$	Odor detection threshold is very low. One of the chemicals with major influence on the quality of drinking water	N/A	camphoraceous odor	N/A
123-92-2	iso-amyl acetate (3-methylbutyl acetate)	$C_7H_{14}O_2$	Used to confer banana flavor in foods.	25	banana-like odor	13

a. Reference: 1999 Proceeding of the Georgia Department of Agriculture Odor Control Program for Rendering Plants

N/A = Not Available

Odor Threshold References

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9. Matheson Tri-Gas, Inc. Material Safety Data Sheet
http://www.mathesongas.com/msds/ButylMercaptan.htm
10. Matheson Tri-Gas, Inc. Material Safety Data Sheet
http://www.mathesongas.com/msds/DimethylSulfide.html
11. Matheson Tri-Gas, Inc. Material Safety Data Sheet
http://www.mathesongas.com/msds/EthylMercaptan.htm
12. Matheson Tri-Gas, Inc. Material Safety Data Sheet
http://www.mathesongas.com/msds/MethylMercaptan.htm
13. NIOSH/OSHA/DOE Health Guidelines
http://www.osha-slc.gov/SLTC/healthguidelines/isoamylacetate/recognition.html

REGULATORY HISTORY

Rule 402 - Nuisance

Rule 402 prohibits the discharge of air contaminants or other material which can cause nuisance or annoyance to any considerable number of people or to the public or which endanger the comfort or repose of any such persons, or the public. Historically, facilities within the South Coast Air Basin that emit nuisance odors have been cited for violation of Rule 402.

Under Rule 402, a Notice of Violation (NOV) for public nuisance can only be issued after the SCAQMD receives public complaints. A specified number of public complaints, generally 6 or more, must be received to constitute a 'public nuisance'. There are limitations with the implementation of Rule 402 to address complaints from odors from rendering facilities. Rule 402 does not contain a mechanism to reduce odors from rendering facilities. Rule 402 is a reactive approach to public complaints, since SCAQMD staff must wait for public complaints prior to taking enforcement action. Often, there is a lag in time between the complaint and inspector verification of an odor, making it difficult to address specific odor issues. In addition, Rule 402 does not establish minimum standards to minimize or reduce odors.

SCAQMD Authority to Regulate Odors

The District is given broad authority to regulate air pollution from "all sources, other than emissions from motor vehicles." Health and Safety Code (H&SC) §40000. The term "air pollutant" includes odors [H&SC §39013]. Therefore, the District may regulate to control air pollution, including odors, from PR 415 sources. In addition, the District has authority to adopt such rules as may be "necessary and proper" to execute the powers and duties imposed on the District by law. [H&SC §40702].

The District's legal authority to adopt and enforce PR 415, establishing best management practices and requirements to reduce odors from rendering facilities also derives from H&SC §41700, which, in pertinent part, prohibits the discharge of air contaminants causing annoyance to the public. It further prohibits the discharge of air contaminants, such as odors, which "endanger the comfort, repose, health, or safety of any of those persons or the public, or that cause, or have a natural tendency to cause, injury or damage to business or property." [H&SC §41700]. The District's authority granted by H&SC 41700 to protect the public's comfort and health and safety provides for the regulation of facilities in order to prevent the discharge of odors before they cause nuisance or annoyance to the public.

In addition, H&SC §40001(b) authorizes the District to adopt rules and regulations, such as PR 415, and provides, in relevant part, for the prevention and abatement of air pollution episodes which cause discomfort or health risks to a significant number of persons. PR 415 is a reasonable and proper use of the District's regulatory authority.

Findings of Public Nuisance

In order for an odor complaint to be verified by an SCAQMD inspector, the inspector needs to perform several sequential steps, including: respond to the odor complaint; interview the complainant; detect the same odor as the complainant describes; and trace the odor back to its source. It is often difficult to complete this process during an odor event while the odors are still present, assuming that a facility source can even be identified. Due to the very long distances

rendering odors can travel and the proximity of the four Vernon area facilities relative to one another, it is often not possible to pinpoint a single facility as the source of odors.

Odor events from rendering facilities in the Vernon area rarely rise to the level of public nuisance as defined under Rule 402 and H&SC §41700. This is true despite the fact that unpleasant odors can often be detected miles away from the Vernon area rendering facilities, and odors are prevalent many days out of the year. In fact, a public nuisance event is so rare that since 2000, only a single notice of violation (NOV) has been issued for public nuisance odors from a rendering facility. However, given the difficulties of making a finding of public nuisance, the low number of NOVs is not indicative of the impact on area residents.

Regulation of Rendering Facilities in other States

Table 1-2 presents a summary of the requirements imposed by 16 states on rendering facilities, without references to state regulations. It should not be taken as an exhaustive list of all requirements imposed on rendering facilities in each listed state; rather, a brief summary of the State regulations that SCAQMD staff was able to identify.

Table 1-2 – Summary of Rendering Requirements by State

State	Summary of State Rendering Requirements
Alabama	Render in a pressure tank where temperature is not lower than 220 degrees for not less than 4 hours. Use steel-bodied trucks or trucks with impervious liners for transport. Thoroughly clean and disinfect transport vehicles after each trip. Separate room with concrete floor for skinning and cutting up dead animals. Do not store grease or other tankage in room for skinning/cutting up.
Arizona	Note: Arizona requirements divided into: 1. Slaughter Establishments; 2. Rendering to Produce Certified Animal Fat; 3. Meat from Dead Animals used as Animal Food. Raw materials free from condemned and/or diseased material. Walls of smooth, finished Portland cement plaster, glazed tile, or other approved material impervious to moisture. Floors constructed of dense concrete or floor tile, sloped to drain. Hot and cold water connections shall be provided. No openings between an inedible products department and an edible products department. Loading dock shall be paved, drained, and of sufficient size to accommodate the largest truck used. Raw materials not certified for animal fat production separated at all times (transport, storage and rendering) from other material in separate marked containers identified as such. Hot and cold water provided (hot water at least 180° F). Drainage and plumbing system and sewage disposal system that will not serve as a breeding place for flies, constitute a hazard, or endanger public health. Floors, walls, ceilings, partitions, posts, doors, and other structures of materials capable of being thoroughly cleaned. Floors must have sufficient drainage to preclude stagnant accumulations of moisture. All outside windows and doors shall be screened. Rooms with well-distributed ventilation to prevent uncontrolled mold growth and filth or bacteria that may endanger health. Plant kept free from flies, rats, mice, and vermin.

State	Summary of State Rendering Requirements
California	Note: California requirements inclusive of renderers, collection centers, dead animal haulers and transporters of inedible kitchen grease. Vehicles used in transportation leakproof and constructed of impervious material to permit cleaning and sanitizing and to control insects and odors and prevent the spread of disease. Vehicles used to transport dead animals cleaned and sanitized at the end of each day. Rendering facilities must be physically separate from any facility with meat or meat byproducts. Rendering facilities that receive carcasses from any source other than a slaughter facility on the premises can not operate within 1000 yards of a facility that slaughters livestock or other animals for human consumption. Rendering facilities must comply with the California Building Code (2007). Buildings of sound construction, to discourage entrance/harboring of pests. Floors, walls, ceilings, partitions and doors of material and finish as to make them readily cleanable. Unloading slab of sufficient size to contain all waste material unloaded on it; constructed of concrete and sloped to result in quick draining of fluids. Floors of rooms graded to cause runoff into drains and avoid pooling. No excessive build-up of dust and organic matter on equipment, floors, walls and ceilings or excessive accumulation of water, blood, manure, raw material, grease or organic matter on floors and passageways. Plant premises kept free of excessive junk, wood piles, debris and weeds that provide potential breeding places and harborage for rodents; excessive accumulation of raw materials, including manure piles, paunch contents, hair piles, dead animals and other places suitable for fly breeding; pooling water; and similar nuisances and potential breeding areas for insects and vermin.
Colorado	Rendering plants of sound construction and kept in good repair, to prevent the entrance into, or the harboring therein, of rodents, birds, insects, vermin, dogs, cats. Plant premises kept clean and orderly and free of strong or foul odors, smoke and other pollutants. Outside areas kept free from refuse, rubbish and waste materials, to prevent harborage of rodents, insects, vermin. Supply of running water available, adequate for operations. Water temperature not less than 180 degrees F., or a chemical sanitizing agent used for washdown. Vehicles used in the transportation of dead animal carcasses, parts, bone and raw tankage material constructed and maintained to prevent leakage of blood & tissue. Load compartment covered whenever a load is on board. Floors, walls, ceiling, partitions, posts, doors, and other parts of each plant structure shall be of material, construction, and finish to be readily and thoroughly cleaned. Floor kept water tight.
Georgia	Floors constructed of concrete or other non-absorbant material. Ample hot water supply (140 F). Adequate drainage. Drainage only into sewer. Cleaned and sanitized daily to prevent odor. Trucks used to transport carcasses or refuse on public highways must prevent seepage and residue from escaping. Carcasses/refuse not allowed to accumulate or be held except at rendering plant. Rodent/vermin control diligently practiced. Barrels used to transport carcasses/refuse marked "INEDIBLE" with letter at least 2 inches high.

State	Summary of State Rendering Requirements
Idaho	Rendering establishments must be constructed to protect finished product and prevent pollution of surrounding environment or creation of a nuisance to the public. Rendering material transported to the rendering establishment in covered and leak-proof vehicles, such vehicles to be used for this purpose only and to be cleaned and disinfected after delivering each load. Rendering material shall be heated to a sufficient temperature for a sufficient length of time to destroy all pathogens, and processed under sanitary procedures that prohibit the recontamination of the product after cooking.
Illinois	Floors constructed of concrete or other non-absorbant material. Adequate drainage. Rooms to be equipped with sufficient steam and steam hose to clean floors and trucks. Floors, walls and equipment kept in sanitary condition and cleaned with steam. Trucks and truck equipment kept in sanitary condition and cleaned with steam.
Kentucky	Haul carcass in covered vehicle, bed or tank which is constructed so that no drippings or seepings from carcass can escape. If driver suspects that animal died of communicable disease, vehicle must be disinfected.
Michigan	Except for approved escapes for steam, all tanks, cookers, boilers, driers, and condensers must be airtight. Steam shall be controlled in a manner that does not constitute a public or private nuisance or pose a threat to the health of the public or animals. Floors and walls constructed of a material that can be easily cleaned and disinfected. Floors have adequate surface drainage so that liquids will not collect or create standing pools. Adequate supply of running hot water for cleaning purposes. Loading and unloading docks/platforms constructed so that drainage is adequate and natural precipitation will not collect or create standing pools. Equipment necessary to maintain the facility in a clean and sanitary condition, including insect and pest control equipment. The floor space and equipment in a licensed facility shall be kept clean and free of accumulations of filth and debris. Accumulations of dead animals shall not create a public or private nuisance or health hazard. Odors in and around licensed facilities shall not be allowed to create a public or private nuisance. Odor control equipment available on the premises. Dead animals stored indoors on floors constructed of concrete. Contents of the digestive tract and manure not allowed to accumulate on the premises of any licensed facility for more than 6 days and disposal not allowed to create a public nuisance or health hazard or endanger the health of livestock. The contents of the digestive tract shall be stored in covered containers that do not leak.

State	Summary of Rendering Requirements
Mississippi	No new plant located or constructed within two miles of the nearest point of any municipality with a population in excess of five hundred (500) according to the latest federal census, or within one mile of the nearest boundary of lands owned or controlled in connection either with any state, county, township, city or town park, or boulevard, or of any public school or hospital, or of any charitable, religious or educational institution. Building must have four walls complete and be provided with concrete or cement floors and with good drainage and be thoroughly sanitary in construction and maintenance. Any sewage, drainage, or waste water, if of an offensive or obnoxious character or odor, not be permitted to escape until first treated. All sewage and plant wastes disposal according to recognized and accepted sanitary engineering methods which will not create a public health hazard or unsanitary situation so as to be a nuisance. Plants must be equipped and operated with steel tanks, enclosed dryers and cold water condensers. Tanks must be airtight except proper escapes for live steam, passing through the tanks during cooking, which steam shall be condensed by use of cold water condensers. All equipment for use in disposal or rendering plants constructed and maintained as to prevent any avoidable escape of odors into the air. Skinning and dismembering done within a building so that no unnecessary annoyance caused to other persons by the conditions or unsightly appearance. All such bodies/parts disposed of within 24 hours after delivery to plant.
Ohio	Floors constructed of concrete or some other nonabsorbent materials. Have adequate water supply, and be supplied with sufficient steam and steam hose to clean the floors of the plant and its trucks. All parts of building and all equipment kept in a sanitary condition and cleaned at least once each day with steam. All raw rendering material processed or disposed of within forty-eight hours after arrival at the rendering plant. Cooking vats/tanks airtight, except for proper escapes for steam. Steam disposed of so as to cause no nuisance. All skinning and dismembering of an animal body or part thereof done within a building.
Oklahoma	Floors constructed of concrete, or some other non-absorbent material, adequate drainage, be thoroughly sanitary, be provided with adequate water supply and sufficient hot water to properly and adequately clean floors and trucks. Plants separated by a permanent wall and apart from any other business operation. Maintain the facilities in such sanitary manner as to eliminate insofar as possible, all odors, insects, and vermin. Separate building or storage area shall be provided for the purpose of storing the finished products in order to avoid contamination after processing. No tools or equipment used in handling the unfinished product used in storage area, or in handling of finished product. Rodent and vermin control diligently practiced. Uncontrolled animal and birds not tolerated on premises. Buildings and surrounding grounds shall be kept clean and free from refuse, trash, or the accumulation of product or products of processing, including paunch manure. Barrels used for transporting and storage of scrap or used cooking grease and oils clearly marked "inedible" with letters not less than three inches in height.

State	Summary of State Rendering Requirements
Oregon	All interior surfaces of impervious materials. All areas of the building and equipment used in the conduct of the business shall be maintained in a clean and sanitary condition. Areas and equipment, including storage pits and transfer augers, cleaned at the end of every work day, and a log kept. Floors, walls and ceilings shall be free of any observable raw material. Liquid not allowed to collect or pool. Sanitary drainage provided, leading to a sewage disposal system. Hot water and steam available to maintain the areas and equipment. Outside premises shall be maintained free of raw material, any dried liquid matter from animal parts and litter. Immediately after unloading for processing or into transfer pits, raw material sprayed with an odor control spray. Raw material for rendering not to remain longer than eight hours on the premises of a business without being refrigerated, processed or transferred to another processing site. If circumstances outside control of the business arise which prevent action within eight hours, business to maintain raw material in such a manner that no public annoyance is caused by the unsightly appearance or odor of the raw material. Cooking area must be separate from the storage area and the area where raw materials are skinned, butchered or dismembered. The latter two areas shall also be separate from each other. The cooking, loading and unloading areas shall be enclosed. Pressure control to be automatic, checked daily. Pressure control calibrated, and tested annually. Traps capable of preventing odor in the disposal of steam or exhaust installed on steam vents. Transport of raw material in a manner that no public annoyance is caused by the unsightly appearance of such material. Vehicles maintained to prevent drippings or seepings. Use industrial grade seals. Inspect seals regularly. Maintain seals to prevent drippings or seepings. Vehicles and containers cleaned after every work day to ensure that no raw material, liquids or scraps remain, and a log kept.
South Carolina	Be located on site zoned for use, have a potable water supply, wastewater and solid disposal; utilize buildings and partitions to prevent any contact between raw material and finished product; ensure adequate drainage and sanitation, walls, floors and ceilings constructed of nonabsorbent materials; have adequate supply of hot water and cleaning agents; operate using reasonable precautions to prevent objectionable odors from being discharged beyond the boundaries of the permitee's property; practice rodent and vermin control; mark all barrels with "INEDIBLE" in letters at least two inches in height; have a control and recontamination program that prevents cross-contamination between raw material and finished product.

State	Summary of State Rendering Requirements
South Dakota	A rendering plant must include a building or buildings provided with concrete floors with good drainage and constructed to be maintained in a sanitary condition. There must be provision to prevent entrance to the buildings of rodents or other animals. All windows, doors, and other openings must be screened unless a program for insect extermination is followed in the buildings and on the premises where the buildings are located. All skinning and dismembering of carcasses must be done in buildings constructed for that purpose. The cooking vats must be airtight except for vents for the live steam used in cooking. All steam vents must be furnished with closing mechanisms and steam valve gauges to ensure that cooking is at the required steam pressure. All carcasses and parts must be disposed of by subjecting them to a cooking and rendering procedure in vats or tanks under steam pressure. Floors and walls of the plant must be thoroughly flushed or scrubbed daily with live steam or boiling water when the plant is in operation. All floor washings and other liquid waste or accumulation of water from washing the viscera must be disposed of through disposal facilities.
Texas	Clean floors at the end of each day's operation. Premises kept clean and free from refuse, waste, rodents, insect breeding, & standing water. Collection containers leak-proof and sanitary. Transfer and loading of dead animals must prevent release of animal parts, spills and leaks. Construction/layout of operation must prevent development of malodorous conditions or nuisance. Floors, walls and ceilings constructed of impervious and easily cleanable materials. Exterior walls/roof and openings must protect against intrusion of insects, rodents and other vermin. Provide a paved area adequate to wash & sanitize trucks. Drain paved area to sanitary sewer system. Provide sufficient ventilation to dispel disagreeable odors, condensate and vapor.

Odor Complaints in Communities Surrounding Vernon

Odor complaints in the communities surrounding the Vernon rendering facilities were evaluated over a ten-year period. Complaints and NOVs were evaluated from January 2002 through October 2011. An average of 35 odor complaints per year were received by SCAQMD during this ten year period. Many of these complaints were not verified by an SCAQMD inspector.

SCAQMD staff has received comments in working group meetings from the regulated industry that the relatively modest number of annual odor complaints from areas surrounding the rendering facilities does not justify rulemaking. However, staff feels the number of complaints is not fully indicative of the impact on area residents, for several reasons. First, stockyards, meat packing houses and slaughterhouses that supplied animal carcasses to rendering facilities have existed in the Vernon area for nearly one hundred years. As a result, odors from rendered animal carcasses have long been part of the landscape in the communities surrounding Vernon, impacting the quality of life for area residents. Many area residents have lived with these odors their entire lives. Furthermore, SCAQMD staff has learned from conducting community meetings in the area that proactive complainants didn't perceive a reduction in odors after repeated complaints, and became discouraged, resulting in a general sense from community members that reporting odors does not yield results.

Location of Odor Complaints

Figure 1-3 shows locations where odor complaints indentifying rending odors were received during the 5-year period spanning from January 2006 through September 2011. Figure 1-4 shows a representation of the wind speed and direction (windrose) at the Central Los Angeles meteorological station; the closest meteorological station to the Vernon rendering facilities. Figure 1-4 shows the prevailing winds originating from the west and south, correlating with the clusters of complaints located to the north and east of the facilities.

Figure 1-3 –Odor Complaint Locations during 5-year Period: 2006 - 2011

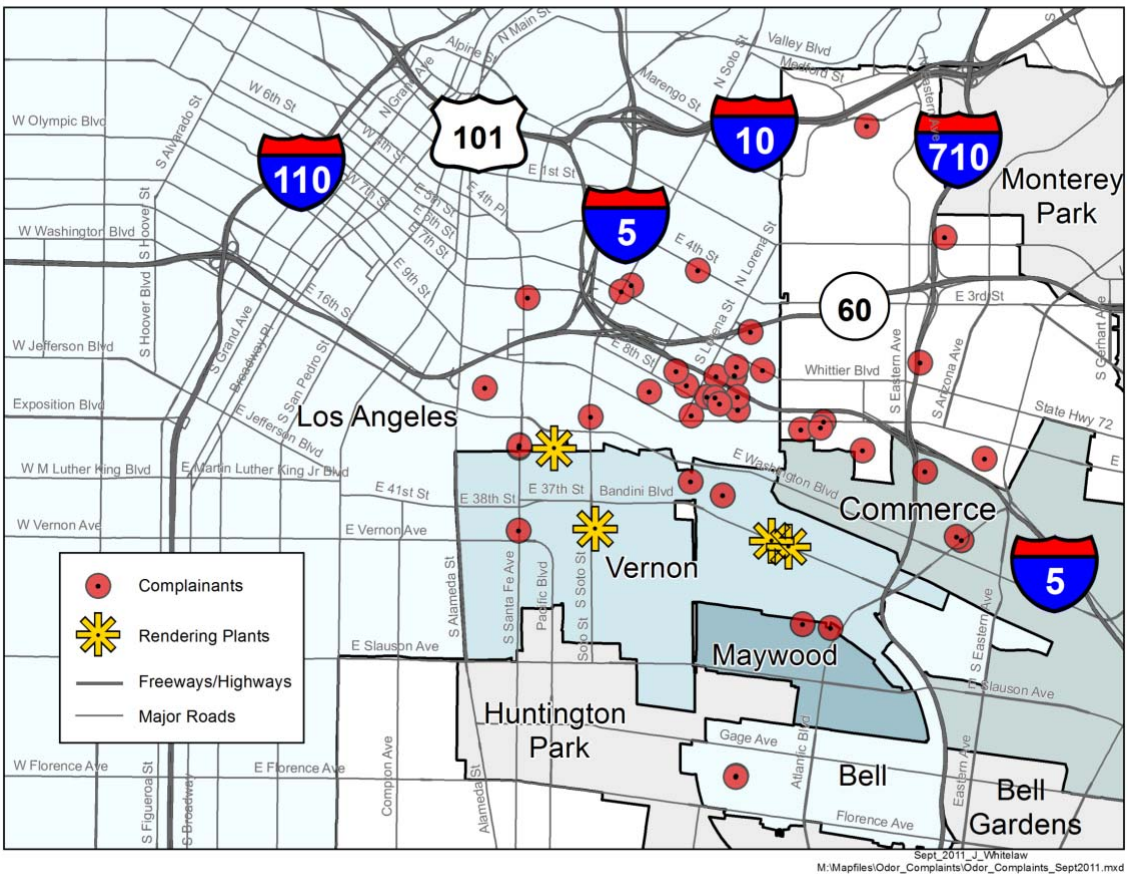
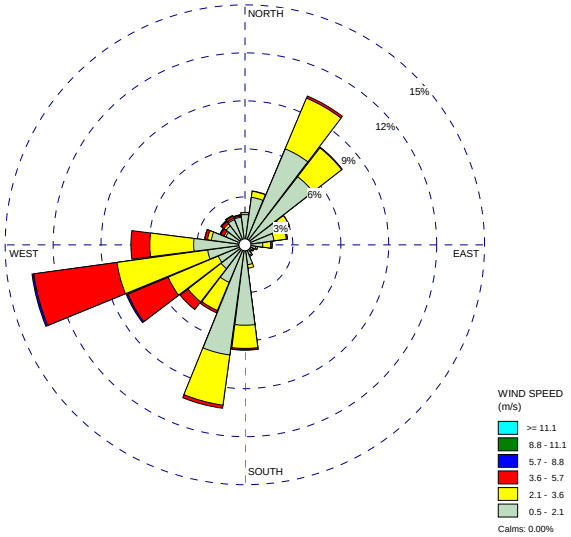


Figure 1-4 – Windrose for Central Los Angeles Meteorological Station



Odors and Potential Health Effects

The presence of odors does not necessarily relate to the presence or absence of toxic air contaminants, and odor issues are generally addressed as public nuisance. Odor complaints, however, are often accompanied by reports of adverse effects such as headache and nausea.

As to whether odors can cause health effects, the American Thoracic Society, a scientific society that focuses on respiratory and critical care medicine, published its official guidelines as to what constitutes an adverse health effect in 1985, and updated these guidelines in 1999. The statement is intended to "provide guidance to policy makers and others who interpret the scientific evidence for the purpose of risk management."[12] The statement acknowledges that there are graduations in the degree of effects and also differentiate between an effect that is adverse from an effect that is merely a physiological response. The ATS statement indicates that air pollution exposures which interfere with the quality of life can be considered adverse. Thus odor-related annoyance should be considered adverse, even if nausea or headache or other symptoms are not present. In the ATS guidelines, odors are clearly listed as an adverse respiratory health effect.

Unpleasant odors have long been considered as warning signs of potential health risks. More recently, there have been public health concerns that odor sensations themselves, or perhaps the agents responsible for odor, may in fact cause health effects[13]. Such odors often elicit complaints of respiratory irritation, headache, nausea and other adverse symptoms. While the mechanism for the production of these effects is not known, these effects have been noted at concentrations of substances that produce unpleasant odors. Postulated mechanisms include

[12] "What Constitutes an Adverse Health Effect of Air Pollution?", American Thoracic Society, 1999, http://www.thoracic.org/statements/resources/archive/airpollution1-9.pdf

[13] "Odour Impact - Odour Release, Dispersion and Influence on Human Well-Being with Specific Focus on Animal Production", Nimmermark, 2004

neurological changes in sensory nerves that could influence symptom production in the absence of other toxicological effects[14]

[14] "Science of Odor as a Potential Health Issue", Schiffman, 2005

CHAPTER 2: SUMMARY OF PROPOSED RULE 415

AFFECTED FACILITIES

PUBLIC PROCESS

PROPOSED RULE 415 REQUIREMENTS

AFFECTED FACILITIES

There are four rendering facilities in the South Coast Air Basin. All four are located in the Vernon area near Los Angeles. Three of these facilities use a continuous rendering process and one uses a batch-type process. All are in heavily industrial areas.

Site Visits

During this rule development process, SCAQMD staff visited all four facilities and interviewed facility operators to review the operating practices and equipment used for odor control. SCAQMD Compliance personnel were also familiar with all of the facilities subject to PR 415 from prior visits, and interviewed facility operations personnel about the operating configurations, odor control equipment, operating practices and prior compliance history prior to site visits.

PUBLIC PROCESS

The development of PR 415 was conducted through a public process. Through the rulemaking process, the SCAQMD staff met with a Working Group, consisting of industry, environmental and community groups. Throughout the rule development process, two Working Group meetings were held, in July 2014 and December 2014. A third working group meeting is planned for February 24, 2015. A Public Workshop will be conducted on March 5, 2015. Responses to comments received at the Public Workshop will be included in an Appendix to the Draft Staff Report.

PROPOSED RULE 415 REQUIREMENTS

Purpose

Proposed Rule (PR) 415 will establish best odor management practices and requirements to reduce odors from facilities rendering animals and animal parts. The proposed rule will be implemented in addition to continued enforcement of public nuisances under Rule 402.

Applicability

The proposed rule applies to new and existing facilities that cook raw rendering materials; facilities that process trap grease in addition to rendering, and treatment of wastewater from processes associated with rendering or processing of trap grease at these facilities.

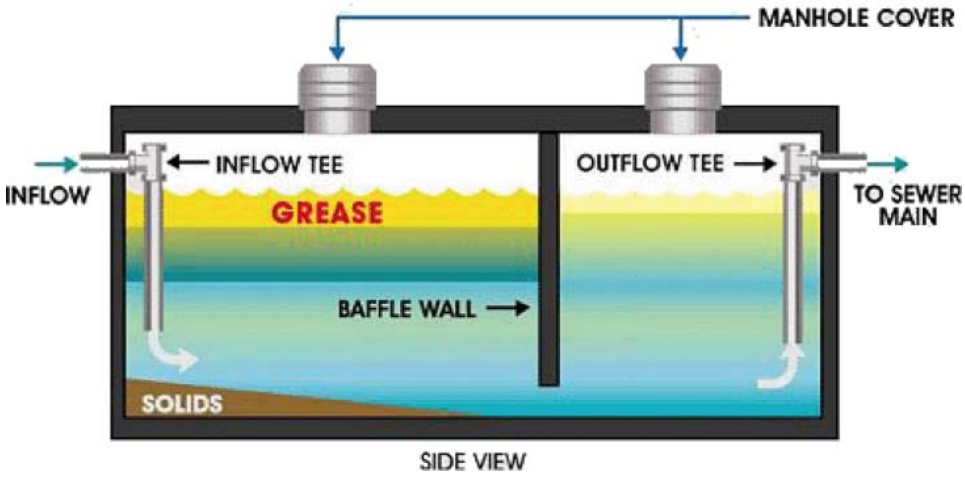
Applicability is to facilities that conduct inedible rendering operations, whether or not these facilities also conduct edible rendering. If an integrated facility conducts both edible and inedible rendering operations, the edible rendering operations are not subject to the requirements of PR 415. Inedible rendering means that the products and by-products of the rendering process are not intended for human consumption.

Edible rendering processes are essentially meat processing operations; producing lard or edible tallow for use in food products consumed by humans. Edible rendering is generally carried out in a continuous process at low temperature, less than the boiling point of water. The process

usually consists heating edible fats (fat trimmings from meat cuts), followed by two or more stages of centrifugal separation. The first stage separates the liquid water and fat mixture from the solids. The second stage further separates fat from water. The solids may be used in food products or pet foods, and fat may also be used in food products, or soap making operations. Most edible rendering is done by meat packing or processing companies.

Trap grease is collected at three of the four rendering facilities. Trap grease is pumped from restaurant and other food service establishment grease traps; also known as grease interceptors. Grease interceptors are used by restaurants to reduce the volume of fats, oils and grease (FOG) from entering the city sewer systems and prevent blockages of that system as well as the accidental discharge of wastewater into the storm drain system. A typical restaurant grease interceptor is shown in Figure 2-1.

Figure 2-1 – Typical Restaurant Grease Interceptor



A grease interceptor for a large food establishment is typically located below grade and consists of discrete compartments with baffles between them that restrict the flow of grease and solids from kitchen waste, thereby only allowing water to pass into the sewer. Grease floats to the top of the inflow compartment, and food particles and other solids sink to the bottom. When the grease interceptor is pumped out (no established regulatory requirement for timing of grease trap servicing; it averages between one month and one year), water, grease and food particles are all removed and are collectively known as “trap grease”.

Trap grease is required to be hauled by a licensed waste hauler, and is taken either to a local wastewater treatment facility (local POTW) or to a facility that processes trap grease. Trap grease consists mainly of wastewater, with small amounts of brown grease and solids that must be removed during processing. Processing consists of letting trap grease tankage settle and then pumping wastewater from the bottom of the tank. The wastewater requires further treatment prior to disposal in the city sewer.

At a rendering facility, wastewater from trap grease is typically processed through the same treatment system as wastewater from rendering; hence the applicability to processing of wastewater for rendering facilities that also process trap grease.

The proposed rule does not apply to:

- Facilities that collect, store or process trap grease that are not located at a rendering facility. It should be noted that odors from these facilities will be addressed under a separate rule-making.
- Facilities conducting only edible rendering operations (products for human consumption) that do not also conduct inedible rendering.
- Collection centers for animal carcasses and parts that do not also conduct inedible rendering operations (products not for human consumption) or process trap grease.

Definitions

Refer to the proposed rule language for definitions. Key definitions that require further explanation or discussion are listed below.

Closed System means a system handling solids, fluids or air at a rendering facility, in which odors are completely contained. Staff recognizes that no system can contain 100% of the solid, liquid or gas that passes through it and there will always be minute amounts of fugitive emission leakage. A closed system refers to a system without significant air leakage out of the system, through which the transfer of odors is possible. A piping system containing ground solids with well-sealed flanges and limited access ports is an example of a closed system. A dissolved air flotation tank in a wastewater treatment process with an open top would not be considered a closed system.

Confirmed Odor Event is an odor event that has been verified as coming from a specific source by SCAQMD Compliance personnel after an investigation. It takes at least three complaints from different physical addresses to comprise a confirmed odor event. When an investigation following three or more complaints determines that objectionable odors are being emitted from a particular facility and travelling beyond the property boundary of the facility, that event is determined to be a Confirmed Odor Event.

Enclosure Envelope means the total surface area of a building directly enclosing rendering operations and includes the enclosure's exterior walls, floor and horizontal projection of the roof on the ground. In the case of a rectangular building, this measurement would include the area of the four walls plus the area of the ceiling (not the roof, which may be pitched). The intent of this definition is to serve as the basis for calculating the area of routine enclosure openings as a percentage of the enclosure envelope under PR 415, subparagraph (f)(2)(A).

Facility Grounds means any area of operations where rendering materials are transported, stored or handled other than within an enclosure. The intent of this definition is to include only those areas that have the potential for spilled raw or partially processed rendering materials, washdown water or wastewater to collect and create an odor issue. The intent is not to include rainwater which has low potential for odors.

Permanent Enclosure means an enclosure having a permanently installed roof and exterior walls which are constructed of solid material, and completely surround one or more odor-generating sources, such that all odors from processes conducted within the enclosure are contained therein. The intent of this provision is for a permanent enclosure to be constructed of solid material. Examples of solid material include masonry, concrete, or light gauge steel, aluminum or rigid plastic siding over framing. Sheet plastic, vinyl or canvas is not considered to be permanent or solid.

Receiving Area means the area, tank or pit within a rendering facility where raw rendering materials are unloaded from a transport vehicle, or transferred from another portion of the facility for the purpose of rendering these materials. In the case of an integrated facility that conducts both slaughtering and/or meat packing in addition to rendering, and has a method of conveyance to deliver animal carcasses or parts to the rendering facility other than by truck, the receiving area would be the location where animal carcasses enter the rendering process. That area would need to be enclosed or considered a closed system by the timetable under PR 415, subparagraph (d)(1)(B).

Routine Enclosure Opening means any of the following areas that may be open during normal operations at facilities subject to this rule, and through which odors have the potential to escape from a permanent enclosure:

(A) Vents for natural or forced-air ventilation, including but not limited to gable vents, eave vents, wall vents and rooftop vents;
(B) Windows, doors and doorways; and
(C) Spaces below metal sheathing where it does not reach the foundation.

The intent of this definition is to include all areas that are usually open where air is allowed to enter a permanent enclosure in the calculation to determine the area of routine enclosure openings as a percentage of the enclosure envelope under PR 415, subparagraph (f)(2)(A). The purpose of the requirement under PR 415, subparagraph (f)(2)(B) is to ensure inward airflow into the permanent enclosure so that odorous or foul air cannot escape the permanent enclosure.

Core Requirements for New and Existing Facilities

Odor Best Management Practices

All facilities are required to implement Best Management Practices (BMP) for odor control. This requirement is applicable to new facilities upon startup, and to existing facilities within 90 days after rule adoption. There are four BMPs that would no longer be required after an existing facility begins operating certain processes within a permanent enclosure or closed system. The reasoning for this is that since these processes occur within a permanent enclosure, any odors emitted from these processes will be captured by odor control equipment serving the permanent enclosure. These BMP include:

- Preventing Accumulation of Processed Materials within Enclosures
- Washdown of Receiving Area
- Washing of Floor Drains
- Repair of Leaking Components

Permanent Enclosure/Operate in Closed System Requirement

All facilities are required to operate certain odorous processes within a permanent enclosure or within a closed system. This requirement is applicable to new facilities upon startup and to existing facilities within approximately 3 to 4 years after rule adoption. Existing facilities are required to submit a permit application to the SCAQMD within 12 months after rule adoption for odor control equipment, to be evaluated in combination with a permanent enclosure.

If an existing facility owner/operator currently operates all applicable processes within a closed system, no permit application needs to be submitted, as there is no requirement for a permanent enclosure or an odor control system in this case. However, it is anticipated that all existing

rendering facilities subject to PR 415 will need to construct or retrofit one or more permanent enclosure(s) under the rule proposal.

The SCAQMD will issue a Permit-to-Construct (P/C) for the proposed enclosure or retrofit of an existing non-compliant enclosure. As described above, the permanent enclosure and odor control system will be evaluated together. The timing for issuance of the P/C by SCAQMD is within 180 days after the permit application is deemed complete. This will occur approximately 18 months or later after rule adoption, depending on the date a permit application is deemed complete. A rendering facility then has 24 months after the date of P/C issuance to construct and commission the permanent enclosure, ventilation system and odor control system.

Ventilation of Permanent Enclosure to Odor Control Equipment

All permanent enclosures are required to be ventilated to odor control equipment. The purpose of this requirement is to prevent release of odorous or foul air from a permanent enclosure directly into the environment. The timing for this requirement is the same as the timing for a permanent enclosure – upon startup for new facilities, and 24 months after a Permit-to-Construct (P/C) is issued for the combined permanent enclosure/odor control system for existing facilities.

Wastewater Treatment

Certain wastewater treatment processes are required to be enclosed within a permanent enclosure (ventilated to odor control) or operated in a closed system. This includes screens, skimmers, clarifiers (including dissolved air flotation), settling tanks, sludge dewatering equipment and the outlet of wastewater treatment to the city sewer.

In the case of an integrated facility that conducts both slaughtering and/or meat packing in addition to rendering, only the wastewater that originates from inedible rendering operations needs to be enclosed. Wastewater originating from edible rendering, meat packing or slaughter operations does not fall under this requirement.

This requirement is applicable to new facilities upon startup. The timing of this requirement for existing facilities is as follows. Within 12 months after rule adoption, the facility owner/operator is required to submit a permit application for necessary enclosures, to be evaluated in combination with odor control as proposed by the owner or operator. A rendering facility then has 12 months after the date of P/C issuance to construct and commission the permanent enclosure, ventilation system and odor control system for odor control of wastewater treatment operations.

Installation of Odor Complaint Contact Sign

All rendering facilities are required to display a sign with contact information for area residents and businesses to phone in odor complaints. This requirement is applicable upon startup for new facilities and within 6 months after rule adoption for existing facilities.

The sign must list the SCAQMD's 1-800-CUT-SMOG number as the first contact for odor complaints. If desired by the rendering facility owner/operator, a secondary contact at the facility may be listed on the sign. However, if the rendering facility receives an odor complaint directly, facility personnel must notify the SCAQMD by telephone at 1-800-CUT-SMOG no more than three hours after receiving the odor complaint or after facility personnel became aware of the complaint, or should reasonably have become aware of the complaint

The sign must be installed within 50 feet of the facility entrance. The reasoning for this requirement is that some area residents and businesses may not be aware of rendering facility operations in all cases, especially where two facilities exist in close proximity.

Other requirements for the odor complaint contact sign have to do with visibility. The sign must be 4 feet square, have lettering at least 4 inches tall that contrasts with the background and be located 6 to 8 feet above grade. Finally, the sign must be unobstructed so it is clearly visible.

Both Rule 403 (Fugitive Dust) and Rule 410 (Odors from Transfer Stations and Material Recovery Facilities) have a similar requirement to install a complaint contact sign, so there is precedent for this requirement.

Specific Cause Analysis

If a facility receives a Rule 402 Notice of Violation (NOV) for public nuisance, or if a confirmed odor event is declared for a facility, an analysis of the specific cause(s) surrounding the NOV or odor event is required to be conducted. The analysis is a process used by a facility subject to this rule to investigate the cause of a confirmed odor compliant, identify corrective measures needed, and corrective measures taken to prevent recurrence of a similar event.

Submittal of Odor Mitigation Plan

In the case of pervasive and ongoing odorous emissions from a rendering facility, the owner or operator may be required to submit an Odor Mitigation Plan (OMP). This can occur either before or after the requirement to construct an enclosure and vent that enclosure to odor control equipment within approximately 3 to 4 years after rule adoption. Submittal is required within 90 days after notification by the Executive Officer that an OMP is required. There are two situations that can trigger this requirement, as follows:

1. A Notice of Violation (NOV) is received for Public Nuisance subject to Rule 402
2. 3 or more confirmed odor events are received in a consecutive 180-day period.

As described in Chapter 1, in order to receive an NOV under Rule 402, generally 6 or more odor complaints must be received and verified in a short period of time to constitute a public nuisance. If this occurs, the owner or operator will be asked to submit an OMP. The conditions of the OMP are distinct from any corrective action that is required under the settlement terms of the NOV.

The second trigger would correspond to a long-term chronic situation, where 3 or more confirmed odor events are received within a consecutive 180-day period. A confirmed odor event is an occurrence of odor resulting in three or more complaints by different individuals from different addresses, and the source of the odor is verified by District personnel. In this situation, a rendering facility would need to take corrective actions to prevent objectionable odors from crossing its property boundary.

Odor Best Management Practices

There are 18 Best Management Practices (BMP) under PR 415 that will assist in reducing odors from various points or processes within a rendering facility. These include:

1. Covering of Incoming Transport Vehicles

Transport vehicles delivering raw rendering materials to a rendering facility from offsite locations are not permitted to enter the rendering facility unless the cargo area of the vehicle is completely enclosed or fully covered with a durable, solid covering that does not allow odors to pass through and is free of holes, gaps, cracks, or tears.

2. Spilled Raw Rendering Materials

   Raw rendering materials from delivery trucks that is spilled outside of the receiving area(s) must be put into the receiving area as soon as possible, but not to exceed 30 minutes after a spill occurs.

3. Direct Transfer of Raw Rendering Materials

   Raw rendering materials must be transferred directly from the delivery truck (or other conveyance mechanism in the case of inter-plant delivery within an integrated facility) into a receiving area located inside a permanent enclosure. Alternatively, it can be delivered and stored temporarily in odor tight containers.

4. Standards for Washing

   Washing of facility grounds, enclosure interiors, delivery trucks, and drums and containers at a rendering facility (or the rendering portion of a facility integrated with a slaughterhouse or meat-packing plant) must be conducted with water at a temperature of at least 120^{o}F and pressure of at least 1000 pounds per square inch (psi).

5. Washing of Outgoing Transport Vehicles

   Where raw rendering materials come directly into contact with a delivery truck, the cargo area and exterior of any vehicle exiting the rendering facility must be thoroughly washed prior to the truck leaving the facility in order to prevent trackout of raw rendering materials.

6. Washing of Drums and Containers

   Drums or containers holding raw rendering materials must be thoroughly washed to remove raw rendering materials prior to leaving a rendering facility.

7. Holding Time of Incoming Raw Rendering Materials

   Within 4 hours after arrival, incoming raw rendering materials must be placed into the cooking process, or be staged in a permanent enclosure or sealed, odor-tight containers.

8. Cleanup of Spilled Raw Rendering Materials

   Raw rendering materials washed out of a transport vehicle at a rendering facility must be placed into the receiving area for processing within one hour after the truck is washed.

9. Repair of Facility Grounds

   Within 180 days after rule adoption, all areas of broken concrete or asphalt, including divots, cracks, potholes and spalling of concrete on the facility grounds of a rendering facility, (or the rendering portion of a facility integrated with a slaughterhouse or meat-packing plant) where raw and processed rendering materials are transported, stored or otherwise handled must be patched, repaired or repaved to prevent standing water with a surface area greater than one square foot from accumulating, in order to prevent odors from bacteria breeding in the standing water.

10. Holding Time of Raw Materials after Size-reduction

    Within one hour after size-reduction or grinding activities, raw rendering materials must enter the cooking process, or be staged in a permanent enclosure or a sealed, odor-tight container. This may not be relevant to continuous rendering operations and is more applicable to batch processing.

11. Holding Time of Cooked Materials

    Within one hour after being removed from a batch cooker at a rendering facility subject to this rule, cooked materials must be placed in downstream processing equipment to be separated into protein and fat commodities or be placed in sealed, odor-tight containers for temporary storage. This may not be relevant to continuous rendering operations and is more applicable to batch processing.

12. Transfer of Raw or Cooked Rendering Materials between Enclosures

    Raw or cooked rendering materials must be transported between permanent enclosures only through a closed system of conveyance, or by odor-tight containers.

13. Trap Grease Delivery Trucks

    Trap grease from delivery trucks must be delivered to tankage at the facility and transferred within the trap grease storage and processing area(s) within a closed system, inside of a permanent enclosure, or through a system vented to odor control equipment.

14. Venting Trap Grease Delivery Vehicles to Odor Control Equipment

    The pressure relief valve on trap grease delivery trucks fitted with an internal vacuum or pressure pump must be vented to odor control equipment operating in good condition prior to unloading of trap grease, unless the truck is unloaded inside of a permanent enclosure.

15. Preventing Accumulation of Processed Materials within Enclosures

    Standing water, fat, drippings, grease, oil, tallow or other liquids is not permitted to accumulate on floors or equipment.

16. Washdown of Receiving Area

    Walls, floors, and other surfaces of the receiving area of a rendering facility and any equipment operated in the receiving area, including screw conveyors, pumps, shovels, hoses, etc., must be thoroughly washed at least once per shift, with a minimum of three hours between washdowns, unless a shorter time period is necessary to ensure odors from the receiving area are minimized.

17. Washing of Floor Drains

    Accessible interior and exterior floor drains are to be maintained in a manner that prevents accumulation of rendering materials.

18. Repair of Leaking Components

    All leaking valves, flanges, fittings, conveyor troughs, or any other device holding or conveying liquids, drippings, trap grease or tallow at a rendering facility must be repaired within 72 hours after the actual discovery of a leak of more than 3 drops per minute, or within 48 hours after discovery and notice by SCAQMD staff personnel.

BMP 15 through 18 are no longer required after the deadline for a permanent enclosure or closed system(s) becomes effective.

Enclosure and Odor Control Standards

Certain operations and processes at a rendering facility are required to be enclosed within a permanent enclosure, or to be operated within closed systems under PR 415. These include:

- Raw material receiving areas at rendering facilities;
- Conveyors associated with raw material transfer operations that are not completely covered;
- Size reduction and conveying equipment, including but not limited to: breakers, crushers hoggers, grinders and conveyors associated with raw material sizing that are not completely covered;
- Raw material cookers; and,
- Process equipment for separating rendered fat from protein materials (meat and bone meal), including but not limited to: centrifuges, presses, separators, pumps, screens, tanks that aren't completely enclosed, bins and hoppers, and conveyors used to transport materials between equipment that are not completely covered.

A permanent enclosure must meet certain requirements. These include:

- The combined area of all routine enclosure openings through which odors can escape from a permanent enclosure must not exceed 5% of the enclosure envelope.
- A permanent enclosure must be ventilated by a system designed and operated to maintain a minimum inward face velocity through all routine enclosure openings of at least 200 feet per minute (fpm).

The specifications for a permanent enclosure were derived from EPA Method 204 – Criteria for a Permanent Total Enclosure. The inward face velocity for each permanent enclosure is to be measured using an anemometer, or an equivalent approved device at the center of the plane of any opening of the permanent enclosure.

In lieu of meeting the requirements for minimum inward face velocity, it is allowable for the permanent enclosure to be ventilated such that each routine enclosure opening is continuously maintained at a negative differential pressure of at least 0.02 mm of Hg (0.011 inches H2O) by a digital differential pressure monitor. This alternative requirement was also allowed under Rule 1420.1 (Emission Standards for Lead and Other Toxic Air Contaminants from Large Lead-Acid Battery Recycling Facilities). If this method is chosen the system must be operated and maintained as follows:

- At least one differential pressure monitor must be installed on three walls of a permanent enclosure that is 10,000 square feet or more:
    - The leeward wall.
    - The windward wall.
    - An exterior wall that connects the leeward and windward wall at a location defined by the intersection of a perpendicular line between a point on the connecting wall and a point on its furthest opposite exterior wall, and intersecting within plus or minus ten ($\pm$10) meters of the midpoint of a straight line between the two other monitors.

- At least one differential pressure monitoring system must be installed on the leeward wall of a permanent enclosure that is less than 10,000 square feet.
- A differential pressure monitor must be certified to measure negative pressure between 0.01 and 0.2 mm Hg (0.005 to 0.11 inches H2O) with an increment of plus or minus 0.001 mm Hg (0.0005 inches H2O).
- A differential pressure monitor must be equipped with a continuous strip chart recorder or electronic recorder. If an electronic recorder is used, the recorder must be capable of writing data on secure, tamper-proof media. The recorded data must shall be readily accessible upon request.
- A differential pressure monitoring systems must be calibrated in accordance with manufacturer's specifications at least once every 12 months or more frequently if recommended by the manufacturer.

Wastewater Treatment

Certain wastewater treatment processes at a rendering facility are required to be enclosed within a permanent enclosure, or to be operated in a closed system. These include:

- Screens
- Skimmers
- Clarifiers, including dissolved air flotation
- Settling tanks
- Sludge dewatering equipment
- Sludge drying equipment, and
- Wastewater treatment outlet to city sewer.

Odor Mitigation Plan

As previously described, an Odor Mitigation Plan (OMP) may be required either prior to or after the requirement for a permanent enclosure and odor control system is fully implemented. If an OMP is required prior to enclosure, it must include:

- All pertinent facility-specific information in Appendix A – Rule 415 Odor Mitigation Plan (currently under development).
- A prioritization of odor-emitting areas within the facility, in order of highest-to-lowest odor intensity. For each odor emitting area:
    - A description of odor mitigation activities proposed to address odors from within the area;
    - The owner or operator's intent to either enclose operations and processes within a permanent enclosure or operate them in a closed system (for all equipment and processes that are not already within a permanent enclosure or a closed system); and
    - A detailed construction schedule for each proposed permanent enclosure.
- An explanation of why construction of the permanent enclosure and odor control system cannot be expedited and completed prior to the date the enclosure standard becomes effective under the proposed rule.

An OMP submitted after the enclosure standard is fully implemented must address all of the above elements, except for the intent to enclose and detailed construction schedule.

The OMP will be approved or disapproved by the SCAQMD within 90 days. If it is disapproved, it must be resubmitted within 90 days for reconsideration. Finally, an OMP is subject to plan fees under SCAQMD Rule 306 – Plan Fees.

Specific Cause Analysis

Within 24 hours after notification by the Executive Officer of a confirmed odor event against a facility subject to this rule, the owner or operator is required to conduct a specific cause analysis and submit a report in a format specified by the Executive Officer within 30 days. The report must include a description of activities during the time of the odor event, any upset or breakdown conditions at the facility, including potential sources of odors and emission points for all equipment required to be enclosed under the rule proposal. In addition, identify any corrective measures taken to prevent recurrence of a similar event.

Recordkeeping

The following records are required to be maintained at the rendering facility for at least 3 years and made available to SCAQMD personnel upon request:

- A written log of the date and time of discovery of any leaking valves, flanges, fittings, conveyor troughs, or any other device holding or conveying liquids; the name of the individual who detected the leak; the date and time the leak was repaired; and the name, phone number and company affiliation of the individual who repaired the leak.
- Records of all readings taken by anemometer to demonstrate compliance with the permanent enclosure inward face velocity requirement.
- Records from the continuous strip chart recorder or electronic recorder for differential pressure monitoring.
- A written log of all odor complaints received by the rendering facility. The odor complaint log must contain:
    - Date and time of odor event
    - Date and time complaint was received
    - Outdoor ambient temperature at time of complaint
    - Odor description and intensity (i.e., week, moderate, strong)
    - Weather conditions
    - Wind speed and direction
    - Name and contact phone number of complainant, if provided
    - Determination of cause for odor emissions that generated the complaint, if found
    - Processes or conditions that may have triggered the alleged odor event

CHAPTER 3: CONTROL TECHNOLOGIES

CONTROL OF ODORS FROM RENDERING FACILITIES

CONTROL OF ODORS FROM RENDERING FACILITIES

Factors Affecting Odors from Rendering Facilities

The perception of offsite odors from rendering facilities is very site-specific, and depends upon a number of proximal and environmental factors, including:

- location and configuration of raw material receiving area
- proximity of nearby receptors to facility
- intensity and direction of prevailing winds
- ambient temperature
- ambient humidity level

The quality of raw materials when they enter the rendering facility is significant to the perception of odors generated from the receiving area. For example, fresh material and material that has been refrigerated until delivery has much lower potential for odors than raw material that is partially decomposed when it enters the facility. An example of partially decomposed material is an animal carcass that has been deceased for a period of time before it is delivered to the rendering facility.

In addition to the quality of incoming raw materials, the current operating configuration of a facility also may have an impact on odors that travel beyond a facility's fenceline. These include fugitive odors from grinding and conveying raw material, cooking, fat processing and wastewater. All of these sources generate fugitive odors. Odors perceived by neighbors of a rendering facility depend on how well these fugitive odors are currently controlled. For example, a building with large openings that houses cooking and fat processing operations may generate fugitive odors that travel farther from a rendering facility's location, where a similar process in a building with fewer or smaller openings may be better able to limit migration of odors.

Temperature and humidity also impact the perception of odors, as odors are often perceived as stronger on summer days where both temperature and ambient humidity levels are elevated, possibly due to faster decomposition of raw materials.

Two Approaches to Regulating Odors

At the beginning of rulemaking efforts on PR 415, SCAQMD staff considered two approaches to the regulation of odors from rendering facilities. These approaches are described below:

1. Quantitative Approach to Rulemaking

The first approach considered by SCAQMD staff was to establish allowable odor concentrations for compounds typically emitted from rendering processes. Allowable odor concentrations are the maximum level at which odorous compounds (odorants) are emitted, as measured at the facility's property boundary. A reasonable starting point for this effort would be to use the 25 odorants from rendering processes identified in Table 1-1.

In order to establish allowable odor concentrations, it would first be necessary to create an odor panel. An odor panel consists of individuals (panelists) that are selected and trained using a procedure for detecting and describing odors such as the "Guidelines for Selection and Training

of Sensory Panel Members"[1]. Odor panelists are recruited from the community at large and are considered representative of the community. A person who smokes, uses smokeless tobacco, who may be or is pregnant, or who has chronic allergies or asthma is not a good candidate for an odor panel[2]. In order to initiate this effort, it might be necessary for the SCAQMD to partner with a university or research institution with the background and experience to form and train an odor panel.

The goal of the odor panel would be to establish perception thresholds for each odorant under consideration. A perception threshold is the dilution level of a sample of the odorant at which 50% of the odor panelists can smell an odor and 50% cannot. This is baseline level, or level of detection of the odor panel.

After perception thresholds are determined for each odorant under consideration, it would then be necessary to establish an allowable odor concentration for each odorant tested, as described previously. An allowable odor threshold is the level at which an odor would be considered objectionable by a reasonable person. Allowable odor concentrations are typically a multiple of the perception threshold determined by the odor panel (e.g., where only 50% of the panel can smell it). For example, it might be 100 times the perception threshold or 1000 times the perception threshold. The effort to determine the level at which an odor becomes objectionable would require more testing by an odor panel.

If staff followed this approach, allowable odor concentrations would become part of the rule proposal. To ensure these concentrations were met, it would be necessary to require periodic air sampling at a rendering facility's property boundary. This could mean SCAQMD would need to develop new air sampling protocols and test methods. In addition, new lab analysis instrumentation may need to be obtained to analyze samples with odorant concentrations in the parts per trillion range.

The entire effort to establish an odor panel, obtain pure odorant samples, conduct odor testing for each of the 25 odorants, and conduct additional testing to determine a level at which an odor becomes objectionable would come at great time and expense – perhaps years to complete.

2. "Best Control" Approach to Rulemaking

The second approach considered by SCAQMD staff was to evaluate the state of odor controls currently utilized by well-controlled rendering facilities in California and other states; evaluate areas of a typical rendering facility that have high potential for odorous emissions, and determine the best approach to eliminate or minimize odors from these areas.

Given the probable high cost, difficulty in obtaining pure odorant samples, uncertainty in developing suitable methodologies for new sampling and analysis, and long rulemaking timeframe inherent in following the quantitative approach, staff opted instead to follow a "best control" approach, as such measures have proven effective in other facility practices.

[1] "Guidelines for the Selection and Training of Sensory Panel Members"; STP 758, ASTM Committee E-18, 1981
[2] "Odor Basics", Understanding and Using Odor Testing; McGinley, 2000
http://www.fivesenses.com/Documents/Library/33%20%20Odor%20Basics.pdf

Evaluation of Tallowmasters LLC Rendering Facility

In April 2014, SCAQMD staff traveled to Florida to investigate a novel odor control technology utilized by Tallowmasters LLC, a rendering facility in Miami. During this visit, staff discovered that odors from the rendering processes were considerably lower than the odor levels at any of the Vernon area rendering facilities. In discussions with facility personnel, it was determined that the facility had made concerted and deliberate efforts to minimize odors through a combination of odor containment by enclosure of odorous operations, new odor control technology, and work practices that minimize the potential for odors.

Operating personnel followed a plan modeled on recommended industry manufacturing processes and controls. The plan was established as a guideline for every employee of the facility, and all operating personnel were trained on the "good manufacturing practices" that ensured the quality of proteins and rendered fats produced at the facility, and promoted low odors from the facility. Some of these became Best Management Practices (BMP) for the PR 415 proposal, as outlined in Chapter 2. Notable examples of the operation and work practices at this facility follow.

Washing with High Temperature/High Pressure Water - All cleaning of floors and equipment at the facility was performed with hot water using a high pressure pump. The pump is capable of delivering water at a temperature of 180^{o}F and water pressure of 5000 pounds per square inch (psi) using a hand wand similar to the manual wand at a car wash. Washing of floors and equipment in this manner was done both to decrease water usage, and to prevent standing water at the facility. Standing water is a breeding ground for bacteria that can cause odors. Using high temperature water results in the water evaporating more quickly than ambient temperature water. In addition, facility personnel reported the demand for washdown water had decreased considerably by using high pressure water. This work practice is incorporated in the proposed rule requirements as a BMP [PR 415 (e)(4) – Standard for Washing]. An image of the high pressure pump used at the facility is shown in Figure 3-1.

Image 3-1 – High Pressure Pump

Resurfaced Interior Floors – all interior floors in operational areas where water, oils, fat and other drippings could collect were resurfaced to facilitate ease of cleaning and reduce standing water. Facility personnel used large squeegees to move any water or other liquids into floor drains upon discovery. Floor drains were cleaned regularly to keep them free flowing and there was no water evident in the drains. There was very little standing water present on interior floors, and there was no oil or fat residue in the cooking and fat processing rooms, in marked contrast to facilities staff visited in the Vernon area. Facility personnel stated the practice of using high pressure washdown water and not allowing standing water contributed to a major reduction in odors. These work practices are incorporated in the proposed rule requirements as BMP [PR 415 (e)(15) – Preventing Accumulation of Processed Materials within Enclosures, and (e)(17) –Washing of Floor Drains]. Images 3-2 and 3-3 show resurfaced floors and floor drains. Image 3-4 shows the cooker. The floor around the cooker was almost completely dry.

Image 3-2 – Resurfaced Concrete Floors

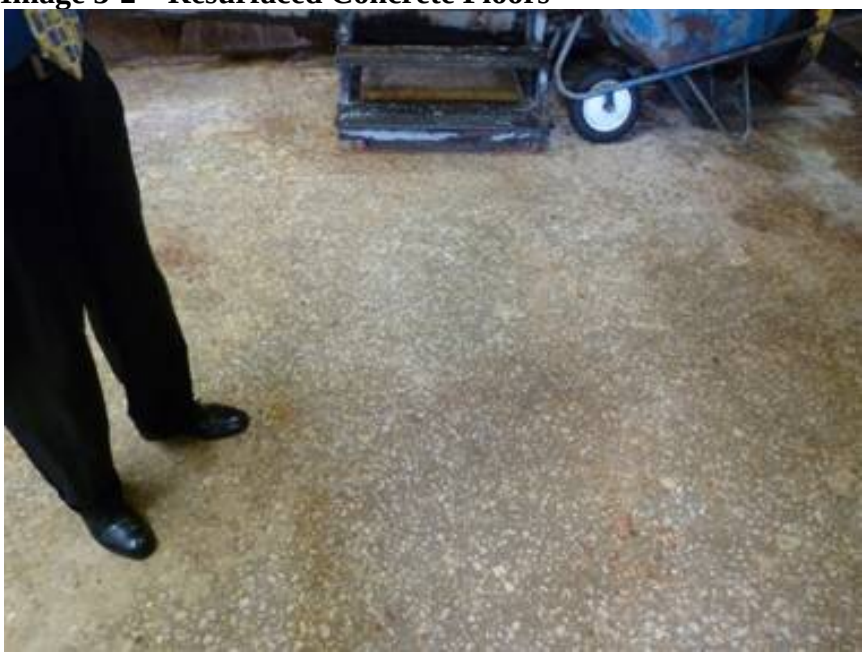


Image 3-3 – Floor Drains

Image 3-4 – Cooker Room

Replacement of Leaking Components – One work practice employed by this facility is to promptly replace leaking components. The purpose of this company policy is to prevent leaking of materials containing bacteria that can cause odors. During the visit by staff, a leaking trough that houses a screw conveyor was observed by SCAQMD staff. Facility personnel noted that raw rendering materials are highly acidic and very corrosive to the carbon steel troughs, valves and fittings at the facility. When a component fails or begins leaking, it is replaced with a stainless steel component. While stainless steel is more expensive, the facility felt it was the better long-term solution. The work practice of promptly replacing leaking components is incorporated in the proposed rule requirements as a BMP [PR 415 (e)(18) – Repair of Leaking Components]. However, replacement with stainless steel components is a decision by this facility and is therefore not incorporated as a requirement. Images 3-5 and 3-6 show the leaking trough, and the new stainless steel trough that was intended to replace it.

Image 3-5 – Leaking Raw Material Trough

Image 3-6 – Stainless Steel Trough

Enclosure around Odorous Operations – The cooker and all processing equipment are housed inside an enclosure. Facility personnel felt an enclosure is crucial to odor containment. One work practice used at the facility is to train operating personnel to close all doors, including access doors and roll-up doors at the entrance to the raw material receiving pits when not in use. This work practice was also considered to be very important to odor containment.

Odor control equipment – The facility utilizes odor neutralizing equipment that purports to produce hydroxyl radicals (HO). Hydroxyl radicals are highly reactive in the atmosphere, and consequently very short-lived. They react with many pollutants in the atmosphere, including odorous compounds that are emitted from rendering processes. Reaction with a potent oxidizer such as hydroxyl radicals or ozone can dramatically reduce the odor potential of these odorous compounds. Tallowmasters LLC uses several of these devices to control odors inside their facility enclosure, which has allowed the facility to discontinue use of their scrubber. SCAQMD staff verified the use of this technology at the facility as being very effective in reducing odors. However, staff did not have the opportunity to test one of the units to ensure they were using the technology claimed by the manufacturer. The State of California has established standards for indoor air cleaners, due to concerns over ozone production potential and exposure of residents to ozone. The technology used by Tallowmasters LLC would require further evaluation prior to verification under the rule that it constitutes an odor control technology that is safe for worker exposure.

Evaluation of Darling – Fresno

Darling International operates a rendering facility on West Belgravia Road in Fresno, CA. The facility is located less than half a mile from a residential community. The facility is permitted to accept up to 850,000 lbs of raw material each day and has a main processing building to house most operations. Delivery trucks enter the main processing building to empty loads of raw material, and are rinsed and disinfected prior to exiting the building. Trucks are required to be unloaded within 2 hours after entering the facility, and raw material is required to be processed within 24 hours after receipt, according to permit conditions (San Joaquin Valley APCD).

In addition to raw material delivery, all facility operations and load-out of finished product is conducted inside an enclosure. Buildings at the facility are maintained under negative pressure, and odorous air inside the building routed to two packed-tower wet scrubbers. The main processing building doors, meal building doors, and meal load-out doors are all required to be closed, except for truck entry and exit, or during an emergency. Access openings are further required to be controlled such that the building always remains under negative pressure, which keeps odors inside the building from being released to the outside.

The facility uses a thermal oxidizer to control high intensity odors generated at the cooker, presses, condenser and centrifuge. In the case of a breakdown of the thermal oxidizer, high intensity vapors are routed to the wet scrubbers, or operations are required to be shut down.

In 2011, the City of Fresno and Darling entered into an Abatement Agreement, where Darling – Fresno agreed to adopt a number of additional measures to further control odors. These measures included:

- Install permanent ductwork to re-route odors from the thermal oxidizer to the wet scrubbers in the event of thermal oxidizer breakdown (temporary ductwork was previously used).
- Install ductwork and/or louvers in the boiler room to provide make-up air to the boiler.
- Install a notification system on doors that are critical to maintaining negative pressure in the building so operating personnel know when a door is open.

- Modify internal ventilation system to eliminate pockets of odorous air inside building.
- Report to the City of Fresno on emerging technologies that allow real-time detection and quantification of specified odorants that can serve as an early warning system for odor events.
- Notify the City of Fresno within 24 hours after an odor complaint is made to the facility directly.
- Comply with an Odor Control Plan.

Prior to the 2011 Abatement Agreement described above, the facility continued to be the source of odor complaints from nearby residents. This is in spite of the operating conditions at the facility and all the precautions taken to that point (e.g. the permanent enclosures, control equipment, operating buildings under negative pressure, closing doors, breakdown provisions, etc.). This represents an example of a facility that is located near a residential community that needed to do even more than simply enclosing odorous operations in order to reduce odors from the facility to acceptable levels.

Equipment and Procedures Currently Used by Vernon Area Rendering Facilities

During site visits to each rendering facility in Vernon, it became apparent that there is a wide range of odor control efforts used by the four Vernon-area rendering facilities. These are described below.

Enclosures

Enclosure of odorous rendering operations may provide the most effective means of odor control. However, only one facility had a completely enclosed raw material receiving operation. The enclosed building had roll-up doors to allow delivery truck access. This building is kept under negative pressure and vented to odor control equipment.

Two rendering facilities had partial enclosures around the receiving area. One consisted of a roof with three walls and the fourth wall open. The other had only a roof structure over the receiving pit.

The fourth facility has an asphalt/concrete slab, where raw materials are directly deposited, with no covering. This method of receiving raw material does not offer any protection from the sun or wind, allowing accelerated decomposition to occur in the sun during warm days and allowing odors to be readily transported off-site.

All four facilities had at least partially enclosed cooking and fat processing areas, consisting of a roof with one or more walls. However, in order to meet the proposed enclosure requirements, all four facilities would be required to do additional construction to completely enclose these operations. One facility would need to replace or repair the sheet metal sheathing which contains a number of oxidation holes.

One facility had an enclosure around the wastewater treatment area. It is an older masonry building and some additional work would need to be performed for the building to be compliant with the rule proposal. In addition, the wastewater outlet to the city sewer connection was open to the atmosphere, allowing odors from the treated wastewater to be released. The other three

rendering facilities have open wastewater treatment processes that would need to be enclosed and vented to odor control (or somehow converted to closed systems) in order to be compliant with the rule proposal.

Odor Control Equipment

All four rendering facilities have a means of controlling high-intensity odors from cookers, and currently comply with the requirements of Rule 472 – Reduction of Animal Matter. One facility has a packed-bed scrubber that controls odors from the raw material receiving building. It is not known whether this scrubber has the capacity to accommodate additional airflow from enclosures that the facility would be required to construct and ventilate under the rule proposal. The other three rendering facilities would likely need to install additional control equipment to comply with the rule proposal.

Misting Systems

Two of the four rendering facilities use a misting system that may have a limited impact on odor control. Misting systems use products designed to mask or neutralize the characteristic odor of rendering operations. One approach to control odors in the past has been to use products that mask odor with a more pleasant small. Masking does not modify or neutralize the odorous molecule. Instead, the maskant overpowers the odorous molecules with a stronger molecule. Maskants often use an essential oil, such as vanilla, citrus, pine or floral scents. However, at concentrations necessary to mask odors from rendering operations, masking products sometimes seem excessive after long and continuous exposure, and may become as irritating as the odor they are intended to mask.

Misting systems can also use an odor neutralizer. The perception of odor can be decreased significantly when an odorous molecule is paired with a modifying molecule. Certain pairs of odors have a neutralizing effect on each other. Each has a recognizable odor, but when combined in the vapor state, both become unrecognizable by a canceling effect. Known as "Zwaademaker pairing", this phenomenon results in *olfactory confusion*: the inability of the brain to categorize signals from the olfactory sensors.

Work has been done to quantify the response to odorous substances. Once individual odor molecules are isolated, odorous substances are identified and odor thresholds are measured using odor panel analysis. Through experimentation, inhibitors and synergists that modify the character of the odor are identified.

Odor neutralization is usually accomplished using essential oils and organic solvents. Also called volatile oils, essential oils impart the characteristic odors of plants. Used in perfumes and food flavorings, essential oils are also used in products designed to mask or neutralize odors.

CHAPTER 4: IMPACT ASSESSMENT

REDUCTIONS IN ODORS

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

SOCIOECONOMIC ANALYSIS

AQMP AND LEGAL MANDATES

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE 40727.2, COMPARATIVE ANALYSIS

REDUCTIONS IN ODORS

Implementation of PR 415 will require rendering facilities to implement Best Management Practices (BMP) and will require critical processes to be enclosed. The odor BMPs in the proposal are achieved in practice and reasonable measures that will result in odor reductions from rendering facilities. Implementation of PR 415 will minimize odors from rendering facilities through a combination of odor capture by enclosing odor-generating processes, odor control by venting odorous air from within enclosures to odor control equipment, and BMP. Requiring affected facilities to submit a permit application for the combination of enclosure and odor control to be analyzed as a single permit unit will give a measure of assurance regarding the efficacy of an enclosure/control combination proposed by a rendering facility to effectively capture and treat odors.

Although implementation of PR 415 is expected to minimize odors from rendering facilities, there is no practical way to measure odors before and after measures are implemented; therefore, the magnitude of odor reduction is not quantifiable. Implementation of PR 415 provides a proactive approach to controlling odors that is expected to reduce the number of odor complaints.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

PR 415 is considered a "project" as defined by the California Environmental Quality Act (CEQA), and the SCAQMD is the designated lead agency. Pursuant to CEQA and SCAQMD Rule 110, the SCAQMD will be preparing the appropriate environmental documentation to evaluate any potential adverse significant impacts associated with implementing the proposed rule. An environmental impact is defined as an impact to the physical conditions which exist within the area which would be affected by the proposed project.

SOCIOECONOMIC ANALYSIS

A socioeconomic analysis will be conducted and will be released for public review and comment at least 30 days prior to the SCAQMD Governing Board hearing on PR 415, which is anticipated to be May 1, 2015.

AQMP AND LEGAL MANDATES

There are no specific legal requirements for SCAQMD to propose Rule 415, and it will not be submitted into the State Implementation Plan (SIP). PR 415 is a direct result of an issue that was identified by the working group for the Clean Communities Plan (CCP) in the pilot study area of Boyle Heights. In November 2010, the Governing Board approved the CCP. SCAQMD staff began holding meetings of the stakeholder working group in July 2011 in order to identify air quality issues in Boyle Heights and surrounding communities that the working group felt should be addressed. The prevalence of odors from the four rendering facilities in Vernon, directly south of Boyle Heights was of great concern to the working group. As a direct result of the CCP pilot study process, SCAQMD staff undertook rulemaking to address these odors in 2014.

DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE 40727.2, COMPARATIVE ANALYSIS

Under Health and Safety Code (H&SC) Section 40727, the SCAQMD is required to make findings of necessity, authority, clarity, consistency, non-duplication and relevance. Under H&SC Section 40727.2, the SCAQMD is required to perform a comparative written analysis when adopting,

amending or repealing a rule or regulation. The comparative analysis is relative to existing federal requirements, existing or proposed SCAQMD rules and air pollution control requirements and guidelines which are applicable to odors from rendering.

The final staff report will include the required findings, and a comparative analysis of other current state and federal requirements regulating odors from rendering facilities.

ANALYSIS OF ALTERNATIVES

The final staff report will include an analysis of alternatives relative to key rule requirements.

COMMENTS AND RESPONSES

All comments received will be responded to in the final staff report.

CONCLUSIONS AND RECOMMENDATIONS

This rulemaking is the direct result of an issue that was identified by the working group for the CCP in the pilot study area of Boyle Heights. The need to address odors from the Vernon rendering facilities is a key air quality priority for the CCP stakeholders in the communities where they live and work.

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