



# Clarion Food Grade and Environmental Lubricants

**The webinar will begin in less than 10 minutes.**

Erica McDonald





# Clarion Food Grade and Environmental Lubricants

**The webinar will begin in less than 5 minutes.**

Erica McDonald





# Clarion Food Grade and Environmental Lubricants

Erica McDonald



# Erica McDonald

- CITGO Lubricants Product Specialist
- BS, Integrative Biology with Minor in Chemistry
- 10 Years in the Lubricants Industry, including extensive experience at the CITGO Cicero Lab
- LubeAlert Oil Condition Monitoring Program Support



# Agenda

Food Grade Lubricants Market

Introduction to Food Grade Lubricants

Clarion Products for Direct Food Contact

Clarion Products for Indirect Food Contact

Clarion Products for Food Packaging Applications

Introduction to Environmental Lubricants

Environmental Lubricants Market

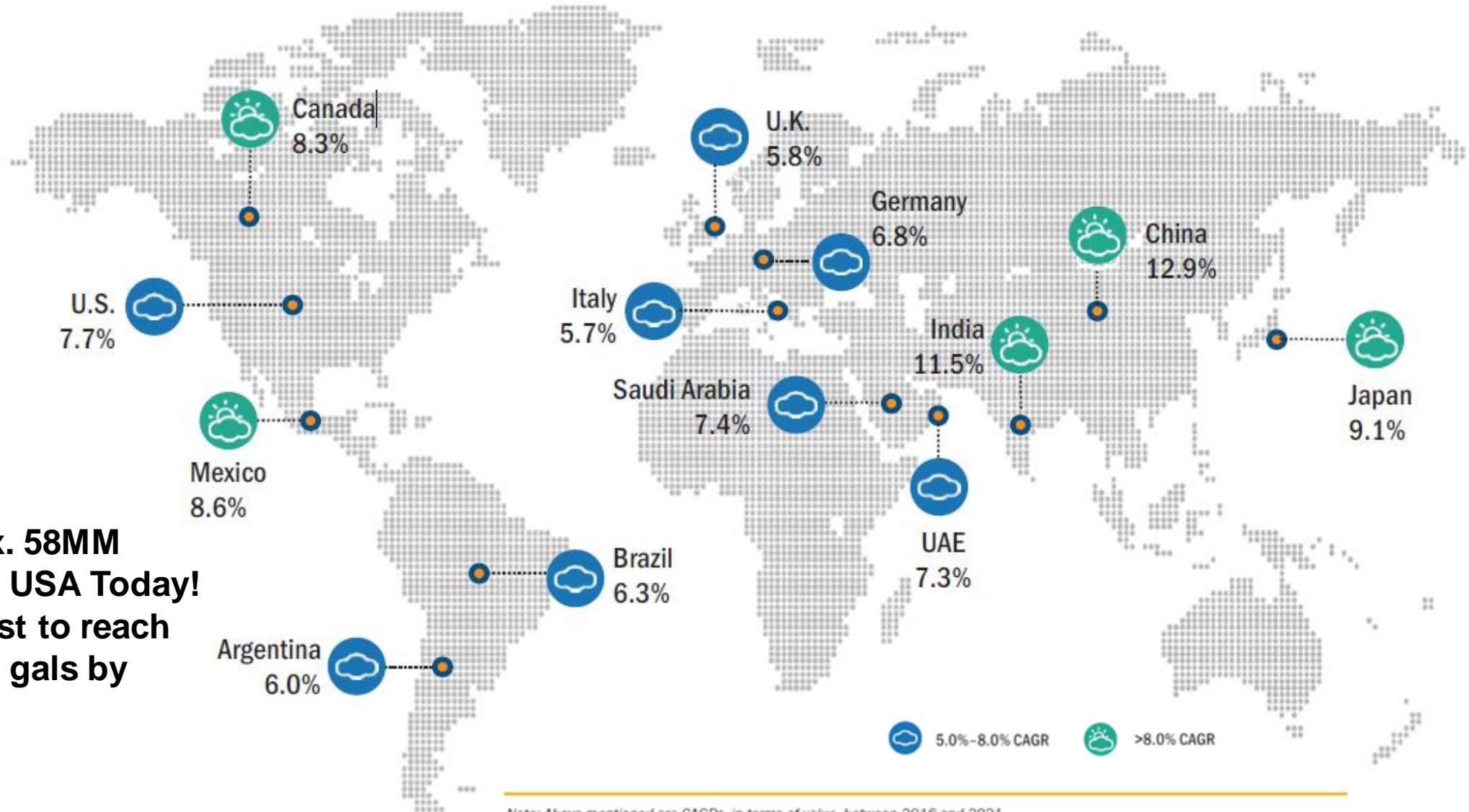
VGP Requirements

Clarion Green Lubricants



# Clarion: Food Grade Lubricants

# Food Grade Lubricants Projected Growth

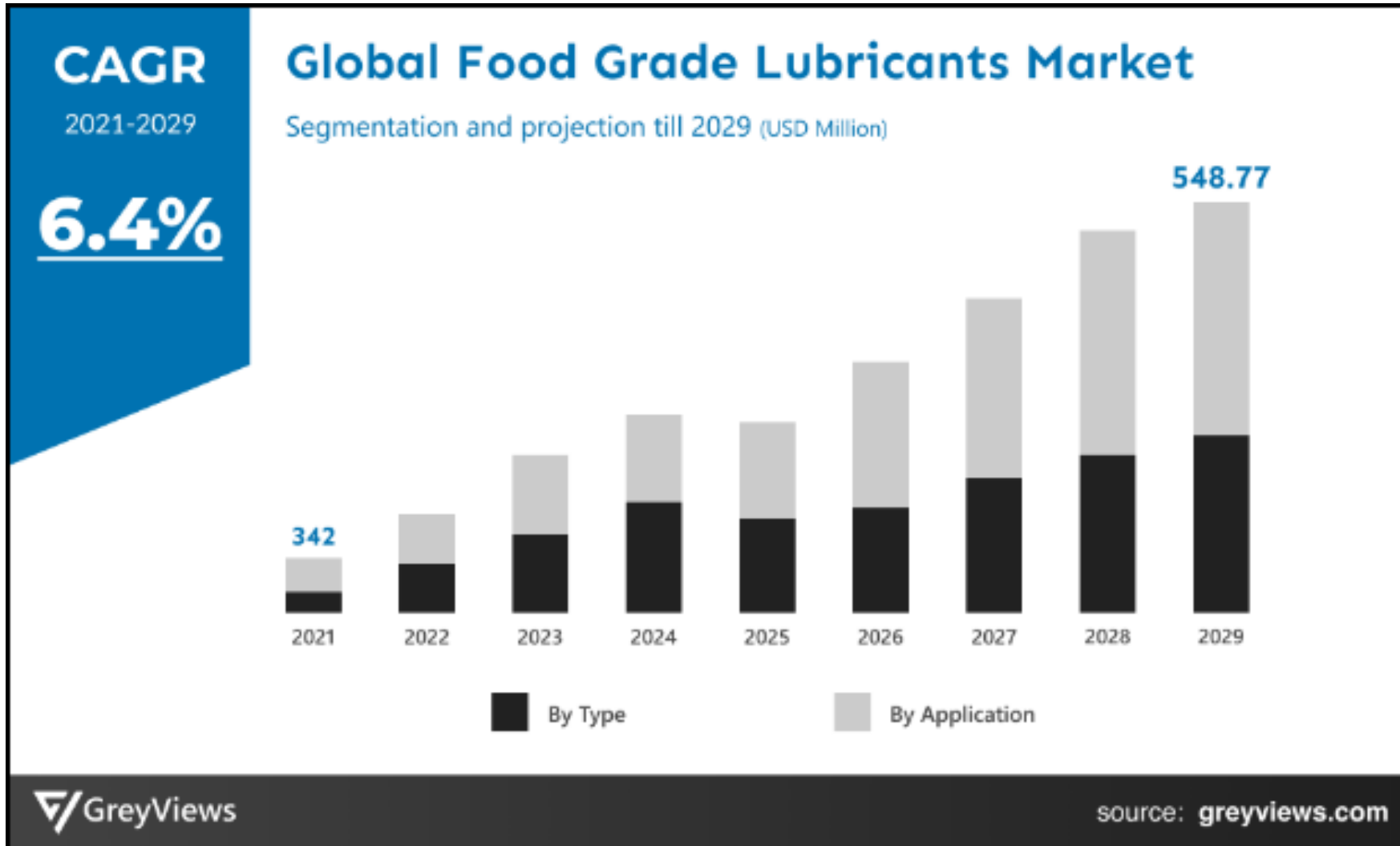


**Approx. 58MM Gals in USA Today!  
Forecast to reach 100MM gals by 2028!**

*Note: Above mentioned are CAGRs, in terms of value, between 2016 and 2021.*

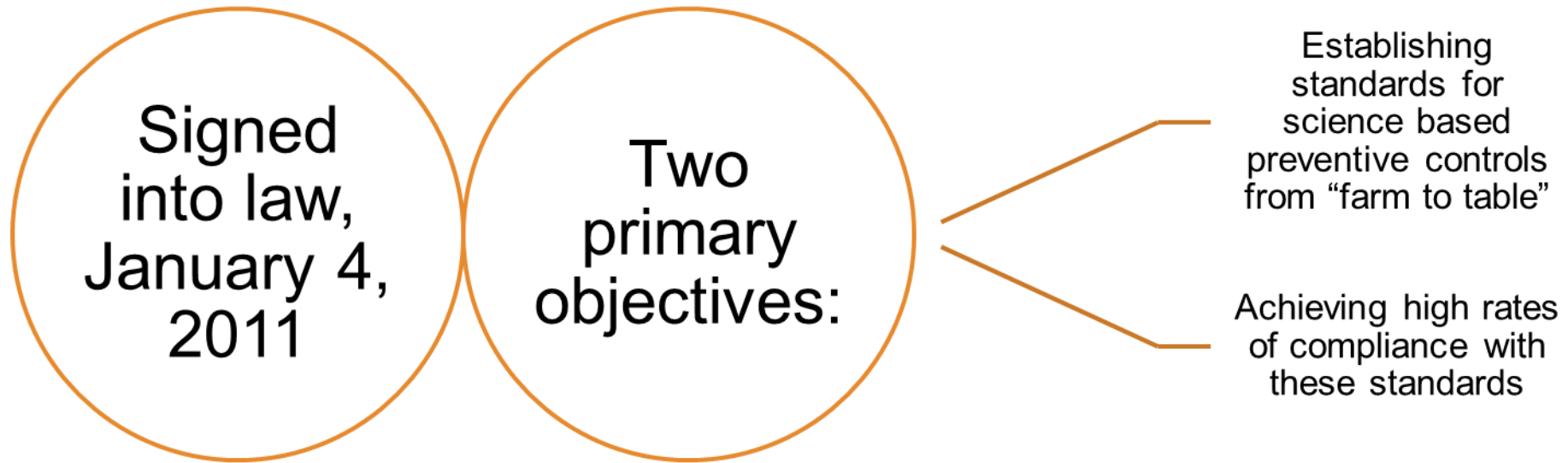
*Source: Secondary Research, Expert Interviews, and MarketsandMarkets Analysis*

# Food Grade Lubricants Market





# Food Safety Modernization Act



# FSMA – Why it is Needed

Globalization

- 15 percent of US food supply is imported

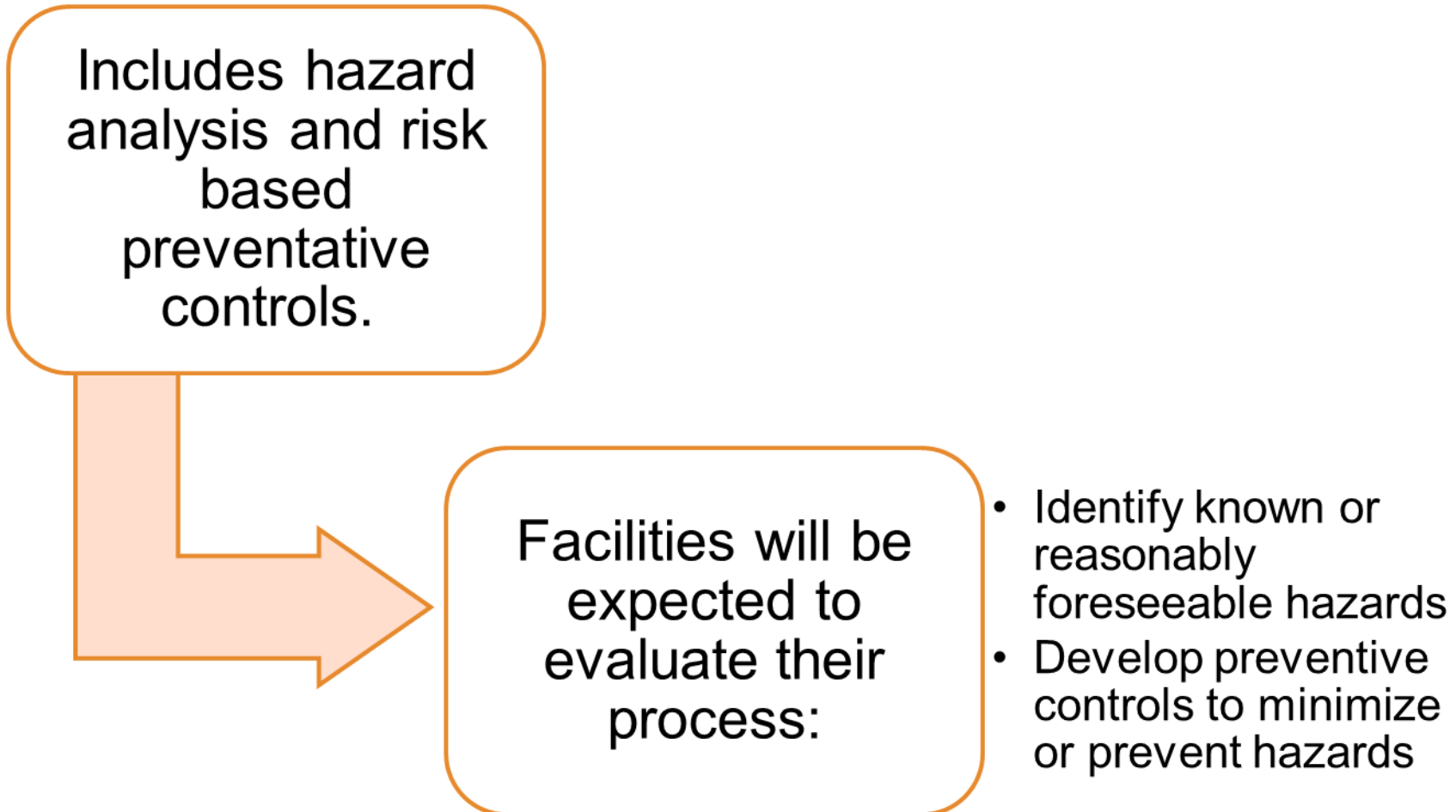
Food supply  
more high  
tech and  
complex

- More foods in the marketplace
- New hazards in foods not previously seen

Shifting  
demographics

- Growing population (about 30%) of individuals who are especially at risk for foodborne illness

# Food Safety Modernization Act



# Introduction to Food Grade Lubricants



# What is a Food Grade Lubricant?

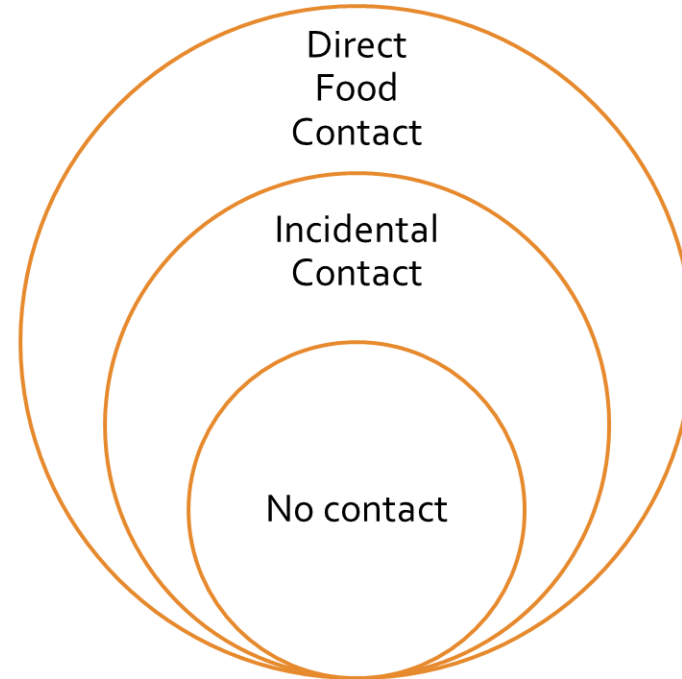
- A lubricant that is safe to use in facilities producing food and beverages but....
  - Who or what makes sure the lubricant is safe?
    - How is safe defined?
  - Are all lubricants that are called food grade designed for all applications?
- There are regulatory and industry requirements that answer these questions
- Use classifications



# Classification Driven by Intended Use

- Direct Food Contact
  - NSF 3H, USP, NF 21 CFR 172.878
- Incidental Food Contact
  - NSF H1 21 CFR 178.3570
- No Food Contact
  - NSF H2
- The concentration limit of an H1 lubricant in food is 10 ppm.

# Where can Food Grade Lubricants be Used?





# Food Grade Lubricants Requirements

- Direct food contact lubricants must meet strict purity requirements.
- Incidental food contact lubricants include hydraulic fluids, gear lubricants, compressor fluids, greases, etc.
- These products are designed to lubricate and protect machinery in the food and beverage processing industry.
- They are formulated with approved components:
  - Base Fluid – White Mineral Oil, Certain Synthetics (PAO, PAG, Esters)
  - Additives – Limited additives, and in limited concentration in the product formulation
  - Thickeners – Limited range of thickeners allowed



# Certifying and Government Agencies

- U.S. Pharmacopoeia (USP)
  - High Viscosity Oils
- National Formulary (NF)
  - Low Viscosity Oils
- US Department of Agriculture (USDA)
- US Food and Drug Administration (FDA)
- NSF International



# Religious Certifications

- Kosher (Union of Orthodox Jewish Congregations of America)



- Halal certification of compliance with Islamic food law



# Potable Water

- NSF/ANSI Standards 60, 61
  - Specific to products used for potable water system safety
    - Well pumps, water system pumps, gearboxes



**Certified to  
NSF/ANSI-60/61**



# What is Needed in a Food Grade Lubricant?

- Performance requirements
  - Anti-wear
  - Rust and corrosion protection
  - Contaminant resistant
    - Water washout
    - Dust, juices, sugars, etc.
- Additional physical requirements
  - Tasteless
  - Odorless
  - Inert
  - Allergen free

# Lubricants for Direct Food Contact



## Clarion Food Grade White Mineral Oils

- NSF 3H Lubricants as defined in 21 CFR 172.878
- Also meets 21 CFR 178.3620(a) for components of non-food articles intended for contact with food (food packaging)
- High-purity oils produced by an ultra-high pressure hydrotreating process
- Stabilized with vitamin E as an oxidation inhibitor
- Colorless, odorless, and tasteless
- Free of natural products derived from animals, nuts, or GMOs
- Grades: 70, 90, 200, 350, 500
- ISO Grades: 10, 15, 32, 68, 100

# Clarion Food Grade White Mineral Oil Spray

- High purity National Formulary (NF) white mineral oil
- Meets 21 CFR 172.878
- NSF 3H registered
- Colorless, odorless, and tasteless
- Aerosol packaging with propellant
- ISO 22 viscosity grade



# Direct Food Contact Applications

- Release Agent
  - Baking, smoked meats, etc.
- Dust Control
  - Grains, to prevent explosive dust/air mixtures
- Coating and sealant
  - Fruits, vegetables, eggs
- Float
  - Vinegar
  - Wine

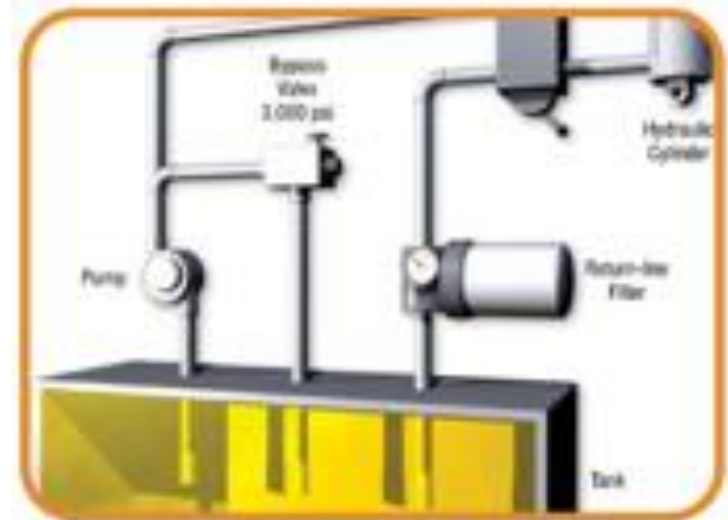




# Lubricants for Indirect Food Contact

# Clarion Food Machinery AW Oils

- Hydraulic fluids designed specifically for use as lubricants for processing equipment
- Meet the requirements of U.S. FDA regulation 21 CFR 178.3570 for incidental food contact
- Do not contain any natural products derived from animals, nuts, or GMOs
- Colorless, odorless, and tasteless
- Certified as Kosher and Halal
- ISO grades: 32, 46, 68, and 100





## Clarion Food Grade FR Fluid

- Food grade water-glycol fire resistant hydraulic fluid designed for food process applications
- Meets the requirements of U.S. FDA regulation 21 CFR 178.3570
- Factory Mutual approved
- ISO 46 viscosity grade

# Clarion Food Machinery Gear Oils

- Gear oils designed for use in food machinery applications
- Colorless, odorless, and tasteless
- Certified Kosher and Halal
- ISO grades: 150, 220, 320, and 460





# Clarion Food Machinery Gear Oils

- Gear oils designed for use in food machinery applications
- Colorless, odorless, and tasteless
- Certified Kosher and Halal
- Meet the requirements of U.S. FDA regulation 21 CFR 178.3570
- ISO grades: 150, 220, 320 and 460

# Clarion Synthetic Gear Fluids

- Synthetic gear fluid
- Excellent performance in food and beverage canning machinery
- Colorless, odorless, and tasteless
- Exceptional heat resistance and low temperature fluidity
- Meet U.S. FDA regulation 21 CFR 178.3570
- ISO viscosity grades: 150, 220, and 320



# Clarion CompressorGard

- Synthetic compressor fluids designed for use in the food service industry
- Excellent oxidation stability and long service life
- Ideal for wide temperature range use
- Compatible with seal and gasket materials normally used in hydraulic and compressor systems
- ISO viscosity grades 32, 46, and 68



# Clarion Synthetic Refrigeration Fluid

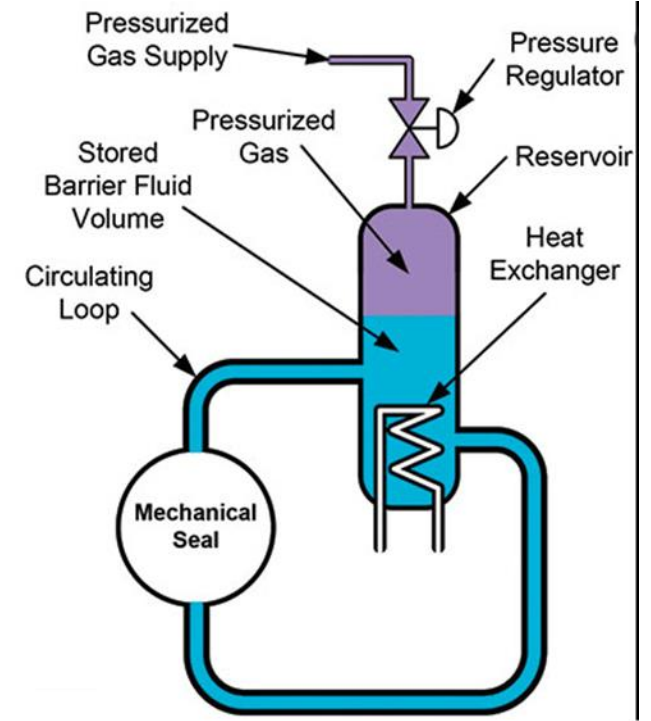
- High-performance refrigeration compressor lubricant
- Does not contain paraffin wax component to form deposits
- Compatible with most paints and elastomers used in refrigeration systems
- Designed for use in rotary screw compressors
- Meets U.S. FDA regulation CFR 21 178.3570
- ISO 68





# Clarion SynBar Fluids

- Synthetic barrier fluids for mechanical seals
- Excellent low-temperature fluidity and high-temperature stability for wide service temperature range
- Compatible with commonly used seal materials
- ISO grades: 5 and 22



# Clarion Food Machinery Grease #2



- NSF H-1, ANSI Standard 60 & 61 (water pumps & water system machinery)
- Anhydrous Calcium
- NLGI No. 2
- Polymer Fortified
- Very Adhesive
- Water Resistant
- Transparent

# Clarion Food Machinery HT EP Greases



- Aluminum Complex
- White Appearance
- Very Adhesive
- NSF H-1, ANSI Standard 60 & 61 (#2)
- Good EP/AW Performance (400 Weld, 40 lb. Timken OK Load)
- Fully Additive Treated

# Clarion Chain and Trolley Lube



- Anhydrous Calcium
- No. 0000 Consistency
- Smooth
- Some Polymer for Adhesion
- Clear
- Wear Resistant
- Water Resistant
- H-1

# Clarion FM CS EP Grease



- Calcium Sulfonate
- White Appearance
- NSF H-1 Certified
- 400 Weld
- ISO 220 (oil + polymer)
- Outstanding Rust Protection
- Good for use in food pellet mills

# Clarion PM Hi-Temp Food Machinery 100 Greases



- Food Pellet Mill Grease
- Aluminum Complex (Water Resistant)
- NSF H-1 Certified
- ISO 100
- High Dropping Point
- Excellent EP/AW
- Rust Resistant



# Clarion FM Silicone Spray

- High quality silicone fluid content
- Rapid drying time
- Long lasting dry lubricant food
- Meets 21 CFR 178.3570

# Clarion FM Grease Spray



- Aluminum Complex
- White
- ISO 150
- Good EP: 315 Weld
- Good AW
- 0.46 mm Wear Scar
- No. 0.5 Consistency





# Clarion Products for Incidental Food Contact

- NSF H1 Lubricants as defined in 21 CFR 178.3570
- Used for plant maintenance in the food and beverage processing industry:
  - Hydraulic Fluid
  - Gear Lubricant
  - Compressor Fluid
  - Grease
- Formulated with limited base fluids, HX-1 listed additives (in limited concentration), and limited thickeners (for grease)

# Indirect Food Contact Lubricant Applications

## Hydraulic systems

- Due to pressurized system, a burst hose could potentially contaminate food even if not within close proximity to a food production area

## Air compressors

- Where is the air being used?
- Is air in contact with food or food packaging?

## Other

Gear drives,  
bearings,  
conveyors,  
blowers,  
refrigeration,  
vacuum pumps



# Clarion Lubricants for Incidental Food Contact

- Clarion Food Machinery A/W Oils
- Clarion Food Grade FR Fluid
- Clarion Food Machinery Gear Oils
- Clarion Synthetic Gear Fluids
- Clarion CompressorGard
- Clarion SynBar Fluid 22
- Clarion Synthetic Refrigeration Fluid
- Clarion Food Machinery HT EP Greases
- Clarion FM CS EP 2 Grease
- Clarion PM Hi-Temp Food Machinery 100 Greases
- Clarion Food Machinery Grease 2
- Clarion Chain and Trolley Lube
- Clarion FM Silicone Spray
- Clarion FM Spray Grease



# Technical White Oil Products

# ClariPac Technical Grade White Oils

- Defined by 21 CFR 178.3620(b)
- Refined by high pressure hydrotreating
- Stabilized with vitamin E as an antioxidant
- Colorless, odorless, and tasteless
- Some application examples:
  - Adhesives, coatings
  - Filters
  - Plasticizers
  - Foil and paper manufacture
  - Dust suppressant for aggregate materials and grains  
not intended for human consumption
- Grades: 70, 90, 200, 350, 500
- ISO Grades: 10, 15, 32, 68, 100



# Clarion Lubricants: Clarion Environmental

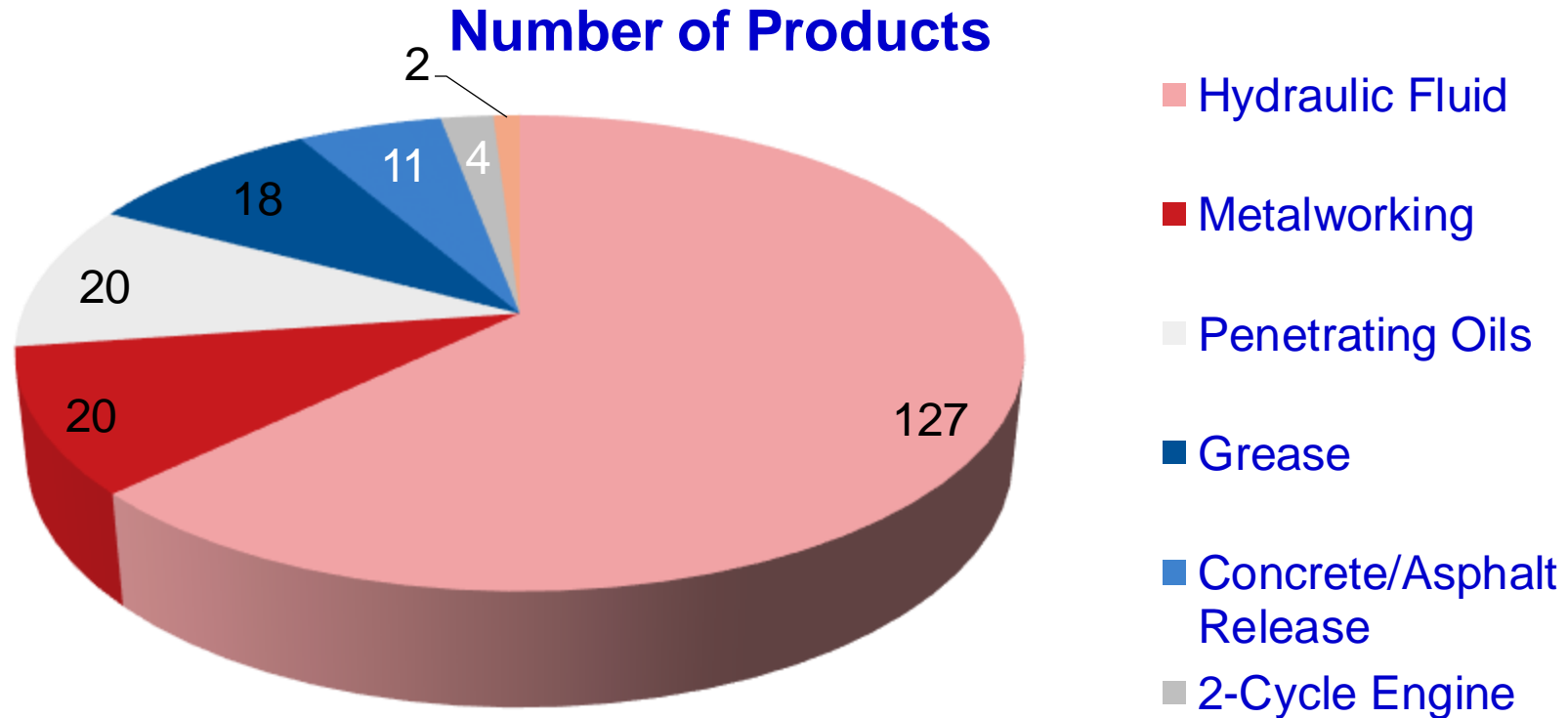


# North American Market

- North America has the highest growth rate of 7.1% ACGR.
- Estimated Market Value 2018 - USD \$849,000,000
- Estimated Market Value 2025 - USD \$1,370,000,000

		<b>7.1% CAGR Shown in MM USD</b>					
2018	2019	2020	2021	2022	2023	2024	2025
849	908	972	1,041	1,115	1,194	1,279	1,370

# Environmental Products in Market





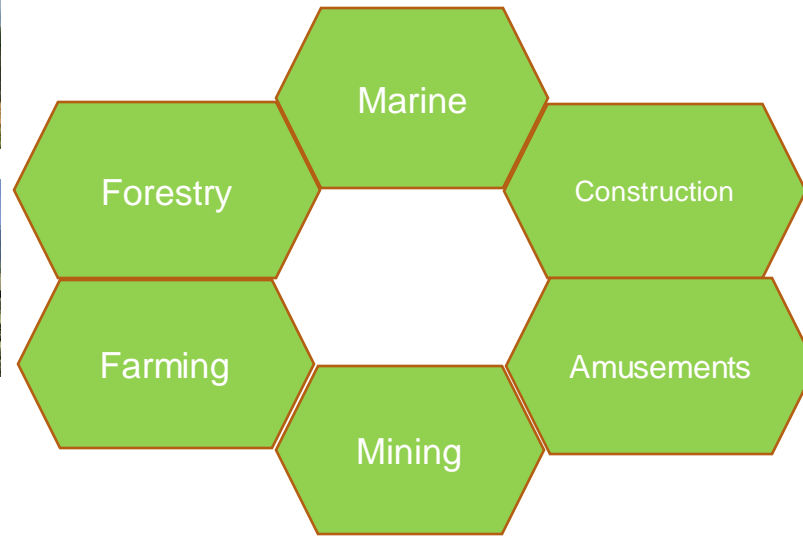
# Why Environmental Products

- 2.5 billion gallons of lubricants sold in North America
- 60% goes unaccounted for and ends up in rivers, lakes and on the ground



Source: "The Advantages and Disadvantages of Biodegradable Lubricants" Josh Pickle, Machinery Lubrication, Noria Corporation 2/2012

# Environmental Applications





## What is VGP?

“Lubricants lost from a vessel enter the aquatic environment, where serious damage to the aquatic ecosystem can occur. Consequently, there has been an emphasis on encouraging the use of EALs on vessels to protect the environment (Carter, 2009). Although their use is increasing, EALs comprise only a small percentage of the total lubricant market. “



# VGP Standards

The EPA VGP - 2013 covers discharges from Marine vessels

Commercial vessels 79 feet and over. Operating In US territory waters.

All vessels less than 79 feet are not covered by VGP

All vessels covered under VGP must use EALs



# 2013 Vessel General Permit

- Defines Environmentally Acceptable Lubricants (EALs)
  - Biodegradable
  - Minimally Toxic
  - Not Bioaccumulative
  - Defines each of the above in Appendix A



# EAL Definitions

- Biodegradable
  - Lube formulas with at least 90% readily biodegradable component
  - Grease formulas with at least 75% readily biodegradable
  - Up to 5% of lube formula can be non-biodegradable, but not bio accumulative. Balance must be inherently biodegradable.
  - For grease, up to 25% can be either inherently or non-biodegradable, but not bio accumulative.



# Terminology

ASTM D5864 defines biodegradation as: “The process of chemical breakdown or transformation of a substance caused by organisms or their enzymes.”

## **Readily** Biodegradable

- Biodegrades rapidly

## **Inherently** Biodegradable (propensity to biodegrade)

- Biodegrades slowly



# EAL Definitions

Minimally Toxic

- Must pass toxicity tests
- Provides various acceptable test methods and pass requirements

Not  
Bioaccumulative

- Must pass bioaccumulation tests
- Provides various acceptable test methods and pass requirements



# Clarion Lubricants: Clarion Environmental Products



# Clarion Green Synthetic Fluids

- Readily biodegradable
  - Meets 2013 VGP requirements
- Fully synthetic ester-based hydraulic fluids
- ISO 22, 32, 46, 68



## Clarion Green Bio

- Readily biodegradable,
  - Meets 2013 VGP requirements
- High oleic natural ester hydraulic fluids
- ISO 32, 46, 68



# Clarion Green Synthetic Gear Lubricants

- Fully synthetic ester-based gear lubricants
- Readily biodegradable
  - meets 2013 VGP requirements
- ISO 150, 220, 320



## Clarion Green AW Oils

- White mineral base (finished formula is not food grade)
- Inherently biodegradable, does not meet 2013 VGP
- Passes EPA static sheen test
- ISO 22,32, 46, 68



## Clarion Green Gear Oils

- White mineral base (finished formula is not food grade), AGMA EP Oils
- Inherently biodegradable, does not meet 2013 VGP
- Passes EPA static sheen test
- ISO 220, 320, 460



## Questions

- Please post your questions using the Q&A function.



## How to Contact Us

- Lubes Answer Line

800-248-4684

8:00 AM - 12:00 PM, 1:00 PM – 5:00 PM CT  
Monday through Thursday

8:00 AM - 12:00 PM, 1:00 PM – 4:30 PM CT  
Friday

[lubeshelp@citgo.com](mailto:lubeshelp@citgo.com)





## Future Webinars

November 11, 2022

CITGO Stationary National Gas Engine Oils

December 2, 2022

CITGO Wireline Lubricants

December 16, 2022

Industrial Gears and Gear Lubrication