



The dirty business of disinfectants

Research Memo
by Material Research L3C
for Women's Voices for the Earth

March 2022

**MATERIAL
RESEARCH**
L3C

Table of Contents

- [Findings](#)
- [Hazards summary of chemicals involved in the QUATs supply chain](#)
- [Supply Chain Fundamentals](#)
- [Supply Chain Demographics](#)
- [Key facilities in the US quats disinfectants supply chain](#)
 - [Olin in Freeport, Texas](#)
 - [Stepan \(Matamoros, Tamaulipas, México\)](#)
 - [Stepan \(Elwood, Illinois\)](#)
 - [Lonza \(Mapleton, Illinois\)](#)
 - [Pilot Chemical/Mason Chemical \(via Rho Chemical\) \(Joliet...](#)
 - [Pilot Chemicals/Órgano Síntesis \(Capulhuac, México\)](#)
 - [The Lewis Chemical Company \(Rome, Georgia\)](#)
 - [The Clorox Company \(Forest Park, Georgia\)](#)
 - [Reckitt Benckiser \(Hillsborough, New Jersey\)](#)
- [Glossary](#)

Researched and written by Connie Murtagh, Verónica Odriozola, Jim Vallette and Jill Weber.

Findings

In 2021, Women's Voices for Earth requested that Material Research investigate the supply chain of quaternary ammonium compounds (quats) that are commonly used in household cleaning products, such as Clorox wipes. We found:

- Quats used in common household cleaners are made by just four little-known companies, at six plants (three in Illinois, one in Georgia, and two in México). The US quats quartet are Stepan Chemical (Elwood, Illinois), Lonza (Mapleton, Illinois), Pilot Chemical (*a/k/a* Mason Chemical, Joliet, Illinois), and Lewis Chemical (Rome, Ga.). México is home to Stepan México and Organo Sintesis.
- The quats used in common household disinfectants require the use of highly toxic chemicals, methyl chloride and benzyl chloride, that is produced by Olin in Freeport, Texas.
- The manufacturing and storage of hazardous chemicals for quats manufacturing places communities at risk of chemical disaster. Only two of the four major quats manufacturers in the U.S. have Risk Management Plans. Chemical incidents and violations of environmental regulations are common.
- People living near quats manufacturing plants are more likely to be children, people of color, and living in poverty than the national average. More than 204,000 people live within 3 miles of these facilities. Fenceline residents are 18% more likely to be a child, 72% more likely to be a person of color, and have 20% less income than the national average. Overall, residents' "social vulnerability" as calculated by the U.S. Center for Disease Control is 40% above average.
- These demographic data cover U.S. residents only. One of the key facilities, Stepan's quats plant is in Matamoros, Tamaulipas, México, less than a mile from Brownsville, Texas. In 2015, according to DataMéxico, "35.5% of the population of Matamoros was in a situation of moderate poverty and 4.23% in extreme poverty."¹
- The most dangerous and toxic chemicals involved in quats manufacturing are benzyl chloride and methyl chloride. Benzyl chloride's health impacts include carcinogenicity and endocrine disruption. Methyl chloride also is a carcinogen, and a developmental and reproductive toxicant.

¹ <https://dataMéxico.org/en/profile/geo/matamoros-28022>

- Olin's chemical factory in Freeport, Texas, manufactures benzyl chloride and methyl chloride, which it sends to quat producers, including Stepan's plant in Matamoros. Olin's production equipment uses asbestos diaphragms, which relies on imports of asbestos from mines in Brazil and Russia.
- Olin releases high rates of chlorinated pollution into the environment of Freeport, Texas. From 2015 to 2016, Olin-Freeport's release rates, per chlor-alkali capacity, were among the highest in the industry for dioxins and PCBs.
- Benzyl chloride is released from quats manufacturing plants during routine operations and incidents. Three quats factories in Illinois release more than 1,400 pounds of benzyl chloride into the air each year, combined. Stepan, Lonza, and Rho/Pilot/Mason chemical plants account for more than 7% of benzyl chloride air pollution nationwide.
- While there are 36 different quat molecules used in disinfection, the most widely used consumer products rely upon only a handful of them, mainly in the alkyl dimethyl benzyl ammonium chlorides (ADBAC) and dialkyl dimethyl ammonium chloride (DDAC) groups.
- Consumer brand products often contain mixtures of quats produced at different facilities. There are a lot of supply chain crossovers in this obscure industry.
- Some of the facilities that service the large consumer brand names have escaped regulatory attention despite their sizable production of quats.
- These companies coordinate and work together as business to business operations, sharing facilities and potentially formulations to address the consumer market.
- The quats supply chain meets the fragrance supply chain in consumer products, from personal hygiene to household cleaners. This brief concludes with short profiles of the factories where Lysol and Clorox products are made, many of which use a combination of quats and fragrances.

The supply chain connections identified in this brief are based upon Material Research's examination of EPA pesticide registration numbers, Chemical Data Reports, Toxic Release Inventory (TRI) reports, and Risk Management Plans. This data was supplemented with other literature regarding methods and practices, such as journals, news, and patents. Trade data, obtained via the commercial database, Datamyne, provided information about imports and exports that further clarified the roles of various locations in this supply chain.

Hazards summary of chemicals involved in the QUATs supply chain

Chemical names and CAS nos.	Uses and Hazards ²
Methyl chloride (74-87-3)	<u>Use</u> : Manufacture of quats. <u>Hazards</u> : Carcinogenicity, reproductive and developmental toxicity, systemic toxicity and/or neurotoxicity, acute mammalian toxicity, flammability, highly persistent.
Benzyl chloride (100-44-7)	<u>Use</u> : Manufacture of quats. <u>Hazards</u> : Carcinogenicity, endocrine activity, skin and eye irritation, systemic toxicity and/or neurotoxicity, acute mammalian toxicity, flammability, persistence, acute and chronic aquatic toxicity.
Ammonia (7664-41-7)	<u>Use</u> : Manufacture of quats. <u>Hazards</u> : Skin and eye irritation, respiratory sensitization, endocrine activity, acute mammalian and aquatic toxicity, persistence.
ADBAC compounds: <ul style="list-style-type: none"> - Alkyl* dimethyl benzyl ammonium chloride *(50%C14, 40%C12, 10%C16 (68424-85-1) - Alkyl* dimethyl benzyl ammonium chloride *(60%C14, 30%C16, 5%C18, 5%C12) (68391-01-5) 	<u>Quat Manufacturers</u> : Stepan (México and Illinois), Lonza (Mapleton IL); Lewis (Rome, GA). Users: Pilot/Mason. Lewis also imports ADBAC from Shandong Taihe (China chemical trader). <u>Use</u> : Common disinfectants sold by SC Johnson, Procter & Gamble, Clorox, Home Depot, 3M, and Lysol. , such as 3M Quat Disinfectant Cleaner, Clorox Disinfecting Wipes, Lysol Disinfectant Spray. <u>Hazards</u> : Skin and eye irritation/corrosivity, respiratory sensitization, acute aquatic toxicity, acute mammalian toxicity, bioaccumulation.
DDAC (didecyl dimethyl ammonium chloride) compounds: <ul style="list-style-type: none"> - 1-Decanaminium, N-decyl-N,N-dimethyl-, chloride (7173-51-5) - 1-Decanaminium, N,N-dimethyl-N-octyl-, chloride (32426-11-2) - 1-Octanaminium, N,N-dimethyl-N-octyl-, chloride (5538-94-3) 	<u>Quat Manufacturers</u> : Stepan (México), Lonza (Mapleton, Illinois). Users: Pilot/Mason (Joliet, Illinois), Lewis (Rome, Georgia). <u>Use</u> : Common disinfectants sold by SC Johnson, Procter & Gamble, Clorox, Home Depot, and 3M, such as Renown Citrus Quat 64 disinfectant cleaner, sold at Home Depot ³ , 3M Quat Disinfectant Cleaner Disinfectant, SC Johnson Professional Quaternary Disinfectant Cleaner, and Procter & Gamble Clean Quick Broad Range Quaternary Sanitizer. <u>Hazards</u> : Endocrine activity, skin sensitization, skin and eye irritation/corrosivity, respiratory sensitization, systemic toxicity and/or neurotoxicity, acute aquatic toxicity.
Alkyl* dimethyl ethylbenzyl ammonium chloride *(68%C12, 32%C14) (85409-23-0)	<u>Quat Manufacturer</u> : Pilot/Mason (Joliet, Illinois) <u>Use</u> : Clorox disinfecting wipes, Clorox Broad Spectrum Quaternary Disinfectant Cleaner. <u>Hazards</u> : Acute mammalian toxicity, respiratory sensitization, skin irritation/corrosivity, acute aquatic toxicity
Alkyl* dimethyl benzyl ammonium saccharinate *(50% C14, 40% C12, 10%	<u>Quat Manufacturer</u> : Stepan (location unknown, but listed in Stepan safety data sheet for "Onyxide 3000" (published in 2018)). ⁴ <u>Use</u> : SC Johnson FamilyGuard Disinfectant Aerosol Mountain Air, Professional Lysol Brand

² Hazards information obtained from the Pharos Project database (subscription required),
Pharosproject.net

³

<https://www.supplyworks.com/Sku/REN02846-MS/renown-128-oz-citrus-quat-64-disinfectant-cleaner-741224028462-111462>

⁴

<https://www.stepan.com/content/dam/stepan-dot-com/webdam/website-product-documents/safety-data-sheets/sds-us/en/00184700.pdf>

C16) (68989-01-5,)

Disinfectant Spray.⁵

Hazards: Acute mammalian toxicity, respiratory sensitization, skin irritation/corrosivity

Walmart

Departments Services

Ellsworth Supercenter | Bar Harbor, 04609

Household Essentials / Cleaning Supplies / All-Purpose Cleaners

Popular pick for "lysol spray disinfectant"

Lysol

Lysol Disinfectant Spray, Sanitizing and Antibacterial Spray, For Disinfecting and Deodorizing, Crisp Linen, 19 fl oz

★★★★☆ (4.7) 1459 reviews

Incomplete Ingredients

\$6.47 ~~\$41.13~~ 34.1 ¢/oz

Add to cart

Walmart's sales site for this common disinfectant spray does not disclose the ingredients. However, a cross-referencing of the EPA registration number for this product (777-99) with the agency's pesticides registry reveals the ingredients to include Alkyl* dimethyl benzyl ammonium chloride *(50%C14, 40%C12, 10%C16), a quat imported, manufactured or used by all of the quats companies in this report. Lysol is a branded product of **Reckitt Benckiser**. (See below for a profile of this company.)

Supply Chain Fundamentals

According to the companies that produce quats, there are 36 different molecules used for disinfection.⁶ Chemicals identified via registration numbers associated with common consumer disinfectant products mostly fall into one of two types: ADBAC and DDAC.

- **ALKYL DIMETHYL BENZYL AMMONIUM CHLORIDES (ADBAC)**

Alkyl dimethyl benzyl ammonium chlorides (ADBAC) are “used in different formulations as part of sanitizing and disinfectant products for hard, non-porous surfaces.”⁷

Other names of this group include Benzalkonium chlorides (BACs or BKCs), alkyl dimethyl benzyl ammonium chlorides, alkyl dimethyl (phenylmethyl) quaternary ammonium chlorides, ammonium alkyl dimethyl (phenylmethyl) chlorides, or ammonium alkyl dimethyl benzyl chlorides.⁸

BAC is a mixture of alkylbenzyl dimethylammonium chlorides of various even-numbered alkyl chain lengths (C8-C18). The greatest biocide activity is associated with the C12-C14 derivatives, which are the main components of the mixture.⁹

- **DIALKYL DIMETHYL AMMONIUM CHLORIDE (DDAC)**

DDAC group members are structurally similar, with two alkyl groups and two methyl groups. “DDAC-based products are used as hard surface disinfectants in healthcare facilities and other locations,” according to the Household and Commercial Products Association.¹⁰

Chemicals used in the most widely used formulations for institutional and consumer disinfectants carry the following CAS numbers: 68424-85-1, 68391-01-05, 7173-51-5, 32426-11-2 and 5538-94-3.

Four chemical plants in the United States, and two in México, manufacture the quaternary ammonium compounds (quats) used in consumer disinfectant brands like Lysol and Clorox:

⁶ <https://www.quats.org/what-are-quats/what-quats-do>

⁷ <https://www.quats.org/what-are-quats>

⁸ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6581159/>

⁹ https://www.eurl-pesticides.eu/userfiles/file/EurlSRM/EurlSRM_meth_QAC_ShortMethod.pdf

¹⁰ <https://www.quats.org/what-are-quats>

- Lonza (Mapleton, Illinois). Lonza holds the underlying EPA registration product (Bardac 205M-14.08) sold commercially as 3M Quat Disinfectant Cleaner Concentrate, SC Johnson Quaternary Disinfectant Cleaner, and Procter & Gamble's Clean Quick Broad Range Disinfectant Cleaner.
- Stepan (Elwood, Illinois and Matamoros, México). Stepan holds the underlying EPA registration product (BTC 885 NDC-128) sold commercially as Clorox Pro Quaternary All-Purpose Disinfectant Cleaner.
- Pilot Chemical/Mason Chemical (Joliet, Illinois, and Capulhuac, México). Mason holds the underlying EPA registration product (Maquat 64-NHQ) sold commercially at Home Depot and Walmart as Renown 2846 Citrus Quat 64¹¹. Its production in Joliet, Illinois, occurs at the Rho Chemical toll chemical plant.
- Lewis Chemical (Rome, Georgia). This obscure company appears to supply the other three companies (Lonza, Stepan, and Pilot) with quats.

Only rarely does one company supply all the quats for the final consumer product. Each of the four quats producers creates formulations for consumer products that include quats made by other companies.

The quats are manufactured by reacting amines with alkyl halides, mainly benzyl chloride and methyl chloride. The manufacturers generally make their own amines or supply each other with them. Olin's chemical plant (located within Dow's petrochemical complex in Freeport, Texas) supplies Stepan México with methyl chloride.

Amines made in or imported by one plant are used by others. For example, Lonza makes amines that Pilot/Mason also consumes in its quats manufacturing in Joliet. These plants also import amines from a Clariant joint venture in Gresik, Indonesia, called Global Amines.

Benzyl chloride air releases, 2014-2018, pounds total

Facility	Air Releases	% of U.S. total
U.S. total air releases	101,881	
Stepan (Elwood, Illinois)	4,614	5%
Rho/Pilot/Mason (Joliet IL)	1,828	2%
Lonza (Mapleton, Illinois)	962	1%

U.S. Toxics Release Inventory Data via fencelinedata.org.

Supply Chain Demographics

Overall, within 3 miles of the key facilities*:

- **204,030 people**
- **53,413 children (26%) (22% is national average)**
- **136,332 people of color (67%) (40% is national average)**
- **\$27,267 per capita income (\$34,103 is national average¹²)**
- **0.62 Social Vulnerability Index (0.44 is national average)**

* This analysis is based on U.S. EPA and CDC data only. In Matamoros, Mexico, "in 2015, 35.5% of the population was in a situation of moderate poverty and 4.23% in extreme poverty."¹³

Facility-by-facility demographics

Company, Location	No. People within 3-miles (c)	% under age of 18 (c)	% People of Color (c)	Median Per Capita Income (c)	Social Vulnerability Index (a)
<i>U.S. Average</i>	<i>n/a</i>	22%	40%	\$34,103	0.44
Clorox, Forest Park, Georgia	49,375	28%	89%	\$17,298	0.92
Stepan, Matamoros, México	7,742 (b)	30%	95%	\$12,056	0.89
Olin, Freeport, Texas	15,163	33%	79%	\$23,165	0.74
Pilot/Mason/Rho Chemical, Joliet, Illinois	90,210	25%	62%	\$22,246	0.68
Lonza, Mapleton, Illinois	1,407	19%	1%	\$32,865	0.22
Stepan, Elwood, Illinois	3,802	19%	9%	\$30,162	0.13
Reckitt Benckiser, Hillsborough, New Jersey	36,331	24%	38%	\$57,717	0.04

(a) Social Vulnerability Index. Possible scores range from 0 (lowest vulnerability) to 1 (highest vulnerability). According to the U.S. Centers for Disease Control, "Social vulnerability refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss."¹⁴

(b) Demographic data for Stepan is from U.S. government sources only. Stepan's plant is one mile from the U.S. border. This data encompasses people who live in Brownsville, Texas, within two-miles of the closest point on the border.

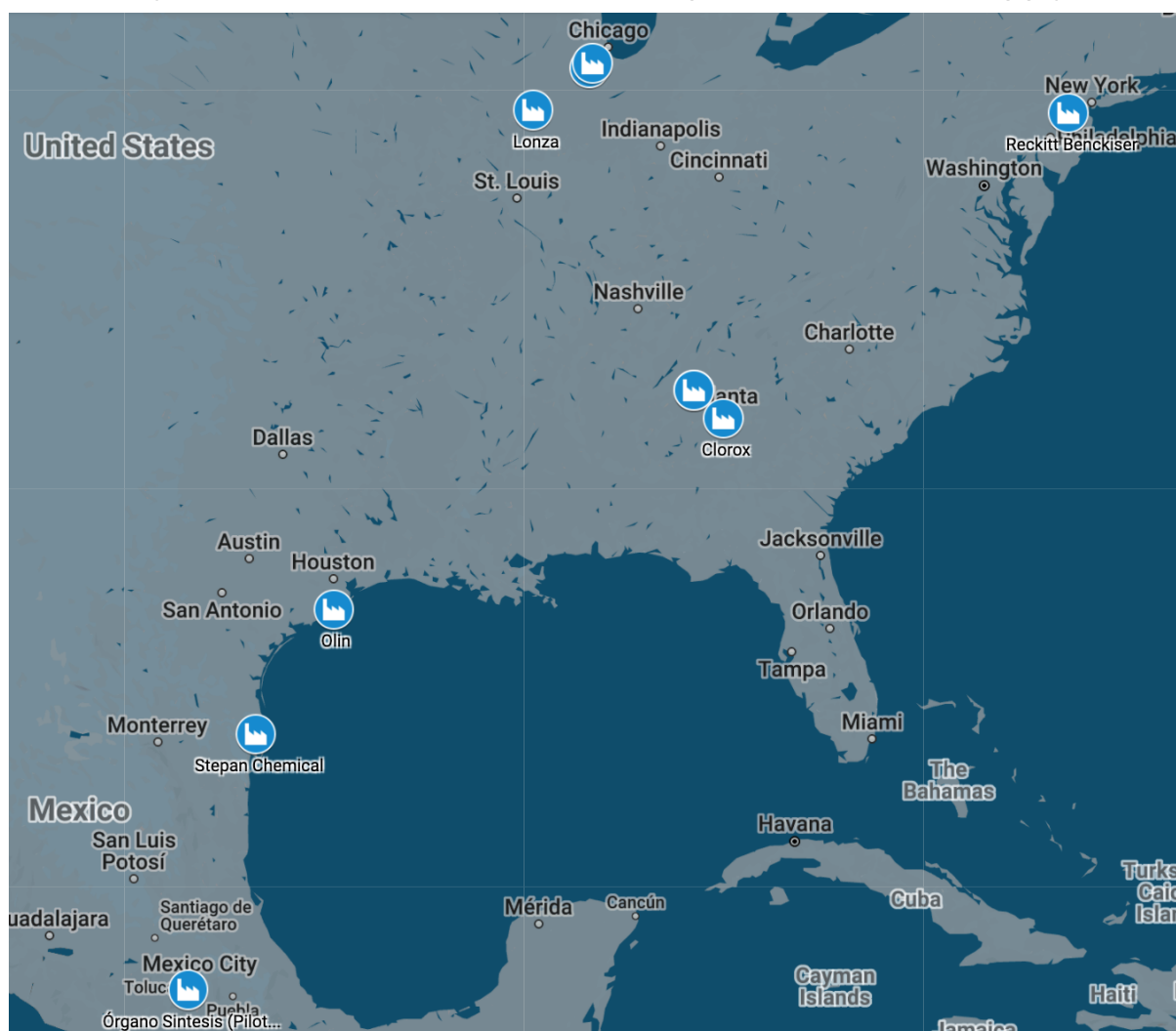
¹² <https://www.census.gov/quickfacts/fact/table/US/SEX255219>

¹³ <https://dataMéxico.org/en/profile/geo/matamoros-28022>

¹⁴ <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>

(c) Except where otherwise noted, data was taken from <https://ejscreen.epa.gov/mapper/>

Key facilities in the North American quat disinfectants supply chain



Link to this map:

<https://www.google.com/maps/d/u/0/edit?mid=1Wlzd56ZFHyAkDezk60wDbWdx0aNggMB&hl=es&ll=29.96678255690148%2C-87.059628055&z=5>

Upstream feedstocks

- Olin (Freeport, Texas - benzyl chloride and methyl chloride)

Midstream (quats)

- Stepan (Elwood, Illinois, and Matamoros, Tamaulipas, México)
- Lonza (Mapleton, Illinois)
- Pilot Chemical/Mason Chemical (Joliet, Illinois, and Capulhuac, México)
- Lewis (Rome, Georgia)

Downstream (products)

- Reckitt Benckiser (Hillsborough, New Jersey) - Lysol branded products

- Clorox (Forest Park, Georgia)

Facility Profiles

Upstream

- *Olin in Freeport, Texas*

Dow Chemical's Freeport, Texas, plant is the largest petrochemical complex in the Western Hemisphere, according to the company. In 2015, Dow sold a substantial piece of the complex to Olin Corporation, including the largest chlor-alkali plant in the Western Hemisphere. An Olin presentation in 2015 described its newly-acquired plants in Freeport, Texas, and Plaquemine, Louisiana, as "two of the world's lowest cost chlor-alkali facilities."

Its production relies on imports of asbestos from Brazil and Russia, which is used to separate chlorine and caustic soda from brine.¹⁵

Olin sells much of the chlorine from this plant to Shintech's nearby PVC plastics factory, which also is the largest in North America. Olin also uses chlorine in its own production of petrochemicals in Freeport, including benzyl chloride and methyl chloride.¹⁶

Methyl chloride is used in the production of many quats that are used as disinfectants. It is not possible to observe chemical trade within the United States, but customs records in México provide some clues to Olin's relationship with the industry. In 2020, Olin shipped 536,671 pounds (268 tons) of methyl chloride to Stepan México by truck.¹⁷

Olin releases high rates of chlorinated pollution into the environment of Freeport, Texas. From 2015 to 2016, Olin-Freeport's release rates, per chlor-alkali capacity, were among the highest in the industry for dioxins and PCBs. By weight, its chlorine releases were the highest: over 100 tons per year, including 20 tons into the air and 13 tons in water. Other pollutants include carbon tetrachloride, chloroform, and dioxins.¹⁸

¹⁵

https://www.researchgate.net/publication/326584371_Asbestos_Technical_Report_on_production_imports_use_end_of_life_exposure_scenarios_and_associated_environmental_and_human_health_hazards_TSCA_Docket_EPA-HQ-OPPT-2016-0736

¹⁶ Vallette, J and Connie Murtagh, Chlorine and building materials: a global inventory of production technologies, market, and pollution, phase 1: Africa, the Americas and Europe, Healthy Building Network, Washington DC, July 2018
<https://healthybuilding.net/reports/18-chlorine-building-materials-project-phase-1-africa-the-americas-and-europe>.

¹⁷ México Pedimentos (customs forms) in Datamyne trade database (subscription required).

¹⁸ Vallette, J and Connie Murtagh, Chlorine and building materials: a global inventory of production technologies, market, and pollution, phase 1: Africa, the Americas and Europe,

The plant operates in an area where 79% of residents are people of color. The per capita income (median) is \$23,165¹⁹ whereas the Annual Mean Wage for Houston Metropolitan Statistical Area is \$55,950.²⁰

The Social Vulnerability index as calculated by CDC for the 3-miles radius area surrounding the plant is 0.7444. A score of 0.744 indicates a moderate to high level of vulnerability. "Social vulnerability refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss."²¹

For 4 out of the last 10 quarters, the Texas Commission on Environmental Quality (TCEQ) found this facility to be in violation of the Clean Air Act.²² For 3 out of the last 12 quarters, the Texas Commission on Environmental Quality (TCEQ) found this facility to be in violation of the Clean Air Act Resource Conservation and Recovery Act (RCRA).²³

In 2016 a contractor worker died three days after being injured at the Freeport facility. The company did not release information on the incident.²⁴

In 2017, there was an incident at this facility that ended with a contractor worker hospitalized.²⁵

Healthy Building Network, Washington DC, July 2018

<https://healthybuilding.net/reports/18-chlorine-building-materials-project-phase-1-africa-the-americas-and-europe>.

¹⁹ <https://ejscreen.epa.gov/mapper/demogreportpdf.aspx?report=acs2018>

²⁰ https://www.bls.gov/oes/current/oes_26420.htm

²¹ <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>

²² <https://echo.epa.gov/detailed-facility-report?fid=110066943605>

²³ Ibid.

²⁴ Olin officials investigating incident that left contractor dead, October 1, 2016 | Facts, The (Clute, TX), Author/Byline: Erinn Callahan erinn.callahan@thefacts.com | Section: News
126 Words

²⁵ https://thefacts.com/news/article_991b7584-21e7-5898-987b-ee479a97a06d.html

In 2020, one person got medical treatment after a chemical release in Olin's Plant B facility in Freeport. A shelter in place was ordered for the adjacent plants. A company spokesperson did not reveal what chemical had been released.²⁶

Midstream: Quats companies

- *Stepan (Matamoros, Tamaulipas, México)*

Headquartered in Elwood, Illinois, Stepan has manufacturing facilities in México, the U.S. (described below), Brazil, China, Colombia, the Philippines, Singapore, Germany, France, Poland, and the UK.²⁷

The Stepan plant in Matamoros is inside a maquiladoras area along the Río Grande. Brownsville, Texas, is on the other side of the river less than a mile away. According to DataMéxico, "in 2015, 35.5% of the population (of Matamoros) was in a situation of moderate poverty and 4.23% in extreme poverty."²⁸

In addition to importing methyl chloride from Olin in Texas, Stepan's plant in México receives this chemical from China, and a variety of other feedstocks including amines from Dow, Indorama, Ineos, and Taminco, in the U.S.²⁹

Stepan exports quats to the U.S. (including Stepan's own operations), and worldwide, such as to Colgate-Palmolive in Guatemala.

Since the early 1990's Stepan's facility in Matamoros had significant complaints because of the pollution.³⁰ They were also accused by the neighboring community of having dumped xylene waste through a waste canal.³¹

²⁶ https://thefacts.com/free_share/article_239bca8a-6aaa-5df5-8099-6ac375d88abb.html

²⁷ <https://www.stepan.com/content/stepan-dot-com/en/you-stepan/locations.html>

²⁸ <https://dataMéxico.org/en/profile/geo/matamoros-28022>

²⁹ Datamyne.

³⁰ <https://www.baltimoresun.com/news/bs-xpm-1992-01-19-1992019023-story.html>

³¹ https://buffalonews.com/news/signs-of-industrial-devastation-abound-in-matamoros-dump/article_c227156c-79b8-58e3-a376-22de2af4f100.html

According to the Multinational Monitor, "Stepan's owners have repeatedly denied responsibility for poisoning the water and ground around the plant, claiming that the area around the facility was already contaminated when they bought it in 1988. Yet the Coalition for Justice in the Maquiladoras (CJM) video contains 1990 footage of Stepan workers dumping wheelbarrow loads of contaminants into open drainage ditches. At that time, Stepan faced a proliferation of community complaints and unfavorable local press coverage; yet rather than clean up its mess, or even undertake an environmental assessment of the site, Stepan bulldozed the drainage ditches in an apparent attempt to cover up the toxic sludge pools it had created."³²

In June 1992 the Stepan plant was one of five temporarily closed by the Secretariat of Social Development or Sedeso for mishandling of toxic substances.³³

A 1999 report described how Stepan's factory was next to the very edge of a settlement of mostly squatters, who were already protesting against the company's practices before the coalition took it on as a campaign.³⁴

According to México's toxic pollution registry, Registro de Emisiones y Transferencia de Contaminantes, Stepan reported releasing 5,907 metric tons of carbon dioxide emissions to the air, and 335.2 kilograms of chloroform to "final disposal" in 2019.³⁵

³² https://multinationalmonitor.org/hyper/issues/1993/05/mm0593_11.html and <https://library.fes.de/libalt/journals/swetsfulltext/6859320.pdf>

³³ INDUSTRY Agency's plant closings called political By Eduardo - Montes Associated, June 26, 1992 | San Antonio Express-News (TX), Page: 8A, 458 Words

³⁴ <https://library.fes.de/libalt/journals/swetsfulltext/6859320.pdf>

³⁵ http://sinat.semarnat.gob.mx/retc/retc/RETC_2004-2019.zip



Still from Matamoros: The Human Face of Globalization.³⁶

- *Stepan (Elwood, Illinois)*

Stepan's main facility, in Elwood, Illinois, is called the Millsdale plant. It produces quats used in disinfecting products, and other chemicals. The disinfectants are used in institutional and consumer industries, and shipped globally. It also produces surfactants that are used in foaming and cleaning.³⁷

The Millsdale facility produces benzyl-C12-18-alkyldimethyl chlorides according to CDR records from 2016.

Under the TRI, Stepan reports releasing several toxic chemicals above 1,000 pounds/year including ethyl benzene, xylene, ammonia and 1,4-dioxane. Other toxic

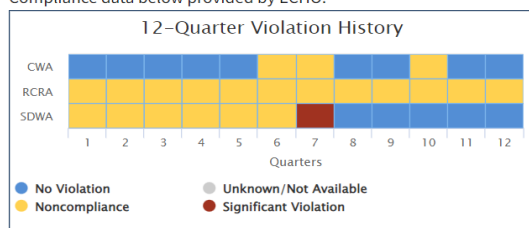
³⁶ <https://www.videoproject.org/Matamoros-The-Human-Face-of-Globalization.html>

³⁷ <https://rtk.rjifuture.org/rmp/facility/100000074117#execsum>

chemicals of interest to this research have been reported to be released include benzyl chloride (933 pounds fugitive air emissions in 2019).³⁸

Compliance Information

Compliance data below provided by ECHO.



[Go to ECHO for More Enforcement and Compliance Data](#)

Violations of the Clean Air Act were reported in 11 out of 12 quarters since January 2019. It has been out of compliance with RCRA (Resource Conservation and Recovery Act) for the last three years. It recently was in significant violation of the Safe Drinking Water Act.³⁹

From October 2016 to October 2021 there were four OSHA (Occupational Safety and Health Administration) related violations reported and one OSHA inspection in 2017.⁴⁰

Toxic and Hazardous Chemical Storage, Air Releases, and Waste Transfers (Stepan in Elwood, Illinois)

Pollutant (CAS number)	Pounds - Stored	Pounds - Air Release, 2020 ⁴¹	Pounds - Waste transfers, 2020	Hazards
Ammonia (7664-41-7)		2172	499	Toxic if inhaled, potential endocrine disruptor, causes severe burns to skin and eyes, toxic to aquatic life, persistent in the environment
Benzyl chloride (100-44-7)		1211	86	Carcinogen, potential endocrine disruptor, causes damage to organs upon single exposure, very toxic to aquatic life, persistent in the environment.
Chloroacetic acid (79-11-8)		512	-	Causes severe skin and eye damage, toxic to aquatic life.
Diethanolamine (111-42-2)		295	4210	Carcinogen, potential endocrine disruptor, causes organ damage, skin sensitizer, causes serious eye damage.
Ethylbenzene (100-41-4)		942	19	Carcinogen, potential endocrine disruptor, toxic to reproduction,

³⁸ https://enviro.epa.gov/enviro/tris_control_v2.tris_print?pPrev=1&tris_id=60421STPNCRURAL

³⁹

<https://echo.epa.gov/detailed-facility-report?fid=110000432504#pane3110000432504>

⁴⁰ https://www.osha.gov/pls/imis/establishment.inspection_detail?id=1423364.015

⁴¹ https://enviro.epa.gov/enviro/tris_control_v2.tris_print?pPrev=1&tris_id=60421STPNCRURAL

				toxic to aquatic life.
Ethylene oxide (75-21-8)	590,000	221	-	Carcinogen, mutagen, toxic to reproduction and development, potential endocrine disruptor, acutely toxic to mammals, causes damage to organs through prolonged or repeated exposure, may cause an allergic skin reaction, asthmagen, causes severe skin burns and eye damage, causes serious eye damage, persistent, causes damage to organs.
Methanol (67-56-1)		229,878	362.892	Toxic to reproduction, potential endocrine disruptor, organ toxicity, skin and eye irritant.
Propylene oxide (75-56-9)	590,000			Carcinogen, mutagenic, toxic to reproduction, irritant to skin and eyes, very persistent and very flammable.
Sulfur trioxide (7446-11-9)	100,000			Highly acutely toxic to mammals, persistent, causes organ damage, irritant to skin and eyes, chronically toxic to aquatic life.

Note: Storage data is based on "surface active agent manufacturing" chemicals listed in Stepan's Risk Management Plan, and not other processes such as soaps and detergent manufacturing.

Incidents:

- In 2014, there was a significant chemical release at the facility. While employees were unloading a railcar a cloud of sulfur trioxide was released into the air. A second release occurred while the railcar was being secured. A shelter in place was enforced and truck drivers waiting to make deliveries were evacuated from the area.⁴² According to a [Risk Management Plan](#) filed by Stepan on May 15, 2020, the facility stores 100,000 pounds of sulfur trioxide for use in surface active agent manufacturing.

- **Lonza (Mapleton, Illinois)**

Lonza is a subsidiary of the Swiss Lonza Group Ltd. Interestingly, the Lonza plant in Mapleton, Illinois, does not appear on Lonza Group's map of international locations.⁴³

⁴² Chemicals released from railroad tanker in Elwood, November 14, 2014 | Herald News, The (Joliet, IL) Author/Byline: BRIAN STANLEYbstanley@shawmedia.com | Section: News 361 Words)

⁴³ <https://www.lonza.com/company-overview/our-locations>

The facility produces chemicals used as ingredients in cleaning products and household products, and specifically ingredients for COVID-19 killing disinfectant products.⁴⁴

Lonza imports alkyl dimethyl benzyl ammonium chloride (ADBAC) from Shandong Taihe, China and Didecyl Dimethyl Ammonium Chloride from Organo Sintesis, México (see below).

According to the Good Jobs First Violations Tracker, Lonza has been fined \$2,465,284 for environmental violations, and \$96,914 for safety violations.⁴⁵

The following quats, used in disinfectants, are produced by Lonza in Mapleton according to Chemical Data Reporting records filed with EPA in 2016.

Chemical	Pounds	Imported or Manufactured	Use
Quaternary ammonium compounds, benzyl-C12-16-alkyldimethyl, chlorides	636,773	Domestically Manufactured	Not known
Quaternary ammonium compounds, di-C8-10-alkyldimethyl, chlorides	117,746	Domestically Manufactured	Not known

Lonzagard™ BKC cGMP antimicrobial is used in high exposure consumer product formulations, including feminine hygiene, wipes, surgical scrubs, and baby products.⁴⁶

Toxic and Hazardous Chemical Storage, Air Releases, and Waste Transfers (Lonza in Mapleton, Illinois)

Pollutant (CAS number)	Pounds - Stored ⁴⁷	Pounds - Air Releases ⁴⁸	Pounds - Waste transfers	Hazards
Dimethylamine	231,000	13,437	65,708	Developmental Toxicity/Mammalian Toxicity/Systemic Toxicity/Eye & Skin Irritation
Methyl chloride (74-87-3)	150,000	11,580	-	Occupational carcinogen, Reproductive and Developmental Toxicant, Neurotoxicant, Harmful if Inhaled, Persistent, Extremely Flammable, Causes Organ Damage, Depletes Ozone.

⁴⁴ <https://hoiabc.com/2020/06/18/lonza-plant-producing-ingredients-for-covid-19-disinfectants/>

⁴⁵ <https://violationtracker.goodjobsfirst.org/prog.php?parent=lonza>

⁴⁶ https://glenncorp.com/wp-content/uploads/2015/02/Lonzagard-BKC_cGMP.pdf

⁴⁷ <https://rtk.rjifuture.org/rmp/facility/100000113147>

⁴⁸ https://enviro.epa.gov/enviro/tris_control_v2.tris_print?pPrev=1&tris_id=61547LNZNCUSROU

Methanol (67-56-1)		7,076	-	Toxic to reproduction, potential endocrine disruptor, organ toxicity, skin and eye irritant.
Hydrochloric Acid		1,888	-	Systemic toxicant, Eye irritant
Benzyl Chloride		500	-	Toxic to reproduction, potential endocrine disruptor, organ toxicity, skin and eye irritant.
Methylamine (74-89-5)	170,000	-	-	Skin and eye irritant, toxic to organs, extremely flammable.
Phosphorus trichloride (7719-12-2)	220,000	-	-	Very high aquatic toxicity, irritant to skin and eyes, very persistent, toxic to organs.

Note: This, as with other plants, produces quats used in many kinds of products, so releases and production data are not attributable solely to their production for consumer disinfectants.

- Pilot Chemical/Mason Chemical (via Rho Chemical) (Joliet, Illinois)

Rho Chemical is a one-facility one-family toll processing chemical company in Joliet, Illinois. Robert Rolih worked at the Monsanto Corporation and Amoco before establishing Rho Chemical Company.⁴⁹

According to an EPA submission, "Rho Chemical has been manufacturing quaternary ammonium (quat) and related surfactants for over 30 years and is a contract manufacturer for Mason Chemical and Pilot Chemical (which are related to each other)," according to a filing with EPA in 2020. "Current volume of quaternary ammonium compounds and related surfactant products produced at this facility surpasses 20 million pounds per year."⁵⁰

According to data provided to the Toxic Release Inventory Rho Chemicals categorizes itself as to be involved in the Surface Active Agent Manufacturing and Custom Compounding of Purchased Resins industries.⁵¹

Until 2016, Rho Chemical had been importing benzyl chloride from Ineos Chlorotoluenes, Netherlands, averaging about 700 tons of imports a year. In 2019, Rho reported air stack releases of 450 pounds of benzyl chloride from its facility.⁵²

⁴⁹ <https://www.tezakfuneralhome.com/obituary/Robert-Rolih>

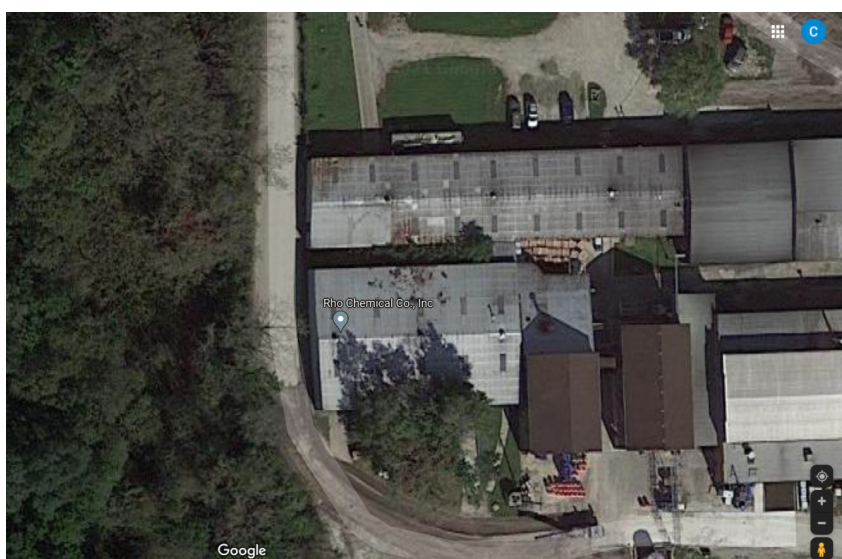
⁵⁰ https://downloads.regulations.gov/EPA-HQ-OPPT-2020-0588-0055/attachment_4.pdf

⁵¹ <https://enviro.epa.gov/facts/tri/ef-facilities/#!/Facility/60435RHCHMINDUS>

⁵² https://enviro.epa.gov/enviro/tris_control_v2.tris_print?pPrev=1&tris_id=60435RHCHMINDUS

In 2002, there was a fire at an abandoned Rho Chemical warehouse in Joliet which was reported to have stored benzyl chloride. While bystanders witnessed thick black smoke pouring from the building it was claimed that the building did not contain a significant amount of benzyl chloride.⁵³

In 2000, Rho Chemical was fined \$40,000 by the EPA for improperly storing waste tetrachloroethylene and another unidentified flammable waste. The company was also investigated in 1995 by the Illinois EPA for an incident in which an intruder broke into the plant and opened a valve to a storage tank releasing 300 gallons of benzyl chloride into Joliet's sewer system. The odor from the release made three local residents ill.⁵⁴



[Google Maps](#)

- **Pilot Chemicals/Órgano Síntesis (Capulhuac, México)**

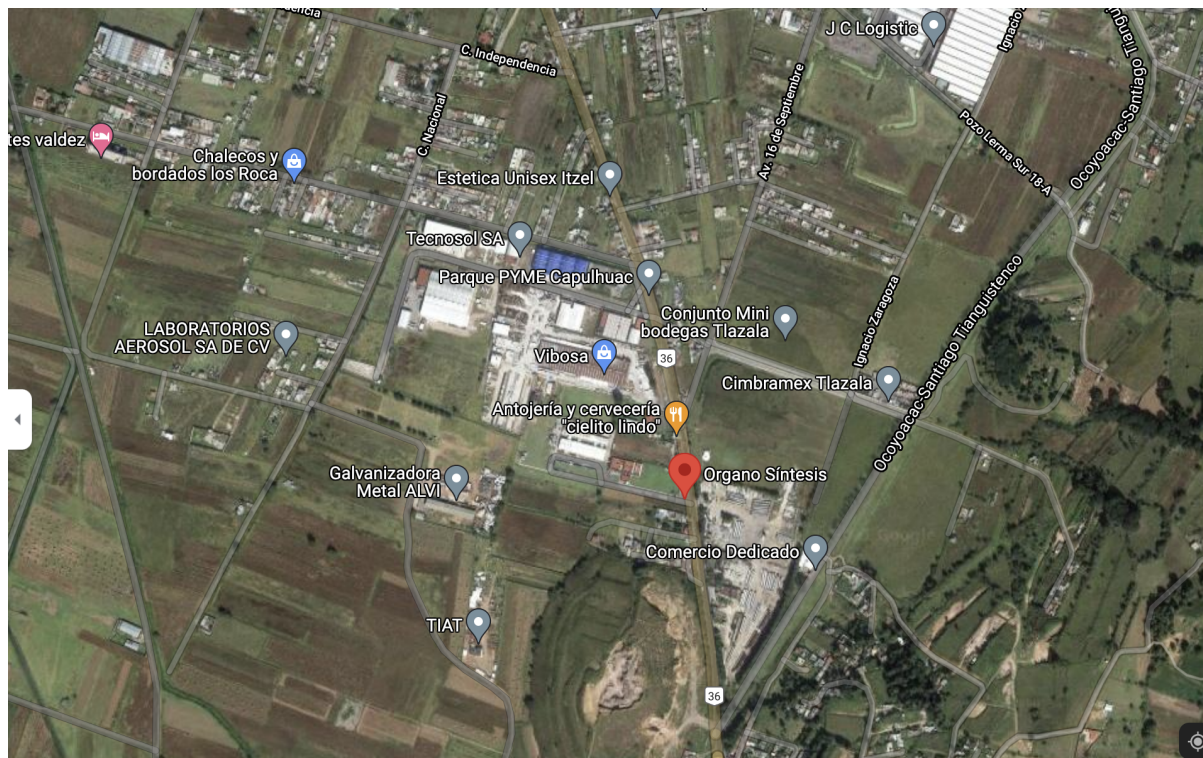
Órgano Síntesis is a chemical company situated 50 kilometers from México city in Capulhuac city, México State. According to DataMéxico, "In 2015, 50.9% of the population (of Capulhuac) was in a situation of moderate poverty and 3.97% in extreme poverty. "

⁵³ Arson suspected in warehouse fire June 21, 2002 | Herald News, The (Joliet, IL)
Author/Byline: Joe Hosey | Page: A5 | Section: local 242 Words

⁵⁴ Improper Waste Storage Nets Fine For Joliet Firm
May 18, 2000 | Herald News, The (Joliet, IL)
Author/Byline: Charles B. Pelkie | Page: A7 | Section: LOCAL
347 Words

Pilot Chemical acquired Órgano Síntesis in 2019.⁵⁵ The plant produces quats that are used in disinfectants sold in the US and elsewhere. According to the trade database Datamyne, Órgano Síntesis exports quats by truck to Lonza (Benzalconium Chloride) and Pilot (Didecil Dimethyl Ammonium Chloride) facilities in the US.

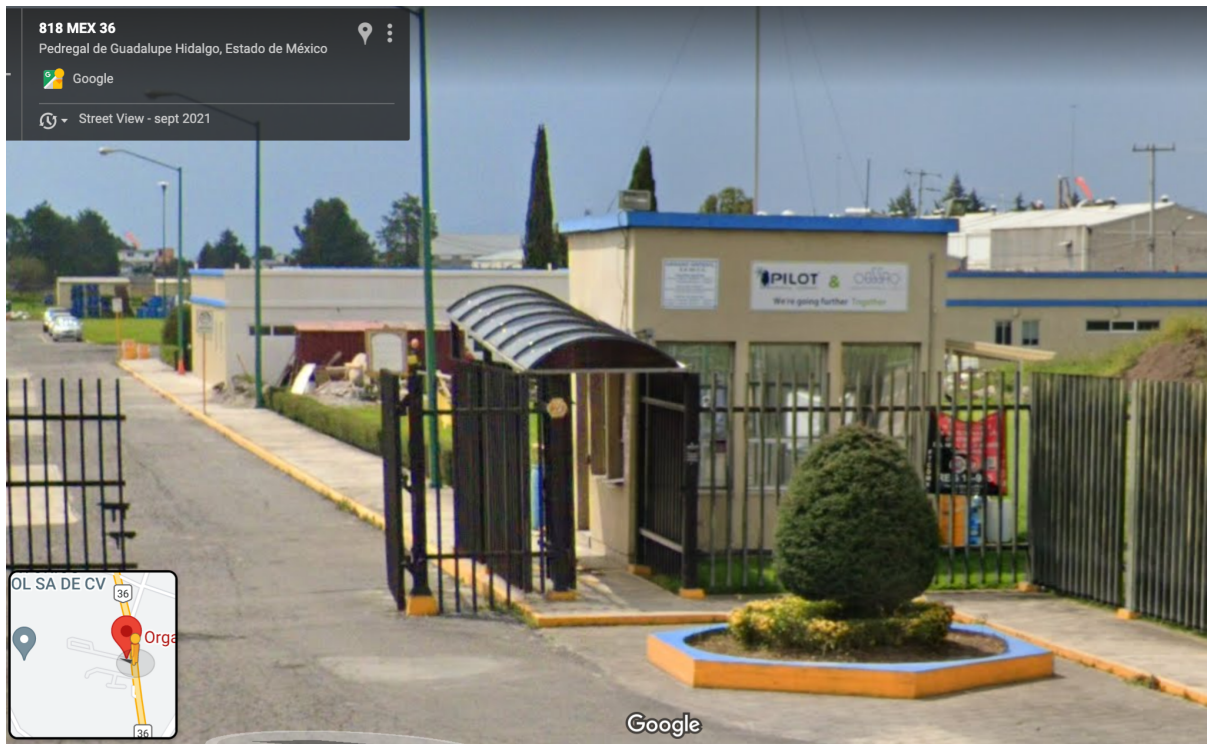
Pollutants releases declared by Órgano Síntesis include only CO2 emissions to air (272 tons/year in the latest available report from 2019).⁵⁶



[Google maps](#)

⁵⁵ <https://www.pilotchemical.com/about/history/>

⁵⁶ http://sinat.semarnat.gob.mx/retc/retc/RETC_2004-2019.zip



- The Lewis Chemical Company (Rome, Georgia)

The Lewis Chemical Company provides ingredients for quat-based products to manufacturers such as Mason, but doesn't appear to produce any disinfectant products of its own. According to a March 2020 article in *The Northwest Georgia News*, "As a contract manufacturer, they make their chemicals on demand, and their customers are being inundated with orders right now for products that contain their active ingredients... Those ingredients are primarily quaternary ammonium compounds that kill 99.9% of bacteria and viruses. Called quats for short, Lewis Chemical makes millions of pounds of the material every year under different retail labels..."⁵⁷

Lewis, which has operated two chemical manufacturing facilities (and has an additional warehouse⁵⁸) in Rome, Georgia, has a complicated and somewhat mysterious web of ownership and operating partnerships with other US-based as well as International entities.

⁵⁷

https://www.northwestgeorgianews.com/rome/business/lewis-chemical-has-best-month-in-history-of-the-company-with-increased-need-for-disinfectant/article_9a27c422-6ecf-11ea-bd34-675bc97bc4d7.html

⁵⁸

https://www.northwestgeorgianews.com/rome/business/lewis-chemical-co-to-add-3rd-facility-in-rome/article_ad3602c8-44c0-11e6-9654-6f64b77feabd.html

According to EPA Facility Registry Service records, The Lewis Chemical Company at 430 Lavender Drive was formerly the Mason Chemical Company. Its facility in Rome lists Mason Chemical and its parent company Pilot Chemical as mailing addresses and Sue Leslie, Vice President of Operations at Pilot Chemical, is listed as Lewis Chemical's owner.⁵⁹

This contradicts a March 2020 article in the *Rome News-Tribune* which states, ""Lewis Chemical was founded by Gregg and Diane Lewis in 2006. The company took off when some of its surfactant materials were picked up by the oil drilling companies." ⁶⁰

Further muddying the picture is the fact that an address search on Google for the 430 Lavender Drive facility indicates Lonza operates at this location as a business-to-business service. This is likely a result of Lewis private-labeling products for Lonza. Lonza markets [Barquat](#) surfactants.

The 430 Lavender Drive address is also shared with Jem Manufacturing/Inchemco, according to EPA documents.⁶¹ Jem Manufacturing is a manufacturer of disinfectants for the institutional market, including a quat-based product Virucide F-410 Quaternary 10% Solution (which also carries the Inchemco label).⁶²

Inchemco is a company headquartered in Vietnam and specializes in industrial chemicals.

Lewis Chemical has produced quats at both the Lavender Drive and Sycamore Street locations.

Quats manufactured at Lewis Chemical 430 Lavender Drive, Rome, GA, - CDR data (2016)

CDR Chemical Reported (name, CAS)	Volume	Imported/	Uses
-----------------------------------	--------	-----------	------

⁵⁹

https://ofmpub.epa.gov/frs_public2/fii_query_detail.disp_program_facility?p_registry_id=110067065071

⁶⁰

https://www.northwestgeorgianews.com/rome/business/lewis-chemical-has-best-month-in-history-of-the-company-with-increased-need-for-disinfectant/article_9a27c422-6ecf-11ea-bd34-675bc97bc4d7.html

⁶¹ https://enviro.epa.gov/enviro/trisquery.dcn_details?tris_id=30161JMSLS430LA

⁶²

<http://jemmfg.com/wp-content/uploads/2020/04/F-410-Quaternary-Solution-KILLS-CORONAVIRUS-COVID-19.pdf>

		Domestically Manufactured/ CBI	
Quaternary ammonium compounds, benzyl-C12-18-alkyldimethyl, chlorides	486,000	Domestically Manufactured	Cleaning and furnishing care products

Quats and amines (which are used in the manufacture of quats) at Lewis Chemical, 8 North Sycamore St, Rome, GA , - CDR data (2016)

CDR Chemical Reported (name, CAS)	Volume	Imported/ Domestically Manufactured/ CBI	Uses
1-Decanamine, N,N-dimethyl-, N-oxide	412000	Domestically Manufactured	Laundry and dishwashing products
1-Dodecanaminium, N-(2-hydroxy-3-sulfopropyl)-N,N-dimethyl-, inner salt	737000	Domestically Manufactured	Laundry and dishwashing products
1-Dodecanaminium, N,N,N-trimethyl-, chloride (1:1)	170000	Domestically Manufactured	Personal care products
1-Hexadecanaminium, N,N,N-trimethyl-, chloride (1:1)	181000	Domestically Manufactured	Personal care products
1-Tetradecanamine, N,N-dimethyl-, N-oxide	139156	Domestically Manufactured	Personal care products, cleaning and furnishing care products
Quaternary ammonium compounds, benzyl-C12-18-alkyldimethyl, chlorides	357000	Domestically Manufactured	Personal care products, cleaning and furnishing care products

Lewis Chemical also imports Alkyl Dimethyl Benzyl Ammonium Chloride from Shandong Taihe, Tsingtao, China.⁶³

⁶³ Datamyne.

Downstream

Clorox and Lysol are dominant brand names for commercial and consumer disinfectants. The Clorox brand is based on the name of the company, The Clorox Company, while Lysol is the brand of Reckitt Benckiser, a global disinfectant corporation.

Both facilities also are major consumers of fragrances.

The two locations, however, are very different demographically. Clorox's Forest Park, Georgia, complex, ranks highest among all locations in this report for social vulnerability, and second lowest for per capita income (less than \$18,000). Reckitt Benckiser's solar-powered plant in New Jersey is in the least socially vulnerable community, Hillsborough. People living within a 3-mile radius have a per capita income of more than \$55,000.

- The Clorox Company (Forest Park, Georgia)

Clorox operates two large adjacent plants in Forest Park, Georgia.

In addition to selling quat-based disinfectant wipes, Clorox manufactures Pine-Sol(R) brand cleaner which does not contain quats but does contain terpenes which are discussed in our research memo on fragrances. It also manufactures Clorox bath and toilet wands.⁶⁴ Its product line also includes Scentiva-brand disinfecting wipes and sprays "that are designed in collaboration with high-end fragrance houses," according to a company press release.⁶⁵ Scentiva Tuscan Lavender & Jasmine contains d-Limonene and Citronellol.⁶⁶

The company was out of compliance with the Clean Water Act for six of the most recent 12 quarters.⁶⁷ It releases certain glycol ethers into the air and the Flint River water treatment plant in Jonesboro, Georgia.⁶⁸ According to the European Centre for

⁶⁴

<https://www.wdam.com/story/6854700/clorox-to-close-plant-80-employees-to-lose-jobs/#:~:text=The%20Pearl%20plant%20produces%20all,made%20in%20the%20United%20States.&text=bath%20and%20toilet%20wands>.

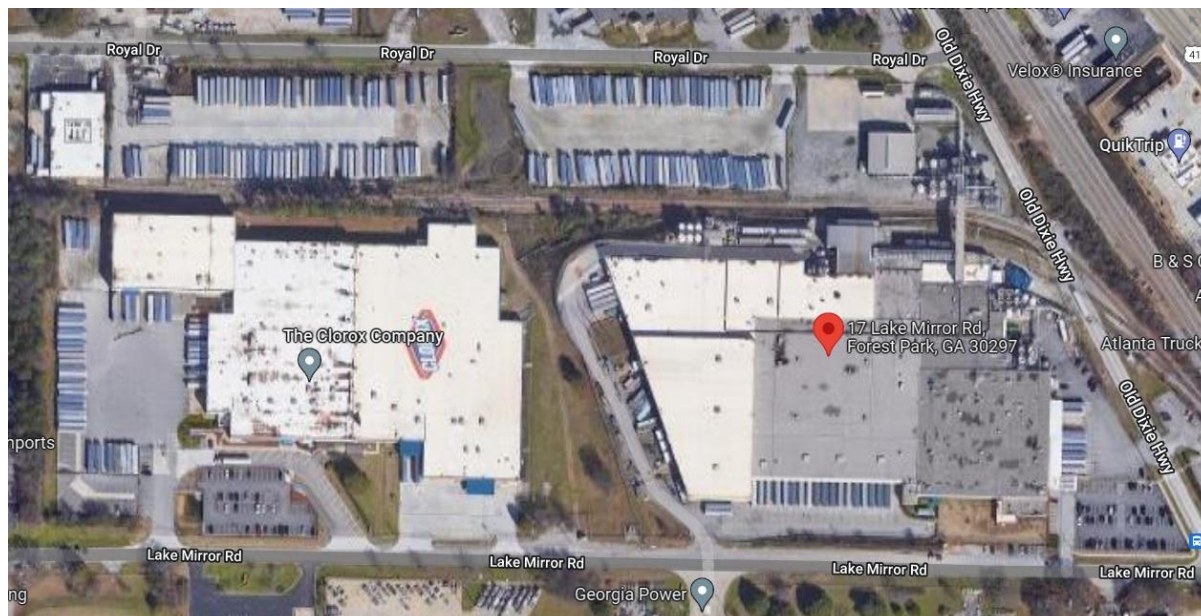
⁶⁵ Clorox Expands Manufacturing Operations in Atlanta Area
November 28, 2017 | PR Newswire (USA)

⁶⁶ <https://smartlabel.labelinsight.com/product/6096788/ingredients>

⁶⁷ <https://echo.epa.gov/detailed-facility-report?fid=110000355730>

⁶⁸ https://enviro.epa.gov/enviro/tris_control_v2.tris_print?pPrev=1&tris_id=30050CLRXC17LAK

Ecotoxicology and Toxicology of Chemicals, “reports of a number of effects in humans have been associated with glycol ether exposure, such as anemia, granulocytopenia and leuokpenia, increased risk of abortion or reduced sperm count in painters.”⁶⁹



- **Reckitt Benckiser (Hillsborough, New Jersey)**

The RB plant in Hillsborough supplies Lysol disinfectant sprays to North American consumers. It produces over 1 million consumer units of product per day.⁷⁰ “Every day the factory uses up at least three tanker cars of ethanol that arrive by train, each carrying about 30,000 gallons”, reported Bloomberg in November 2020. “Reckitt Benckiser Group Plc, Lysol’s corporate parent, says that by year end it’ll be producing 35 million cans of Lysol in North America each month—more than triple its pre-Covid-19 peak”⁷¹

RB also imports Lysol wipes, canisters and flat packs from Asia. In 2020, it imported over 11,078 metric tons of these products from Tongling Jieya Biologic Technology and 3,907 tons of wet wipes from Nox Bellcow Cosmetics, both of China. It also imported 1,933 tons of air fresheners, including Air Wick refills, from its plant in Hungary.

⁶⁹ <https://www.ecetoc.org/wp-content/uploads/2014/08/ECETOC-TR-095-Vol-I.pdf>

⁷⁰

<https://centraljersey.com/2020/09/03/hillsborough-is-home-to-only-rb-factory-that-supplies-lysol-to-north-america/>

⁷¹

<https://www.bloomberg.com/news/features/2020-11-19/lysol-is-making-more-sanitizer-than-ever-in-pandemic-america-it-s-not-enough>

Glossary

Benzyl Chloride - used mainly as a chemical building block for the production of plasticizers, such as benzyl butyl phthalate, it is also a component in the production of quaternary ammonium salts for disinfectants and benzyl esters for the flavor and fragrance industry.⁷²

Methyl Chloride - also called chloromethane it is used mostly in the production of silicon, but secondary uses involve the production of quaternary ammonia compounds, herbicides, and butyl rubber.⁷³

Quaternary ammonium compounds ("Quats") - a group of chemicals used for the manufacturing of disinfectants, sanitizers, preservatives, surfactants, and anti-static agents. The popularity for quats increased significantly during the Covid pandemic, when the compound's efficiency for killing the SARS-CoV-2 virus was widely touted.⁷⁴ According to the U.S. Cybersecurity and Infrastructure Security Agency, "Quats can be found in shampoos, toilet cleaners, hand soap, shaving cream, baby wipes, body wash, sunscreens, moisturizers, disinfectant sprays, liquid fabric softeners, anti-cling dryer sheets, disinfectants, and spermicidal jellies."⁷⁵

Quaternization - "Quaternization occurs by introducing a quaternary ammonium moiety onto or outside the chitosan backbone, via chemical reactions with primary amino and hydroxyl groups, under vast experimental conditions," explains a team of scientists in Brazil.⁷⁶

Toll Processing - an outsourcing contract between companies in which a company with specialized equipment will process raw materials under contract for another company according to their specifications and recipes. The company hiring the toll processing company is considered the owner of the raw materials and final products.⁷⁷

<https://pubs.acs.org/doi/pdf/10.1021/acs.estlett.0c00437>

⁷² <https://pubchem.ncbi.nlm.nih.gov/compound/7503#section=Uses>

⁷³ <https://pubchem.ncbi.nlm.nih.gov/compound/Chloromethane#section=Uses>

⁷⁴ <https://www.chemicalsafetyfacts.org/quaternary-ammonium-compounds/>

⁷⁵

<https://www.cisa.gov/sites/default/files/publications/Quaternary%20Ammonium%20Disinfectant%20Alternatives%20Fact%20Sheet%20%28002%29.pdf>

⁷⁶ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7759937/>

⁷⁷ <https://www.customprocessingservices.com/blog/toll-processing-101-what-you-need-to-know>