



UNPREPARED FOR DISASTER: CHEMICAL HAZARDS IN THE WAKE OF HURRICANE IDA

INCIDENT CASE STUDIES OF:
SHELL CHEMICAL, East Site, Norco, LA
CORNERSTONE CHEMICAL, Waggaman, LA
CF INDUSTRIES, Donaldsonville, LA

THIS REPORT WAS PRODUCED BY:

COMING CLEAN: a national collaborative of environmental health and environmental justice organizations and experts working to reform the chemical and energy industries so they are no longer a source of harm. We coordinate hundreds of organizations and issue experts—including grassroots organizers, community leaders, scientists and researchers, business leaders, lawyers, and advocates working to reform the chemical and energy industries. We envision a future where no one's health is sacrificed by toxic chemical use or energy generation, and we are winning campaigns for a healthy, just, and sustainable society by growing a stronger and more connected movement. [Visit our website.](#)

INCIDENT CASE STUDY RESEARCH PROVIDED BY:

MATERIAL RESEARCH: An L3C that works in collaboration with non-profit organizations, communities, policymakers, and journalists to better understand and solve critical environmental, public health, and social justice issues. [Visit our website.](#)

REVIEWED BY:

WILMA SUBRA BA, MS, Subra Company, Technical Advisor for the Louisiana Environmental Action Network, former member of the EPA's National Environmental Justice Advisory Council (where she chaired the Gulf Coast Hurricanes Work Group, and co-chaired the Cumulative Risk and Impacts Working Group), former vice-chair of the EPA's National Advisory Council for Environmental Policy and Technology.

PHOTOGRAPHS COURTESY OF:

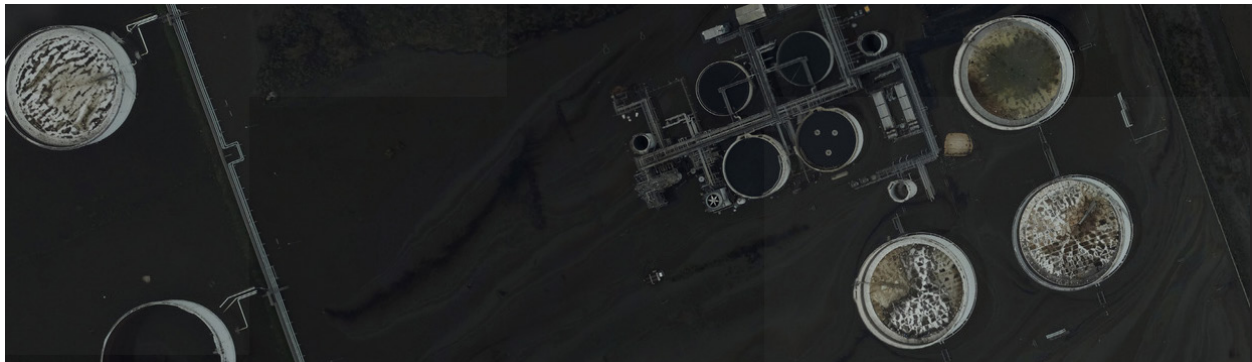
HEALTHY GULF: An organization committed to uniting and empowering people to protect and restore the natural resources of the Gulf Region.

The report also contains public domain images from the National Oceanic and Atmospheric Administration and the European Space Agency.

SPECIAL THANKS:

The sponsoring organizations would like to thank these funders for their generous support of work related to this report:

Cloud Mountain Foundation	New York Community Trust Park
Cornell Douglas Foundation	Foundation
John Merck Fund	Sills Family Foundation
Marisla Foundation	The Fine Fund



INTRODUCTION

EXACTLY ONE MONTH AGO on August 29, 2021, Hurricane Ida landed in Port Fourchon, Louisiana as one of the most intense and damaging natural disasters to strike the state. Aside from the immediate destruction, flooding, and power outages, Ida - like Katrina and other hurricanes before it - swept through one of the nation's largest chemical, petroleum and natural gas hubs. In its aftermath, [the US Coast Guard National Response Center](#), which collects reports on oil, chemical and other discharges into the environment and forwards them to appropriate federal/state agencies for response, received 223 incident reports related to the storm.¹

Across the United States, almost [12,500 high-risk chemical facilities](#) put 39% of the US population who live within three miles of these facilities (and all the employees who work at them) at risk of toxic exposure, injury, or death.² The full vulnerability zones can extend up to twenty-five miles in radius, disproportionately impacting communities of color and low-income communities.

This report highlights just three of the industrial facilities that released toxic chemicals in the wake of Ida, and how the facility workers and people in the surrounding neighborhoods were impacted. The following case studies summarize chemical incidents related to Hurricane Ida at: the Shell Chemical, East Site facility in Norco, LA; the Cornerstone Chemical facility

in Waggaman, LA; and the CF Industries facility in Donaldsonville, LA. Prior incidents and chemicals in use at any given time at these facilities are also listed, along with findings and recommendations that can be drawn from this information.

The Shell Chemical, East Site facility in Norco, LA reported releases of hydrogen, hydrogen sulfide, benzene, butadiene, and natural gas (methane). Reports noted that "chemicals are not being burned off properly." Health hazards of butadiene include cancer and reproductive toxicity. [Benzene](#) is known to cause cancer in humans, and is also linked to blood and bone marrow damage, and reproductive health effects in women, among other health and environmental concerns. At any given time, the facility has up to 27.8 million pounds of high-risk chemicals on-site. Over 50,000 people live within 3.1 miles of the facility; 49% are people of color and the per capita income is only \$32,587. Full study on pg. 7.

The Cornerstone Chemical facility in Waggaman, LA released unknown amounts of sulfur dioxide and sulfur trioxide, and 7,000 pounds of ammonia, into the air. Anhydrous ammonia, which this facility may have more than 50 million pounds of on-site at any given time, is acutely toxic, is a potential endocrine (hormone) disruptor, can cause severe skin

burns and eye damage, and poses other health and environmental hazards. Health hazards of sulfur dioxide include developmental toxicity, endocrine (hormone) disruption, acute toxicity if inhaled, and other health and environmental hazards. At any given time, this facility can have more than 88 million pounds of toxic and hazardous chemicals on-site. Almost 30,000 people live within 3.1 miles of this facility, of which 69% are people of color. The per capita income of people living near the facility is \$24,476, less than half the per capita income of the metro area. Full study on pg. 13.

The CF Industries facility The CF Industries facility in Donaldsonville, LA reported releases of anhydrous ammonia to the air that employees were “unable to secure.” Anhydrous ammonia is acutely toxic, is a potential endocrine (hormone) disruptor, can cause severe skin burns and eye damage, and poses other health and environmental hazards. At any given time, the facility has up to 328 million pounds of anhydrous ammonia on-site. Over 10,000 people live within 3.1 miles of the facility, with a per capita income of \$21,754, less than half that of the surrounding metro area. Full study on pg. 18.

Information available about these, and other, chemical incidents during Hurricane Ida is still incomplete and developing even one month later. Amounts of chemicals released, whether additional chemicals were also released, on-site and off-site environmental and health impacts, damage estimates, and specific causes of releases are still unknown or unconfirmed.

These case studies corroborate the already extensive public record, and years of demand from endangered neighborhoods, facility workers, and disproportionately impacted communities of color and low-income communities, demonstrating that existing chemical

disaster prevention rules are woefully inadequate.

The U.S. Environmental Protection Agency’s (EPA) [Risk Management Plan](#) rule regulates high-risk industrial and commercial facilities that use or store certain [hazardous substances](#) above threshold amounts. Covered facilities must identify the potential effects of a chemical incident, identify steps the facility is taking to prevent an incident, and spell out emergency response procedures. But despite the fact that the RMP program was mandated by Congress specifically to prevent chemical catastrophes, decades of weak rules and lack of prevention requirements have resulted in constant, often avoidable releases and disasters. For example, facilities aren’t required to have back-up power or air monitoring on site; incident plans aren’t required to address potential threats from extreme weather events and other impacts of climate change; workers are not fully involved in planning and prevention; facilities are not required to implement safer technological or chemical alternatives even when those are available; and cumulative hazards from multiple facilities in the same neighborhood are not considered. Reviewing just three incidents during just one storm (Hurricane Ida) demonstrates that:

- Many high-risk chemical facilities are not prepared for extreme weather events and other natural disasters, which are increasing due to climate change;
- Prevention and safety recommendations made by the U.S. Chemical Safety and Hazard Investigation Board, the U.S. Government Accountability Office, the Center for Chemical Process Safety, and other independent experts are not required to be implemented; and most facilities are not voluntarily doing so;

- Many communities, especially communities of color and low-income communities, are disproportionately exposed to multiple, cumulative chemical exposures and hazards, which are not addressed in federal chemical disaster prevention rules or other regulations;
- Loopholes in federal chemical facility safety policies are resulting in the full extent of chemical hazards and potential consequences at these facilities and in these communities being underestimated;
- Stronger federal prevention rules, especially requirements to switch to safer chemicals and technologies when available, could help prevent future disasters.

These Ida-related incidents are just the latest in a string of chemical releases, fires, and explosions caused by increasing extreme weather events. Hurricane Harvey in 2017 caused widespread chemical releases in Texas, including almost 1.5 million pounds of toxic air emissions. The Arkema chemical facility in Crosby, TX, experienced flooding, uncontrolled fires, an explosion, and serious toxic emissions. During Hurricane Laura in 2020, the Biolab chemical plant in Westlake, LA caught fire and burned for several days, releasing large amounts of toxic chlorine gas and completely destroying the facility.

Sadly, more than [100 harmful incidents occur every year in the United States](#), that bear strong similarities to the ones profiled here in Norco, Donaldsonville, and Waggaman, Louisiana. Each facility and incident can endanger up to a million people. Nationally, the costs and consequences of these often preventable incidents are dramatic: in just one decade, RMP facility incidents caused over \$2 billion in property damage, and injury, death, shelter in place, or evacuation of half a million people.

The good news is that future incidents like these could be prevented with stronger federal protections in place. These three high-risk facilities, along with [506 others in Louisiana](#), are regulated under the EPA's RMP program, among almost 12,500 facilities nationwide. Decades of independent safety and prevention recommendations, and existing hazard reduction policy models, exist and can be implemented nationally. What has been missing are national requirements to adopt and implement these common-sense measures.

Action by the Biden Administration and the Environmental Protection Agency (EPA) is urgently needed to prevent chemical disasters by strengthening the Risk Management Plan (RMP) rule. Specific recommendations are outlined in the conclusion of this report.

METHODOLOGY

Each case study summarizes incidents at these facilities related to Hurricane Ida. The studies list prior incidents and chemicals in use at any given time at these facilities, and provide findings and recommendations that can be drawn from this information.

Much of this information is drawn directly from [Risk Management Plans reported to EPA by these companies](#). EPA's Risk Management Plan (RMP) rule "requires facilities that use extremely hazardous substances to develop a Risk Management Plan. These plans must be revised and resubmitted to EPA every five years."

The rule requires facilities that use certain extremely hazardous substances to develop a plan that:

- identifies the potential effects of a chemical incident;
- identifies steps the facility is taking to prevent an incident, and;
- spells out emergency response procedures should an incident occur.

These plans must include an [Offsite Consequence Analysis](#) (OCA), including a worst-case release scenario and alternative release scenarios.

However, only summaries of facility RMPs are publicly available, and most of the worst-case scenario analyses are not publicly available at all (only very limited information is accessible, and only through official federal reading rooms). The lack of public access to RMP information severely limits the ability of at-risk communities to understand the hazards imposed on them, participate in their own protection, or advocate for safety measures.

SHELL CHEMICAL - EAST SITE



KEY LESSONS: In the absence of federal requirements, high-risk chemical facilities are not planning or preparing for increasingly common and severe natural disasters, and the current RMP program is not addressing the cumulative hazards of many facilities in close proximity.

SUMMARY OF IDA-RELATED INCIDENTS AT THIS FACILITY

At any given time, more than 27 million pounds of hazardous and toxic chemicals may be on-site in Shell Chemical's East Site facility in Norco, Louisiana.

On August 28, 2021, 9:27 a.m., [the National Response Center](#) received its first call from Shell related to Hurricane Ida, a day before landfall. According to the report, "Caller states an unknown amount of hydrogen release to the flare and into the atmosphere. The release was from a planned unit shut down during Hurricane Ida." The remedial

September 3, 2021: 15136 River Road, Norco, St. Charles Parish, Louisiana

action is listed as "actively flaring until the storm passes."³

On September 1, NRC issued an update on Shell's East Site in Norco: "Adding hydrogen sulfide, benzene, and butadiene to this release. The site still has no power, no water and no steam. Unknown rate of release for each material." It added: "Site is still down and they are monitoring the flares."⁴ The same day, September 1, EPA issued a "damage report." It states: "Heavy flaring to evacuate systems. Will stop when system is empty. Building is damaged. No further action."⁵

[Grist reported](#) on September 2: "Despite Shell's assurances that the Norco plant is 'safe and secure,' several sections of the plant appeared to be inundated with the remnants of flash flooding from Ida, with water sitting more than two feet high in many places.

State agencies were reportedly being deployed to monitor the air around this plant on September 9. "The refinery's lack of electricity and inability to supply steam and nitrogen to the flares means chemicals are not being burned off properly, causing thick black smoke to pour into the sky above residents who are repairing their damaged roofs and cutting broken branches from trees," [The Guardian reported](#). 'Community members in Norco have a right to know what chemicals are in the air they are breathing,' said Wilma Subra, Louisiana resident and Technical Advisor for the Louisiana Environmental Action Network.

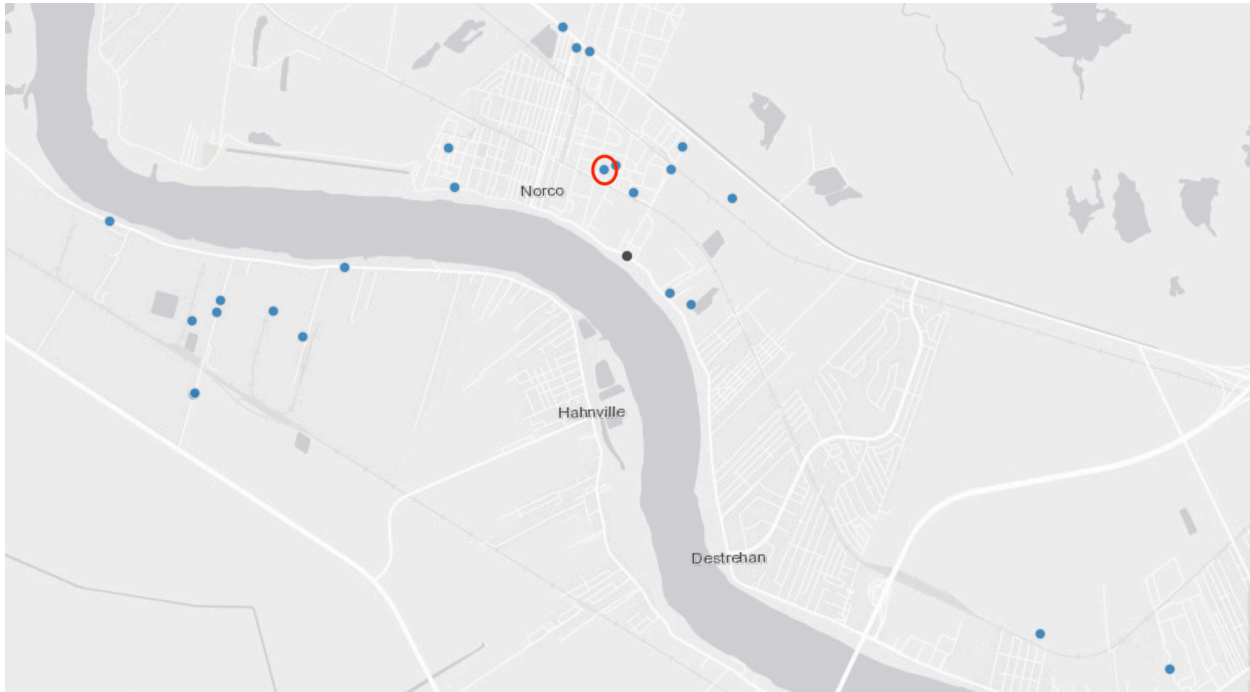
On September 12, [a Shell Chemical press release stated](#): "The Shell Norco Manufacturing facility continues to assess impacts from Hurricane Ida. The site continues to flare residual light hydrocarbon material with visible smoking. We are continuing to complete repairs and we are making improvements to minimize visible flaring until power is fully restored..."

On September 16, 12:55 p.m., the National Response Center released an incident update. It added natural gas (methane) to the list of materials "discharged." Further, "the amount released is currently unknown. The power is back on and the facility is going through systems checks. Flaring will be ongoing until the facility is fully operational. Media interest is low. The release rate will be changed from 24,000 pounds [per hour] to unknown." It said the remedial action is to keep "actively flaring until the facility has completed all systems checks and is fully operational."⁶

KEY FINDINGS OF THIS INCIDENT

Worst case scenarios from the most recent [RMP for this facility](#) assume low wind speeds. During the passage of Hurricane Ida, wind speeds at the nearby Louis Armstrong New Orleans International Airport reached [90 mph](#). While the worst-case release scenario for a toxic gas release may be slow moving air conditions, other dangerous release scenarios might be made worse by high winds.⁷ And the extremely high winds, storm surges, and flooding experienced during hurricanes (or severe conditions experienced during other natural disasters like wildfires) are not considered in most Risk Management Plans or addressed in most prevention plans. Climate change hazards and the increasing frequency of intense hurricanes in New Orleans are not currently being reflected in this facility's RMP.

Some of the chemicals released from the Shell Norco plant around the passage of Ida are listed in the company's RMP. According to the latest submission, this facility has on-site, at any given time, up to 3,108,000 pounds of butadiene (plus over 10,000,000 pounds of butadiene and other chemicals in flammable mixtures), 55,215 pounds of methane, and 20,000 pounds of hydrogen. Hydrogen sulfide was reported to have been released, but no sulfur compounds are declared to be stored as such in the facility.



In red, the Shell Norco Chemical Plant East Site facility. Blue circles show other facilities in the region that are subject to RMPs as per 2014 data.

Benzene was also reported to be released, although it does not appear as stored or used according to their RMP. In total, they report almost 28 million pounds of hazardous chemicals, some of which are highly toxic and/or flammable (see table below). Reducing storage or changing to safer chemicals or technologies would avoid the current threat posed by these hazardous chemicals present in the facility.

[EPA's EJScreen tool](#) measures environmental injustice in many ways, and uses a five-kilometer radius (3.1 miles) around a facility as the standard area. In this area around Shell Norco, there are 50,067 people, 49% of whom are people of color.⁸

EPA ranks the community cancer risk from air toxics in the highest possible percentile range (95% to 100%).⁹ The per capita income is \$32,587. A new RMP policy should address the cumulative impacts of industries, the resulting vulnerability of communities to additional pollution, and disproportionate impacts on people of color and low-income people.

A recent [analysis by the Center for Progressive Reform](#), Earthjustice, and the Union of Concerned Scientists concluded that "of roughly 12,331 RMP facilities in U.S. states and territories, 3,856 (one third) face a growing risk of natural disasters due to climate change." As shown in a [2014 map](#), Shell Chemical's Norco facility and the nearby community are situated in an area with other RMP facilities that also store and use hazardous chemicals. This represents an unpredictable threat to workers, the community and the environment, particularly when extreme weather events simultaneously hit the chemical facilities in the area. A new RMP policy should also address cumulative hazards posed by several RMPs facilities in the same area.

The facility's Risk Management Plan does not appear to consider floods or extremely high winds, but the facility was flooded as a consequence of Hurricane Ida, and very high winds



occurred.¹⁰ After Hurricane Harvey, the [U.S. Chemical Safety and Hazard Investigation Board \(CSB\) called for more robust industry guidance](#) to help hazardous chemical facilities better prepare for extreme weather events. Some of the following recommendations could have helped prevent the incidents provoked by Hurricane Ida.¹¹

“Develop broad and comprehensive guidance to help companies assess their U.S. facility risk from all types of potential extreme weather events...Include guidance for each of the following:

- Addressing common mode failures of critical safeguards or equipment that could be caused by extreme weather events, including but not limited to flooding. For flooding scenarios, sufficient independent layers of protection should be available if flood water heights reach the facility.
- Evaluating facility susceptibility to potential extreme weather events. Relevant safety information such as flood maps should be incorporated as process safety information
- Involving relevant professional disciplines, including engineering disciplines, to help ensure risk assessments and process hazard analyses are as robust as practicable for any given facility.”

Flares and other air pollution from Shell Chemical’s East Site in Norco, Louisiana, as seen from Europe’s Sentinel satellite, September 2, 2021. A shortwave infrared wavelength filter makes these releases more apparent than is apparent to the naked eye. European Space Agency.

In the same report based on the experience of Hurricane Harvey, the CSB also recommends: “Facilities should perform an analysis to determine their susceptibility to extreme weather events. Companies should compile key safety information such as flood maps within their process safety information programs. This important safety information should be evaluated to determine whether any portions of their facilities are located within the 100- year or 500-year flood plain. In addition, companies should assess seismic hazard maps to determine the risk of earthquakes and consider the risk of other extreme weather such as high-wind events. Companies should evaluate risk assessments and the adequacy of relevant safeguards by applying facility process safety management programs, such as process hazard analyses or facility siting programs. Facilities should strive to apply a sufficiently conservative risk management approach when evaluating and mitigating the potential effects of extreme weather scenarios.”

By the time the EPA did an assessment¹³ on September 1, there was still no power at the facility. The facility remained without power at least until September 12, [according to OPIS PetroChemWire](#). Backup systems should have been required if climate change and natural disaster potential impacts had been considered. Also, as noted in [the U.S. Chemical Safety Hazard and Investigation Board bulletin "After Katrina: Precautions Needed During Oil and Chemical Facility Startup,"](#) "the startup of major processes is a hazardous phase in the operation of oil refineries and chemical plants."

PRIOR INCIDENTS

January 11 to January 20, 2020: Shell's Norco complex was "creating what at times has been a flare over its facility large enough that it can be seen for miles," [the New Orleans Advocate reported](#).

2018: The [New Orleans Advocate reports](#), "Earlier this year, the EPA and Shell reached a proposed settlement over improper operation of flares at that company's Norco plant, resolving decades of allegations that the plant was violating the Clean Air Act. In February, a federal judge ordered the company to spend \$10 million on pollution-control equipment, plus a \$350,000 fine. In that case, federal regulators accused the industry giant of failing to properly control their industrial flares to such a degree that officials allowed chemicals capable of causing cancer and other ailments to permeate the air around the plant."

December 1 to December 3, 2012: [The New Orleans Times-Picayune reports](#), "For more than 30 hours, Shell Chemical, located on the Motiva Enterprises campus in Norco, has been experiencing elevated flares, shooting flames and leaking thick black smoke into the air

above St. Charles Parish. According to a report submitted to the U.S. Coast Guard National Response Center, the plant is releasing unknown amounts of hydrogen sulfide, butadiene and benzene, a known carcinogen."

May 8, 2012: Lightning strikes the chemical plant. Chemicals are released and burned for more than a day. Pollution included benzene, butadiene, carbon monoxide, ethylene, hydrogen sulfide, nitrogen oxide, propylene, sulfur dioxide, and xylene.

May 5, 1988: A catalytic cracker [blows up](#), killing seven employees, destroying neighborhoods, and releasing 159 million pounds of chemical waste, reported in the Washington Post.

COMPANY & FACILITY BACKGROUND

Address:

Shell Norco Chemical Plant East Site
15136 River Road
Norco, LA 70079

Geocoordinates:

Longitude: -90.409900 Latitude: 29.995500

Plant description: At Norco, [Shell Chemical LP manufactures](#) lower olefins (ethylene, propylene, butadiene). These chemicals are used in the production mainly of plastics, such as polyethylene and synthetic rubber.

Hazardous Chemicals Use/Storage: Shell East Plant Norco Risk Management Plan

According to the facility's latest available RMP, this facility has on-site, at any given time, up to 27.8 million pounds of reportable chemicals, as detailed in the table below.¹²

CHEMICAL/ CAS NUMBER	STORAGE (lbs)	HAZARDS
Ethylene 74-85-1	5,477,311	Extremely flammable gas
1,3-Butadiene 106-99-0	3,108,000	Carcinogen, Mutagen, Reproductive Toxicity - Female, Developmental toxicity, Extremely flammable gas
Ethane 74-84-0	1,999,372	Extremely flammable gas
Propylene 115-07-1	1,460,533	Extremely flammable gas
Butene /25167-67-3	261,800	Extremely flammable gas
Acetylene / 74-86-2	240,000	Extremely flammable gas
Propane/ 74-98-6	151,009	Extremely flammable gas
Methane/ 74-82-8	55,215	Extremely flammable gas
Cyclohexylamine 108-91-8	35,000	Extremely flammable gas, global warming potential
Hydrogen / 1333-74-0	20,000	Extremely flammable gas
FLAMMABLE MIXTURES WITH		
Pentane 109-66-0, Butane 106-97-8, Isopentane 78-78-4, 1,3-Butadiene 106-99-0	8,000,000	Pentane: Systemic Toxicity/Organ Effects (Single Exposure - Aspiration Hazard) Butane: May cause cancer, May cause genetic defects (Germ cell mutagenicity), Extremely flammable gas Isopentane: May be fatal if swallowed and enters airways (Aspiration hazard)
Flammable Mixture of 1,3-Butadiene 106-99-0, Butane 106-97-8	2,880,000	See above
Flammable Mixture of Butane 106-97-8, Hydrogen 1333-74-0, Isobutane 75-28-5, Ethane 74-84-0, Propylene 115-07-1, Propane 74-98-6, Methane 74-82-8, and Ethylene 74-85-1	2,880,000	Isobutane: Extremely flammable gas
Flammable Mixture of Propylene 115-07-1, Ethane 74-84-0, 2-Butene-trans 624-64-6, 2-Butene-cis 590-18-1, Isopentane 78-78-4, Ethylene 74-85-1, Hydrogen 1333-74-0, Isobutane 75-28-5, Methane 74-82-8, Propane 74-98-6, and Pentane 109-66-0	1,800,000	2-Butene-trans: Extremely flammable gas 2-Butene-cis: Extremely flammable gas
Methane 74-82-8, 2-Butene-trans 624-64-6, 1-Butene 106-98-9, Butane 106-97-8, 2-Butene-cis 590-18-1, Isopentane 78-78-4, Isobutane 75-28-5	1,000,000	1-Butene: Extremely flammable gas
Isobutane 75-28-5, Butane 106-97-8, and 1,3-Butadiene 106-99-0	23,000	1-Butene: Extremely flammable gas
Pentane 109-66-0, Isoprene 78-79-5 Isopentane 78-78-4	10,000	1-Butene: Extremely flammable gas
TOTAL	27,885,472 pounds	

CORNERSTONE CHEMICAL COMPANY



KEY LESSONS: Regulatory loopholes underestimate the full extent of hazards present, and the current RMP rule fails to address disproportionate hazards and cumulative impacts faced by communities of color and low-income communities.

SUMMARY OF IDA-RELATED INCIDENTS AT THIS FACILITY

At any given time, Cornerstone Chemical in Waggaman, Louisiana (just across the Mississippi River from New Orleans), can have more than 88 million pounds of toxic and hazardous chemicals on-site.

On August 28, 2021, 22:52 p.m., with Hurricane Ida approaching but not yet in Louisiana, a caller to 911 reached the Louisiana State Police. [The caller reported](#), “a process safety valve lifted and released ammonia” at Cornerstone. “The release has been stopped and the amount of ammonia actually released is being investigated.”¹⁴ The day after Ida passed overhead, August 30, 12:39 p.m., a caller reported “the release of an unknown amount of sulfur dioxide and sulfur trioxide from a molten sulfur storage tank. The released materials went into the air and atmosphere. The cause of the release is due to Hurricane Ida.”

September 4, 2021: River Parishes, LA

[C&EN later reported](#) that the tank may have been struck by lightning.

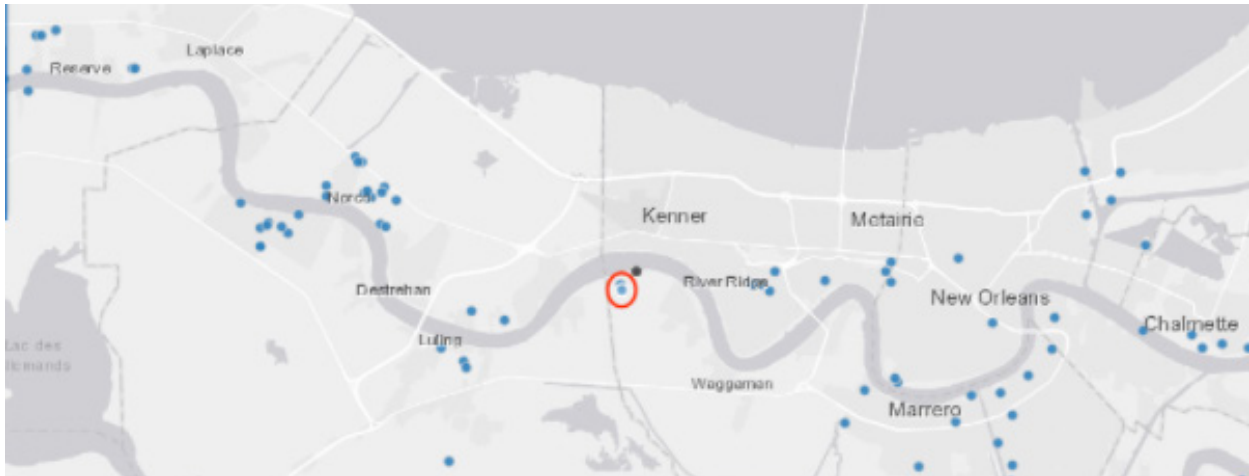
On August 31, Cornerstone Chemical published a [press release](#) about the hurricane’s impact on the facility. It claimed, “There have been no injuries to Cornerstone personnel, nor environmental release.”

However, On September 9, the U.S. Environmental Protection Agency filed a damage assessment¹⁵ and reported that 7,000 pounds of ammonia and unknown quantities of sulfur dioxide and sulfur trioxide had been released. The EPA also reports that the facility flooded by less than 1 feet.

KEY FINDINGS OF THIS INCIDENT

Worst case scenarios from the most recent RMP for this facility assume low wind speeds. During the passage of Hurricane Ida, wind speeds at the nearby Louis Armstrong New Orleans International Airport reached [90 mph](#).

While the worst-case release scenario for a toxic gas release may be slow moving air conditions, other dangerous release scenarios might be made worse by high winds.¹⁶ And the



extremely high winds, storm surges, and flooding experienced during hurricanes (or severe conditions experienced during other natural disasters like wildfires) are not considered in most Risk Management Plans or addressed in most prevention plans. Climate change hazards and the increasing frequency of intense hurricanes in New Orleans are not currently being reflected in this company's RMP.

Two of the chemicals released from Cornerstone around the passage of Ida are listed in the company's RMP. According to this [latest submission](#) (May 26, 2017), this facility has on-site, at any given time, up to 51,180,000 pounds of anhydrous ammonia and 7,600 pounds of sulfur dioxide. Cornerstone also has on-site millions of pounds of other flammable mixtures and toxic chemicals (see table below). These include the storage of up to 230,000 pounds of hydrocyanic acid and 7 million pounds of Oleum (fuming sulfuric acid mixture with sulfur trioxide). Two other recent incidents involved this hazardous chemical. Reducing storage or changing to safer chemicals or technologies would avoid the current threat posed by the ammonia and other hazardous chemicals present in the facility.

In addition to the ammonia in Cornerstone Chemical, this facility consumes ammonia from a \$860 million plant built and owned by Dyno Nobel inside the [same complex](#).

In red, the Cornerstone Chemicals facility. Blue circles show other facilities in the region that are subject to RMPs as per 2014 data.

In their [RMP](#) Dyno Nobel reports they have at their plant 77,161,792 lbs of anhydrous ammonia. Combined, this means that at any given time, there could be 126 million pounds (63,000 tons) of anhydrous ammonia at the Waggaman complex. This more than doubles the amount of ammonia reported by Cornerstone and significantly increases the amount of a hazardous chemical that could eventually be subject to an incident in the same area. An updated RMP rule should account for such situations.

EPA's [EJScreen tool](#) measures environmental injustice in many ways, and uses a five-kilometer radius (3.1 miles) around a facility as the standard area. In this area around Cornerstone, there are 28,861 people, 69% of whom are people of color. EPA ranks the community cancer risk from air toxics in the highest possible percentile range (95% to 100%).¹⁷ [The per capita income](#) is \$24,476. This is less than half (45%) the per capita income (\$54,363) of the New Orleans-Metairie metropolitan area in 2019.

A new RMP policy should address disproportionate impacts on communities such as those around Cornerstone.

[A recent analysis by the Center for Progressive Reform](#), EarthJustice, and the Union of Concerned Scientists concluded that “of roughly 12,331 RMP facilities in U.S. states and territories, 3,856 (one third) face a growing risk of natural disasters due to climate change.” As shown in the [2014 map](#) above the Cornerstone Chemical Company plant in Waggaman and the nearby community are situated in an area with other RMP facilities that also store and use hazardous chemicals. This represents an unpredictable threat to workers, the community and the environment, particularly when extreme weather events simultaneously hit the chemical facilities in the area. A new RMP policy should also address cumulative hazards posed by several RMP facilities in the same area.

It is unclear¹⁸ if the facility’s Risk Management Plan specifically considered floods or extremely high winds, but the facility was flooded as a consequence of Hurricane Ida, and very high winds occurred. After Hurricane Harvey, [the U.S. Chemical Safety and Hazard Investigation Board \(CSB\) called for](#) more robust industry guidance to help hazardous chemical facilities better prepare for extreme weather events. Some of the following recommendations could have helped prevent the incidents provoked by Hurricane Ida.

“Develop broad and comprehensive guidance to help companies assess their U.S. facility risk from all types of potential extreme weather events...Include guidance for each of the following:

- Addressing common mode failures of critical safeguards or equipment that could be caused by extreme weather events, including but not limited to flooding. For flooding scenarios, sufficient independent layers of protection should be available if flood water heights reach the facility.

- Evaluating facility susceptibility to potential extreme weather events. Relevant safety information such as flood maps should be incorporated as process safety information.
- Involving relevant professional disciplines, including engineering disciplines, to help ensure risk assessments and process hazard analyses are as robust as practicable for any given facility.”

In the same report based on the experience of Hurricane Harvey, CSB also recommends: “Facilities should perform an analysis to determine their susceptibility to extreme weather events. Companies should compile key safety information such as flood maps within their process safety information programs. This important safety information should be evaluated to determine whether any portions of their facilities are located within the 100- year or 500-year flood plain. In addition, companies should assess seismic hazard maps to determine the risk of earthquakes and consider the risk of other extreme weather such as high-wind events. Companies should evaluate risk assessments and the adequacy of relevant safeguards by applying facility process safety management programs, such as process hazard analyses or facility siting programs. Facilities should strive to apply a sufficiently conservative risk management approach when evaluating and mitigating the potential effects of extreme weather scenarios.”

PRIOR INCIDENTS

Cornerstone has a “long history of accidents and accidental releases,” [notes Mark Schleifstein of the New Orleans Advocate](#). On April 2019, Della Hasselle of the New Orleans Advocate [reviewed the company’s track record](#) of incidents and violations.

"Of the 2,253 industrial facilities in Jefferson Parish, the EPA has flagged the Cornerstone plant as one of 62 facilities, or just 3 percent of the total, to have been charged with a 'significant violation' of federal pollution laws. That violation happened when the company failed to submit a report showing how much waste it was discharging into nearby bodies of water, the EPA alleged in records."

The report continues, "Workers at the plant have been responsible for several ammonia releases that have resulted in as many as 300 pounds of the chemical being released into the air at a time, sometimes for as long as 17 hours straight, documents show. Nearly a half-dozen ammonia leaks were reported in 2014, 2015 and 2018. Some resulted in fines for the company because they were due to inadequate mechanics — including undersized or failing pumps and other poorly maintained control devices — or from human error. Ammonia can cause respiratory distress and "serious burns" in the mouth, lungs and eyes, according to the EPA."

June 2020: Residents in Harahan, Waggaman and River Ridge complained of noxious fumes wafting through their neighborhoods from Cornerstone's Waggaman facility, among others. Despite the local protest, the Jefferson Parish Council allowed Cornerstone to build a new cyanide plant at the facility. Faimon Roberts of the [New Orleans Advocate](#) reported, "Under the settlement, the company abandoned plans to build two new 26,000 gallon storage tanks as part of its new plant and instead will build two new 4,500-gallon 'process vessels' that will be used in hydrogen cyanide storage and production... River Ridge resident Jenny Zimmer said, 'Hydrogen cyanide is not safe. We don't want it.'

April 2019: A pipe at Cornerstone leaked 3,600 gallons of sulfuric acid.

August 14, 2017: Due to "human error," [according to Cornerstone's RMP](#), Cornerstone released an undisclosed amount of hydrocyanic acid for fourteen minutes. The acid evaporated into the atmosphere. One worker was injured.

May 2017: Cornerstone released 234 pounds of cyanide into the Mississippi River, according to the same RMP.

March 25 to March 28, 2017: Due to "equipment failure" Cornerstone released hydrocyanic acid gas for a four day period. One worker was injured, according to the same RMP.

2016: [The New Orleans Advocate](#) reported that the company was the fourth largest polluter of all cyanide compounds, releasing 599,528 pounds into underground wells.

2011: Three workers were exposed to cyanide gas, one of whom was sent to the hospital, according to the same report.

COMPANY & FACILITY BACKGROUND

Address:

10800 River Road
Waggaman, LA 70094

Geocoordinates:

Longitude: -90.270472 Latitude: 29.958889

Plant description: According to the company's [RMP](#), the site "consists of continuous manufacturing plants producing a variety of end products, including acrylonitrile, melamine, urea and sulfuric acid. Processes at the Fortier facility that produce regulated substances are acrylonitrile, melamine, and sulfuric acid."

Fortier is the name of the family that once owned the Orange Grove Plantation which

occupied this land, according to [Cornerstone's history](#).

American Cyanamid purchased the property in 1952. [Archives show](#) that in 1858, a prior owner of the Orange Grove Plantation sold all of his "property" including a "Sugar house, steam engine, dwelling house, negro cabins, and the following slaves attached to said plantation." The advertisement then lists 112 people for sale, aged 1 month to 65 years old. The original inhabitants of the New Orleans area were the [Chitimacha](#).

Today, this land's occupants produce petrochemicals. Cornerstone's products are used in the manufacture of plastics including formaldehyde resins and synthetic rubber.

Hazardous Chemicals Use/Storage: Cornerstone Chemical's Risk Management Plan

According to Cornerstone's latest available RMP, this facility has on-site, at any given time, the chemicals and quantities in the table below:

Chemical/CAS	Storage (lbs)	Hazards
Ammonia (anhydrous) 7664-41-7	51,080,000	Potential Endocrine Disruptor, Acute Toxicity if inhaled, Asthmagen, Causes severe skin burns and eye damage, Causes serious eye damage, Very toxic to aquatic life, Persistent in the environment, Causes damage to organs through prolonged or repeated exposure/specific target organs/systemic toxicity following repeated exposure
Acrylonitrile 107-13-1	23,800,000	Carcinogen, May damage fertility or the unborn child (Toxic to reproduction), Potential Endocrine Disruptor, Toxic in contact with skin, Danger of skin sensitization, Causes skin irritation, Causes serious eye damage, Acutely toxic to aquatic life, Very ecotoxic in the soil environment, Highly flammable liquid and vapour, Causes damage to organs (Specific target organs/systemic toxicity following single exposure), Toxic to aquatic life with long lasting effects
Oleum (Fuming Sulfuric acid mixture with sulfur trioxide) 8014-95-7	7,000,000	
Flammable Mixture, including: Propane 74-98-6; Propylene 115-07-1	6,700,000	Propane: Persistent in the environment, Extremely flammable gas. Propylene: Potential Endocrine Disruptor, Extremely flammable gas
Hydrocyanic acid 74-90-8	230,000	Reproductive Toxicity, Acute Mammalian Toxicity (fatal if inhaled), Chronic cardiovascular, renal and musculoskeletal effects after single exposure, Neurotoxicity-Single Exposure, Causes serious eye damage/eye irritation, Very toxic to aquatic life with long-lasting effects, Persistent, Extremely flammable liquid and vapour, Causes damage to organs through prolonged or repeated exposure/ specific target organs/systemic toxicity following repeated exposure
Sulfur dioxide (anhydrous) 7446-09-5	7,900	Developmental toxicity, Potential Endocrine Disruptor, Toxic if inhaled (Acute toxicity), Respiratory sensitizers, Causes severe skin burns and eye damage. Persistent in the environment.
Total	88,817,900	

CF INDUSTRIES

KEY LESSONS: High-risk chemical facilities are not voluntarily reducing or eliminating hazards, or voluntarily implementing independent expert recommendations to address climate-connected natural disasters and prevent incidents.

SUMMARY OF IDA-RELATED INCIDENTS AT THIS FACILITY

At any given time, CF Industries' facility in Donaldsonville, Louisiana, may contain as much as 328 million pounds of anhydrous ammonia.

On August 29, 2021, the National Response Center (NRC) [received reports](#) of anhydrous ammonia releases from up to four storage tanks at the CF Industries fertilizer factory. At 7:31 p.m., Aug. 29, a caller reported, "that the pilots on the flares of two storage tanks were extinguished by the conditions of Hurricane Ida on the North and South Complex #1. The control valves are partially open, which resulted in the release of anhydrous ammonia into the atmosphere. Conditions from Hurricane Ida are ongoing and a crew is unable to secure the release."

At 8:04 p.m., Aug. 29, a caller reported, "that the pilots on the flares of two storage tanks, D901 (Ammonia #5 area)/TK806(Complex #2 area) were extinguished by the conditions of Hurricane Ida and the control valves are partially open, which resulted in the release of anhydrous ammonia into the atmosphere. Due to continued conditions from Hurricane Ida, crew is unable to secure the release.

KEY FINDINGS OF THIS INCIDENT

Worst case scenarios from the most recent RMP for this facility assume low wind speeds. However, wind gusts [exceeded 62 mph](#) during the passage of Hurricane Ida. While the worst-case release scenario for a toxic gas release may be slow moving air conditions, other dangerous release scenarios might be made worse by high winds.¹⁹ And the extremely high winds, storm surges, and flooding experienced during hurricanes (or severe conditions experienced during other natural disasters like wildfires) are not considered in most Risk Management Plans or addressed in most prevention plans. Climate change hazards and potential impacts, such as larger or more frequent storms, are not currently being reflected in this company's RMP.

By the time the EPA did an assessment on August 31, there was still no power at the facility. Reliable backup systems would have been required if climate change potential impacts had been considered, as we recommend.

According to the company's latest available RMP, this facility has on-site, at any given time, as much as 328,223,043 pounds of anhydrous ammonia. According to the [previous RMP](#) the company submitted, the amount of anhydrous ammonia was 330,000,000 pounds, which represents only a 1% decrease for this chemical.

This facility has had one previous release subject to EPA 40 CFR Part 68 on February 24, 2021. The incident involved 4,375 pounds of ammonia and 907 pounds of flammable gas. Reduction and removal of hazards is needed to actually prevent hazardous releases like the one that happened at CF Industries in late August 2021. Reducing storage or changing to safer chemicals or technologies would avoid the current threat posed by the ammonia present in the facility.

Incidents reported following previous hurricanes and floods have shown that chemical plants are failing to prevent hazardous releases and incidents with the current regulations. After Hurricane Harvey, [the U.S. Chemical Safety and Hazard Investigation Board \(CSB\) called for more robust industry guidance](#) to help hazardous chemical facilities better prepare for extreme weather events. Some of those recommendations are listed below and could have helped prevent the incidents provoked by Hurricane Ida.

“Develop broad and comprehensive guidance to help companies assess their U.S. facility risk from all types of potential extreme weather events...Include guidance for each of the following:

- Addressing common mode failures of critical safeguards or equipment that could be caused by extreme weather events, including but not limited to flooding. For flooding scenarios, sufficient independent layers of protection should be available if flood water heights reach the facility.
- Evaluating facility susceptibility to potential extreme weather events. Relevant safety information such as flood maps should be incorporated as process safety information.
- Involving relevant professional disciplines, including engineering disciplines, to help ensure risk assessments and process hazard analyses are as robust as practicable for any given facility.”

In the same report based on the experience of Hurricane Harvey, CSB also recommends: “Facilities should perform an analysis to determine their susceptibility to extreme weather events. Companies should compile key safety information such as flood maps within their

process safety information programs. This important safety information should be evaluated to determine whether any portions of their facilities are located within the 100- year or 500-year flood plain. In addition, companies should assess seismic hazard maps to determine the risk of earthquakes and consider the risk of other extreme weather such as high-wind events. Companies should evaluate risk assessments and the adequacy of relevant safeguards by applying facility process safety management programs, such as process hazard analyses or facility siting programs. Facilities should strive to apply a sufficiently conservative risk management approach when evaluating and mitigating the potential effects of extreme weather scenarios.”

PRIOR INCIDENTS

2013: A 34-year veteran of the company died after nitrogen that was being offloaded exploded causing “horrific” damage.

COMPANY & FACILITY BACKGROUND

Address:

39018 Highway 3089
Donaldsonville, LA 70346

Geocoordinates:

Longitude: 30.086940 Latitude: -90.957780

Plant description: This is the largest nitrogen facility in the country, according to CF Industries. Most of the nitrogen is used to manufacture fertilizer. Owner: CF Industries Holdings, Inc., headquartered in Deerfield, Illinois.

Hazardous Chemicals Use/Storage: CF Industries Risk Management Plan

According to the company’s latest available RMP, this facility has on-site, at any given time, the chemicals and quantities in the table on the following page.²¹

Chemical/ CSA	Storage (lbs)	Hazards
Ammonia (anhydrous)7664-41-7	328,223,043	Toxic if inhaled (Acute toxicity)
Flammable Mixture of Hydrogen 1333-74-0 and Methane 74-82-8	457,126	Hydrogen: Persistent in the environment, Very flammable gas Methane: Extremely flammable gas, Global warming potential
Flammable Mixture of Ethane 74-84-0 and Methane 74-82-8	23,189	Ethane: Extremely flammable gas Methane: Extremely flammable gas, Global warming potential
Total	328,703,358	

CONCLUSION AND RECOMMENDATIONS

Climate change-related extreme weather events, such as Ida, are [increasing the vulnerability](#) of chemical facilities nationwide. The Gulf Coast is one of the most vulnerable regions in the country, with more than 2,500 facilities facing elevated risk from natural disasters alone.

As the communities in Louisiana attempt to recover from Ida, as they do every year from similar natural disasters, the EPA is reviewing its Risk Management Plan (RMP) rule which can help prevent these incidents from occurring in the first place. With President Biden's commitments to addressing climate change and to environmental justice, it should be a top priority for EPA to produce a strong new RMP rule that will require hazard reductions, address climate change and natural disasters, increase worker participation, and include other key measures.

The EPA does not need to invent new approaches to help prevent chemical disasters—they already exist. They have been developed over decades by workers, facility safety experts, and local and state governments. For example, the recent California refinery [Process Safety Management rule](#), the [Contra Costa County \(CA\) Industrial Safety ordinance](#), and other robust prevention policies have already been implemented.

Workers and fenceline communities are unwilling to continue living with the constant threat of chemical disasters that could destroy businesses and communities, when safer chemicals and technologies exist. Injuries, death and disease are not acceptable risks,

and communities are not sacrifice zones. The lives and health of those at risk should be the first - not the last - consideration when developing the new RMP rule.

We are calling on the EPA to make sure that the updated RMP will help prevent chemical disasters, and protect workers, communities, and businesses, by reducing and eliminating hazards. A new, stronger RMP rule must, among other improvements:

- **Ensure prevention of chemical disasters by eliminating or reducing hazards.** Many safer chemicals and processes already exist, and more can be developed. What is missing, but urgently needed, are national requirements for transition to safer alternatives whenever possible, and other proven measures like incident root cause analyses, independent third-party safety audits, and collecting and sharing hazard reduction opportunities.
- **Proactively address climate hazards and impacts.** Expand RMP coverage to more facilities in areas prone to natural disasters. Require safer shutdown and startup procedures. Collect and publicly share air emissions data in real time. Require reliable backup power. Require that communities receive timely information about natural disaster response plans and incidents in ways that are clearly communicated to those at risk.
- **Strengthen emergency response and incident management requirements.** Backup power, alerts in multiple languages (including advance community notification), real-time fenceline air monitoring, leak detection and repair, emergency response exercises, and similar best practices should not be optional.

- **Increase enforceability, corrective action, and accountability.** Incorporate RMP requirements into Clean Air Act Title V permits to improve compliance and enforceability. Require meaningful worker involvement in all incident response and prevention planning systems, and implement stop work authority (including an anonymous safety and near-miss hotline). Clear, expeditious implementation and compliance deadlines are essential.
- **Expand coverage of the RMP program.** The current scope of the RMP program is inadequate for the dangers posed by these facilities, especially in light of increasing climate-related impacts. More facilities, processes and chemicals (including ammonium nitrate and other reactives) must be covered. One process or part of a facility should trigger coverage for the whole facility.
- **Address the cumulative hazards and disproportionate impacts in many communities, and ensure environmental justice.** RMP facilities are frequently located in close proximity to each other, as well as additional facilities that continuously release multiple pollutants. Often, the communities neighboring these facilities - disproportionately made up of people of color and low income people - are faced with a host of other social and environmental conditions that increase their susceptibility to health threats. Human bodies don't experience one health threat at a time, they overlap and accumulate. When chemical disasters occur, these health hazards can be even more extreme. The EPA must ensure more layers of prevention in communities where cumulative hazards and disproportionate impacts exist, due to the the proximity of multiple RMP and other polluting facilities.

ENDNOTES:

1. Hurricane Ida Report #20 – FINAL September 24, 2021: <https://response.epa.gov/sites/15323/files/Hurricane%20Ida%20Report%202020.pdf>
2. Life at the Fenceline: Understanding Cumulative Health Hazards in Environmental Justice Communities: <https://ej4all.org/life-at-the-fenceline>
3. National Response Center. "2021 Incidents." (Spreadsheet, incidents through September 19, 2021.) <https://nrc.uscg.mil/> Downloaded September 24, 2021. Incident report number 1314961.
4. National Response Center. "2021 Incidents." (Spreadsheet, incidents through September 19, 2021.) <https://nrc.uscg.mil/> Downloaded September 24, 2021. Incident report number 1315456.
5. Environmental Protection Agency Emergency Response. "Hurricane Ida. Shell Chemical LP - Norco Chemical Plant - East Site Facility Report." September 1, 2021. LDEQ-EDMS Document No. 12881055.
6. National Response Center. "2021 Incidents." (Spreadsheet, incidents through September 19, 2021.) <https://nrc.uscg.mil/> Downloaded September 24, 2021. Incident report number 1316967.
7. In its "Risk Management Program Guidance for Offsite Consequence Analysis," EPA notes that while the required assumptions about weather and other conditions in potential release scenarios are expected to usually estimate the worst-case release, "In certain cases, actual conditions could be even more severe than these worst-case assumptions (e.g., very high process temperature, high process pressure, or unusual weather conditions, such as temperature inversions); in such cases, your results might underestimate the effects
8. Area defined as 5 kilometers Ring Centered at 29.994340,-90.407181, LOUISIANA, EPA Region 6 using <https://ejscreen.epa.gov/mapper/>
9. Area defined as 5 kilometers Ring Centered at 29.994340,-90.407181, LOUISIANA, EPA Region 6 (Population: 28,861) using <https://ejscreen.epa.gov/mapper/>
10. The facility's publicly-available RMP summary does not list flooding, high winds, or storms among the "hazards identified."
11. U.S. Chemical Safety and Hazard Investigation Board, Arkema Inc. Final Investigation Report: <http://www.csb.gov/file.aspx?DocumentId=6063>
12. Chemicals on-site: Risk Management Plan; Chemical hazards: [Pharos Project](#).
13. Environmental Protection Agency Emergency Response. "Hurricane Ida. Shell Chemical LP - Norco Chemical Plant - East Site Facility Report." September 1, 2021. LDEQ-EDMS Document No. 12881055
14. National Response Center. "2021 Incidents." (Spreadsheet, incidents through September 19, 2021.) <https://nrc.uscg.mil/> Downloaded September 24, 2021. Incident report numbers 1315003 and 1315119.
15. Environmental Protection Agency Emergency Response. "Hurricane Ida. Cornerstone Chemical Company Facility Report." September 2, 2021. LDEQ-EDMS Document No. 12878637.
16. See endnote 7.
17. Area defined as 5 kilometers Ring Centered at 29.958880,-90.270472, LOUISIANA, EPA Region 6 (Population: 28,861).
18. While the Cornerstone facility's publicly-available RMP summary lists a variety of specific "hazards identified," it only lists "hurricanes" generally, and not specific likely hazards such as flooding, extremely high winds, or extended power outage.
19. See endnote 7.
20. Area defined as 5 kilometers Ring Centered at 30.100695,-90.992911, LOUISIANA, EPA Region 6,
21. CF Industries RMP, RMP Review, Version 4.3. US Department of Environmental Protection, Chemical Emergency Preparedness and Prevention Office. Software refreshed June 30, 2021. See also the [Pharos Project](#).