

PRODUCT BROCHURE: EMERGENCY GAS SCRUBBER

ELIMINATING THE RISK OF TOXIC GAS RELEASES

Protecting staff, community and ensuring compliance with the most exhaustive chlorine risk mitigation solution: **The Purafil Emergency Gas Scrubber (EGS)**



purafil
Filtration Group®



WHAT IS YOUR PLAN?

In the case of an unanticipated release of chlorine from a 1-ton cylinder, the lives of employees and residents within a 5-mile radius are at risk. The Purafil Emergency Gas Scrubber is designed to mitigate the risk of any release event of up to 2 tons, whether caused by operator error during cylinder changeout, or equipment failure during storage.

Purafil is a proven and trusted provider of safety equipment, also offering solutions for toxic levels of ammonia, SO₂ and H₂S. Ensure your compliance with safety regulations. Nothing is more important than protecting the safety of the people working and living nearby.

Chlorine Gas Basic Facts

At room temperature, chlorine is a yellow-green gas.

When liquid chlorine is released, it quickly turns into a gas that stays close to the ground and spreads rapidly. Because chlorine gas is heavier than air, it will sink to low-lying areas and increase the risk of exposure.

Chlorine gas can be recognized by its pungent, irritating odor. However, repeated exposure to chlorine reduces the ability to detect the odor. ¹

Chlorine is **the most common inhalation irritant** in the United States with **6300 exposures** annually. ²



Effects of Chlorine Gas

Exposure to low concentrations of chlorine (1 to 10 ppm) may cause eye and nasal irritation, sore throat, and coughing.

Inhalation of higher concentrations of chlorine gas (>15 ppm) can rapidly lead to respiratory distress with airway constriction and accumulation of fluid in the lungs (pulmonary edema).

The lowest **lethal concentration** has been estimated as **430 ppm**. ³

In the event of a full scale release, concentrations can reach as high as **300,000 ppm** in the chlorine room.

A 1-ton chlorine release can impact an area over a 5 mile radius.



ARE YOU IN COMPLIANCE?

There are several regulations around the storage and handling of hazardous, toxic, or reactive chemicals, like chlorine, that apply to most common industrial and commercial applications. Some only require you to report the quantity you are storing, but as that quantity increases, they can also require risk management plans (RMP). This is meant to highlight some key Threshold Planning Quantities (TPQ) for chlorine to help determine if you may need to take steps to ensure compliance.

WHO IS COVERED BY THE RMP REGULATIONS?

Owners and operators of a facility (stationary source) that manufactures, uses, stores, or otherwise handles more than a threshold quantity of a listed regulated substance in a process, must implement a risk management program and submit a single RMP for all covered processes at the facility.

REGULATION	TYPE	CHLORINE THRESHOLD
(CLEAN AIR ACT SECTION 112(R)) 40 CFR 68.130	RMP THRESHOLD QUANTITY	2,500 POUNDS
(OSHA) 29 CFR 1910.119	RMP THRESHOLD QUANTITY	1,500 POUNDS

CLEAN AIR ACT SECTION 112(r)

ACCIDENTAL RELEASE PREVENTION /RISK MANAGEMENT PLAN RULE. Requires companies of all sizes that use certain listed regulated flammable and toxic substances to develop a Risk Management Program, which includes a(n):

- Hazard assessment
- Prevention program
- Emergency response program

https://www.epa.gov/sites/default/files/2020-03/documents/caa112_rmp_factsheet_march_2020_final.pdf

40 CFR 68.130

40 CFR Chapter I – Environmental Protection Agency, Subchapter C – Air Programs, Part 68 – Chemical Accident Prevention Provisions, Subpart F – Regulated Substances for Accidental Release Prevention, Section 68.130 – List of substances, Table 1 to Section 68.130 – **List of Regulated Toxic Substances and Threshold Quantities for Accidental Release Prevention.** <https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-68/subpart-F/section-68.130>

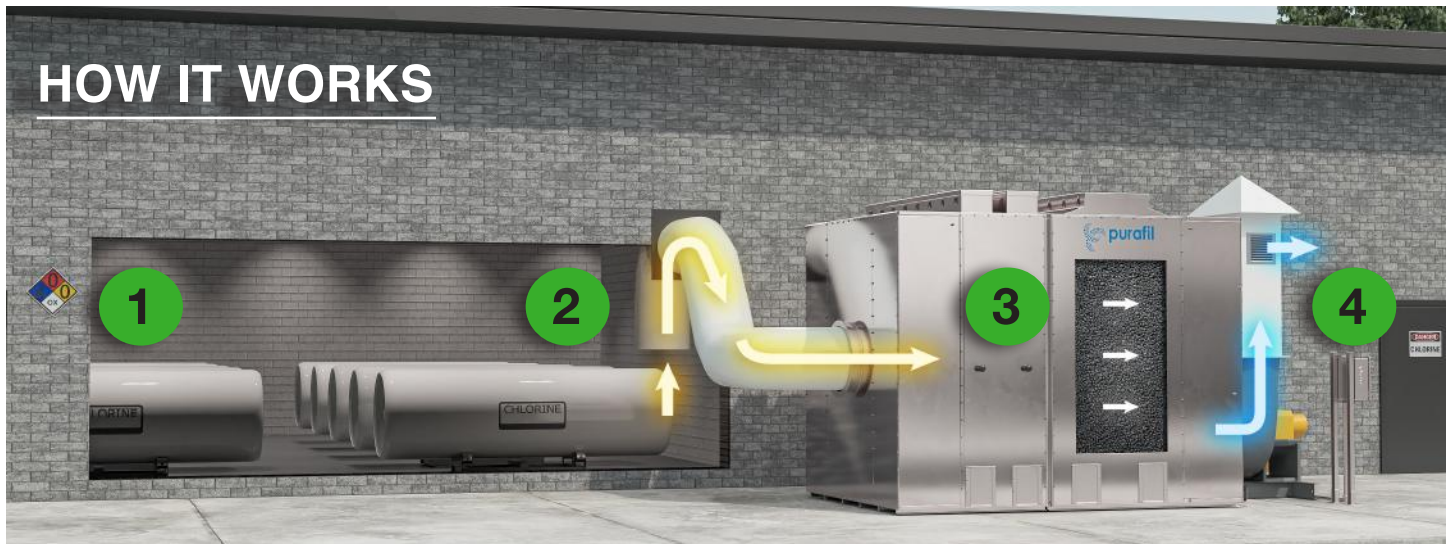
29 CFR 1910.119 (OSHA)

This section contains requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. These releases may result in toxic, fire or explosion hazards

29 CFR Subtitle B – Regulations Relating to Labor, Chapter XVII – OSHA, Department of Labor, Part 1910 – Occupational Safety and Health Standards, Subpart H – Hazardous Materials, Section 1910.119 – Process safety management of highly hazardous chemicals, Appendix A to Section 1910.119 – **List of Highly Hazardous Chemicals, Toxics and Reactives (Mandatory).** <https://www.ecfr.gov/current/title-29/subtitle-B/chapter-XVII/part-1910/subpart-H/section-1910.119>

BEST IN CLASS CHLORINE MITIGATION

THE PURAFIL EMERGENCY GAS SCRUBBER (EGS) is designed to protect staff and the local community in the event of a catastrophic toxic gas release. Purafil has standard options to mitigate large and small scale leaks of chlorine, ammonia, or sulfur dioxide, by providing immediate protection against leaking gas.



- 1** Approximately 400 lbs of liquid chlorine will flash into vapor and the remaining contents of the chlorine cylinder would spill out as a liquid at its boiling point.
- 2** A chlorine sensor inside the room activates the EGS blower which will begin suction of the room at 5,000 cfm until the full contents of the release have passed into the scrubber.
- 3** Inside the scrubber, Chlorosorb Ultra media will use adsorption, absorption and irreversible chemical reaction to change the chlorine into a harmless solid.
- 4** Chlorine Free air is released, protecting employees, and preventing the need to evacuate the local community.

THE PURAFIL ADVANTAGE:

- Keep the plant personnel, property, and surrounding community safe
- Highest flow rates (CFM) to quickly and efficiently mitigate releases
- Patented Chlorosorb® Ultra media offers the highest chlorine absorption rate (15% by weight)
- Standard systems for 150lbs up to 2-ton chlorine cylinders.
- Custom designs for your specific head space/foot print limitations, preferred material, and system flow dynamics.
- Designed to help you meet or exceed federal and local standard requirements

LOW MAINTENANCE:

- Patented media technology chemically converts gas into non hazardous solid.
- No caustic liquid, non-toxic, non-hazardous and landfill disposable before and after use.
- No secondary containment, pumps, or seals
- Simple, reliable controls for easy integration

SPECIFICATIONS:

- Available in fiberglass and aluminum construction
- Ranging from 700 CFM up to 11,000 CFM
- Control panel, pressure gauge and switch, and chlorine stack alarm come standard
- Ladders, railings, and redundant fans are optional



**FOC1: Fiberglass Scrubber
For 1 Ton Cylinders**



**AOC1: Aluminum Scrubber
For 1 Ton Cylinders**



**FOC5: Fiberglass Scrubber
For 150 lb CL₂ Cylinders**

WHAT'S INSIDE



15% Removal Capacity*

PURAFIL'S PATENTED DRY SCRUBBING MEDIA

Our patented media formulations are manufactured using special chemicals that react with target gases and remove them from the air stream. Contaminant gases are chemically transformed into harmless solids that remain trapped inside the media. Known as chemisorption, this process converts odors and toxic fumes into harmless solids. Once the gases are removed from your environment, they cannot re-enter the air stream.

Purafil's media perform well at all temperatures and humidity levels, and are non-flammable (UL classified). Our media provide the highest removal capacity for target gases like chlorine. As a complimentary service, our laboratory technicians analyze samples from your system(s) and provide a report indicating the current capacity and can recommended media replacement dates.

CHLOROSORB® ULTRA

- Rapidly removes and neutralizes chlorine gas
- Operates in below freezing temperatures without special heaters
- *Highest removal capacity available in the Industry with 15% minimum by weight capacity for chlorine Gas
- Landfill disposable


PURAFIL SCRUBBERS vs CAUSTIC WET SCRUBBERS

Purafil's dry scrubbers have several advantages over conventional wet scrubbers. They require significantly less maintenance, resulting in less work, and less expense. No need to replace pumps, spray nozzles, or valves!

Dry scrubbers are much **SAFER**. Instead of using toxic caustic liquid, they neutralize gases with non-toxic, dry-scrubbing media, which permanently transforms gases into harmless solids. In addition, dry scrubbing media is landfill disposable as supplied.

Unlike toxic caustic liquid, dry-scrubbing media is immediately available for instantaneous reaction, regardless of the load rate. Purafil's EGS captures chlorine faster, releasing less than 25 parts per **billion**, while wet scrubbers discharge 1-4 parts per **million**.

FACTOR	PURAFIL	WET SCRUBBER
Contains liquid toxic chemicals	NO	YES
Requires secondary containment	NO	YES
Caustic recirculation pumps with mechanical seals	NO	YES
Media reacts with other gases in air to deplete capacity	NO	YES (CO ₂ , H ₂ S)
Requires a complex control panel to integrate multiple functions	NO	YES
Has the potential to release NaOCl (Bleach)	NO	YES
Has the potential to precipitate salts and plug nozzles	NO	YES
Spent media is landfill disposable	YES	NO
Requires a special heater	NO	YES
Estimated annual maintenance costs	\$1K	\$10K



TRUSTED AND PROVEN: PURAFIL SCRUBBER PROTECTS STAFF AND SURROUNDING COMMUNITY DURING A CHLORINE GAS LEAK IN MISSISSIPPI

JACKSON, MISSISSIPPI

THE PROBLEM:

On Monday, September 19, 2022, on-site safety personnel were notified of an alarm activation at O.B. Curtis Water Treatment Plant indicating a chlorine gas leak. All personnel were evacuated, and multiple agencies responded to the event. **“First responders, along with O.B. Curtis’s maintenance staff, identified three leaking valves and secured the area.”**

THE SOLUTION:

In 2006, the O.B. Curtis Water Treatment Plant installed a FOC-1, Fiberglass Emergency Gas Scrubber (EGS) with Chlorosorb® dry-scrubbing media adjacent to the chemical building. Purafil’s EGS is designed to contain the entire contents of a fully loaded 1-ton chlorine cylinder in a worst-case release scenario, which exceeds the requirements of the Uniform Fire Code. **“The building has air scrubbers to keep chlorine from escaping the building. The devices worked as designed”**, the release states.

Instead of using toxic, liquid caustic to neutralize gases, the EGS uses non-toxic, dry-scrubbing media. This Chlorosorb’s chemisorptive process removes chlorine by means of adsorption, absorption and chemical reaction. Chlorine gas is trapped within the pellets where an irreversible chemical reaction changes the chlorine gas into a harmless solid. The personnel on site performed annual media life testing, provided free of charge by Purafil, on the filtration media. After 16 years, the original Chlorosorb media was fully functional and ready when needed. During the chlorine leak at O.B. Curtis, Purafil’s EGS immediately began to remove the chlorine gas, minimizing the risk to employees and the community. **“No injuries were reported... No other evacuations of the surrounding area were needed.”** During a full cylinder release, chlorine gas can reach concentrations that are dangerous to human life in up to a five-mile radius.

ABOUT THE AREA:

Able to produce 50 million gallons of water a day, the O. B. Curtis plant was built in the late 1980s to address the rapidly increasing population in Jackson, Mississippi and serves as the main water treatment plant for the region.

FREQUENTLY ASKED QUESTIONS ABOUT THE EMERGENCY GAS SCRUBBER

DOES THE EGS CONTAIN HAZARDOUS CHEMICALS?

No. The EGS uses Purafil's patented dry-chemical media, which is UL Classified, non-toxic, and non-hazardous both before and after reaction with toxic gas.

IS EGS MEDIA SAFE TO HANDLE?

Yes. Purafil media is non-toxic, non-hazardous, and non-flammable as supplied. Although the media is safe to handle, Purafil suggests using gloves and goggles.

HOW DO I KNOW WHEN TO REPLACE MY MEDIA?

Provided as a complimentary service, Purafil's lab analyzes media samples from your air scrubber to determine the remaining life. Purafil recommends sampling your critical EGS media every 1 to 6 months, and after any suspected or confirmed release of chemicals. We will send a detailed report showing the media life available.

Every year, Purafil generates over 20,000 analyses in 12 different languages. We have one of the only ISO 17025:2017 accredited labs, which ensures that our processes and procedures exceed the American Association for Laboratory Accreditation's (A2LA) high standards. Purafil was able to earn this prestigious certification (certificate number: 4971.01) by ensuring that our testing procedures, equipment and processes are best-in-class. This allows us to provide you with more accurate test results and give you the Purafil peace of mind you've come to expect from us.

WHAT TESTING HAS THE MEDIA BEEN PUT THROUGH?

Purafil has media tests for the Chlorosorb Ultra at temperatures at the -40°F range without the need for heat application. Purafil also has auto ignition tests that exceed 644°F. Purafil has done extensive research on all production media and has independent research tests to prove the validity of the system. Third-party laboratory testing demonstrates Chlorosorb® Ultra's ability to remove the entire contents of a fully loaded, storage cylinder with less than 25 parts per billion at discharge.

WHAT IS THE LIFE EXPECTANCY OF THE MEDIA?

When properly maintained and without coming into contact with chlorine, Chlorosorb Ultra virtually has an indefinite life. It will not chemically react with other gases typically found at municipal and industrial facilities. Purafil suggests analyzing the media at least twice a year, which is a complimentary, value-added service that Purafil provides to each customer, in order to determine media life. After 10 years, we recommend an on-site Purafil assessment to ensure the condition of the media and equipment.

HOW DO I DISPOSE OF EGS MEDIA?

EGS media can typically be disposed of in a landfill unless local, state or federal guidelines require additional procedures.

1) <https://www.cdc.gov/chemicalemergencies/factsheets/chlorine.html>

2) <https://pubmed.ncbi.nlm.nih.gov/29185815/>

3) <https://wwwn.cdc.gov/TSP/MMG/MMGDetails.aspx?mmgid=198&toxid=36#:~:text=Chlorine%20gas%20is%20irritating%20and,airway%20and%20lungs%20can%20occur.>