White Paper

HYDROGEN SULFIDE: *A Lift Station's Super Villain*

WHAT DOES YOUR LIFT STATION SMELL LIKE?

And what does that mean to you?

Author: Alan Rein, DRP Chemicals, June 2026

Why H_2S Matters

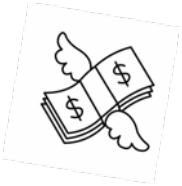
Dangerous, destructive, costly, and preventable

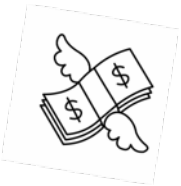
Hydrogen sulfide, commonly written as H_2S, is one of the most serious operational concerns in wastewater lift stations. There are four major consequences:

- Health hazards,
- Corrosion to concrete and metals,
- Public complaints,
- Potential legal expenses.

H_2S is not simply an odour problem. It is a poisonous, corrosive gas that is associated with worker safety risks, accelerated infrastructure damage, equipment failure, community nuisance complaints, and long-term cost exposure. In wastewater systems, unmanaged H_2S can shorten the life of pumps, motors, electrical controls, metal surfaces, concrete structures, wet wells, manholes, and connected conveyance assets.

H_2S concern	Practical impact in lift stations
Health hazards	Exposure can irritate eyes and airways and can become life-threatening at higher concentrations.[1]
Corrosion	H_2S can contribute to acid formation on wet surfaces, damaging concrete and steel.
Odour complaints	Rotten-egg odours can trigger public complaints and community concern.[1]
Cost and liability	Repairs, downtime, replacement, complaints, and safety obligations can become expensive.



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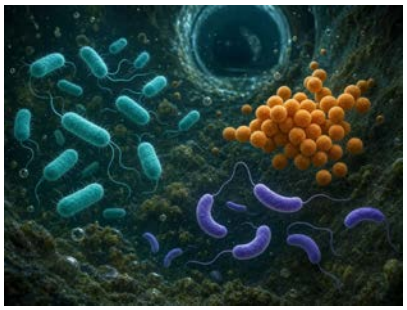
Where H_2S Comes From

Low oxygen, sulfates, bacteria, and organic load

The most common source of foul odours in lift stations is the formation of sulfide compounds by anaerobic or facultative bacteria. In practical terms, sulfides are produced when bacteria operate under low-oxygen conditions in wastewater.



Three typical bacteria are found in waste:

- Bacilli (coloured teal)
- Cocci (orange)
- Vibrios (violet)

Wastewater contains multiple species of bacteria. These can result in a high biological oxygen demand, commonly called BOD. When available dissolved oxygen is depleted, bacteria can obtain oxygen by using sulfate compounds, represented chemically as SO_4. This process releases sulfide ions into the wastewater. Those sulfide ions will then combine with hydrogen ions to form hydrogen sulfide gas, written as H_2S.

Lift stations are vulnerable because wastewater can experience detention time, turbulence, low oxygen, grease accumulation, heavy solids, and areas of limited circulation. These conditions create a favourable setting for sulfide generation, H2S formation, odour release, and corrosion.

SO_4 loses Oxygen to bacteria.

This releases a Sulfur Ion.

This Sulfur Ion combines with a H_2 Ion.

Forming H_2S

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Hidden H_2S Production Zones

Why surface-level odour control is often incomplete

Bacteria associated with H_2S formation are not found only in the moving wastewater stream. Some are present in the active flow, but many are hidden in heavy solid deposits and low-flow areas.

These hidden zones matter because a lift station may continue to produce H_2S even after surface-level odour treatment. If solids, FOG, wet-well corners, pipe-wall deposits, and other buildup remain in place, the underlying biological environment can continue to support sulfide production.

Hidden area	Why it matters
Pipe walls	Deposits along pipe walls can shelter bacteria and organic material.
Wet-well bottoms and corners	Settled solids can accumulate where circulation is weak.
Floating FOG layers	Fats, oils, and grease (FOG) can trap organic matter and create low-oxygen microenvironments.
Heavy solids	Deposits can become long-term sources of biological activity and odour.

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Corrosion and Infrastructure Damage

H_2S prevention is also asset protection

Once H_2S is present, it can create destructive conditions inside lift stations, manholes, wet wells, and sewer infrastructure. When H_2S connects with a wet surface, sulfuric acid can form. That acid will attack concrete and steel, shortening the usable life of structures and equipment.

The financial consequences can be significant. Corrosion can reduce the service life of pumps and motors, damage electrical wiring and controls, dissolve concrete surfaces, rust steel, and contribute to premature replacement of major structures. In severe cases, a lift station or manhole may require extensive rehabilitation or total replacement.

Asset affected	Potential consequences
Pumps and motors	Shortened equipment life and increased maintenance.
Electrical wiring and controls	Corrosion-related shorts, failures, and downtime.
Concrete and steel	Acid attack, surface loss, rust, weakening, and repair needs.
Manholes and wet wells	Rehabilitation or major replacement exposure.

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Odours, Complaints, and Liability

Rotten-egg odour is a warning, not a measurement

H_2S is widely associated with a rotten-egg odour. People can detect unpleasant odours at low concentrations, and OSHA states that the odour threshold can be very low; however, odour is not a reliable safety indicator because olfactory fatigue can occur.[1]

This distinction is important for lift station operators. A bad smell may indicate a problem, but the absence of smell does not prove that conditions are safe. At elevated concentrations, people may lose the ability to smell H_2S, making reliance on odour especially dangerous.[1]

Odour complaints also have a public-facing impact. Neighborhoods, motorists, nearby businesses, and employees may experience recurring nuisance conditions when lift-station odours are not controlled. Odour is more than inconvenience: H_2S odours can become a liability when they signal unsafe or unmanaged operating conditions.

Worker Safety and Exposure Awareness

Exposure limits and severity increase quickly

Hydrogen sulfide is dangerous to people. OSHA states that H_2S can produce a wide range of health effects,.[1] NIOSH lists a recommended exposure limit of 10 ppm as a 10-minute ceiling and identifies 100 ppm as immediately dangerous to life and health.[1][3]

Concentration or limit	Reference meaning
OSHA general industry ceiling: 20 ppm	Exposure must not exceed this ceiling except for a limited peak condition described by OSHA.[2]
OSHA peak: 50 ppm	OSHA allows a 10-minute maximum peak only if no other measurable exposure occurs during the shift.[2]
NIOSH REL: 10 ppm	Recommended 10-minute ceiling exposure limit.[3]
NIOSH IDLH: 100 ppm	Immediately dangerous to life and health.[1][2]
500–700 ppm	OSHA describes collapse within minutes and possible death within 30–60 minutes.[1]
700–1,000 ppm	OSHA describes rapid unconsciousness, knockdown, respiratory arrest, and death within minutes.[1]

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Low-Level and Repeated Exposure

Do not rely on smell

H_2S can be dangerous even at lower levels when exposure is repeated. OSHA reports that prolonged or repeated exposure at low concentrations may cause nausea, eye tearing, headaches, loss of sleep, fatigue, appetite loss, irritability, poor memory, and dizziness.[1]

Repeated or prolonged exposure should therefore be taken seriously:

- Especially for workers who visit lift stations regularly
- For people living or working near persistent odour sources.
- Even motorists that drive by daily can be adversely affected.

ATSDR medical guidance also notes that hydrogen sulfide is rapidly absorbed through the lungs and that odour may not provide adequate warning because olfactory fatigue can occur.[4]

Safety principle	Practical application
Monitor, do not guess	Use appropriate gas detection when H_2S exposure is possible.
Train exposed workers	Ensure workers understand H_2S hazards, limits, and response actions.
Respect confined spaces	Follow applicable confined-space procedures before entry.
Address the source	Reduce conditions that allow H_2S generation rather than only masking odour.

All personnel who may encounter H_2S should receive appropriate H_2S safety training and should follow applicable confined-space, ventilation, monitoring, respiratory-protection, and emergency-response requirements.[2][3]

Treat recurring odour complaints as operational signals that require attention rather than as normal wastewater background conditions.

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A Prevention-Focused Strategy

Treat the source, not only the symptom

Do not rely only on after-the-fact odour treatment. Operators should not focus solely on removing H_2S with filters after it forms, scavenging it away, or masking it with fragrances. Instead, it is most effective to stop H_2S before it exists by interrupting the bacterial production pathway.

This prevention-focused approach is operationally important because H_2S problems often originate in deposits, FOG layers, and low-oxygen zones. If treatment does not reach those sources, the lift station may continue to generate gas. A better strategy is to improve the biological environment so sulfide-producing activity is reduced or prevented.

Reactive approach – not effective	Prevention-focused approach
Mask odour after release	Reduce biological conditions that create sulfide gas.
Filter gas after formation	Prevent H_2S generation inside wastewater and deposits.
Treat symptoms	Address solids, oxygen availability, and microbial activity.
Temporary relief	Long-term operational improvement.

How DRP Accelerator® Works

Supporting native microbiology with usable oxygen

DRP Accelerator® works by supplying natural bacteria, both anaerobic and aerobic, with a large source of usable oxygen in the form of a large inorganic salt molecule with many oxygen ions attached.

This usable oxygen supply supports native microbiology and accelerates natural bacterial activity. When the bacteria have access to sufficient usable oxygen, they do not need to utilize sulfate as an oxygen source. As a result, no sulfide ion is created, and H_2S does not form through that pathway.

The product is different from bacteria or enzyme products. Its role is to accelerate and support the bacteria already present in the wastewater environment, rather than simply adding another biological product.

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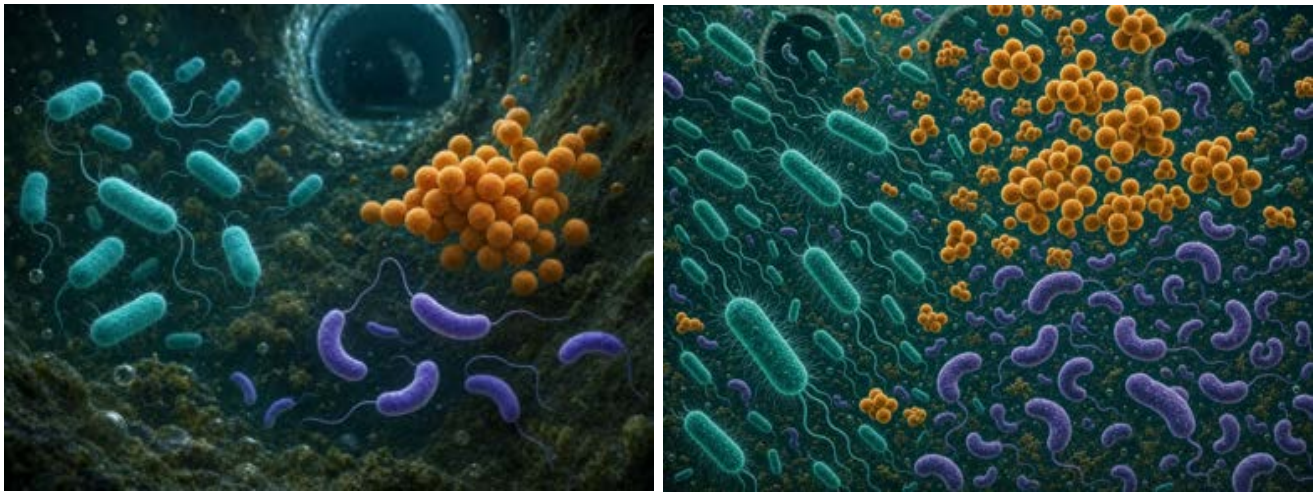
Not only does DRP Accelerator® stop the production of H_2S, it creates the conditions for the bacteria population to multiply up to 40 times.



Without Accelerator .....With Accelerator.

This very large increase in population and in bacteria's health causes the bacteria to break down organics in the system much, much faster. This cleans the pipe walls, bottom deposits and FOG, eliminating areas where H_2S is created.

This is accomplished with the NATURALLY occurring bacteria. Nature spent millions of years developing bacteria to break down waste – we trust nature!

There are no genetic changes. When treatment is stopped, the bacteria will rebalance to their normal conditions and populations.

Operational Benefits and Application Areas

Potential reductions in cost, solids, corrosion, and complaints

There are several operational benefits gained from using DRP Accelerator® to eliminate H_2S. These include reducing organic waste quantities, thinning the waste so pumping is easier, reducing electrical usage by pumps, reducing corrosion-related maintenance costs, improving employee working conditions, reducing public complaints, and potentially improving public health.

DRP Accelerator® helps break down organic buildup where H_2S-producing bacteria hide. As the bacterial population becomes more active, the deposits in pipes and wet wells will be slowly eliminated, and the wastewater can become thinner and easier to handle.

Applications	Potential purpose
Pumping stations	Reduce H_2S formation, odour, corrosion, and solids buildup.
Primary and secondary treatment	Support waste processing and organic reduction.
Digesters and wash-down slurries	Assist with difficult organic loads.
Manholes and sewer pipes	Address deposits and odour-producing zones.

DRP Accelerator® contains no sulfur, nitrogen, potassium, magnesium, phosphates, or other potential ions that can negatively affect sewer systems or plant operations. It is non-hazardous and made from ingredients found and used in the food industry.

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Summary, Next Steps, and References

A practical solution for lift-station decision makers

H_2S is a lift-station concern because it negatively affects safety, odour, corrosion, public relations, and operating cost. H_2S should be addressed at the source, not merely after the odour is noticed. Lift stations should be evaluated for low oxygen, high BOD, FOG, heavy solids, wet-well deposits, pipe-wall buildup, corrosion indicators, and recurring odour complaints.

Key takeaway	Why it matters
H_2S is dangerous	Worker exposure can become serious or fatal at elevated concentrations.[1]
H_2S is destructive	Acid formation can damage concrete, metals, and equipment.
H_2S is costly	Odour complaints, downtime, repairs, and replacement can create major expense.
Prevention is preferable	Stopping formation can be more effective than masking or reacting after gas is present.

For more information, please contact FP Process Corp at 403-879-6174 or at info@fpprocess.ca

References

[1] OSHA, Hydrogen Sulfide: Hazards, https://www.osha.gov/hydrogen-sulfide/hazards

[2] OSHA, Hydrogen Sulfide: Standards, https://www.osha.gov/hydrogen-sulfide/standards

[3] CDC/NIOSH, NIOSH Pocket Guide to Chemical Hazards: Hydrogen sulfide, https://www.cdc.gov/niosh/npg/npgd0337.html

[4] CDC/ATSDR, Medical Management Guidelines for Hydrogen Sulfide, https://wwwn.cdc.gov/TSP/MMG/MMGDetails.aspx?mmgid=385&toxid=67

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