



When Machines Make Decisions: **Emerging Liability Exposures in Chemical Manufacturing**

In chemical plants, autonomous systems are moving beyond monitoring operations and increasingly making the decisions that keep processes running. Tasks that once depended on an experienced operator are now being handled by software that can detect issues, adjust feed rates, and correct process conditions in real time. The benefits are significant: improved consistency, greater efficiency, and reduced waste.

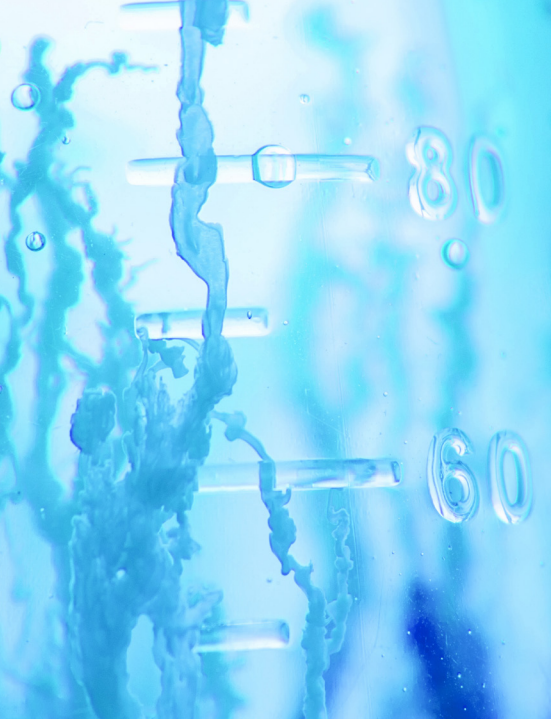
But as decision-making shifts from people to systems, the nature of risk shifts as well. When an autonomous system gets it right, performance improves. When it gets it wrong, the consequences can be severe. What starts as a process upset can quickly become a chemical release, fire, or explosion, affecting workers, operations, and potentially the surrounding community. The question is no longer whether these systems can operate autonomously, but whether organizations fully understand and are prepared for the risks that come with that autonomy.

With AI, Liability Has Shifted

Chemical manufacturers have been slower to adopt AI than most manufacturing sectors. Where plants have applied AI, the implementation tends to sit close to the process itself, in the controls and monitoring that keep a reaction inside its safe envelope.¹ **If an error occurs when an autonomous system is in controls of the process, rooting out the question of liability can be challenging.**

Publicly reported cases involving a sensor that simply failed are relatively uncommon. The more compelling pattern is broader: instrumentation, automated safeguards, alarm systems, monitoring, and control technology may fail mechanically, be poorly designed, become overwhelmed, or provide information that does not translate into effective intervention. The resulting loss is rarely attributable to one device. More often, it reflects a breakdown across technology, system design, operating procedures, and human response.

Consider how that broader pattern could unfold. An optimization system nudges feed rates upward to lift throughput. A sensor drifts out of calibration, so the model reads the reaction as cooler than it is and keeps pushing. Operators trust the automated recommendations because the system has been right for months. A runaway reaction follows, and with it a release. Investigators find no single point of failure. The sensor, the model's assumptions, the operators' reliance, and the vendor's design each contributed something.



When a product liability claim or regulatory action occurs, all parties in the supply chain are still named. With increasing reliance on automated systems, what has changed is the number of decision-makers involved and the difficulty in identifying who, or what, made the decision. In an advanced chemical facility, a single event can involve:

- + The manufacturer
- + The automation or control-system vendor
- + The AI or software provider
- + Sensor, analyzer, or data platform suppliers
- + The systems integrator or maintenance contractor

When a system acts on its own and something goes wrong, fault rarely sits in one place. That fragmentation lengthens root cause analysis, complicates regulatory investigations, and raises defense costs, at the same moment a release or injury may have put the plant under scrutiny.

The Duty of Care is Also Evolving

In most industries, the duty of care around AI is being written by courts after an incident. In chemical manufacturing, much of it is already written into regulation, and that regulation is in motion.

The stable anchor is OSHA's Process Safety Management standard, the framework built to prevent catastrophic releases at plants that handle hazardous chemicals in bulk. Its core elements, process hazard analysis, management of change, mechanical integrity, and incident investigation, are exactly the functions AI now feeds. When an algorithm flags process drift or predicts an equipment failure, that warning lands within a system that regulators already expect manufacturers to manage.²

Less settled is the EPA's Risk Management Program, which governs accidental releases at roughly 11,500 facilities. The 2024 Safer Communities rule strengthened it with safer-technology analysis, third-party audits, and tougher incident investigation. In February 2026, the EPA proposed rolling much of that back to reduce duplication with OSHA's standard. The compliance dates from the 2024 rule remain in force until a final rule replaces them, which leaves manufacturers managing to a standard that may shift under them.³

The shifting rules move the compliance floor, not the liability ceiling. When a system generates a warning and no one acts on it, that record does not disappear because a regulation loosens. And autonomy raises a harder version of the question. In a closed-loop system, the alert, the decision, and the action can all happen before a person ever sees them. After an incident, regulators and courts still look at whether:

- + An alert was generated
- + The alert was reviewed
- + A decision was overridden
- + That decision was documented

When the loop closes without a human in it, those questions do not go away, they get pointed at the design of the system and the choice to let it run unattended. Failure to act on an insight, or to explain why it was ignored, is treated as a potential control failure. The standard is shifting from reactive problem-solving to credible prevention and oversight. It does not remove people from responsibility. It raises the bar on human accountability.

Demonstrating human oversight with clear escalation channels, documented overrides, model governance, and active monitoring is moving from best practice to baseline expectation. In chemical manufacturing, where the record of what a system knew can surface in an OSHA investigation or a civil suit, thorough documentation is a legal defense.

Before Insurance, Read the Contract

When an autonomous system contributes to a loss, many manufacturers assume the question is whether their insurance responds. The more immediate question is often: who was supposed to absorb the risk in the first place. That answer lives in the vendor contract, and it is frequently unfavorable. Software and automation agreements routinely cap the vendor's liability at the value of a year's licensing fees, a number measured in thousands of dollars against where a loss measured in cleanup, injury, and lost production can cost millions of dollars. A manufacturer that has not read those caps closely may be carrying far more of the exposure than it realizes, which may discover the gap only after an incident. **Contract terms decide where risk lands before any policy is triggered, which makes them the first place to look, not the last.**

The AI Insurance Gap

Most commercial manufacturing insurance is still written for human-driven operations. As AI changes the risk, insurers are responding, mostly by narrowing coverage. For chemical manufacturers, the gaps cross several coverage lines.

GENERAL LIABILITY / POLLUTION LIABILITY

When AI drives process control, the algorithm becomes part of how the plant runs. If a decision it makes, or misses, contributes to a release, standard general liability may not respond, because most GL policies carry a pollution exclusion. That gap is structural. Carriers have built combined forms to close it, pairing general liability with site-specific pollution coverage for chemical operations. For a plant where an automated misstep can become an environmental event, the pollution piece is not optional.

PROPERTY AND BUSINESS INTERRUPTION

An error in an autonomous control system can cause physical damage on site, not just a bad batch. A release or incident that halts a covered process can shut production down for months. Property policies written before AI ran the controls may not clearly account for a loss that starts in software.

PRODUCT LIABILITY

Chemical producers carry downstream exposure when an AI-driven production error changes a product's composition. A contaminated or off-spec batch can cause harm far from the plant, and pollution-related product losses are frequently excluded from standard product liability, which is where products-pollution coverage comes in.

WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY

A release or process incident puts workers closest to the harm. Workers' compensation will likely respond, but employer's liability exposure grows when a known system warning went unheeded or safety integration failed.

CYBER

Chemical plants run on connected control systems, which changes what a cyber event can do. If a breach or an act of data poisoning corrupts the models or controls that run a process, it can become a physical release. A single intrusion can trigger property, pollution, and liability claims at once, and cyber coverage written only for data breaches may not reach a loss that ends in the physical plant.

When evaluating AI in chemical production, underwriters are drilling into questions such as:

- + Who owns and controls training data?
- + How often are models reviewed or audited?
- + What happens when systems disagree with human decisions?

Manufacturers who struggle to answer are facing stricter terms, higher retentions, and reduced capacity.

Where to Start: A Practical Checklist

Chemical manufacturers do not need to solve everything at once. But they do need a clear starting point. The following checklist focuses on actions that matter most from a liability and insurance perspective.

GOVERNANCE AND OVERSIGHT

- ☐ Document when and how humans can override automated systems
- ☐ Define escalation protocols for AI-generated alerts
- ☐ Require a written rationale for overrides and ignored alarms
- ☐ Maintain version control and change logs for models in production

VENDOR AND CONTRACT RISK

- ☐ Review AI, software, and automation contracts for liability caps
- ☐ Require vendors and contractors to carry minimum limits and indemnify for control-system and process failures
- ☐ Confirm indemnification language aligns with the real operational risk
- ☐ Understand who bears responsibility for model failure or data issues

INSURANCE COVERAGE ALIGNMENT

- ☐ Map AI use cases against existing policies, not job titles
- ☐ Identify where GL, pollution, property, and cyber policies may stop responding
- ☐ Confirm general liability and pollution coverage work together, not around each other
- ☐ Confirm cyber coverage addresses data integrity and process control, not just breaches

INCIDENT RESPONSE READINESS

- ☐ Integrate AI system data into release, OSHA, and EPA reporting plans
- ☐ Ensure cyber, operations, safety, and legal teams are aligned
- ☐ Test how alerts, logs, and analytics will be handled after an event

UNDERWRITER READINESS

- ☐ Prepare clear explanations of AI governance for renewal meetings
- ☐ Show how models are monitored, reviewed, and corrected
- ☐ Demonstrate that automation decisions are understood, not blind





Final Thought

Automation has modified exposure in chemical manufacturing, and the regulation around it is shifting even as the stakes remain the same. What matters next is making sure contracts, controls, and insurance keep pace with how plants evolve their operations. Aligning a risk strategy with an automation strategy is no longer optional. It is part of running a defensible operation, and in this industry, a safe one.

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