



Australian Government
Department of Agriculture,
Fisheries and Forestry

The future of biosecurity fumigation monitoring: discussion paper



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Acknowledgement of Country

We acknowledge the Traditional Custodians of Australia and their continuing connection to land and sea, waters, environment and community. We pay our respects to the Traditional Custodians of the lands we live and work on, their culture, and their Elders past and present.

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Purpose

This discussion paper has been prepared to facilitate consultation on the development and use of new technologies for the monitoring of fumigations in the biosecurity industry. This paper is about ensuring that regulatory settings deliver outcomes for regulated entities and the beneficiaries of this regulation.

Context

Our land, air, seas and waterways are deeply interwoven with our way of life – our people, environment and economy – which is why our biosecurity system is so valuable. It's what protects us and the communities we live in from the harmful impacts of exotic and established pests, weeds and diseases. Even a single outbreak can have a potentially devastating, costly and far-reaching impacts for Australia.

Australia is free from many harmful pests, weeds and diseases found elsewhere in the world. Our animal, plant, human and environmental health outcomes rely on strong biosecurity – that is, the controls and measures to manage the risks of these pests, weeds and diseases entering, emerging, establishing or spreading within Australia. A strong, resilient and adaptable biosecurity system is critical to ensure we manage increasingly complex risks.

One of the controls Australia relies on to manage biosecurity risk and facilitate international and domestic trade are effective biosecurity fumigations. The number of treatments required to manage biosecurity risk is increasing over time and there are challenges for all stakeholders in gaining assurance that the treatments are being done effectively.

Current situation

The department wants to ensure that there are appropriate controls in place to address the risk of ineffective biosecurity fumigations. One of the controls the department applies is to ensure that critical treatment parameters, including fumigant concentration levels, are monitored throughout the treatment. The department reviews this information to ensure treatments are effectively managing the risks of target biosecurity pests.

A significant non-compliance risk is that information on any of these critical treatment parameters is not reported accurately to the department. The majority of the technology currently available to monitor fumigant concentration levels requires fumigation personnel to observe the concentration reading output from the device and then manually transcribe this information, either onto a paper form or an electronic application.

This level of 'human interface' between the measurement of the concentration readings and what is recorded creates opportunities for inaccuracies, both accidental and deliberate, in what is reported to the department.

Compliance management activities have regularly identified fumigation operators engaging in fraudulent behaviour. The provision of false or misleading information may lead to impressions of effective biosecurity fumigations, when in fact minimum treatment parameters have not been met.

While the department's compliance management approach is effective at identifying these issues, it requires extensive department resourcing and is a control that can only be applied retrospectively.

To mitigate the risk of ineffective treatments, there is a pressing need for improved technology to proactively monitor, validate and report fumigation information. By improving the accuracy and transparency of fumigation data, we can reduce the risk of fraud, enhance compliance and ensure

that biosecurity measures are consistently followed. Embracing innovative solutions such as technological advancements is essential to modernizing biosecurity fumigation practices and securing trade against biosecurity threats.

Beyond the significant risk posed by ineffective treatments, stakeholders are also consistently impacted by these non-compliances. Deliberate non-compliance in the fumigation process can lead to shipments being delayed, requiring re-treatment, export, or even destruction of goods. This not only creates operational costs but also damages the reputation of the impacted businesses and disrupts the supply chain. As the trade environment becomes more complex, stakeholders along the supply chain are seeking greater transparency and reliability in the fumigation process.

There are widespread benefits to companies that use or incentivise the use of these technologies that go beyond reducing biosecurity risk. These include:

- enhanced accuracy and reliability
- minimised liability and risk of non-compliance
- improved operational efficiency (fumigation set ups and reduced treatment failures)
- stronger confidence from customers and regulatory authorities
- better fumigation documentation and traceability
- competitive advantage
- improved regulatory compliance and audit readiness
- enhanced efficiency and predictability of the logistics chain, ensuring smoother, faster processing of shipments
- more secure trade practices
- minimised disruptions.

Proposed options

In the future, the department will explore mandating the use of fumigation monitoring equipment that provides us with confidence that the treatments being conducted for Australian biosecurity purposes are being done according to the minimum treatment parameters.

The department is considering mandating minimum device capabilities as part of setting those requirements. There are numerous devices in development that have a variety of the below features, we are seeking views on the desirability of these features from stakeholders and will use this information in ensuring that our regulatory controls are reasonable.

- 1) Real-time monitoring and data logging
 - a) Continuous real-time data capture: the device is capable of continuously monitoring and recording essential parameters (e.g. temperature, fumigant concentrations and treatment duration) throughout the fumigation process.

- b) Automated data logging: the device automatically logs data at set intervals (e.g. every 15 minutes) without manual input, reducing human error and preventing falsification of records.
 - c) Alerts for key treatment parameters: if parameters fall outside acceptable ranges during the treatment process (e.g. incorrect fumigant concentration or insufficient treatment time), the device triggers immediate alerts for intervention.
- 2) Location of the device during fumigation:
- a) Within the enclosure: the device can be placed inside the fumigation enclosure and remains in situ for the duration of the treatment. This provides the greatest level of assurance that the treatment information that has been captured is authentic, OR
 - b) External to the enclosure: the device sits externally to the enclosure but remains in place to take ongoing monitoring readings, OR
 - c) Portable and mobile: the device is external to the fumigation enclosure and is portable and mobile, taking start and end point concentration readings for multiple treatments (potentially at different locations).
- 3) Secure data storage and transmission
- a) Encrypted data storage: all captured data is securely stored with encryption to prevent unauthorized access or tampering of records.
 - b) Blockchain or digital ledger for traceability: data from the fumigation process is recorded in a tamper-proof digital ledger (e.g. blockchain) that ensures immutability, traceability and accountability. This allows stakeholders to verify that the data has not been altered during or after collection.
 - c) Remote data access and monitoring: authorized stakeholders (such as NPPOs, regulatory bodies or clients) are able to remotely access the data, in real time or after the treatment, via secure channels for verification purposes.
- 4) Non-overridable data capture
- a) Automatic data capture: data is captured automatically and cannot be manually overridden by operators during the fumigation process. The system ensures that only data from the actual treatment conditions are recorded.
 - b) Non-interference in treatment parameters: the device ensures that users cannot override or adjust critical treatment parameters (e.g. temperature, fumigant concentration) that are critical for compliance.
- 5) Reporting and documentation generation
- a) Automated records of fumigation: the device automatically generates detailed records at the end of the fumigation process, showing that all treatment parameters were met as per the relevant treatment methodology. These records are timestamped, signed electronically and stored securely.
 - b) Audit-ready documentation: all data captured by the device is available for audit purposes, with a clear chain of custody for all records, ensuring that they are traceable, verifiable and secure.

- 6) User authentication and access control
 - a) User authentication: the devices have unique access controls which ensure that only authorised personnel can use the device.
 - b) Audit trail for user actions: the devices maintain a detailed log of all user actions with timestamps, to provide a clear record of who completed certain activities or made any interventions made during the fumigation process.
- 7) Integration with other systems
 - a) Interoperability with other monitoring systems: the device is capable of integration with other biosecurity or supply chain monitoring systems, such as NPPOs, or import/export management platforms, for seamless data sharing and real-time reporting.
 - b) GPS and location tracking: integration with GPS allows for location tagging of the fumigation process, ensuring that treatments are conducted at the correct locations and preventing fraudulent claims about where fumigation occurred.
- 8) Mobile and cloud access
 - a) Mobile compatibility: the device is accessible via a mobile application or other portable interfaces, allowing treatment providers to monitor, adjust settings, and verify compliance on-the-go, as well as report directly to central systems.
 - b) Cloud-based storage for data sharing: the system supports cloud-based storage for ease of data sharing and real-time access by authorized stakeholders (treatment providers, NPPOs, importers/exporters) for verification purposes.
- 9) Battery life and power redundancy
 - a) Continuous power supply: the device has a reliable power source (e.g. long-lasting battery) with backup power option in case of power failure. This ensures allows for site conditions to be met whilst ensuring the monitoring process is continuous without interruption.
- 10) Tamper-proof design and integrity
 - a) Tamper-proof design: the device includes built-in tamper proof elements (e.g. Seals, locks, etc) that prevents or identifies efforts to tamper with the device, or allows it to be securely stored on site.
 - b) Secure hardware components: critical components such as sensors, data storage, and communication systems are resistant to tampering.

Make a submission

We invite industry, business and the community to contribute suggestions for the future of biosecurity fumigation technology.

We welcome submissions on any element touched on by this paper or related to this issue but particularly encourage responses on:

- Are there features that we haven't captured that you believe would be useful and provide additional assurance?
- Are you aware of devices that currently exist or are in development that satisfy all, of some, of the features outlined above?
- What do you consider are the significant drawbacks, if any, of using technology that satisfies the above features?
- What is an acceptable timeframe for the department mandating this change? 3 years, 5 years, 10 years?
- Is there anything the department can do to incentivise voluntary uptake of this technology prior to it becoming mandatory? Reduced intervention at the border? Reduced audit frequency? A public facing system for treatment providers where providers that use this technology are promoted?

Have your say

- We encourage stakeholders to contribute to the discussion through the Have Your Say survey which is now live.
- Proposed options raised as part of this discussion paper and in the survey are intended as a guide. Respondents are welcome to provide more general comments, or perspectives.
- The survey closes on **2 June 2025**.

Join the conversation. Go to <https://haveyoursay.agriculture.gov.au/fumigation-technology>.

Next steps

The department will consider all submissions. Your responses and ideas will help them identify ways to improve the way biosecurity fumigations are regulated. The department will prepare a report based on the findings of the survey and discussions during the roadshows.

Contacts

For information about fumigation monitoring technology email offshoretreatments@aff.gov.au.

Glossary

Term	Definition
ALOP	Appropriate level of protection.
Biosecurity	Managing risks to Australia's economy, environment and community of pests and diseases entering, emerging, establishing or spreading in Australia.
Concentration	The amount of fumigant present at a certain point in the fumigation enclosure.
Enclosure	Any gas-tight space intended to contain sufficient concentrations of methyl bromide for a period of time. Common examples of fumigation enclosures used for QPS fumigations are (but not limited to) un-sheeted sea containers, semi-permanent or permanent structures, sheeted enclosures, vessel holds, silos and bunkers.
Fumigant	A chemical, which at a particular temperature and pressure can exist in a gaseous state in sufficient concentration and for sufficient time to be lethal to insects and other pests.
Fumigation documentation	Documents and records associated with particular fumigations.
Goods	Goods includes an animal, a plant, a sample or specimen, a pest, mail or any other article, substance or thing (including, but not limited to, any kind of moveable property).
Pest	Any animal, plant or other organism that may pose a threat to the community or the natural environment.
Quarantine and Pre-shipment (QPS)	<p>1) 'Quarantine applications', with respect to fumigations, are treatments to prevent the introduction, establishment and/or spread of quarantine pests (including diseases), or to ensure their official control, where:</p> <p>a) Official control is that performed by, or authorised by, a national plant, animal or environmental protection or health authority.</p> <p>b) Quarantine pests are pests of potential importance to the areas endangered thereby and not yet present there, or present but not widely distributed and being officially controlled.</p> <p>2) 'Pre-shipment applications' are those non-quarantine applications applied within 21 days prior to export to meet the official requirements of the importing country or existing official requirements of the exporting country.</p>
Record of fumigation	An official document or electronic record that records the information of the treatment to demonstrate the fumigation complied with requirements.
Regulation	A rule or order, as for conduct, prescribed by authority; a governing direction or law.
Regulatory authority	The government department, ministry or agency responsible for animal and plant biosecurity in the importing or exporting jurisdiction.
Treatment provider	An entity or company that is responsible for the effective conduct of a QPS treatment.