

Why Your Wildfire Risk Data Cannot Be Audited — And What Auditable Means

Cryptographic Fuel Intelligence (CFI) — Executive White Paper, Public Cut

An executive briefing on the auditability gap, CFI category requirements, and how GFMS-1.0, PlotSeal, and RiskWise relate

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Executive Abstract

The wildfire risk data many organizations rely on today — satellite imagery, regional fuel models, analog field surveys — often cannot be independently audited. It frequently cannot be traced to the moment it was measured, the observer who measured it, or an instrument state that survives third-party challenge. If a regulator, underwriter, or opposing counsel asks whether fuel data has been modified since collection, many operators cannot answer with cryptographic proof.

This is not only a data-quality concern. In post-fire rate cases, wildfire mitigation plan (WMP) audits, and infrastructure insurance renewals, fuel data is increasingly treated as primary evidence. Operators who can produce a **ground-measured, cryptographically sealed, observer-attributed** fuel record stand in a different evidentiary position than those who cannot.

Cryptographic Fuel Intelligence (CFI) is an enterprise technology **category** — not a product SKU and not “the open standard.” CFI defines the properties wildfire fuel data must satisfy to be independently auditable: physical ground measurement, cryptographic sealing at capture, and verifiable observer custody. **GFMS-1.0** is the open **standard**. **PlotSeal** names the **registry / system of record** concept. **RiskWise** is a **commercial vehicle** that may deliver CFI-conformant field programs; it is not the category and not the standard.

*This Public executive white paper teaches the auditability problem and category requirements at executive length. It does **not** disclose proprietary collection engines, registry internals, trade-secret thresholds, pricing, or go-to-market programs. Soft next step: evaluate current fuel layers against CFI properties, then read GFMS-1.0 (Public cut).*

1. Problem — Your Wildfire Risk Data Often Cannot Be Audited

Your wildfire consultant may have given you a fuel map. Your internal team may have run it through a fire behavior model. The output may be operationally useful. That is not the problem. The problem is what happens when someone asks you to **prove** it.

- When an insurer asks who measured the fuel load at a plot, with what instrument, when, and whether the reading has been altered — many industry-standard products cannot answer in a verifiable form.
- When a utility commission asks whether fuel records reflect conditions at the time of a fire — operators can often produce a map, but not prove when measurements were taken.
- When opposing counsel asks whether fuel data might have been updated after a fire — there is frequently no cryptographic answer and no ledger proving the record was sealed before the event.

Claim (problem thesis): This is an **auditability gap** — primarily a **provenance** problem, not merely a data-quality problem. Accuracy and good faith cannot be proven from the data itself unless the record carries collection-time integrity and custody.

***Illustration (non-normative):** A high-resolution satellite fuel layer can be valuable for planning context. Resolution alone does not imply physical sub-canopy fuel mass was weighed on the ground, sealed at capture, or bound to an attributable observer.*

1.1 Why this matters now

Regulatory escalation. WMP and related processes increasingly expect documented fuel records. Vegetation standards requiring time/location inspection records are difficult to satisfy at plot level with satellite-derived maps alone. Documented fuel management is becoming a baseline expectation in more jurisdictions.

Insurance market pressure. Commercial wildfire liability coverage has tightened since 2020. Underwriters increasingly ask whether fuel records are “defensible” — language that implies reproducibility under audit. A sealed, timestamped, custody-bound record presents a different risk profile than an unverifiable composite.

Litigation exposure. Post-fire utility liability litigation treats fuel management records as core evidence. Illustrative context (non-normative): events such as the Marshall Fire (Colorado, December 2021) and the Dixie Fire (California, 2021) generated litigation in which fuel management practices and records were central. In discovery, the question is not only *what did you know* but *what can*

you prove you knew, and when.

2. Category Requirements — What “Auditable” Means (CFI)

Cryptographic Fuel Intelligence (CFI) is a **category** specification that defines what wildfire fuel data must satisfy to be independently auditable at executive decision level. Three requirements define CFI-class properties:

#	Requirement	Executive meaning
1	Physical ground measurement	CFI-class data originates from plot-level physical measurement by a human observer with a calibrated instrument class. Remote sensing and modeled estimates may provide context; they are not substitutes for the sealed physical anchor.
2	Sealed at capture	The measurement is cryptographically sealed on the field device at capture — before network transmission where connectivity is absent — using NIST-approved digests over a canonical payload. Any later change produces a detectable hash mismatch.
3	Observer chain of custody	Every sealed record includes attributable observer identity (or authorized role) and instrument/method context in the sealed payload. Custody cannot be added, removed, or changed without breaking the seal.

Naming lock: CFI is a **category**. It is **not** “the emerging standard.” The open standard in this stack is **GFMS-1.0**.

*Softened comparative note (teach, don’t sell): Many current satellite products, aerial surveys, and analog field-note programs are valuable for planning and situational awareness. They typically do **not**, by themselves, satisfy all three CFI properties at once. That is a category boundary — not a claim that every non-CFI product is unfit for every use.*

Practical test (illustration): Take a current fuel layer to an independent SHA-256 (and, where dual-digest is claimed, SHA3-256) verification workflow and ask whether you can prove that no sealed field has changed since measurement, and that observer custody is bound into that seal. If you cannot, the layer is not CFI-class — regardless of spatial resolution or model sophistication.



Figure 1 — Three CFI executive requirements. Illustration (non-normative).

3. Evaluation Criteria — Informative RFP Lens (Not a Product Scorecard)

The following matrix is an **informative** executive lens for evaluating wildfire fuel data against properties that determine regulatory, insurance, and litigation readiness. It is **not** a vendor ranking or a claim that any commercial vehicle scores a fixed total.

Table 1 — Evaluation criteria (Illustration / informative)

Criterion	What it tests	Typical legacy posture (illustration)	CFI-class posture
C1 Ground-truth	Traceable to physical measurement at a specific plot?	Often weak / absent for remote-only layers	Required
C2 Observer custody	Who / what / where / when attributable?	Partial at best (analog notes)	Required
C3 Tamper evidence	Post-collection change independently detectable?	Often absent	Required (collection-time digests)
C4 Interchange	Docket / third-party readable without proprietary lock-in?	Mixed; vendor-locked formats common	Required via open interface (e.g., GFMS-1.0)
C5 Plot precision	Fine cell (e.g., ~30×30 m) vs. coarse regional average?	Mixed	Expected for CFI-class ground programs
C6 Litigation readiness	Authenticated documentary evidence with verifiable custody?	Often challenged on authentication	Strengthened when seals + custody intact

Notes (claim labeling): “Typical legacy posture” is an **illustration** of structural gaps common to satellite NDVI composites, airborne LiDAR-derived estimates, and analog field-note programs — not a score of every commercial offering. Gaps on C1, C3, and C6 are often **structural** (different evidence class), not remediable by resolution upgrades alone. Commercial vehicles — including RiskWise — are evaluated separately after category properties are clear.

4. How CFI Maps to GFMS-1.0, PlotSeal, and RiskWise

Name	Role	Public classification
CFI	Category / discipline boundary	This executive WP + CFI Doctrine (HPS-09-CFI-01-PUB)
GFMS-1.0	Open interface standard	Technical Public open standard (HPS-09-MAP-01)
PlotSeal	Registry / system of record concept	Named SoR; implementation internals not public
RiskWise	Commercial vehicle for CFI-conformant programs	Commercial packaging (not category; not standard)

4.1 Open vs. proprietary boundary (public-safe)

- **Open (interface):** Representation rules, basis taxonomy (Measured / Modelled / Grounded), canonicalization and dual-digest structure as published in GFMS-1.0, spatial support rules, conformance checklist.
- **Not disclosed here:** Proprietary field-collection engines, registry architecture, device-binding or key-management internals, commercial scoring or exposure engines, program pricing, and GTM playbooks.

Allowed public phrase: Proprietary field-collection protocols may produce GFMS-1.0-conformant payloads; they are not required for external conformance.

4.2 Executive mapping — what a CFI-conformant commercial program typically produces

- **Field program** — GIS pre-plot against an open grid/cell scheme; calibrated instruments; registered observer identity and instrument state; on-device sealing at observation (including offline capture with later sync).
- **Sealed ground record** — physical measurements as foundation; optional derived classification and risk/exposure overlays **traceable to sealed measurements**; export in GFMS-1.0 interchange format readable without proprietary lock-in.
- **Registry / SoR extract** — hash ledger / seal extract enabling independent offline verification of integrity and custody for the engagement’s date range.

RiskWise (commercial vehicle — context only): RiskWise, developed by High Plains Shield, LLC, is one commercial vehicle that may operationalize CFI-conformant workflows and deliver a sealed **Ground Record** package suitable for WMP documentation, insurance files, and discovery readiness. Mention here is **implementation context**, not the thesis. Category membership does not require exclusive use of any one vendor.

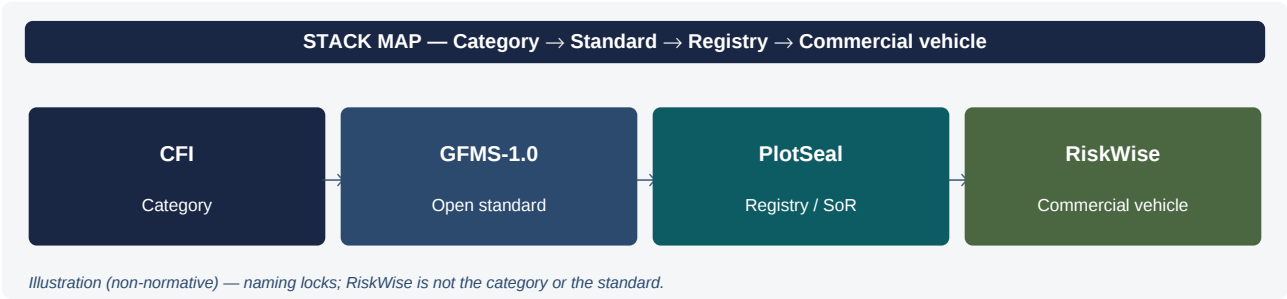


Figure 2 — Stack map: CFI → GFMS-1.0 → PlotSeal → RiskWise. Illustration (non-normative).

5. Organizational Implications (Executive)

5.1 Regulatory affairs & WMP compliance

A GFMS-1.0-formatted fuel record with sealed custody is designed to survive documentary challenge better than an unverifiable map. **Claim:** this is the difference between a planning document and regulatory evidence. **Limitation:** no document guarantees acceptance in every jurisdiction.

5.2 Insurance & underwriting

Underwriters increasingly ask *when* the assessment occurred, *who* conducted it, and *how* pre-event conditions are proven. Sealed timestamps and observer custody answer those questions in a form that can be independently checked.

5.3 Legal & litigation readiness

In discovery, a sealed ground record with an offline-verifiable digest ledger strengthens the authentication posture of fuel-management evidence. Disclosure packages can include sealed exports, ledger extracts, observer enrollment context, and instrument calibration records — without relying solely on expert narrative.

5.4 Lender & investor reporting

A machine-readable GFMS-1.0 export with sealed provenance supports climate-risk documentation expectations and lender covenants without manual re-keying of fuel assumptions.

6. Limitations — What This Document Is Not

This Public cut:

- **Is not** an open standard (see GFMS-1.0).
- **Is not** a product datasheet, SKU list, pricing sheet, or sales proposal.
- **Is not** a disclosure of proprietary field-collection protocols, PlotSeal implementation architecture, key-management, device attestation, commercial scoring/exposure engines, or trade-secret thresholds.
- **Is not** a go-to-market program plan or competitive win/loss playbook.
- **Does not** claim that every remote-sensing or aerial product is unfit for all uses; it claims those approaches alone typically do not satisfy all CFI properties where physical, sealed, custody-bound fuel mass is decision-critical.
- **Does not** guarantee regulatory, insurer, or court acceptance in any specific matter.
- **Does not** overwrite the internal Final Cut master (HPS-09-WPE-01 TM Final Cut).
- **Does not** reopen locked sibling Public cuts (HPS-09-CFI-01-PUB; HPS-09-MAP-01 Public).

Quantitative performance, timeline, or cost claims for any commercial engagement are **out of scope** here and belong in scoped proposals — labeled separately as claim, requirement, or illustration.

7. Glossary

Term	Public meaning
CFI	Enterprise technology category for physical, cryptographically proven fuel intelligence. Not “the standard.”
GFMS-1.0	Open interface standard for representation, spatial support, uncertainty, and cryptographic provenance of physical fuel data.
Basis	Mandatory tag: Measured / Modelled / Grounded.
Dual-hash / dual-digest	Concurrent SHA-256 and SHA3-256 digests over a canonical payload.
Observer custody	Attributable chain binding observer (or role), place, time, method class, and evidence through the registry.
PlotSeal	Registry / system of record concept for sealed fuel records. Not “Wildfire Data Center.” Internals not public.
RiskWise	Commercial vehicle that may implement CFI-conformant workflows. Not the category; not the standard.
Ground Record	Executive term for a sealed, custody-bound package of field measurements and interchange exports.
Offline verification	Ability to check digests without proprietary API authentication or vendor intervention.
WMP	Wildfire Mitigation Plan (and related regulatory documentation processes).

8. Soft Next Step (Teach, Don’t Sell)

- Inventory current fuel layers against the three CFI properties (physical ground measurement · sealed at capture · observer custody).
- Read **GFMS-1.0** (Public cut) — Document ID HPS-09-MAP-01 — for normative interface requirements.
- Read **CFI Doctrine** (Public cut) — Document ID HPS-09-CFI-01-PUB — for the full category essay.
- Contact High Plains Shield, LLC at info@highplainshield.com for standards clarification or conformant-implementation questions — not a product hard sell.

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Contact	info@highplainshield.com

Revision History

Version	Effective	Summary / Gates
TM Final Cut	prior	Internal executive white paper (master retained; not overwritten). Prior packaging included commercial program/pricing and personal byline — not public.

Version	Effective	Summary / Gates
Public v1.0	2026-09-24	Parallel Public cut: High Plains Shield, LLC sole authorship; face block; Classification Public; F3 spine; naming locks; absolute "no product meets..." softened; pricing/GTM/program hard-sell and founder byline scrubbed; Level 3–4 internals absent; Figures 1–2 visual proof; Limitations + Glossary; soft CTA; clean Markdown → PDF. Author → Technical Review → Publication Review → Release recorded under High Plains Shield, LLC process.

Pre-Publish Checklist (Hard Gate) — Recorded Pass

- Format F3; exec abstract · problem · category/requirements · GFMS/PlotSeal/RiskWise mapping · limitations · glossary · soft CTA
- Author = High Plains Shield, LLC everywhere (incl. metadata)
- Face block complete (Document ID · Version · Effective · Supersedes · Classification · Author)
- Naming locks: CFI=category · GFMS-1.0=standard · RiskWise=commercial · PlotSeal=registry/SoR · restricted method codes absent
- Claims vs illustrations labeled; Limitations + Glossary present
- IP gate cleared: FMES/HPFS/Method 1.1/Structural MVE/PlotSeal implementation/trade secrets/GTM-pricing absent; absolute claims softened
- Visual proof: Figure 1 (three requirements) + Figure 2 (stack map)
- Production clean from Markdown (no DOCX artifacts); Final Cut master not overwritten
- Technical Review + Publication Review recorded (HPS process); No Netlify (held to T19)
- Teach-don't-sell tone verified; T04 Doctrine not reopened

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