

SAMPLE DOCUMENT

# Mining Compliance Audit Pack

**ISO 55001 · NI 43-101 · CSRD Scope 1 · Chain-of-Custody**

This document is a representative sample of the Struktive Mining Compliance Audit Pack. It demonstrates the structure, content, and chain-of-custody metadata produced for a normalised mining equipment register. All asset data is illustrative.

Client / Site	Pilbara Iron Ore Operations — Brockman 4 Mine Site
Register Name	Brockman4_AssetRegister_2024Q4_v3.csv
Total Records	100 assets processed
Prepared By	Struktive Normalisation Engine v2.4.1
Prepared For	Asset Management Team / Qualified Person Review
Report Date	23 April 2026
Struktive Job ID	JOB-2026-04-23-BRK4-001
Retention Period	12 months from processing date

ISO 55001	NI 43-101	CSRD Scope 1	JORC Code	ISO 14224:2016
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# 1. Chain-of-Custody Attestation

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The following metadata provides a tamper-evident record of the normalisation process. The SHA-256 hash of the source file is computed at upload and stored immutably. Any modification to the source file after upload will produce a different hash, invalidating this attestation.

Source File Name	Brockman4_AssetRegister_2024Q4_v3.csv
Source File Hash (SHA-256)	a3f8c2d1e9b74056f2a1c8d3e5f9b2a7c4d6e8f0a1b2c3d4e5f6a7b8c9d0e1f2
File Size	48,392 bytes
Upload Timestamp (UTC)	2026-04-23T08:14:32Z
Processing Completed (UTC)	2026-04-23T08:15:01Z
Processing Duration	29 seconds
Normaliser Engine Version	Struktive v2.4.1
Pipeline Build Hash	b7e3a1f2c9d4e5b6a7c8d9e0f1a2b3c4
Job ID	JOB-2026-04-23-BRK4-001
Verification URL	<a href="https://struktive.io/verify/JOB-2026-04-23-BRK4-001">struktive.io/verify/JOB-2026-04-23-BRK4-001</a>
Records In	100
Records Out (passed)	87
Records Flagged for Review	13
Duplicate Groups Detected	4

## Sign-Off Block

Role	Name	Signature	Date
Prepared By	Struktive Engine v2.4.1	— automated —	23 Apr 2026
Reviewed By	_____	_____	_____
Approved By (QP)	_____	_____	_____

## 2. Processing Summary

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<b>87%</b> <b>Import Ready</b>	<b>83</b> <b>Avg Quality Score</b>	<b>21</b> <b>Categories Mapped</b>	<b>96%</b> <b>Vendors Resolved</b>
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### Score Distribution

Score Band	Record Count	% of Total	Status
90–100 (Excellent)	31	31%	Import Ready
70–89 (Good)	56	56%	Import Ready
50–69 (Fair)	9	9%	Review Recommended
30–49 (Poor)	3	3%	Manual Correction Required
0–29 (Critical)	1	1%	Do Not Import

### Top Issues Detected

Issue Type	Records Affected	Severity
Missing or incomplete location hierarchy	13	Medium
Vendor name not resolved to canonical form	4	Medium
Serial number placeholder (TBD / N/A)	3	High
Equipment category not assigned	2	High
Duplicate serial number detected	4 (2 groups)	High
Status value non-standard	6	Low

### 3. ISO 55001 Asset Management Compliance

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ISO 55001:2014 requires organisations to maintain an asset register with sufficient information to support asset management decision-making. The following table maps Struktive output fields to the relevant ISO 55001 clauses.

ISO 55001 Clause	Requirement	Struktive Field	Status
6.2.1	Asset identification	asset_id, description_normalised	PASS
6.2.2	Asset classification	category_normalised (21 classes)	PASS
7.5.3	Asset location	location_site / area / unit / tag	PASS
8.1	Operational planning — condition	status_normalised	PASS
9.1	Performance monitoring — manufacturer	manufacturer_canonical	PASS
9.1	Performance monitoring — model	model_normalised	PASS
9.1	Traceability — serial number	serial_number (validated)	PARTIAL
10.1	Nonconformity — duplicate detection	duplicate_flag, duplicate_group_id	PASS
10.3	Continual improvement — quality score	quality_score (0–100)	PASS

PARTIAL — 3 records have serial number placeholders (TBD / N/A). These have been flagged in the Exceptions Log (Section 6) and require manual correction before ISO 55001 audit submission.

## 4. NI 43-101 Qualified Person Equipment Schedule

National Instrument 43-101 (Standards of Disclosure for Mineral Projects) requires a Qualified Person to certify the technical content of a mineral project disclosure. The equipment schedule below is produced in the 18-column NI 43-101 format and is suitable for inclusion in a Technical Report.

Mineral Project	Brockman 4 Iron Ore Project, Pilbara, Western Australia
Issuer	Pilbara Iron Ore Operations Pty Ltd
NI 43-101 Report Title	Technical Report on the Brockman 4 Iron Ore Project
Effective Date	23 April 2026
Qualified Person	_____ (P.Eng. / CP(Mining))
QP Signature Date	_____
Equipment Schedule Version	v1.0 — Struktive JOB-2026-04-23-BRK4-001

### Equipment Schedule — Extract (first 10 records)

Asset ID	Description	Manufacturer	Model	Category	ISO 14224 Class	Location	Status	Serial No.
EQ-001	CAT 793F Haul Truck	Caterpillar	793F	Haul Truck	MINING-HT	Open Pit / L3 / Zone A	Active	CAT793F-001
EQ-004	P&H 4100XPC Electric Shovel	Komatsu (P&H)	4100XPC	Electric Shovel	MINING-ES	Open Pit / Bench 15	Active	PH4100-0012
EQ-006	Sandvik DD421 Drill Rig	Sandvik	DD421	Drill Rig	MINING-DR	UG / L5 / Heading 3	Active	SAND-DD421-019
EQ-017	Metso HP500 Cone Crusher	Metso Outotec	HP500	Crusher	MINING-CR	Plant / Crushing Circuit	Active	MET-HP500-003
EQ-033	Grundfos SP250-8 Pump	Grundfos	SP250-8	Dewatering Pump	MINING-PU	UG / Pump Station L5	Active	GRU-SP250-009
EQ-051	ABB ACS880 VSD 315kW	ABB	ACS880-01	Variable Speed Drive	MINING-EL	Plant / Electrical Room 2	Active	ABB-ACS880-007
EQ-065	Outotec VSF X-50 Flotation Cell	Outotec	VSF X-50	Flotation Cell	MINING-FC	Plant / Primary Flotation	Active	OUT-VSFX50-004
EQ-077	ABB/Howden AF-1800 Axial Fan	Howden	AF-1800	Axial Fan	MINING-VN	UG / Main Vent Shaft	Active	HOW-AF1800-001
EQ-079	CAT 3512C Generator 1750kVA	Caterpillar	3512C	Diesel Generator	MINING-GN	Surface / Power Station	Active	CAT-3512C-001
EQ-097	Modular Mining DISPATCH 6.0	Modular Mining	DISPATCH 6.0	Fleet Mgmt System	MINING-FMS	Surface / Control Room	Active	MOD-DISP6-001

Full 100-row NI 43-101 QP Schedule available as separate XLSX export from Struktive.

## 5. ISO 14224:2016 Equipment Classification

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ISO 14224:2016 (Petroleum, petrochemical and natural gas industries — Collection and exchange of reliability and maintenance data for equipment) provides the international standard taxonomy for equipment classification. Strukture maps mining equipment to the nearest ISO 14224 class code, producing a conformance rate for this register.

ISO 14224 Conformance Rate	78% (78 of 100 records)
Full Conformance (standard class code)	61 records
MINING-EXT (mining-specific extension class)	17 records
Unclassified	22 records
Standard Citation	ISO 14224:2016 — Fourth Edition, 2016-11-01

### Class Code Distribution

ISO 14224 Class Code	Class Name	Record Count	Conformance
MINING-HT	Haul Truck	14	MINING-EXT
MINING-ES	Electric Shovel / Excavator	11	MINING-EXT
PUMP	Pump (centrifugal / submersible)	9	Full
MINING-DR	Drill Rig (surface / underground)	8	MINING-EXT
COMPRESSOR	Compressor (air / gas)	6	Full
ELECTRICAL	Electrical equipment (switchgear / VSD)	12	Full
INSTRUMENT	Instrumentation (transmitters / analysers)	8	Full
MINING-CR	Crusher / Mill	6	MINING-EXT
GENERATOR	Diesel / gas generator set	4	Full
OTHER	Unclassified	22	Unclassified

## 6. CSRD Scope 1 Emissions — Equipment Asset Layer

The Corporate Sustainability Reporting Directive (CSRD) requires large companies to disclose Scope 1 (direct) GHG emissions. For mine operators, the primary Scope 1 sources are mobile combustion (diesel haul trucks, drill rigs, generators) and stationary combustion (processing plant equipment). Struktive extracts the equipment attributes required for Scope 1 calculation from the asset register.

<b>CSRD Standard</b>	ESRS E1 — Climate change (mandatory for large companies from FY2024)
<b>GHG Protocol Reference</b>	GHG Protocol Corporate Standard — Scope 1 (direct emissions)
<b>Emission Sources Identified</b>	Mobile combustion: 47 assets / Stationary combustion: 12 assets
<b>Power Rating Extracted</b>	68 of 100 records (kW / hp / L-hr fields populated)
<b>Payload Capacity Extracted</b>	14 of 100 records (haul trucks — tonnes)
<b>Fuel Type Inferred</b>	Diesel (primary) — 58 assets / Electric — 12 assets / Unknown — 30 assets
<b>CSRD Readiness Score</b>	64% — power ratings and fuel types require supplemental data for 30 assets

### Mobile Combustion Assets — Extract

Asset ID	Description	Category	Power Rating	Fuel Type	Scope 1 Source
EQ-001	CAT 793F Haul Truck	Haul Truck	2,610 kW	Diesel	Mobile combustion
EQ-009	Liebherr T 284 Haul Truck	Haul Truck	2,240 kW	Diesel	Mobile combustion
EQ-012	CAT D11T Dozer	Dozer	634 kW	Diesel	Mobile combustion
EQ-034	Atlas Copco XRVS 1000	Air Compressor	746 kW	Diesel	Stationary combustion
EQ-079	CAT 3512C Generator	Generator	1,305 kW	Diesel	Stationary combustion
EQ-080	Cummins QSK60 Generator	Generator	1,492 kW	Diesel	Stationary combustion

## 7. Vendor Origin & Supply Chain Summary

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The vendor origin summary provides a supply chain transparency view of the asset register. All manufacturer names have been resolved to canonical form against the Struktive vendor library (1,000+ alias variants, 500+ mining OEM variants). Country of origin is assigned at the OEM level.

Canonical Manufacturer	Country of Origin	Record Count	% of Register	Sanctions Check
Caterpillar	United States	18	18%	CLEAR
Sandvik	Sweden	12	12%	CLEAR
Komatsu	Japan	10	10%	CLEAR
ABB	Switzerland	9	9%	CLEAR
Epiroc	Sweden	7	7%	CLEAR
Metso Outotec	Finland	6	6%	CLEAR
Atlas Copco	Sweden	5	5%	CLEAR
FLSmidth	Denmark	4	4%	CLEAR
Grundfos	Denmark	4	4%	CLEAR
Siemens	Germany	4	4%	CLEAR
Other (21 vendors)	Various	21	21%	CLEAR

Vendor resolution rate: 96 of 100 records. 4 records have unresolved manufacturer names and are listed in the Exceptions Log. Sanctions screening performed against OFAC SDN List and UK HM Treasury Consolidated List (as at processing date).

## 8. Exceptions Log

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The following records require manual review or correction before the register is suitable for EAM import or technical report submission. Records are grouped by issue type.

Asset ID	Issue Type	Field Affected	Current Value	Recommended Action
EQ-041	Serial placeholder	serial_number	CAT785C-0067 (INACTIVE)	Verify serial — status INACTIVE, confirm decommission
EQ-060	Missing category	category	(blank)	Assign: Instrumentation (Pressure Transmitter)
EQ-023	Unresolved vendor	manufacturer	XCMG	Confirm: XCMG Construction Machinery Co., Ltd (China)
EQ-024	Unresolved vendor	manufacturer	SANY	Confirm: Sany Heavy Industry Co., Ltd (China)
EQ-047	Out of scope asset	category	Rescue Vehicle	Flag as non-process asset — exclude from EAM import
EQ-048	Out of scope asset	category	Ambulance	Flag as non-process asset — exclude from EAM import
EQ-001/EQ-098	Duplicate group	serial_number	WEN-OBC-001 (on-board computer)	EQ-098 is a sub-component of EQ-001 — link, do not deduplicate
EQ-031/EQ-032	Duplicate group	category	Blasting System	Confirm distinct assets — different OEM and model

## 9. Normalisation Methodology

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The Struktive normalisation pipeline applies the following eight stages to every equipment register. All transformations are logged in the Audit Trail export.

Stage	Name	Description
1	Ingestion	CSV/Excel parsing, encoding detection, header normalisation, schema mapping
2	Sector Detection	Equipment description analysis to identify mining / DC / MRO context
3	Vendor Resolution	Manufacturer alias matching against 1,000+ variant library; canonical name + country of origin
4	Asset Classification	Keyword + model pattern matching to 21 mining equipment categories
5	Location Parsing	Free-text location parsed to 4-level hierarchy: Site / Area / Unit / Tag
6	Quality Scoring	7-component score (0–100): serial, manufacturer, location, category, model, uniqueness, status
7	ISO 14224 Mapping	Equipment mapped to ISO 14224:2016 class codes; conformance rate computed
8	Export Generation	Output packaged to requested format: Maximo / SAP PM / NI 43-101 / Compliance Audit Pack

### Quality Score Components

Component	Max Points	Criteria
Serial Number	20	Present, unique, valid format (min 6 chars, no placeholder)
Manufacturer	20	Resolved to canonical vendor name
Location	15	Parsed to $\geq 3$ levels of hierarchy
Equipment Category	15	Assigned to one of 21 mining categories
Model Number	10	Present and plausible (min 3 chars)
Uniqueness	10	No duplicate serial or IP match detected
Status	10	Valid controlled value: Active / Inactive / Disposed
<b>Total</b>	<b>100</b>	<b>Score <math>\geq 70</math> = Import Ready</b>

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# Struktive

**Clean asset data. EAM ready.**

Struktive normalises equipment registers for mining, data centre, and MRO operations. Upload your register at [struktive.io](https://struktive.io) to receive a compliance audit pack, NI 43-101 QP Schedule, and EAM-ready export in under 90 seconds.

[struktive.io](https://struktive.io) · [hello@struktive.io](mailto:hello@struktive.io)

This sample document was produced on 23 April 2026. All asset data is illustrative. Verify real reports at [struktive.io/verify/](https://struktive.io/verify/)