

MRF Quality Report

s3://talon-storage-private/mrf-feed-uploads/2025-12/2025-12-10_QCP_in-network-rates.json.gz

Size: 66.34 MB • MD5: 263cb43f3f7c28668078468eef9da10f

Payer: **Quality Care Partners** • File Date: **12/9/2025** • Generated: **2026-04-24 20:41 EDT** • Tool Version: **1.0.0** • Elapsed: **459.60s**

74.8

Limited Reliability

Errors: 1 • Warnings: 11 • Info: 3

TOC Plan References

TOC: s3://talon-storage-private/mrf-feed-uploads/2025-12/2025-12_plan_ref_98d7022b7d7165738b14c89261e12b3b_index.json • Talon

Canonical: s3://talon-storage-private/mrf-feed-uploads/2025-12/2025-12-10_QCP_in-network-rates.json.gz

Plan Name	Plan ID	Issuer / Sponsor	Market
QCP	0123456789 (custom)	—	—

CMS Official Schema Validation

PASSED — File conforms to the CMS in-network-rates schema.

Dimension Scores

Dimension	Score	Weight	Findings
Schema Integrity	79.4	30%	4
Provider Mapping	99.9	15%	4
Code Coverage	70.0	15%	2
Pricing Sanity	63.8	40%	5

Schema Integrity — Findings

Score: 79.4

WARNING header_conditional

last_updated_on '12/9/2025' is not a valid YYYY-MM-DD date

WARNING header_conditional

Partial plan fields present — missing: ['plan_market_type']

WARNING rates_without_providers

340256 negotiated_rate entries have neither provider_groups nor provider_references

INFO far_future_expiration

4109093 expiration_dates are more than 3 years in the future

Provider Mapping — Findings

Score: 99.9

WARNING `npi_validity`

0.04% of NPIs failed Luhn checksum validation (2 of 5500)

- 1588679012
 - 1810341789
-

WARNING `ein_validity`

0.31% of EINs failed IRS prefix validation (18 of 5745)

- 281723399
 - 282504837
 - 282884410
 - 283428410
 - 286429330
 - ... and 5 more
-

WARNING `empty_npi_groups`

245 provider groups contain no NPIs

INFO `duplicate_npis`

321 NPIs appear in more than one provider group

Code Coverage — Findings

Score: 70.0

WARNING `billing_code_format`

155537 HCPCS codes do not match expected format

WARNING `duplicate_billing_codes`

14496 billing codes appear in more than one `in_network` item (99.3%)

Pricing Sanity — Findings

Score: 63.8

INFO percentage_rates

493 percentage rates (0.0%) — values represent % of a reference rate, not dollar amounts; excluded from spread analysis

ERROR zero_rates

101757 zero-dollar rates (2.48%) — CMS schema requires negotiated_rate > 0 (exclusiveMinimum)

WARNING rate_spread_by_class

billing_class='institutional' / negotiated_type='fee schedule': P95/P50 spread is 15.0x (threshold: 10x, N=2,089,104 (1,000 sampled), high confidence)

WARNING rate_spread_by_class

billing_class='professional' / negotiated_type='fee schedule': P95/P50 spread is 11.7x (threshold: 5x, N=2,019,490 (1,000 sampled), high confidence)

WARNING per_code_rate_spread

1057 rate contexts have a max/min ratio exceeding the type-specific threshold (20x professional / 50x facility, min 3 occurrences required). Each context is a unique combination of all 10 rate-key dimensions. n= shows how many distinct provider rates exist for that exact context.

Code	Code Type	Neg. Type	Billing Class	Arrangement	Setting	Min	Median	Mean	Max	Ratio	n
Q0249	HCPCS	fee schedule	institutional	ffs	—	\$7.57	\$6572.00	\$4475.03	\$14129.80	1866.8x	221
92953	CPT	fee schedule	institutional	ffs	—	\$0.81	\$1.66	\$409.00	\$1435.83	1772.6x	167
Q0249	HCPCS	fee schedule	professional	ffs	—	\$7.57	\$6572.00	\$3562.92	\$11829.60	1562.9x	218
95004	CPT	fee schedule	institutional	ffs	—	\$3.38	\$6.93	\$638.47	\$2232.34	660.5x	167
95044	CPT	fee schedule	institutional	ffs	—	\$4.66	\$9.55	\$640.02	\$2232.34	479.0x	167
63685	CPT	fee schedule	institutional	ffs	—	\$315.24	\$646.24	\$19383.65	\$66865.00	212.1x	167
33289	CPT	fee schedule	institutional	ffs	—	\$296.20	\$607.21	\$18085.27	\$62377.31	210.6x	167
86905	CPT	fee schedule	institutional	ffs	—	\$3.83	\$7.47	\$227.74	\$789.29	206.1x	167
33231	CPT	fee schedule	institutional	ffs	—	\$360.56	\$739.15	\$20428.82	\$70349.35	195.1x	167
33264	CPT	fee schedule	institutional	ffs	—	\$362.67	\$743.47	\$20431.38	\$70349.35	194.0x	167

Recommended Actions

1. **pricing** zero_rates

P1

101757 zero-dollar rates (2.48%) — CMS schema requires negotiated_rate > 0 (exclusiveMinimum)

2. **provider_mapping** npi_validity

P2

0.04% of NPIs failed Luhn checksum validation (2 of 5500)

3. **provider_mapping** ein_validity

P2

0.31% of EINs failed IRS prefix validation (18 of 5745)

4. **provider_mapping** empty_npi_groups

P2

245 provider groups contain no NPIs

5. **pricing** rate_spread_by_class

P2

billing_class='institutional' / negotiated_type='fee schedule': P95/P50 spread is 15.0x (threshold: 10x, N=2,089,104 (1,000 sampled), high confidence)

6. **pricing** rate_spread_by_class

P2

billing_class='professional' / negotiated_type='fee schedule': P95/P50 spread is 11.7x (threshold: 5x, N=2,019,490 (1,000 sampled), high confidence)

7. **pricing** per_code_rate_spread

P2

1057 rate contexts have a max/min ratio exceeding the type-specific threshold (20x professional / 50x facility, min 3 occurrences required). Each context is a unique combination of all 10 rate-key dimensions. n= shows how many distinct provider rates exist for that exact context.

8. **schema** header_conditional

P2

last_updated_on '12/9/2025' is not a valid YYYY-MM-DD date

9. **schema** header_conditional

P2

Partial plan fields present — missing: [plan_market_type]

10. **schema** rates_without_providers

P2

340256 negotiated_rate entries have neither provider_groups nor provider_references

11. **code_coverage** billing_code_format

P3

155537 HCPCS codes do not match expected format

12. **code_coverage** duplicate_billing_codes

P3

14496 billing codes appear in more than one in_network item (99.3%)

Provider Geographic Coverage

5150 unique NPIs found — 5140 geocoded (100%) — 863 zip codes represented.



Schema Integrity — Metrics

header_missing_fields	
header_conditional_issues	last_updated_on '12/9/2025' is not a valid YYYY-MM-DD date, Partial plan fields present — missing: [plan_market_type]
file_age_days	None
items_total	4106854

items_missing_required_pct	0.0	
items_empty_rates	0	
prices_total	4109093	
prices_missing_required_pct	0.0	
prices_missing_field_breakdown		
prices_missing_service_code	0	
prices_invalid_billing_class	0	
rates_without_providers	340256	
negotiation_arrangements	ffs	4106854
billing_code_types	HCPSC	1216349
	CSTM-ALL	101
	CPT	2890187
	RC	217
expired_prices	0	
invalid_expiration_format	0	

Provider Mapping — Metrics

provider_references_in_file	5745
provider_group_ids_referenced	5745
unresolved_references	0
resolution_rate_pct	100.0
npis_validated	5500
invalid_npi_count	2
npi_validity_rate_pct	99.96
invalid_npi_examples	1588679012, 1810341789
eins_validated	5745
invalid_ein_count	18
ein_validity_rate_pct	99.69
invalid_ein_examples	281723399, 282504837, 282884410, 283428410, 283428410, 283428410, 286429330, 287641240, 287743571, 287841552

empty_npi_groups	245
groups_without_tin	0
npi_in_multiple_groups	321

Code Coverage — Metrics

unique_codes_total	14592	
duplicate_codes	14496	
duplicate_pct	99.34	
by_code_type	HCPCS	5140
	CSTM-ALL	1
	CPT	9404
	RC	47
unknown_code_types		
format_invalid_by_type	HCPCS	155537
codes_not_in_reference	reference_not_loaded	

most_frequent_codes	Type	Code	Occurrences
	HCPCS	E0950	1,791
	HCPCS	E0951	1,791
	HCPCS	E0952	1,791
	HCPCS	E0953	1,791
	HCPCS	E0954	1,791
	HCPCS	E0956	1,791
	HCPCS	E0957	1,791
	HCPCS	E0960	1,791
	HCPCS	E0973	1,791
	HCPCS	E0978	1,791
	HCPCS	E0981	1,791
	HCPCS	E0982	1,791
	HCPCS	E0990	1,791
	HCPCS	E0995	1,791
	HCPCS	E1016	1,791
	HCPCS	E2208	1,791
	HCPCS	E2209	1,791
	HCPCS	E2210	1,791
	HCPCS	E2323	1,791
	HCPCS	E2324	1,791

Pricing Sanity — Metrics

total_prices_checked	4109093
total_rates	4108600
per_diem_rates	0
percentage_rates	493
negative_rates	0
zero_rates	101757
extreme_high_rates	2532
extreme_low_rates	892

rate_distribution	sample_n	4108600
	sample_k	5000
	confidence	high
	p5	4.018000000000001
	p25	53.4498
	p50	260.5573
	p75	1037.0315
	p95	4816.215
	p99	14216.611499999999

by_billing_class	Class / Type	Count	Median	p25	p75	p95	Confidence
	institutional/ fee schedule	2,089,104	398.8	72.1	1420.2	5986.0	high
	professional/ fee schedule	2,019,490	189.0	43.6	694.5	2203.8	high
	institutional/ derived	3	1.0	1.0	1.0	1.0	low
	professional/ derived	3	1.0	1.0	1.0	1.0	low

negotiated_types	fee schedule	4108594
	derived	6

unique_rate_contexts	34352
-----------------------------	-------

rate_key_dimension_validity	invalid_negotiated_type	0
	invalid_negotiated_types_seen	{}
	invalid_setting	0
	invalid_settings_seen	{}
	invalid_severity_of_illness	0
	severity_on_non_apr_drg	0
	institutional_with_service_codes	0
	invalid_service_code_format	0
	billing_code_modifier_too_long	0

Scoring Methodology

Embedded in this report at generation time.

Overall Score

Weighted sum of four structural dimensions, normalized to a 0–100 scale.

Normalized Weights		
	Schema Integrity	30%
	Provider Mapping	15%
	Code Coverage	15%
	Pricing Sanity	40%

Confidence Bands		
	High	≥90
	Usable With Caution	≥75
	Limited Reliability	≥60
	Not Usable	<60

Score Caps		
	Raw Json Errors Only → 74.0	Native JSON syntax errors in the unpatched source file. File must be re-exported by the payer; scoring reflects auto-patched data only.
	Cms Validation Failure Only → 65.0	CMS official schema validator reports the file does not conform to the TIC spec.
	Both Raw Json Errors And Cms Failure → 59.0	Both native JSON syntax errors and CMS schema validation failure present.

Rate Context Key — 14-Tuple Field Coverage

Every rate in a CMS TIC MRF file is described by a 14-field tuple. Fields 1–10 form the rate-context key used to group and compare rates across the system. Fields 11–12 (provider, expiration date) are validated separately and excluded from the grouping key for analytical reasons. Each of the four scoring dimensions validates a distinct slice of this tuple — together they cover all 14 fields.

Field	Validated by
1 billing_code_type	Schema (required field) + Code Coverage (enum + format validation)
2 billing_code_type_version	Schema (required field)
3 billing_code	Schema (required field) + Code Coverage (format, duplicates, reference lookup)
4 billing_code_modifier	Pricing (modifier length, key normalization)
5 service_code	Pricing (POS format, normalization, institutional-class check)
6 negotiated_type	Pricing (CMS TIC enum validation)
7 billing_class	Schema (CMS TIC enum validation) + Pricing (spread thresholds)
8 negotiation_arrangement	Schema (CMS TIC enum validation) + Pricing (FFS vs bundle/capitation gating)
9 severity_of_illness	Pricing (APR-DRG only, valid values 1–4)

Field	Validated by
10 setting	Pricing (CMS TIC enum validation)
11 provider (NPI/EIN)	Provider Mapping (Luhn checksum, IRS prefix, group resolution) — excluded from grouping key
12 expiration_date	Schema (date validity, far-future sanity) — excluded from grouping key
13 additional_generic_notes	not validated (free-text)
14 negotiated_rate	Pricing (negative/zero/extreme-value checks, spread analysis)

- Fields 1–10 are the grouping key. Each unique combination is a distinct rate context — rates with different modifiers, POS codes, or arrangements land in separate buckets and are never compared against each other.
- Provider (field 11) is excluded from the key: the spread check is cross-provider by design. Partitioning by provider produces singleton buckets and eliminates the spread signal.
- Expiration date (field 12) is excluded because it is a contract lifecycle attribute, not a clinical context. Rates for the same service should be comparable regardless of when they expire.
- service_code (field 5) arrays are flattened and normalized before keying: '1' → '01', and a rate with ['11','22'] contributes to both the '11' and '22' buckets so rates are compared apples-to-apples by place of service.

Schema Integrity

Validates required fields, enum values, conditional requirements, and date validity per the CMS TIC in-network-rates schema. Also checks file freshness and expiration date sanity.

Method: Penalty-based deductions from 100, capped per category.

per_missing_required_header_field	5
per_header_conditional_issue	2
freshness_warn	5
freshness_error	10
item_missing_fields_pct	×5 (cap 30)
empty_rates_pct	×0.5 (cap 5)
price_missing_fields_pct	×10 (cap 30)
rates_without_providers_rate	×200 (cap 20)
expired_prices_pct	×0.5 (cap 5)
file freshness warn days	45
file freshness error days	90
expiry far future years	3

Provider Mapping

Verifies that all provider_group_id references in in_network items resolve to an entry in the provider_references array. Validates NPI integrity via Luhn checksum and EIN integrity via IRS-issued 2-digit prefix.

Method: Weighted component sum (not purely penalty-based).

provider_resolution (60%)	$\text{resolution_rate\%} \times 0.60$
npi_validity (30%)	$(100 - \text{invalid_npi_pct} \times 5) \times 0.30$
ein_validity (10%)	$10 - (\text{invalid_ein_pct} \times 0.1)$ [0% invalid → 10 pts, 100% invalid → 0 pts, linear]

Code Coverage

Tracks every (billing_code_type, billing_code) pair and flags unrecognized CMS TIC code types, format violations for CPT/HCCPS/NDC, and duplicates (same code appearing in multiple in_network items).

Method: Penalty-based deductions from 100.

per_unknown_code_type	3 pts each (cap 20)
format_invalid_pct	$\times 0.5$ (cap 10)
duplicate_code_pct	$\times 2$ (cap 20)
codes_not_in_reference_pct	$\times 0.5$ (cap 30) — only when reference set is loaded

Pricing Sanity

Detects invalid rates (negative, zero, extreme-value) and distribution anomalies (per-class P95/P50 spread, per-code max/min ratio, flat-rate distributions). Exact counts are used for all validity checks (negative, zero, extreme, dimension validity). Percentile-based checks (spread, IQR) use reservoir sampling — $k=5\,000$ global, $k=1\,000$ per (billing_class, negotiated_type) bucket — so memory stays bounded on large files. Per-code max/min spread is exact (all rates seen, no sampling).

Method: Penalty-based deductions from 100.

negative_rate_pct	$\times 5$ (cap 20)
zero_rate_pct	$\times 3$ (cap 15)
extreme_rate_pct	$\times 5$ (cap 25) — ffs only
class_spread_excess	$(\text{spread} - \text{threshold}) \times 2$, max across (billing_class, negotiated_type) buckets (cap 15)
per_code_high_spread_count	$\times 0.1$ (cap 15)
invalid_negotiated_type_pct	$\times 3$ (cap 10) — rates silently dropped
invalid_setting_pct	$\times 1$ (cap 5) — silently defaults to wildcard
invalid_severity_pct	$\times 1$ (cap 5) — silently normalised to ''
institutional_with_service_codes_pct	$\times 1$ (cap 5) — extra key variation
invalid_service_code_pct	$\times 2$ (cap 5) — encode raises ValueError
extreme high by billing class	professional: 25000.0, institutional: 2000000.0, both: 2000000.0, default: 500000.0

extreme low	0.01
spread warn p95 over p50 by class	professional: 5, institutional: 10, both: 10, default: 5
per rate context max min ratio	professional_codes: 20, facility_drg_codes: 50
flat rate iqr p75 threshold pct	5.0
flat rate min rates to check	100
spread min n to flag	50
per code min n to flag	3

Dashboard: MRF Identity Key

(ingest-time — not stored in report JSON)

The dashboard assigns a persistent `mrf_key` to each MRF so that all validation runs of the same file are grouped together in the score-history view, even if the payer re-exports the file at a new URL.

Tier 1 — entity + plan_id	Used when both <code>reporting_entity_name</code> and <code>plan_id</code> are present. Key input: <code>plan <entity> <plan_id_type> <plan_id></code> . Stable across monthly re-exports.
Tier 2 — URL hash	Fallback when <code>plan_id</code> is absent. Key input: the raw file location URL/path. Entity name alone is not used — a payer publishes multiple distinct plans under the same entity name and without <code>plan_id</code> they cannot be safely distinguished. A URL change produces a different key.

The key is a 16-character MD5 hex digest of the input string (case-insensitive, whitespace-stripped). **This run:** `mrf_key = c254098866036231 · entity = Quality Care Partners · plan_id = 311435470 (hios) · tier = 1 (entity + plan_id)`

Provider Geographic Coverage

(supplemental — does not affect score)

Geographic analysis is a supplemental feature computed on demand after scoring completes. It does not affect any scoring dimension — it is an observational overlay to assess the breadth and distribution of in-network providers.

NPPES	CMS National Plan and Provider Enumeration System — monthly full-replacement CSV. Maps each NPI to its primary registered ZIP code.
ZCTA centroids	GeoNames US postal code file. Maps each 5-digit ZIP to a (latitude, longitude) centroid for map placement.

Process: Extract all NPIs from the MRF file → resolve each NPI to its primary practice ZIP via NPPES → aggregate provider count per ZIP → map each ZIP to a lat/lon centroid via ZCTA → render as a weighted heatmap (intensity ∝ provider count per ZIP).

Limitations: NPIs absent from NPPES (recently issued, test NPIs, EINs) are excluded and reduce the geocoding match rate. Location reflects the provider's NPPES-registered primary address, not necessarily where they accept this specific plan. Map viewport covers the bounding box of ZIP codes representing 90% of total provider count, dropping sparse geographic outliers.