MRF Quality Report

s3://talon-storage-private/mrf-feed-uploads/2025-11/2025-11-05_QCP_in-network-rates.json.gz

Size: 46.74 MB • MD5: e9cf03a29259158fc7c0fb952aecfda8

Payer: **Quality Care Partners** • File Date: **11/4/2025** • Generated: **2026-04-24 22:40 EDT** • Tool Version: **1.0.0** • Elapsed: **335.20s**

73.9

Limited Reliability

Errors: 1 • Warnings: 12 • Info: 3

TOC Plan References

TOC: s3://talon-storage-private/mrf-feed-uploads/2025-11/2025-11_plan_ref_98d7022b7d7165738b14c89261e12b3b_index.json • Talon

Canonical: s3://talon-storage-private/mrf-feed-uploads/2025-11/2025-11-21_QCP_in-network-rates.json.gz

Mirror: s3://talon-storage-private/mrf-feed-uploads/2025-11/2025-11-21_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	78.9	30%	5
Provider Mapping	99.9	15%	4
Code Coverage	70.0	15%	2
Pricing Sanity	62.0	40%	5

Schema Integrity — Findings

Score: 78.9

WARNING `header_conditional`

last_updated_on '11/4/2025' is not a valid YYYY-MM-DD date

WARNING `header_conditional`

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

WARNING `rates_without_providers`

241287 negotiated_rate entries have neither provider_groups nor provider_references

WARNING `expired_prices`

16475 negotiated_prices have past expiration dates (0.6%)

INFO `far_future_expiration`

2851001 expiration_dates are more than 3 years in the future

Provider Mapping — Findings

Score: 99.9

WARNING `npi_validity`

0.02% of NPIs failed Luhn checksum validation (1 of 4135)

- 1810341789

WARNING `ein_validity`

0.39% of EINs failed IRS prefix validation (17 of 4359)

- 281723399
- 282504837
- 282884410
- 283428410
- 287641240
- *… and 5 more*

WARNING `empty_npi_groups`

224 provider groups contain no NPIs

INFO `duplicate_npis`

291 NPIs appear in more than one provider group

Code Coverage — Findings

Score: 70.0

WARNING `billing_code_format`

2126440 HCPCS codes do not match expected format

WARNING `duplicate_billing_codes`

14699 billing codes appear in more than one in_network item (99.1%)

Pricing Sanity — Findings

Score: 62.0

INFO `percentage_rates`

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

ERROR `zero_rates`

71337 zero-dollar rates (2.49%) — CMS schema requires negotiated_rate > 0 (exclusiveMinimum)

WARNING `rate_spread_by_class`

billing_class='institutional' / negotiated_type='fee schedule': P95/P50 spread is 23.4x (threshold: 10x, N=893,592 (1,000 sampled), high confidence)

WARNING `rate_spread_by_class`

billing_class='professional' / negotiated_type='fee schedule': P95/P50 spread is 11.8x (threshold: 5x, N=1,973,393 (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	$4867.23	$14129.80	**1866.8×**	83
92953	HCPCS	fee schedule	institutional	ffs	—	$0.81	$1.66	$628.53	$1435.83	**1772.6×**	79
Q0249	HCPCS	fee schedule	professional	ffs	—	$7.57	$6572.00	$3562.92	$11829.60	**1562.9×**	218
95004	HCPCS	fee schedule	institutional	ffs	—	$3.38	$6.93	$979.43	$2232.34	**660.5×**	79
95044	HCPCS	fee schedule	institutional	ffs	—	$4.66	$9.55	$980.78	$2232.34	**479.0×**	79
63685	HCPCS	fee schedule	institutional	ffs	—	$315.24	$646.24	$29561.86	$66865.00	**212.1×**	79
33289	HCPCS	fee schedule	institutional	ffs	—	$296.20	$607.21	$27580.03	$62377.31	**210.6×**	79
86905	HCPCS	fee schedule	institutional	ffs	—	$3.83	$7.85	$348.01	$789.29	**206.1×**	79
33231	HCPCS	fee schedule	institutional	ffs	—	$360.56	$739.15	$31132.75	$70349.35	**195.1×**	79
33264	HCPCS	fee schedule	institutional	ffs	—	$362.67	$743.47	$31134.97	$70349.35	**194.0×**	79

Recommended Actions

1. **pricing** `zero_rates` **P1**

71337 zero-dollar rates (2.49%) — CMS schema requires negotiated_rate > 0 (exclusiveMinimum)

2. provider_mapping npi_validity P2

0.02% of NPIs failed Luhn checksum validation (1 of 4135)

3. provider_mapping ein_validity P2

0.39% of EINs failed IRS prefix validation (17 of 4359)

4. provider_mapping empty_npi_groups P2

224 provider groups contain no NPIs

5. pricing rate_spread_by_class P2

billing_class='institutional' / negotiated_type='fee schedule': P95/P50 spread is 23.4x (threshold: 10x, N=893,592 (1,000 sampled), high confidence)

6. pricing rate_spread_by_class P2

billing_class='professional' / negotiated_type='fee schedule': P95/P50 spread is 11.8x (threshold: 5x, N=1,973,393 (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 '11/4/2025' 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

241287 negotiated_rate entries have neither provider_groups nor provider_references

11. schema expired_prices P2

16475 negotiated_prices have past expiration dates (0.6%)

12. code_coverage billing_code_format P3

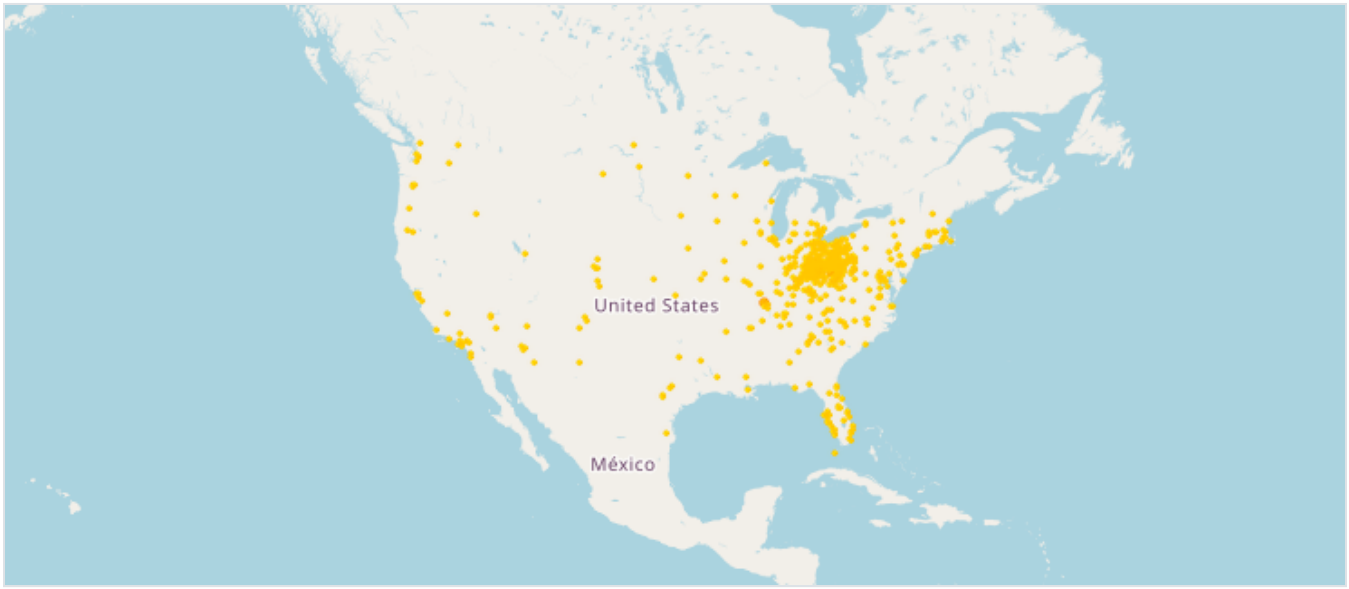
2126440 HCPCS codes do not match expected format

13. code_coverage duplicate_billing_codes P3

14699 billing codes appear in more than one in_network item (99.1%)

Provider Geographic Coverage

3817 unique NPIs found — 3808 geocoded (100%) — 739 zip codes represented.



Schema Integrity — Metrics

header_missing_fields

header_conditional_issues	last_updated_on '11/4/2025' is not a valid YYYY-MM-DD date, Partial plan fields present — missing: ['plan_market_type']
file_age_days	None
items_total	2865237
items_missing_required_pct	0.0
items_empty_rates	0
prices_total	2867476
prices_missing_required_pct	0.0
prices_missing_field_breakdown	
prices_missing_service_code	0
prices_invalid_billing_class	0
rates_without_providers	241287
negotiation_arrangements	**ffs** 2865237
billing_code_types	**CSTM-ALL** 909 **HCPCS** 2864134 **RC** 194
expired_prices	16475
invalid_expiration_format	0

Provider Mapping — Metrics

provider_references_in_file	4359
provider_group_ids_referenced	4359
unresolved_references	0
resolution_rate_pct	100.0
npis_validated	4135
invalid_npi_count	1
npi_validity_rate_pct	99.98
invalid_npi_examples	1810341789
eins_validated	4359
invalid_ein_count	17

ein_validity_rate_pct	99.61
invalid_ein_examples	281723399, 282504837, 282884410, 283428410, 283428410, 283428410, 287641240, 287743571, 287841552, 287924612
empty_npi_groups	224
groups_without_tin	0
npis_in_multiple_groups	291

Code Coverage — Metrics

unique_codes_total	14838	
duplicate_codes	14699	
duplicate_pct	99.06	
by_code_type	**CSTM-ALL**	396
	HCPCS	14395
	RC	47
unknown_code_types		
format_invalid_by_type	**HCPCS**	2126440
codes_not_in_reference	reference_not_loaded	

most_frequent_codes	

Type	Code	Occurrences
HCPCS	E0950	1,260
HCPCS	E0951	1,260
HCPCS	E0952	1,260
HCPCS	E0953	1,260
HCPCS	E0954	1,260
HCPCS	E0956	1,260
HCPCS	E0957	1,260
HCPCS	E0960	1,260
HCPCS	E0973	1,260
HCPCS	E0978	1,260
HCPCS	E0981	1,260
HCPCS	E0982	1,260
HCPCS	E0990	1,260
HCPCS	E0995	1,260
HCPCS	E1016	1,260
HCPCS	E2208	1,260
HCPCS	E2209	1,260
HCPCS	E2210	1,260
HCPCS	E2323	1,260
HCPCS	E2324	1,260

Pricing Sanity — Metrics

total_prices_checked	2867476
total_rates	2866991
per_diem_rates	0
percentage_rates	485
negative_rates	0
zero_rates	71337
extreme_high_rates	2504
extreme_low_rates	628

rate_distribution

sample_n	2866991
sample_k	5000
confidence	high
p5	3.61195
p25	50.7569625
p50	246.92
p75	983.267775
p95	4880.9407
p99	14216.611499999999

by_billing_class

Class / Type	Count	Median	p25	p75	p95	Confidence
institutional/ fee schedule	893,592	507.3	88.1	2148.7	11894.5	high
professional/ fee schedule	1,973,393	208.6	39.9	733.7	2467.2	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	2866985
derived	6

unique_rate_contexts 34141

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%)	`resolution_rate% × 0.60`
npi_validity (30%)	`(100 − invalid_npi_pct × 5) × 0.30`
ein_validity (10%)	`10 − (invalid_ein_pct × 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/HCPCS/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	`× 0.5 (cap 10)`
duplicate_code_pct	`× 2 (cap 20)`
codes_not_in_reference_pct	`× 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	`× 5 (cap 20)`
zero_rate_pct	`× 3 (cap 15)`
extreme_rate_pct	`× 5 (cap 25) — ffs only`
class_spread_excess	`(spread − threshold) × 2, max across (billing_class, negotiated_type) buckets (cap 15)`
per_code_high_spread_count	`× 0.1 (cap 15)`
invalid_negotiated_type_pct	`× 3 (cap 10) — rates silently dropped`
invalid_setting_pct	`× 1 (cap 5) — silently defaults to wildcard`
invalid_severity_pct	`× 1 (cap 5) — silently normalised to ''`
institutional_with_service_codes_pct	`× 1 (cap 5) — extra key variation`
invalid_service_code_pct	`× 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 `reporting_entity_name` and `plan_id` are present. Key input: `plan|<entity>|<plan_id_type>|<plan_id>`. Stable across monthly re-exports.
Tier 2 — URL hash	Fallback when `plan_id` 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 `plan_id` 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.