MRF Quality Report

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

Size: 66.01 MB • MD5: e306e250b8399b2e10dc71ac00eb0799

Payer: **Quality Care Partners** • File Date: **11/20/2025** • Generated: **2026-04-24 22:49 EDT** • Tool Version: **1.0.0** • Elapsed: **452.50s**

74.2

Limited Reliability

Errors: 1 • Warnings: 11 • 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

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	62.2	40%	5

Schema Integrity — Findings

Score: 79.4

WARNING `header_conditional`

last_updated_on '11/20/2025' 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`

4092793 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 5507)

- 1588679012
- 1810341789

WARNING `ein_validity`

0.31% of EINs failed IRS prefix validation (18 of 5736)

- 281723399
- 282504837
- 282884410
- 283428410
- 286429330
- *… and 5 more*

WARNING `empty_npi_groups`

229 provider groups contain no NPIs

INFO `duplicate_npis`

327 NPIs appear in more than one provider group

Code Coverage — Findings

Score: 70.0

WARNING `billing_code_format`

155528 HCPCS codes do not match expected format

WARNING `duplicate_billing_codes`

14702 billing codes appear in more than one in_network item (99.1%)

Pricing Sanity — Findings

Score: 62.2

INFO `percentage_rates`

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

ERROR `zero_rates`

101027 zero-dollar rates (2.47%) — CMS schema requires negotiated_rate > 0 (exclusiveMinimum)

WARNING `rate_spread_by_class`

billing_class='institutional' / negotiated_type='fee schedule': P95/P50 spread is 18.7x (threshold: 10x, N=2,089,081 (1,000 sampled), high confidence)

WARNING `rate_spread_by_class`

billing_class='professional' / negotiated_type='fee schedule': P95/P50 spread is 12.9x (threshold: 5x, N=2,003,214 (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	$3293.76	$4475.03	$14129.80	**1866.8×**	221
92953	CPT	fee schedule	institutional	ffs	—	$0.81	$1.66	$409.00	$1435.83	**1772.6×**	167
Q0249	HCPCS	fee schedule	professional	ffs	—	$7.57	$6572.00	$3562.92	$11829.60	**1562.9×**	218
95004	CPT	fee schedule	institutional	ffs	—	$3.38	$6.93	$638.47	$2232.34	**660.5×**	167
95044	CPT	fee schedule	institutional	ffs	—	$4.66	$9.55	$640.02	$2232.34	**479.0×**	167
63685	CPT	fee schedule	institutional	ffs	—	$315.24	$646.24	$19383.65	$66865.00	**212.1×**	167
33289	CPT	fee schedule	institutional	ffs	—	$296.20	$607.21	$18085.27	$62377.31	**210.6×**	167
86905	CPT	fee schedule	institutional	ffs	—	$3.83	$7.47	$227.74	$789.29	**206.1×**	167
33231	CPT	fee schedule	institutional	ffs	—	$360.56	$739.15	$20428.82	$70349.35	**195.1×**	167
33264	CPT	fee schedule	institutional	ffs	—	$362.67	$743.47	$20431.38	$70349.35	**194.0×**	167

Recommended Actions

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

101027 zero-dollar rates (2.47%) — CMS schema requires negotiated_rate > 0 (exclusiveMinimum)

2. provider_mapping npi_validity P2

0.04% of NPIs failed Luhn checksum validation (2 of 5507)

3. provider_mapping ein_validity P2

0.31% of EINs failed IRS prefix validation (18 of 5736)

4. provider_mapping empty_npi_groups P2

229 provider groups contain no NPIs

5. pricing rate_spread_by_class P2

billing_class='institutional' / negotiated_type='fee schedule': P95/P50 spread is 18.7x (threshold: 10x, N=2,089,081 (1,000 sampled), high confidence)

6. pricing rate_spread_by_class P2

billing_class='professional' / negotiated_type='fee schedule': P95/P50 spread is 12.9x (threshold: 5x, N=2,003,214 (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 '11/20/2025' 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**

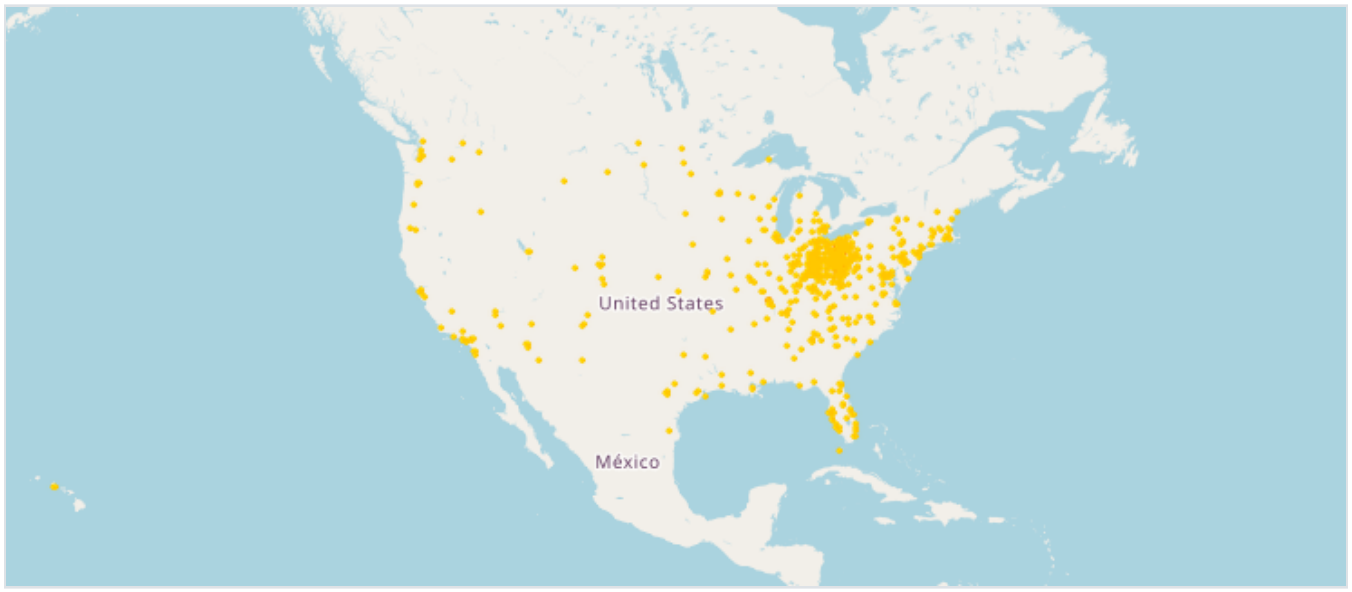
155528 HCPCS codes do not match expected format

12. **code_coverage** `duplicate_billing_codes` **P3**

14702 billing codes appear in more than one in_network item (99.1%)

Provider Geographic Coverage

5151 unique NPIs found — 5141 geocoded (100%) — 864 zip codes represented.



Schema Integrity — Metrics

header_missing_fields	
header_conditional_issues	last_updated_on '11/20/2025' is not a valid YYYY-MM-DD date, Partial plan fields present — missing: ['plan_market_type']
file_age_days	None
items_total	4090554

items_missing_required_pct	0.0
items_empty_rates	0
prices_total	4092793
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: 4090554
billing_code_types	CSTM-ALL: 919 HCPCS: 1208574 CPT: 2880867 RC: 194
expired_prices	0
invalid_expiration_format	0

Provider Mapping — Metrics

provider_references_in_file	5736
provider_group_ids_referenced	5736
unresolved_references	0
resolution_rate_pct	100.0
npis_validated	5507
invalid_npi_count	2
npi_validity_rate_pct	99.96
invalid_npi_examples	1588679012, 1810341789
eins_validated	5736
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	229
groups_without_tin	0
npis_in_multiple_groups	327

Code Coverage — Metrics

unique_codes_total	14838	
duplicate_codes	14702	
duplicate_pct	99.08	
by_code_type	CSTM-ALL	396
	HCPCS	5012
	CPT	9383
	RC	47
unknown_code_types		
format_invalid_by_type	HCPCS	155528
codes_not_in_reference	reference_not_loaded	

most_frequent_codes	

Type	Code	Occurrences
HCPCS	E0950	1,773
HCPCS	E0951	1,773
HCPCS	E0952	1,773
HCPCS	E0953	1,773
HCPCS	E0954	1,773
HCPCS	E0956	1,773
HCPCS	E0957	1,773
HCPCS	E0960	1,773
HCPCS	E0973	1,773
HCPCS	E0978	1,773
HCPCS	E0981	1,773
HCPCS	E0982	1,773
HCPCS	E0990	1,773
HCPCS	E0995	1,773
HCPCS	E1016	1,773
HCPCS	E2208	1,773
HCPCS	E2209	1,773
HCPCS	E2210	1,773
HCPCS	E2323	1,773
HCPCS	E2324	1,773

Pricing Sanity — Metrics

total_prices_checked	4092793
total_rates	4092301
per_diem_rates	0
percentage_rates	492
negative_rates	0
zero_rates	101027
extreme_high_rates	2504
extreme_low_rates	892

rate_distribution

sample_n	4092301
sample_k	5000
confidence	high
p5	4.2546550000000005
p25	52.933825000000006
p50	277.2585
p75	1106.82465
p95	4557.72337500001
p99	14216.611499999999

by_billing_class

Class / Type	Count	Median	p25	p75	p95	Confidence
`institutional/ fee schedule`	2,089,081	406.0	75.2	1438.7	7575.7	high
`professional/ fee schedule`	2,003,214	174.6	38.7	734.3	2259.7	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	4092295
derived	6

unique_rate_contexts 34419

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.