

# MRF Quality Report

s3://talon-storage-private/mrf-feed-uploads/2026-02/2026-02-05\_QCP\_in-network-rates.json.gz

Size: 62.39 MB • MD5: aa30b4b66d382f89e99399c7c3d16d77

Payer: **Quality Care Partners** • File Date: **2/4/2026** • Generated: **2026-04-24 12:37 EDT** • Tool Version: **1.0.0** • Elapsed: **445.10s**

# 75.7

Usable w/ Caution

Errors: 1 • Warnings: 11 • Info: 3

## TOC Plan References

TOC: s3://talon-storage-private/mrf-feed-uploads/2026-02/2026-02\_plan\_ref\_98d7022b7d7165738b14c89261e12b3b\_index.json • Talon

Canonical: s3://talon-storage-private/mrf-feed-uploads/2026-02/2026-02-05\_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	82.7	30%	4
Provider Mapping	99.9	15%	4
Code Coverage	70.0	15%	2
Pricing Sanity	63.5	40%	5

## Schema Integrity — Findings

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Score: 82.7

**WARNING** header\_conditional

last\_updated\_on '2/4/2026' is not a valid YYYY-MM-DD date

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**WARNING** header\_conditional

Partial plan fields present — missing: ['plan\_market\_type']

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**WARNING** rates\_without\_providers

259882 negotiated\_rate entries have neither provider\_groups nor provider\_references

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**INFO** far\_future\_expiration

3920117 expiration\_dates are more than 3 years in the future

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## Provider Mapping — Findings

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Score: 99.9

**WARNING** `npi_validity`

0.02% of NPIs failed Luhn checksum validation (1 of 4445)

- 1588679012
- 

**WARNING** `ein_validity`

0.32% of EINs failed IRS prefix validation (15 of 4704)

- 281723399
  - 282504837
  - 282884410
  - 286429330
  - 287641240
  - ... and 5 more
- 

**WARNING** `empty_npi_groups`

259 provider groups contain no NPIs

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**INFO** `duplicate_npis`

313 NPIs appear in more than one provider group

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# Code Coverage — Findings

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Score: 70.0

**WARNING** `billing_code_format`

146876 HCPCS codes do not match expected format

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**WARNING** `duplicate_billing_codes`

14826 billing codes appear in more than one `in_network` item (99.2%)

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## Pricing Sanity — Findings

Score: 63.5

### INFO `percentage_rates`

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

### ERROR `zero_rates`

78250 zero-dollar rates (2.00%) — CMS schema requires `negotiated_rate > 0` (exclusiveMinimum)

### WARNING `rate_spread_by_class`

billing\_class='institutional' / negotiated\_type='fee schedule': P95/P50 spread is 30.5x (threshold: 10x, N=1,727,709 (1,000 sampled), high confidence)

### WARNING `rate_spread_by_class`

billing\_class='professional' / negotiated\_type='fee schedule': P95/P50 spread is 14.6x (threshold: 5x, N=2,191,896 (1,000 sampled), high confidence)

### WARNING `per_code_rate_spread`

1376 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
A4459	HCPCS	fee schedule	professional	ffs	—	\$0.05	\$184.48	\$179.28	\$240.63	4812.6x	110
Q0249	HCPCS	fee schedule	institutional	ffs	—	\$7.57	\$16.27	\$4702.79	\$14129.80	1866.8x	183
92953	CPT	fee schedule	institutional	ffs	—	\$0.83	\$1.70	\$388.25	\$1446.07	1742.3x	129
Q0249	HCPCS	fee schedule	professional	ffs	—	\$7.57	\$6572.00	\$3584.40	\$11829.60	1562.9x	230
95004	CPT	fee schedule	institutional	ffs	—	\$3.48	\$7.13	\$507.69	\$1878.84	539.9x	129
95044	CPT	fee schedule	institutional	ffs	—	\$4.80	\$9.84	\$509.47	\$1878.84	391.4x	129
33289	CPT	fee schedule	institutional	ffs	—	\$261.77	\$536.63	\$17153.93	\$62756.18	239.7x	129
63685	CPT	fee schedule	institutional	ffs	—	\$298.15	\$611.21	\$18476.60	\$67513.42	226.4x	129
33287	CPT	fee schedule	institutional	ffs	—	\$315.56	\$646.90	\$18500.10	\$67513.42	213.9x	129
33231	CPT	fee schedule	institutional	ffs	—	\$327.65	\$671.68	\$18827.54	\$68675.56	209.6x	129

## Recommended Actions

1. `pricing` `zero_rates`

P1

78250 zero-dollar rates (2.00%) — CMS schema requires `negotiated_rate > 0` (exclusiveMinimum)

2. **provider\_mapping** npi\_validity

P2

0.02% of NPIs failed Luhn checksum validation (1 of 4445)

3. **provider\_mapping** ein\_validity

P2

0.32% of EINs failed IRS prefix validation (15 of 4704)

4. **provider\_mapping** empty\_npi\_groups

P2

259 provider groups contain no NPIs

5. **pricing** rate\_spread\_by\_class

P2

billing\_class='institutional' / negotiated\_type='fee schedule': P95/P50 spread is 30.5x (threshold: 10x, N=1,727,709 (1,000 sampled), high confidence)

6. **pricing** rate\_spread\_by\_class

P2

billing\_class='professional' / negotiated\_type='fee schedule': P95/P50 spread is 14.6x (threshold: 5x, N=2,191,896 (1,000 sampled), high confidence)

7. **pricing** per\_code\_rate\_spread

P2

1376 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 '2/4/2026' 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

259882 negotiated\_rate entries have neither provider\_groups nor provider\_references

11. **code\_coverage** billing\_code\_format

P3

146876 HCPCS codes do not match expected format

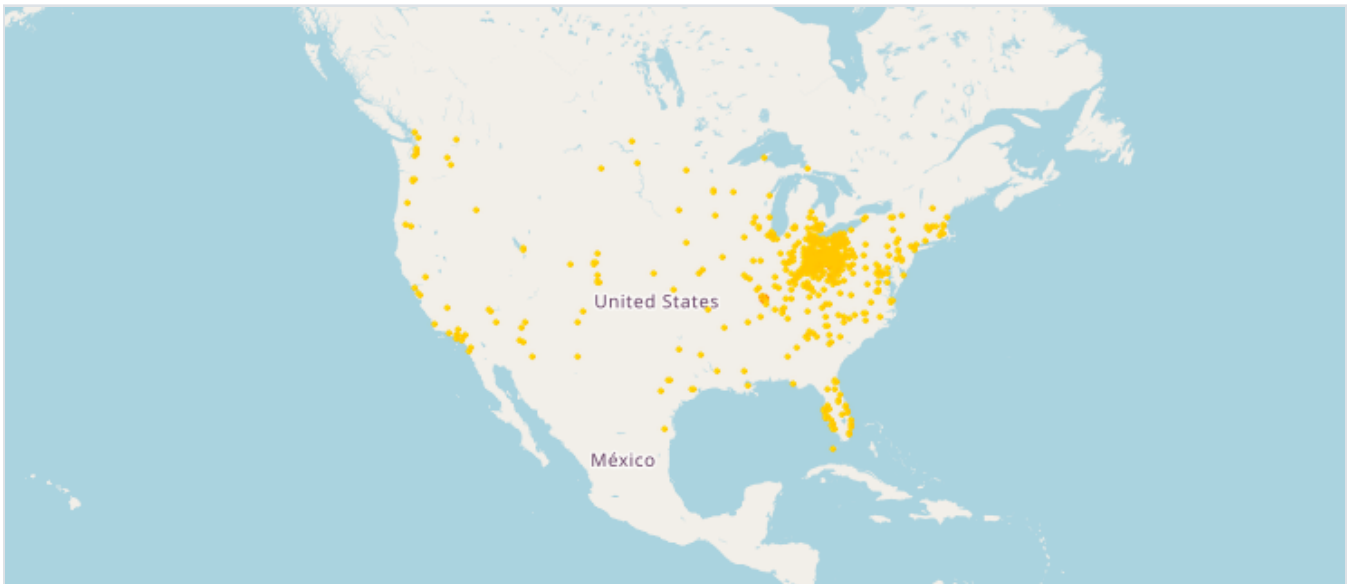
12. **code\_coverage** duplicate\_billing\_codes

P3

14826 billing codes appear in more than one in\_network item (99.2%)

## Provider Geographic Coverage

4105 unique NPIs found — 4098 geocoded (100%) — 772 zip codes represented.



## Schema Integrity — Metrics

header_missing_fields	
header_conditional_issues	last_updated_on '2/4/2026' is not a valid YYYY-MM-DD date, Partial plan fields present — missing: [plan_market_type]
file_age_days	None
items_total	3917855

items_missing_required_pct	0.0	
items_empty_rates	0	
prices_total	3920117	
prices_missing_required_pct	0.0	
prices_missing_field_breakdown		
prices_missing_service_code	0	
prices_invalid_billing_class	0	
rates_without_providers	259882	
negotiation_arrangements	ffs	3917855
billing_code_types	HCPSC	1214895
	CSTM-ALL	114
	CPT	2702574
	RC	272
expired_prices	0	
invalid_expiration_format	0	

## Provider Mapping — Metrics

provider_references_in_file	4704
provider_group_ids_referenced	4704
unresolved_references	0
resolution_rate_pct	100.0
npis_validated	4445
invalid_npi_count	1
npi_validity_rate_pct	99.98
invalid_npi_examples	1588679012
eins_validated	4704
invalid_ein_count	15
ein_validity_rate_pct	99.68
invalid_ein_examples	281723399, 282504837, 282884410, 286429330, 287641240, 287743571, 287841552, 287924612, 290823786, 292667201

empty_npi_groups	259
groups_without_tin	0
npi_in_multiple_groups	313

## Code Coverage — Metrics

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unique_codes_total	14941	
duplicate_codes	14826	
duplicate_pct	99.23	
by_code_type	HCPCS	5380
	CSTM-ALL	1
	CPT	9512
	RC	48
unknown_code_types		
format_invalid_by_type	HCPCS	146876
codes_not_in_reference	reference_not_loaded	

most_frequent_codes	Type	Code	Occurrences
	HCPCS	E0950	1,674
	HCPCS	E0951	1,674
	HCPCS	E0952	1,674
	HCPCS	E0953	1,674
	HCPCS	E0954	1,674
	HCPCS	E0956	1,674
	HCPCS	E0957	1,674
	HCPCS	E0960	1,674
	HCPCS	E0973	1,674
	HCPCS	E0978	1,674
	HCPCS	E0981	1,674
	HCPCS	E0982	1,674
	HCPCS	E0990	1,674
	HCPCS	E0995	1,674
	HCPCS	E1016	1,674
	HCPCS	E2208	1,674
	HCPCS	E2209	1,674
	HCPCS	E2210	1,674
	HCPCS	E2323	1,674
	HCPCS	E2324	1,674

## Pricing Sanity — Metrics

total_prices_checked	3920117
total_rates	3919611
per_diem_rates	0
percentage_rates	506
negative_rates	0
zero_rates	78250
extreme_high_rates	2970
extreme_low_rates	923

<b>rate_distribution</b>	<b>sample_n</b>	3919611
	<b>sample_k</b>	5000
	<b>confidence</b>	high
	<b>p5</b>	4.390165
	<b>p25</b>	56.15575
	<b>p50</b>	258.25899999999996
	<b>p75</b>	969.5733749999999
	<b>p95</b>	4152.113825000001
	<b>p99</b>	14715.051195000002

<b>by_billing_class</b>	<b>Class / Type</b>	<b>Count</b>	<b>Median</b>	<b>p25</b>	<b>p75</b>	<b>p95</b>	<b>Confidence</b>
	institutional/ fee schedule	1,727,709	352.1	81.9	1352.1	10729.4	high
	professional/ fee schedule	2,191,896	178.6	48.6	675.6	2603.2	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

<b>negotiated_types</b>	<b>fee schedule</b>	3919605
	<b>derived</b>	6

<b>unique_rate_contexts</b>	34764
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<b>rate_key_dimension_validity</b>	<b>invalid_negotiated_type</b>	0
	<b>invalid_negotiated_types_seen</b>	{}
	<b>invalid_setting</b>	0
	<b>invalid_settings_seen</b>	{}
	<b>invalid_severity_of_illness</b>	0
	<b>severity_on_non_apr_drg</b>	0
	<b>institutional_with_service_codes</b>	0
	<b>invalid_service_code_format</b>	0
	<b>billing_code_modifier_too_long</b>	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).

<b>provider_resolution (60%)</b>	$\text{resolution\_rate\%} \times 0.60$
<b>npi_validity (30%)</b>	$(100 - \text{invalid\_npi\_pct} \times 5) \times 0.30$
<b>ein_validity (10%)</b>	$10 - (\text{invalid\_ein\_pct} \times 0.1)$ [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.

<b>per_unknown_code_type</b>	3 pts each (cap 20)
<b>format_invalid_pct</b>	$\times 0.5$ (cap 10)
<b>duplicate_code_pct</b>	$\times 2$ (cap 20)
<b>codes_not_in_reference_pct</b>	$\times 0.5$ (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.

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

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

<b>Tier 1 — entity + plan_id</b>	Used when both <code>reporting_entity_name</code> and <code>plan_id</code> are present. Key input: <code>plan &lt;entity&gt; &lt;plan_id_type&gt; &lt;plan_id&gt;</code> . Stable across monthly re-exports.
<b>Tier 2 — URL hash</b>	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.

<b>NPPES</b>	CMS National Plan and Provider Enumeration System — monthly full-replacement CSV. Maps each NPI to its primary registered ZIP code.
<b>ZCTA centroids</b>	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.