

Validating Reno 2021.csv against ['Reno 2020.csv', 'Reno 2019.csv', 'Reno 2018.csv']
... 05-Apr-2022 (14:34:07) (America/Edmonton)

1. Range in Values Checks

wind_direction_range_validator

(Quadrants with no data)

- January OK
- February OK
- March OK
- April OK
- May OK
- June OK
- July OK
- August OK
- September OK
- October OK
- November OK
- December OK

outlier_validator

(Reported concentrations that fall outside threshold = mean +/- std * 10)

Data validities were checked and confirmed. No further

January Data check criteria not met actions required.

- S02: 2021-01-09 14:00:00 4.0 (-2.8996 .. 3.0894)
- S02: 2021-01-11 19:00:00 4.0 (-2.8996 .. 3.0894)
- S02: 2021-01-11 22:00:00 6.0 (-2.8996 .. 3.0894)

February Data check criteria not met Data validity was checked and confirmed. No further actions required.

- NMHC: 2021-02-17 20:00:00 0.03 (-0.0269 .. 0.0275)

March Data check criteria not met Data validities were checked and confirmed. No further actions required.

- S02: 2021-03-02 13:00:00 6.0 (-5.0033 .. 5.4967)
- THC: 2021-03-02 01:00:00 5.18 (-0.6894 .. 4.8483)
- THC: 2021-03-03 04:00:00 8.79 (-0.6894 .. 4.8483)
- THC: 2021-03-03 05:00:00 4.93 (-0.6894 .. 4.8483)
- THC: 2021-03-03 06:00:00 6.42 (-0.6894 .. 4.8483)
- THC: 2021-03-03 08:00:00 5.63 (-0.6894 .. 4.8483)
- CH4: 2021-03-02 01:00:00 5.18 (-0.6826 .. 4.8402)
- CH4: 2021-03-03 04:00:00 8.72 (-0.6826 .. 4.8402)
- CH4: 2021-03-03 05:00:00 4.92 (-0.6826 .. 4.8402)
- CH4: 2021-03-03 06:00:00 6.41 (-0.6826 .. 4.8402)
- CH4: 2021-03-03 08:00:00 5.6 (-0.6826 .. 4.8402)

April Data check criteria not met Data validity was checked and confirmed. No further actions required.

- TRS: 2021-04-30 20:00:00 2.71 (-0.7002 .. 1.4539)

May OK

June Data check criteria not met

- TRS: 2021-06-13 05:00:00 4.04 (-1.8886 .. 2.781)
- TRS: 2021-06-13 06:00:00 3.44 (-1.8886 .. 2.781)
- TRS: 2021-06-28 03:00:00 3.62 (-1.8886 .. 2.781)
- TRS: 2021-06-28 04:00:00 3.45 (-1.8886 .. 2.781)
- TRS: 2021-06-28 05:00:00 3.14 (-1.8886 .. 2.781)

Data validities were checked and confirmed. No further actions required.
Elevated NMHC concentrations were recorded starting June 28 due to extreme hot ambient temperatures

TRS: 2021-06-28 06:00:00 3.38 (-1.8886 .. 2.781)
 TRS: 2021-06-30 04:00:00 3.02 (-1.8886 .. 2.781)
 TRS: 2021-06-30 05:00:00 4.98 (-1.8886 .. 2.781)
 TRS: 2021-06-30 06:00:00 5.01 (-1.8886 .. 2.781)
 SO2: 2021-06-15 07:00:00 1.0 (-0.9568 .. 0.9756)
 SO2: 2021-06-29 07:00:00 1.0 (-0.9568 .. 0.9756)
 THC: 2021-06-28 02:00:00 2.97 (0.9681 .. 2.9424)
 CH4: 2021-06-28 02:00:00 2.95 (0.9684 .. 2.942)
 NMHC: 2021-06-27 19:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-27 20:00:00 0.04 (0.0 .. 0.0)
 NMHC: 2021-06-27 23:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 00:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 02:00:00 0.02 (0.0 .. 0.0)
 NMHC: 2021-06-28 03:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 05:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 11:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 12:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 13:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 14:00:00 0.02 (0.0 .. 0.0)
 NMHC: 2021-06-28 18:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-28 19:00:00 0.03 (0.0 .. 0.0)
 NMHC: 2021-06-28 20:00:00 0.17 (0.0 .. 0.0)
 NMHC: 2021-06-28 21:00:00 0.1 (0.0 .. 0.0)
 NMHC: 2021-06-28 22:00:00 0.05 (0.0 .. 0.0)
 NMHC: 2021-06-28 23:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-29 11:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-29 12:00:00 0.03 (0.0 .. 0.0)
 NMHC: 2021-06-29 13:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-29 14:00:00 0.02 (0.0 .. 0.0)
 NMHC: 2021-06-29 15:00:00 0.02 (0.0 .. 0.0)
 NMHC: 2021-06-29 16:00:00 0.05 (0.0 .. 0.0)
 NMHC: 2021-06-29 17:00:00 0.12 (0.0 .. 0.0)
 NMHC: 2021-06-29 18:00:00 0.23 (0.0 .. 0.0)
 NMHC: 2021-06-29 19:00:00 0.38 (0.0 .. 0.0)
 NMHC: 2021-06-29 20:00:00 0.39 (0.0 .. 0.0)
 NMHC: 2021-06-29 21:00:00 0.3 (0.0 .. 0.0)
 NMHC: 2021-06-29 22:00:00 0.21 (0.0 .. 0.0)
 NMHC: 2021-06-29 23:00:00 0.02 (0.0 .. 0.0)
 NMHC: 2021-06-30 03:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-30 05:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-30 11:00:00 0.01 (0.0 .. 0.0)
 NMHC: 2021-06-30 12:00:00 0.02 (0.0 .. 0.0)
 NMHC: 2021-06-30 13:00:00 0.03 (0.0 .. 0.0)
 NMHC: 2021-06-30 14:00:00 0.1 (0.0 .. 0.0)
 NMHC: 2021-06-30 15:00:00 0.31 (0.0 .. 0.0)
 NMHC: 2021-06-30 16:00:00 0.32 (0.0 .. 0.0)
 NMHC: 2021-06-30 17:00:00 0.2 (0.0 .. 0.0)
 NMHC: 2021-06-30 18:00:00 0.21 (0.0 .. 0.0)
 NMHC: 2021-06-30 19:00:00 0.2 (0.0 .. 0.0)
 NMHC: 2021-06-30 20:00:00 0.05 (0.0 .. 0.0)

July Data check criteria not met

TRS: 2021-07-01 03:00:00 5.26 (-2.7761 .. 3.7638)
 TRS: 2021-07-14 02:00:00 4.01 (-2.7761 .. 3.7638)
 TRS: 2021-07-14 05:00:00 3.87 (-2.7761 .. 3.7638)
 TRS: 2021-07-14 06:00:00 4.37 (-2.7761 .. 3.7638)
 TRS: 2021-07-19 03:00:00 4.14 (-2.7761 .. 3.7638)

Elevated TRS concentrations were likely due to extreme hot ambient temperatures in early month and wildfire from north Saskatchewan in mid-month.

August Data check criteria not met

TRS: 2021-08-06 05:00:00 7.84 (-3.499 .. 4.5167)

Elevated TRS recorded on Aug 6 were caused by BC wildfire. Elevated TRS recorded on Aug 30 were checked, and data validities were confirmed.

```
TRS: 2021-08-30 05:00:00 7.07 (-3.499 .. 4.5167)
TRS: 2021-08-30 06:00:00 9.97 (-3.499 .. 4.5167)
TRS: 2021-08-30 07:00:00 6.04 (-3.499 .. 4.5167)
TRS: 2021-08-30 08:00:00 10.5 (-3.499 .. 4.5167)
NMHC: 2021-08-01 15:00:00 0.02 (-0.0102 .. 0.0104)
NMHC: 2021-08-01 17:00:00 0.07 (-0.0102 .. 0.0104)
NMHC: 2021-08-01 18:00:00 0.1 (-0.0102 .. 0.0104)
NMHC: 2021-08-01 19:00:00 0.1 (-0.0102 .. 0.0104)
NMHC: 2021-08-01 20:00:00 0.03 (-0.0102 .. 0.0104)
NMHC: 2021-08-03 06:00:00 0.04 (-0.0102 .. 0.0104)
```

Elevated NMHC recorded between Aug 1 and Aug 3 were caused by BC wildfire.

September OK

October Data check criteria not met **Data validity was checked and confirmed. No further actions required.**

```
TRS: 2021-10-01 23:00:00 4.67 (-3.4903 .. 4.1962)
```

November Data check criteria not met **Data validities were checked and confirmed. No further actions required.**

```
TRS: 2021-11-22 06:00:00 1.39 (-0.3886 .. 1.1523)
TRS: 2021-11-22 07:00:00 1.44 (-0.3886 .. 1.1523)
TRS: 2021-11-22 15:00:00 1.3 (-0.3886 .. 1.1523)
```

December OK

range_of_change_spike_validator

(Reported concentrations that exceed pre-defined max_delta {'CO': 10000.0, 'PM2.5': 50.0, 'NO2': 30.0, 'O3': 50.0, 'SO2': 40.0})

January OK
February OK
March OK
April OK
May OK
June OK
July OK
August OK
September OK
October OK
November OK
December OK

2. Sticking Values Checks

sticking_parameter_validator

(Non-zero values that repeat more than 12 times consecutively)

January OK

February Data check criteria not met **Data validities were checked and confirmed. No further actions required.**

```
THC: 2021-02-21 21:00:00 sticking value found 1.83, count = 17
CH4: 2021-02-21 21:00:00 sticking value found 1.83, count = 17
```

March Data check criteria not met **Data validities were checked and confirmed. No further actions required.**

```
THC: 2021-03-14 20:00:00 sticking value found 1.88, count = 13
CH4: 2021-03-14 20:00:00 sticking value found 1.88, count = 13
```

April Data check criteria not met **Data validities were checked and confirmed. No further actions required.**

THC: 2021-04-08 13:00:00 sticking value found 1.91, count = 13
CH4: 2021-04-08 13:00:00 sticking value found 1.91, count = 13

May OK

June Data check criteria not met Data validities were checked and confirmed. No further actions required.

THC: 2021-06-08 20:00:00 sticking value found 1.84, count = 12
THC: 2021-06-16 18:00:00 sticking value found 1.94, count = 13
CH4: 2021-06-08 20:00:00 sticking value found 1.84, count = 12
CH4: 2021-06-16 18:00:00 sticking value found 1.94, count = 13

July OK

August OK

September Data check criteria not met Data validities were checked and confirmed. No further actions required.

THC: 2021-09-02 10:00:00 sticking value found 1.97, count = 14
CH4: 2021-09-02 10:00:00 sticking value found 1.97, count = 14

October OK

November Data check criteria not met Data validities were checked and confirmed. No further actions required.

THC: 2021-11-26 15:00:00 sticking value found 1.93, count = 13
CH4: 2021-11-26 15:00:00 sticking value found 1.93, count = 13

December Data check criteria not met Data validities were checked and confirmed. No further actions required.

THC: 2021-12-05 01:00:00 sticking value found 1.98, count = 12
THC: 2021-12-09 05:00:00 sticking value found 1.95, count = 12
THC: 2021-12-21 17:00:00 sticking value found 1.96, count = 13
CH4: 2021-12-05 01:00:00 sticking value found 1.98, count = 12
CH4: 2021-12-09 05:00:00 sticking value found 1.95, count = 12
CH4: 2021-12-21 17:00:00 sticking value found 1.96, count = 13

percent_zero_validator

(Reported concentrations that have more than 50% of zeros)

January OK
February OK
March OK
April OK
May OK
June OK
July OK
August OK
September OK
October OK
November OK
December OK

3. Related Parameter Checks

NOX_validator

(| (NO + NO2) - NOX | > 1 ppb or missing one or more concentrations)

January OK
February OK

March OK
April OK
May OK
June OK
July OK
August OK
September OK
October OK
November OK
December OK

THC_validator

(| (NMHC + CH4) - THC | > 0.1 ppm or missing one or more concentrations)

January OK
February OK
March OK
April OK
May OK
June OK
July OK
August OK
September OK
October OK
November OK
December OK

4. Shifts in Data Checks

baseline_shift_validator

(base_historical_mean is greater than 2 * base_target_mean or less than 0.5 *
base_target_mean)

January OK
February OK
March OK
April OK
May OK
June OK
July OK
August OK
September OK
October OK
November OK
December OK

shift_in_mean_validator

(pdiff > pdiff_threshold, pdiff_threshold=100%)

January Data check criteria not met **actions required.**
S02: historical_mean=0.09665114037905558 target_mean=0.7897727272727273
pdiff=717.1375155795596% > 100%

February Data check criteria not met **actions required.**
S02: historical_mean=0.09665114037905558 target_mean=0.4411302982731554

pdiff=356.41499577044715% > 100%

March OK

April OK

May OK

June Data check criteria not met elevated shift-in-mean value was likely due to wildfire
from north Saskatchewan

NMHC: historical_mean=0.00047046759639048265 target_mean=0.005532846715328467

pdiff=1076.0314116801082% > 100%

July OK

August OK

September OK

October OK

November OK

December OK

Done. ... 05-Apr-2022 (14:34:48) (America/Edmonton)

Elapsed 41.44839930534363 seconds.