

**SUPPLEMENTAL INFORMATION FOR "QUANTIFICATION OF SPACECRAFT
HEATSHIELD CONTAMINANTS SEEN IN REENTRY SHOCK LAYER EMIS-
SIONS USING CALIBRATION-FREE LIBS"**

TABLE I

Elemental composition data for PICA. All measurements are in units of parts-per-million, and each row corresponds to a single measurement location along the sample.

C	H	O	Na	Ca	Al	Si
1.23e+04	7.85e+05	2.02e+05	3.46e-04	2.46e-04	4.92e-02	3.55e+01
2.48e+04	7.83e+05	1.92e+05	8.40e-04	5.58e-04	9.78e-02	8.25e+01
1.40e+04	7.72e+05	2.14e+05	5.48e-04	8.55e-04	5.76e-02	4.40e+01
1.40e+04	7.48e+05	2.38e+05	7.94e-04	7.71e-04	1.97e-02	4.97e+01
1.10e+04	7.80e+05	2.09e+05	4.96e-04	3.96e-04	5.96e-03	3.84e+01
1.09e+04	7.59e+05	2.30e+05	7.30e-04	6.39e-04	1.26e-02	4.30e+01
1.58e+04	7.70e+05	2.14e+05	5.87e-04	6.01e-04	4.03e-03	5.49e+01
1.11e+04	7.67e+05	2.22e+05	6.87e-04	6.45e-04	5.21e-03	4.12e+01
1.08e+04	7.80e+05	2.09e+05	4.86e-04	3.88e-04	3.84e-03	4.10e+01
1.57e+04	7.59e+05	2.25e+05	1.01e-03	7.85e-04	4.48e-03	5.63e+01
7.94e+03	7.91e+05	2.01e+05	4.90e-04	5.30e-04	1.40e-03	3.70e+01
9.40e+03	7.80e+05	2.10e+05	4.76e-04	2.36e-04	2.39e-03	3.46e+01
1.12e+04	7.76e+05	2.13e+05	6.65e-04	4.93e-04	3.37e-03	4.30e+01
9.16e+03	7.95e+05	1.96e+05	5.66e-04	3.75e-04	3.38e-03	3.97e+01
8.63e+03	7.76e+05	2.15e+05	5.58e-04	4.58e-04	3.09e-03	3.55e+01
6.97e+03	7.89e+05	2.04e+05	3.77e-04	4.61e-04	2.78e-03	3.20e+01
8.24e+03	7.86e+05	2.05e+05	4.09e-04	4.66e-04	2.76e-03	3.48e+01
8.63e+03	7.83e+05	2.09e+05	3.82e-04	2.73e-04	3.14e-03	3.60e+01
9.54e+03	8.04e+05	1.87e+05	3.04e-04	2.60e-04	1.31e-03	3.61e+01
1.47e+04	7.87e+05	1.98e+05	5.02e-04	3.60e-04	2.24e-03	5.23e+01
1.34e+04	7.94e+05	1.92e+05	3.87e-04	1.79e-04	1.46e-03	4.49e+01

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C	H	O	Na	Ca	Al	Si
1.24e+04	7.98e+05	1.90e+05	4.21e-04	4.32e-04	1.41e-03	4.12e+01
1.53e+04	7.94e+05	1.91e+05	2.63e-04	1.83e-04	1.93e-03	5.04e+01
8.21e+03	7.97e+05	1.95e+05	2.64e-04	2.83e-04	9.40e-04	3.01e+01
8.73e+03	7.90e+05	2.01e+05	4.27e-04	3.05e-04	1.93e-03	4.09e+01
1.39e+04	7.97e+05	1.89e+05	4.80e-04	2.90e-04	2.88e-03	5.67e+01
1.82e+04	7.67e+05	2.15e+05	6.70e-04	5.14e-04	3.66e-03	6.47e+01
2.10e+04	7.60e+05	2.19e+05	1.40e-03	1.15e-03	2.49e-03	8.56e+01
2.89e+04	7.70e+05	2.01e+05	4.90e-04	4.70e-04	4.38e-03	9.16e+01
1.09e+04	7.57e+05	2.32e+05	7.09e-04	6.45e-04	1.48e-03	4.68e+01
1.11e+04	7.93e+05	1.96e+05	4.65e-04	2.46e-04	1.66e-03	4.22e+01
1.23e+04	7.81e+05	2.06e+05	4.03e-04	4.53e-04	1.80e-03	4.24e+01
1.12e+04	7.85e+05	2.04e+05	3.18e-04	3.27e-04	2.61e-03	3.73e+01
1.59e+04	7.95e+05	1.89e+05	6.17e-04	4.28e-04	2.48e-03	7.44e+01
1.81e+04	7.64e+05	2.18e+05	7.60e-04	5.22e-04	4.32e-03	8.48e+01
2.02e+04	7.69e+05	2.11e+05	9.35e-04	5.01e-04	2.36e-03	7.99e+01
1.36e+04	7.52e+05	2.34e+05	8.94e-04	7.22e-04	3.77e-03	6.01e+01
1.18e+04	7.74e+05	2.14e+05	8.29e-04	8.95e-04	3.42e-03	5.83e+01
1.66e+04	7.58e+05	2.26e+05	1.41e-03	1.76e-03	1.07e-02	9.15e+01
1.32e+04	7.59e+05	2.28e+05	9.18e-04	1.17e-03	5.79e-03	7.31e+01
1.81e+04	7.63e+05	2.18e+05	6.66e-04	6.97e-04	4.24e-03	9.33e+01
1.61e+04	7.64e+05	2.20e+05	5.67e-04	3.87e-04	1.56e-03	7.26e+01
2.55e+04	7.86e+05	1.89e+05	5.00e-04	6.80e-04	4.34e-03	1.00e+02
9.41e+03	7.45e+05	2.45e+05	5.33e-04	5.93e-04	3.52e-03	4.13e+01
1.27e+04	8.05e+05	1.82e+05	3.03e-04	2.66e-04	3.87e-03	6.56e+01
1.20e+04	8.02e+05	1.85e+05	3.00e-04	3.69e-04	3.33e-03	5.18e+01
6.23e+03	7.98e+05	1.96e+05	1.60e-04	1.71e-04	4.55e-04	2.68e+01
9.33e+03	7.71e+05	2.20e+05	4.65e-04	4.45e-04	2.45e-03	4.92e+01
1.64e+04	8.02e+05	1.82e+05	3.84e-04	5.05e-04	2.24e-03	7.89e+01

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C	H	O	Na	Ca	Al	Si
9.01e+03	7.94e+05	1.97e+05	2.10e-04	2.00e-04	3.19e-03	4.44e+01
8.90e+03	8.00e+05	1.91e+05	2.47e-04	3.54e-04	3.10e-03	4.24e+01
1.34e+04	7.94e+05	1.92e+05	4.57e-04	3.27e-04	3.51e-03	6.42e+01
1.60e+04	7.95e+05	1.89e+05	3.76e-04	4.85e-04	2.66e-03	5.66e+01
2.01e+04	7.70e+05	2.10e+05	7.88e-04	7.33e-04	4.17e-03	7.89e+01
1.56e+04	8.07e+05	1.77e+05	4.77e-04	4.43e-04	3.36e-03	5.65e+01
1.36e+04	7.69e+05	2.18e+05	4.51e-04	4.24e-04	2.74e-03	5.67e+01
1.45e+04	7.90e+05	1.96e+05	5.35e-04	5.46e-04	3.52e-03	6.52e+01
1.34e+04	7.80e+05	2.06e+05	7.56e-04	5.84e-04	3.21e-03	6.63e+01
1.12e+04	7.67e+05	2.22e+05	8.52e-04	9.40e-04	6.14e-03	6.02e+01
2.02e+04	7.74e+05	2.05e+05	1.19e-03	6.72e-04	6.61e-03	1.07e+02
2.12e+04	7.79e+05	2.00e+05	8.12e-04	9.16e-04	4.79e-03	8.90e+01
2.29e+04	7.85e+05	1.92e+05	1.01e-03	6.54e-04	6.59e-03	9.01e+01
1.73e+04	8.02e+05	1.80e+05	1.00e-03	7.18e-04	5.81e-03	7.14e+01
1.72e+04	7.90e+05	1.92e+05	1.19e-03	8.83e-04	7.09e-03	5.87e+01
1.66e+04	7.86e+05	1.97e+05	8.22e-04	7.67e-04	3.46e-03	7.12e+01
1.89e+04	7.82e+05	1.99e+05	7.22e-04	5.47e-04	2.48e-03	7.59e+01
7.65e+03	7.12e+05	2.80e+05	1.12e-03	2.00e-03	6.67e-03	5.24e+01
1.53e+04	7.26e+05	2.58e+05	1.15e-03	1.35e-03	4.69e-03	8.18e+01
1.97e+04	7.80e+05	2.01e+05	4.69e-04	4.91e-04	3.51e-04	8.93e+01
1.17e+04	7.79e+05	2.09e+05	4.22e-04	6.88e-04	9.77e-04	5.19e+01
4.25e+04	7.28e+05	2.30e+05	1.58e-03	1.30e-03	5.56e-03	2.30e+02
4.08e+04	7.10e+05	2.49e+05	1.31e-03	3.26e-03	-2.82e-03	2.33e+02
9.67e+03	7.78e+05	2.13e+05	2.90e-04	6.61e-04	2.07e-03	3.98e+01
1.15e+04	8.36e+05	1.52e+05	7.62e-05	1.88e-04	5.42e-04	2.95e+01
2.46e+04	8.26e+05	1.49e+05	1.80e-04	3.88e-04	7.85e-04	6.23e+01
1.74e+04	8.08e+05	1.74e+05	1.14e-04	3.24e-04	1.91e-03	3.25e+01
3.33e+04	8.23e+05	1.44e+05	2.49e-04	5.53e-04	1.90e-03	5.86e+01

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C	H	O	Na	Ca	Al	Si
5.29e+04	7.88e+05	1.59e+05	5.08e-04	7.96e-04	6.09e-03	8.74e+01
4.43e+04	7.93e+05	1.63e+05	2.43e-04	9.20e-04	4.51e-03	4.39e+01
5.23e+04	7.90e+05	1.58e+05	2.19e-04	1.11e-03	2.15e-03	6.18e+01
2.98e+04	9.00e+05	7.06e+04	9.50e-05	6.70e-05	8.43e-04	4.91e+01
2.32e+04	8.98e+05	7.87e+04	1.26e-05	9.01e-05	1.34e-03	3.03e+01
3.28e+04	8.90e+05	7.73e+04	1.24e-04	1.94e-04	1.10e-03	2.27e+01
2.35e+04	8.97e+05	7.98e+04	2.56e-05	9.00e-02	-1.85e-03	3.40e+01
7.88e+04	8.30e+05	9.15e+04	3.00e-04	1.18e-03	1.04e-02	3.81e+01
4.39e+04	8.70e+05	8.57e+04	1.37e-04	3.17e-04	3.80e-03	3.76e+01
3.35e+04	8.94e+05	7.28e+04	1.43e-04	2.22e-04	1.40e-03	3.27e+01
1.83e+04	9.11e+05	7.03e+04	5.54e-05	4.30e-05	8.28e-04	2.85e+01
1.23e+05	7.50e+05	1.27e+05	1.06e-03	2.57e-03	2.67e-02	3.43e+01
7.08e+04	8.41e+05	8.81e+04	3.13e-04	5.40e-04	4.89e-03	1.49e+01
1.93e+05	6.86e+05	1.21e+05	4.69e-03	4.66e-03	6.76e-02	5.50e+01
9.14e+04	8.00e+05	1.09e+05	1.52e-03	6.11e-04	1.70e-02	3.04e+01
1.65e+05	7.10e+05	1.25e+05	2.20e-03	6.15e-03	3.93e-02	4.08e+01
1.21e+05	7.28e+05	1.51e+05	1.16e-03	3.29e-03	6.35e-02	4.40e+01
1.18e+05	7.40e+05	1.42e+05	2.11e-03	2.87e-03	1.10e-03	3.53e+01
1.64e+05	7.08e+05	1.28e+05	1.56e-03	4.99e-03	3.17e-02	4.36e+01
1.81e+05	6.70e+05	1.49e+05	5.97e-03	5.67e-03	1.81e-02	4.68e+01
1.66e+05	6.61e+05	1.73e+05	4.86e-03	4.64e-03	3.68e-02	5.09e+01
1.65e+05	6.95e+05	1.40e+05	3.11e-03	3.31e-03	2.95e-02	4.12e+01
1.34e+05	7.27e+05	1.39e+05	3.79e-03	2.19e-03	2.64e-02	5.06e+01
1.13e+05	7.48e+05	1.38e+05	2.04e-03	4.23e-03	2.99e-02	3.19e+01
1.61e+05	7.06e+05	1.33e+05	2.96e-03	4.51e-03	1.56e-02	3.54e+01
1.12e+05	7.61e+05	1.27e+05	1.20e-03	1.63e-03	3.27e-02	2.42e+01
1.73e+05	6.34e+05	1.94e+05	8.28e-03	7.32e-03	5.02e-02	6.02e+01
1.11e+05	7.65e+05	1.24e+05	1.10e-03	2.93e-03	1.60e-02	1.93e+01

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C	H	O	Na	Ca	Al	Si
1.16e+05	7.06e+05	1.78e+05	4.29e-03	8.83e-03	6.26e-02	3.08e+01
6.19e+04	8.30e+05	1.08e+05	5.26e-04	9.58e-04	1.10e-02	1.20e+01
7.44e+04	8.21e+05	1.05e+05	5.16e-04	1.44e-03	5.90e-03	1.40e+01
3.06e+04	8.68e+05	1.02e+05	2.52e-04	2.19e-04	4.83e-03	4.15e+00
7.14e+04	8.14e+05	1.15e+05	7.06e-04	1.20e-03	1.23e-02	1.27e+01
1.12e+05	7.47e+05	1.40e+05	2.20e-03	3.08e-03	1.67e-02	2.20e+01
1.12e+05	7.39e+05	1.48e+05	1.51e-03	3.74e-03	3.43e-02	2.25e+01
8.61e+04	7.98e+05	1.16e+05	1.33e-03	2.73e-03	3.79e-02	2.19e+01
5.91e+04	8.18e+05	1.23e+05	6.76e-04	9.93e-04	4.81e-03	1.38e+01
8.95e+04	7.55e+05	1.55e+05	1.70e-03	2.43e-03	1.49e-02	2.23e+01
7.99e+04	8.09e+05	1.11e+05	5.38e-04	7.90e-04	7.97e-03	1.39e+01
4.16e+04	8.51e+05	1.07e+05	1.58e-04	2.50e-04	6.81e-03	7.44e+00
4.08e+04	8.27e+05	1.32e+05	4.13e-04	3.24e-04	1.53e-03	9.32e+00
9.28e+04	8.01e+05	1.06e+05	1.05e-03	2.18e-03	1.06e-02	1.61e+01
1.98e+05	6.45e+05	1.57e+05	9.26e-03	8.02e-03	8.53e-02	4.49e+01
1.04e+05	7.69e+05	1.27e+05	2.31e-03	2.37e-03	2.94e-02	2.11e+01
1.64e+05	7.02e+05	1.34e+05	1.68e-03	5.84e-03	6.73e-02	3.15e+01
1.26e+05	7.29e+05	1.45e+05	2.26e-03	4.10e-03	2.02e-02	2.53e+01
1.44e+05	7.14e+05	1.42e+05	5.02e-03	3.48e-03	3.81e-02	3.15e+01
1.74e+05	6.60e+05	1.65e+05	5.22e-03	2.18e-03	-5.38e-04	4.36e+01
1.25e+05	7.37e+05	1.38e+05	2.86e-03	2.54e-03	3.38e-02	2.99e+01
1.47e+05	7.07e+05	1.45e+05	6.38e-03	4.40e-03	4.54e-02	3.72e+01
1.18e+05	7.54e+05	1.27e+05	1.98e-03	2.44e-03	2.52e-02	2.80e+01
1.12e+05	7.61e+05	1.27e+05	1.85e-03	2.52e-03	2.65e-02	3.21e+01
1.67e+05	5.89e+05	2.45e+05	5.56e-03	9.21e-03	1.06e-01	4.50e+01
1.54e+05	6.69e+05	1.77e+05	5.24e-03	8.05e-03	4.89e-02	3.13e+01
1.76e+05	6.57e+05	1.67e+05	7.12e-03	5.52e-03	7.00e-02	4.59e+01
7.44e+04	8.07e+05	1.19e+05	4.50e-04	8.07e-04	9.37e-03	1.37e+01

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C	H	O	Na	Ca	Al	Si
7.59e+04	7.74e+05	1.50e+05	1.40e-03	9.75e-04	1.07e-02	1.81e+01
1.02e+05	7.07e+05	1.91e+05	2.53e-03	2.65e-03	3.65e-02	2.17e+01
6.86e+04	8.10e+05	1.22e+05	4.79e-04	5.42e-04	4.51e-03	9.91e+00
8.07e+04	7.42e+05	1.77e+05	3.55e-04	1.06e-03	-1.55e-03	1.38e+01
7.27e+04	7.15e+05	2.12e+05	9.20e-04	4.16e-04	1.28e-02	1.73e+01
6.38e+04	6.77e+05	2.59e+05	9.33e-04	1.72e-03	3.18e-02	1.43e+01
6.07e+04	7.36e+05	2.03e+05	5.93e-04	7.93e-04	1.07e-02	1.08e+01
7.86e+04	6.85e+05	2.36e+05	1.34e-03	7.96e-04	1.97e-02	2.25e+01
4.66e+04	7.42e+05	2.12e+05	6.21e-04	4.48e-04	1.38e-02	1.11e+01
5.22e+04	7.53e+05	1.95e+05	7.66e-04	6.20e-04	6.44e-03	9.99e+00
8.03e+04	6.81e+05	2.38e+05	2.89e-03	2.10e-03	6.38e-03	1.56e+01
1.15e+05	6.23e+05	2.62e+05	4.69e-03	2.92e-03	8.95e-02	2.70e+01
7.29e+04	6.89e+05	2.38e+05	6.74e-04	1.60e-03	2.44e-02	1.12e+01
8.26e+04	6.30e+05	2.87e+05	1.98e-03	2.31e-03	5.16e-02	2.10e+01
5.68e+04	6.89e+05	2.54e+05	5.90e-04	9.46e-04	2.82e-02	7.57e+00
9.84e+04	6.65e+05	2.37e+05	5.21e-03	2.91e-03	1.42e-02	1.84e+01
1.29e+05	5.50e+05	3.22e+05	9.95e-03	1.01e-02	1.43e-01	3.05e+01
5.10e+04	7.57e+05	1.92e+05	5.92e-04	3.37e-04	1.03e-02	9.12e+00
6.13e+04	6.93e+05	2.46e+05	4.36e-04	1.21e-03	1.11e-02	1.03e+01
9.68e+04	6.79e+05	2.24e+05	1.58e-03	2.54e-03	2.26e-03	1.72e+01
3.48e+04	8.08e+05	1.57e+05	1.50e-04	2.38e-04	3.97e-03	6.96e+00
3.94e+04	8.10e+05	1.51e+05	3.05e-04	5.07e-04	2.82e-03	1.11e+01
2.45e+04	8.33e+05	1.42e+05	5.23e-05	1.58e-04	1.38e-03	4.27e+00
5.78e+04	6.69e+05	2.73e+05	3.11e-04	4.69e-03	1.01e-02	1.77e+01

TABLE II

Elemental composition data from RTV material. All measurements are in units of parts-per-million, and each row corresponds to a single measurement location along the sample.

Si	C	H	O	Na	K	Ca	Al	Fe
2.569e+04	4.998e+04	6.281e+05	2.945e+05	2.770e+00	2.093e-01	1.150e+01	6.975e+00	1.768e+03
4.084e+04	7.283e+04	4.818e+05	3.995e+05	1.817e+01	1.231e+00	3.994e+01	2.742e+01	4.906e+03
5.852e+04	7.541e+04	5.309e+05	3.308e+05	1.621e+01	1.376e+00	2.663e+01	2.093e+01	4.237e+03
6.469e+04	7.431e+04	5.092e+05	3.477e+05	1.513e+01	1.389e+00	2.279e+01	2.028e+01	4.028e+03
5.870e+04	1.015e+05	4.948e+05	3.387e+05	2.697e+01	3.372e+00	2.344e+01	3.212e+01	6.212e+03
3.617e+04	8.642e+04	5.814e+05	2.925e+05	1.111e+01	7.894e-01	1.566e+01	1.843e+01	3.428e+03
3.085e+04	8.254e+04	5.780e+05	3.052e+05	1.020e+01	7.624e-01	1.926e+01	1.670e+01	3.327e+03
3.538e+04	9.816e+04	5.824e+05	2.800e+05	1.242e+01	1.142e+00	1.515e+01	1.868e+01	4.015e+03
3.759e+04	1.145e+05	5.662e+05	2.769e+05	1.425e+01	1.683e+00	1.887e+01	2.124e+01	4.781e+03
2.532e+04	5.892e+04	6.539e+05	2.605e+05	3.242e+00	2.555e-01	5.553e+00	8.986e+00	1.302e+03
3.052e+04	8.441e+04	6.374e+05	2.450e+05	6.278e+00	6.400e-01	1.082e+01	1.410e+01	2.578e+03
2.651e+04	1.066e+05	5.980e+05	2.645e+05	9.331e+00	1.214e+00	1.416e+01	2.437e+01	4.380e+03
2.550e+04	7.913e+04	6.575e+05	2.356e+05	4.091e+00	5.341e-01	9.607e+00	1.113e+01	2.170e+03
2.386e+04	9.494e+04	6.208e+05	2.577e+05	5.880e+00	5.450e-01	9.663e+00	1.229e+01	2.703e+03
2.195e+04	7.290e+04	6.406e+05	2.630e+05	3.243e+00	4.073e-01	6.270e+00	8.924e+00	1.518e+03
2.710e+04	9.726e+04	6.228e+05	2.506e+05	4.479e+00	5.352e-01	6.813e+00	1.090e+01	2.173e+03
2.386e+04	8.744e+04	6.630e+05	2.233e+05	4.577e+00	6.227e-01	6.535e+00	1.334e+01	2.286e+03
3.357e+04	1.241e+05	6.005e+05	2.382e+05	7.653e+00	5.344e-01	1.115e+01	1.348e+01	3.533e+03
2.550e+04	8.897e+04	6.229e+05	2.599e+05	3.982e+00	3.808e-01	7.373e+00	1.172e+01	2.734e+03
2.689e+04	9.036e+04	6.126e+05	2.676e+05	4.658e+00	3.863e-01	8.072e+00	1.174e+01	2.509e+03
2.899e+04	9.243e+04	6.192e+05	2.570e+05	4.784e+00	7.178e-01	8.720e+00	1.280e+01	2.362e+03
2.937e+04	7.323e+04	6.584e+05	2.377e+05	2.144e+00	2.483e-01	1.121e+01	7.041e+00	1.263e+03
2.422e+04	7.383e+04	6.565e+05	2.436e+05	3.063e+00	2.491e-01	5.819e+00	9.624e+00	1.880e+03
2.641e+04	9.255e+04	6.462e+05	2.324e+05	5.239e+00	5.889e-01	7.118e+00	1.150e+01	2.486e+03
1.336e+04	6.838e+04	6.450e+05	2.718e+05	2.409e+00	2.951e-01	4.021e+00	6.837e+00	1.459e+03
2.683e+04	8.225e+04	6.279e+05	2.610e+05	3.967e+00	2.846e-01	5.620e+00	1.186e+01	1.961e+03
1.634e+04	6.692e+04	6.700e+05	2.453e+05	2.786e+00	3.487e-01	4.290e+00	6.851e+00	1.419e+03

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Si	C	H	O	Na	K	Ca	Al	Fe
2.204e+04	7.395e+04	6.551e+05	2.475e+05	2.263e+00	3.164e-01	4.053e+00	6.452e+00	1.403e+03
2.213e+04	9.139e+04	6.507e+05	2.336e+05	4.943e+00	6.473e-01	6.898e+00	1.274e+01	2.157e+03
2.495e+04	9.201e+04	6.577e+05	2.230e+05	3.960e+00	6.304e-01	8.050e+00	8.827e+00	2.282e+03
2.658e+04	8.940e+04	6.624e+05	2.196e+05	3.797e+00	4.028e-01	5.508e+00	9.438e+00	2.041e+03
1.886e+04	6.352e+04	6.823e+05	2.336e+05	2.411e+00	2.224e-01	5.194e+00	2.437e+02	1.465e+03
