

IIIH Task Force Conference Call
October 15, 2015 2:00PM Eastern
Call-in 713-222-0377
Pass Code 5214824464

The call actually started late due to Karin having difficulties connecting as the Host for the aforementioned number. Addison Schweitzer emailed Intertek's Conference line information to everyone and the call started at 2:15pm.

Dial-in Number: 800-391-9177

Conference Code: 4875645502

Attendees:

Chrysler: Haiying Tang

Shell: Karin Haumann

Oronite: Jo Martinez, Robert Stockwell

Afton: Ed Altman

Ashland: Amol Savant

Infineum: Andy Ritchie, Gordon Farnsworth, Mike McMillan, Doyle Boese

Lubrizol: George Szappanos, Kevin OMalley

Intertek: Addison Schweitzer

SwRI: Pat Lang, Ankit Chaudhry, Travis Kostan, Sid Clark

TMC: Rich Grundza

OHT: Jason Bowden, Matt Bowden

Idemitsu: Scott Rajala

Karin opened to explain the purpose of this call was to determine the validity of the fourth round of testing, and establish what matrix data had been completed at Ashland that will be included in the matrix, and what was yet to be completed. Test 1 had been previously determined invalid. Test 2 has not yet been validated, and may need to be rerun. Test 3 is included in the data set at hand.

Addison then proceeded to review the latest available data with the group. (Attachments, #1 IIIH PM Op Data Review Fourth Round of IIIH PM Tests, #2 QI Plots from 4th Matrix Tests, and #3 Non QI IIIH Matrix 4) During the data review Addison pointed out any Quality Index Issues with explanations for each test that experienced any issues. Addison also informed the group that the Quality Index for Fuel Temperature would be reviewed after the Precision Matrix explaining that the labs all seemed to experience some degree of trouble holding the Fuel Temperature within the upper and lower limits set for the Precision Matrix due to varying ambient temperature swings. After discussion of the Controlled Parameters, Addison reviewed the Non-Controlled Parameters stepping through the TMC Plots with explanations provided by each lab as necessary. Addison reminded everyone that the full data set is available on the TMC Website.

Rich Grundza explained the reason not all the NOx data was plotted due to some labs recording the NOx manually at the designated hours vs real time data acquisition. Addison asked if there were anything regarding the data that needed further discussion, and with no reply, Karin made the following motion:

Motion: Karin Haumann, Ed Altman;

The Lab Group (Addison's Data Review Group) recommends to the IIIH Task Force Group that all tests from this round be accepted as valid: CMIR-106776, CMIR-106777, CMIR-106779, CMIR-106780, CMIR-106781, and CMIR-106791 be accepted as valid. This includes the third test by Ashland.

The group conducted a Roll Call Vote by Company which resulted in a unanimous consensus (Approved 12, Abstain 0, Negative 0.)

The next item of discussion was informing the group that during the earlier call to review validity of Ashland's 2nd run, the group decided that a previously validated test CMIR 106764 should also be reconsidered. The group then discussed the reasons for these considerations and the path forward to try to get the necessary data for the Statistical Review Group to evaluate in time for a recommendation to the Sequence III Surveillance Panel Meeting on October 29, 2015.

The group discussed Amol's verbal confirmation of Ashland's re-run data of their 1st test with viewpoints on validity based on comparable results with Ashland's 3rd and 4th test results. The data are not ready for operational review, as the test completed 10/14/15. The group discussed possibly leaving Ashland's data out of the precision Matrix Analysis. Jo Martinez and Karin Haumann commented about the Matrix Design being such that one lab could be left out of the analysis. General consensus seemed to be, the group preferred to include as much data as possible. The group discussed potential problems getting the MRV and CCS data from these repeat tests in time for the analysis.

Karin asked Jo Martinez how the missing data might affect the analysis and her response was that would mean the First Row would be incomplete. Additional discussion included concerns about the re-runs and re-evaluations for one other test from lab G and the potential that the analysis be completed missing two data points, considering Ashland's 1st test re-run is valid.

The group decided we would need to have a meeting Monday to further discuss the tests in question and Ed Altman asked Jo Martinez if the analysis could be performed with two data points missing. Jo Martinez indicated she would need to know what tests would be missing and Kevin O'Malley commented whether we know what the Surveillance Panel and AOAP will be looking for to approve the test.

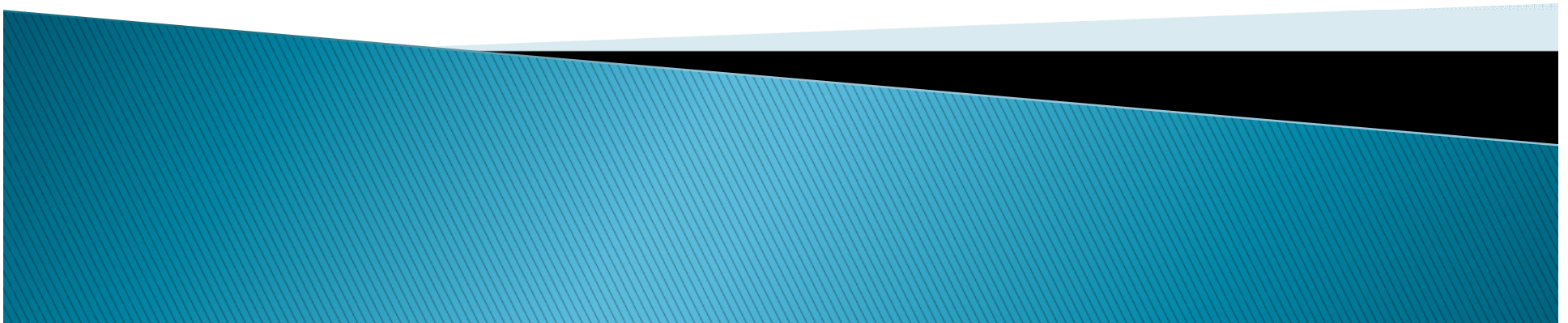
The group listened to comments about the review of PC-11 Matrix Testing. Kevin offered to put together a list of items covered during the PC-11 review and circulate to the group.

Karin summarized the meeting and the concern to get the data together in time for the Surveillance Panel Meeting.

The Conference Call was adjourned at 3:00pm.

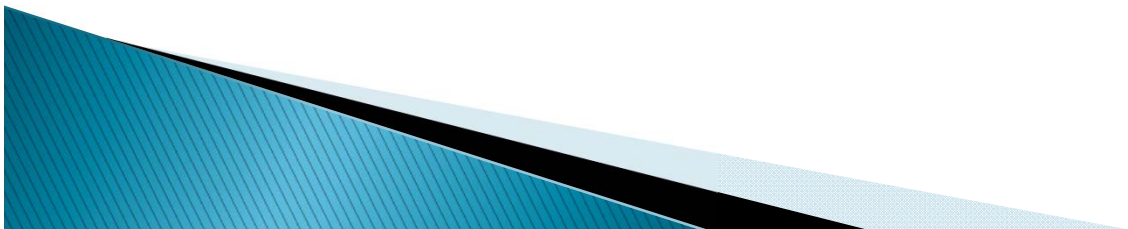
IIIH PM Op Data Review

Fourth Round of IIH PM Tests



Overview

- ▶ The IIIH Task Force has Performed a Preliminary Review of the Following:
 - Controlled Parameters
 - QI's
 - Non-controlled Parameters
- ▶ Parameters and QI's Identified as Having Anomalies were Addressed by the Industry Test Labs.

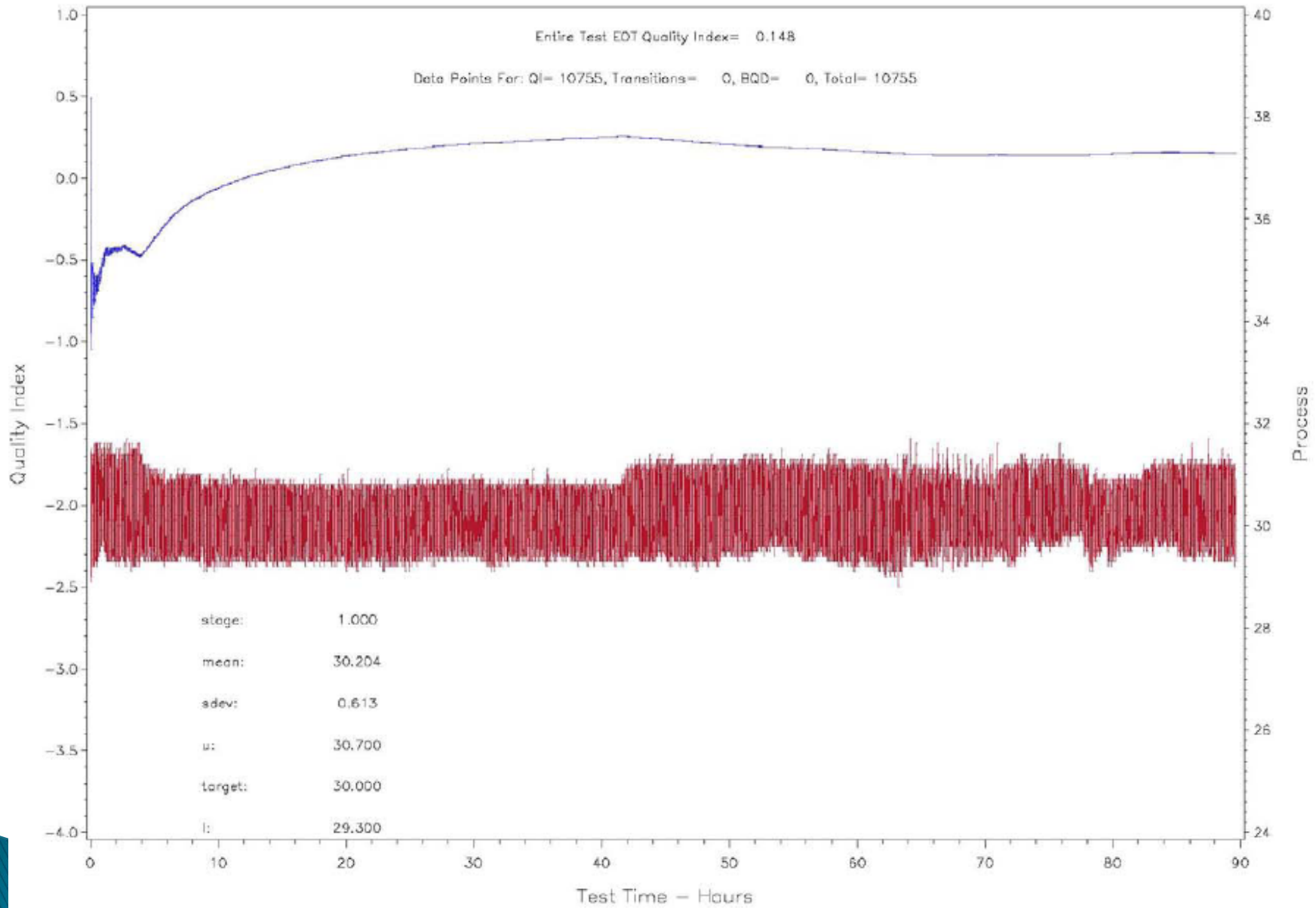


Controlled Parameters

- ▶ **Controlled Parameters Identified:**
 - Fuel Temperature – CMIR-106791
 - Fuel Temperature – CMIR-106776
 - Left Exhaust Back Pressure – CMIR-106781



IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature - Degrees C (CONTROL)
LAB= 0 Stand= CB106 CMIR= 106791

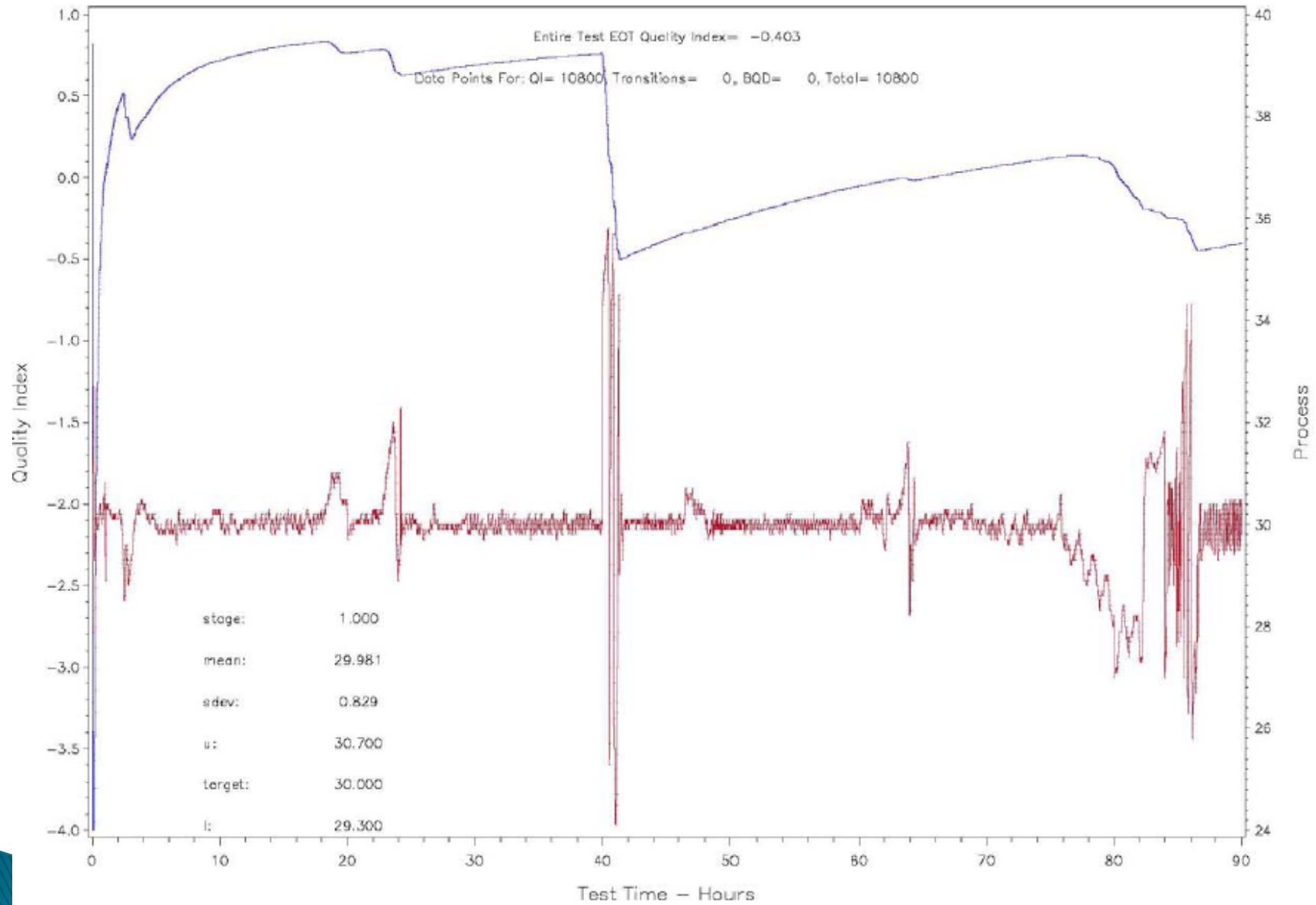


CMIR 106791

- ▶ Fuel Temperature QI
 - The control loop is at the limit of control and highly dependent on ambient effects due to the return-less fuel system.

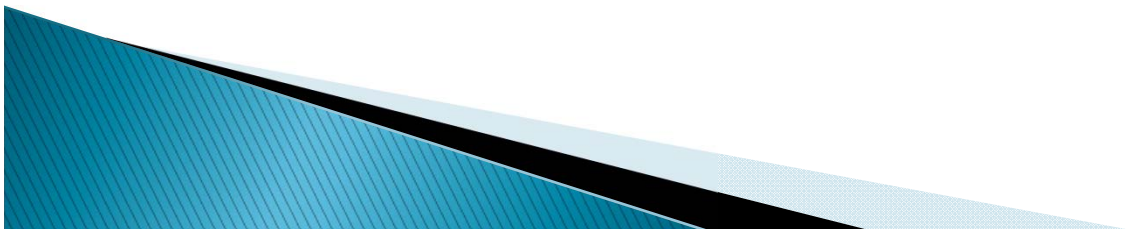


IIIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature - Degrees C (CONTROL)
LAB= A Stand= 2 GMIR= 106776

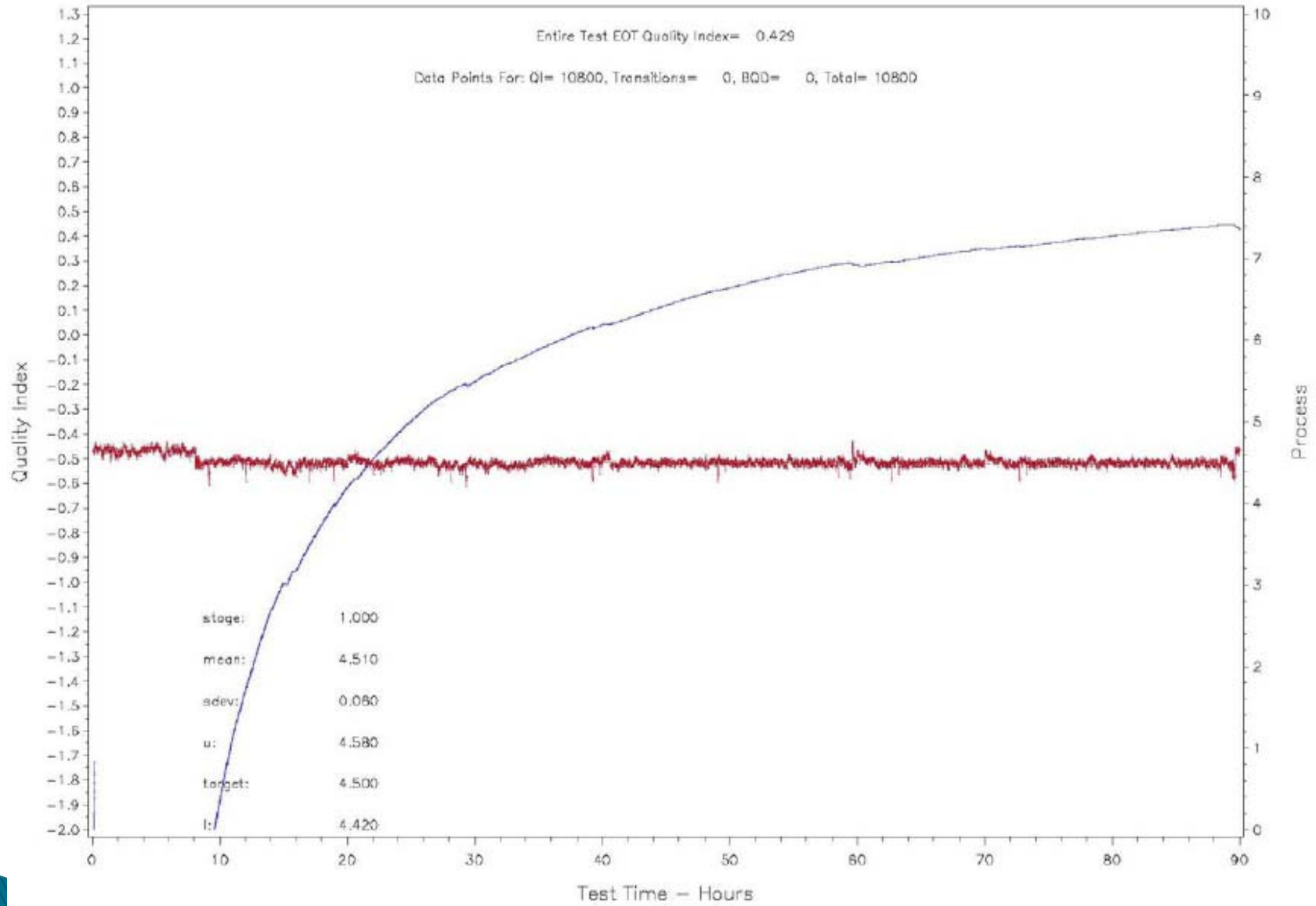


CMIR 106776

- ▶ Fuel Temperature QI
 - Control issues were experienced due to ambient temperature effects.



III. QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= E Stand= 3 CMR= 106781



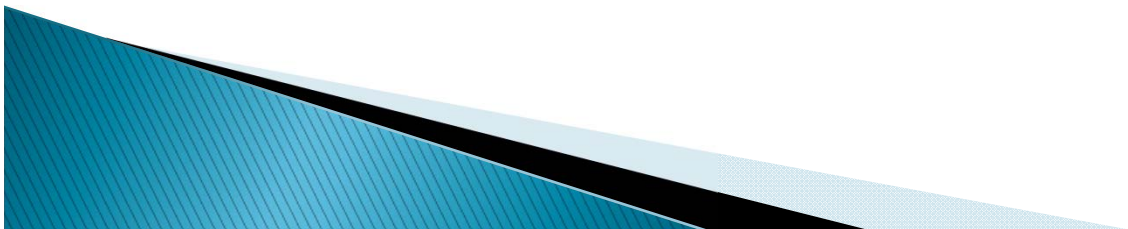
CMIR 106781

- ▶ Left Exhaust Back Pressure QI
 - Exhaust back-pressure valve actuator lower limit was spanned Incorrectly which prevented it from opening fully to lower the exhaust back pressure. It was corrected at test hour 5 by test Engineer. This test did end with a positive QI (0.429).

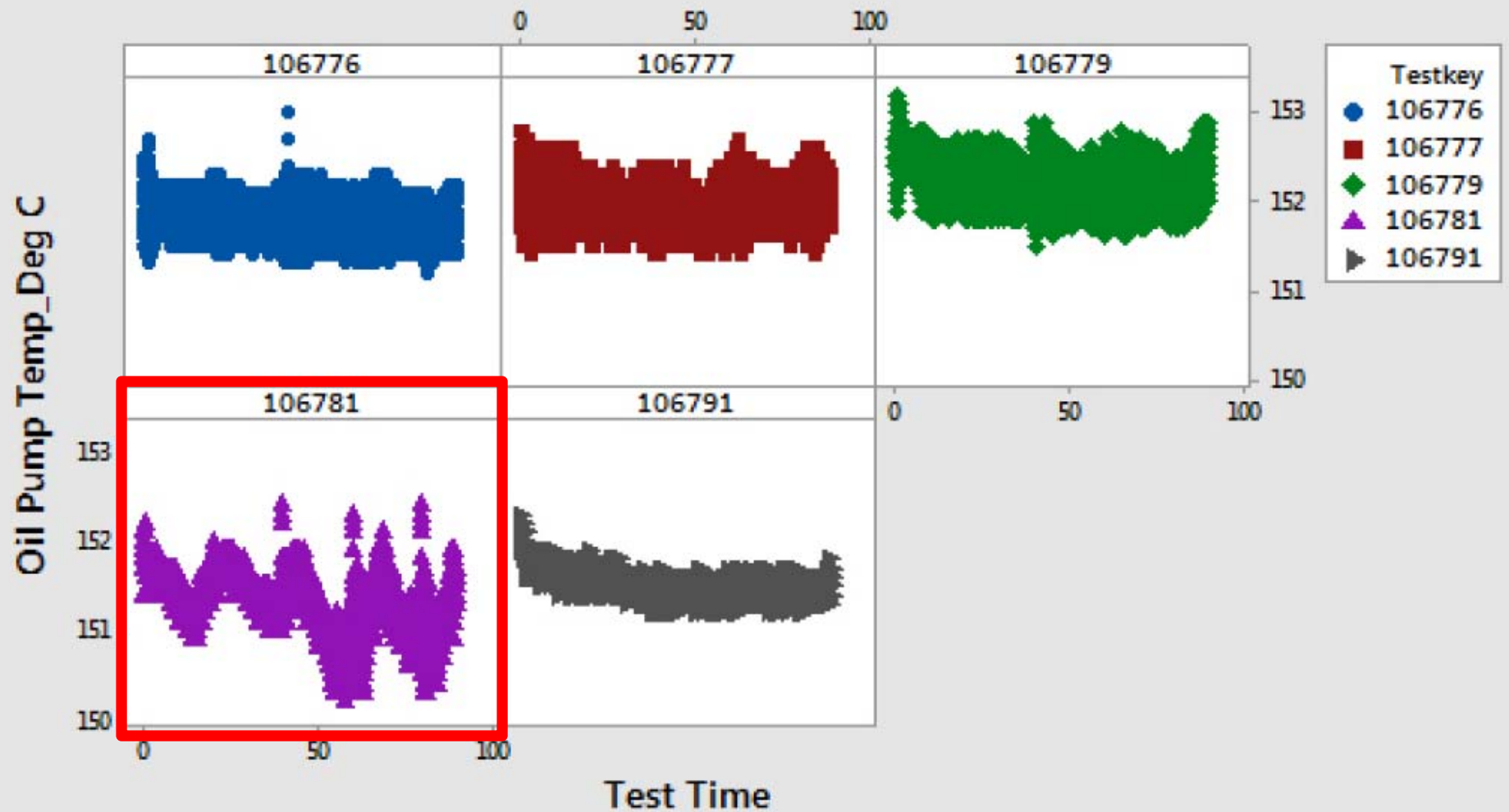


Non-controlled Parameters

- ▶ **Non-Controlled Parameters Identified:**
 - Oil Pump Temperature – CMIR 106781
 - Oil Sump Temperature – CMIR 106781
 - Left and Right Exhaust Temperature – CMIR 106791
 - Left and Right NO_x – CMIR 106777
 - Left and Right NO_x – CMIR 106779

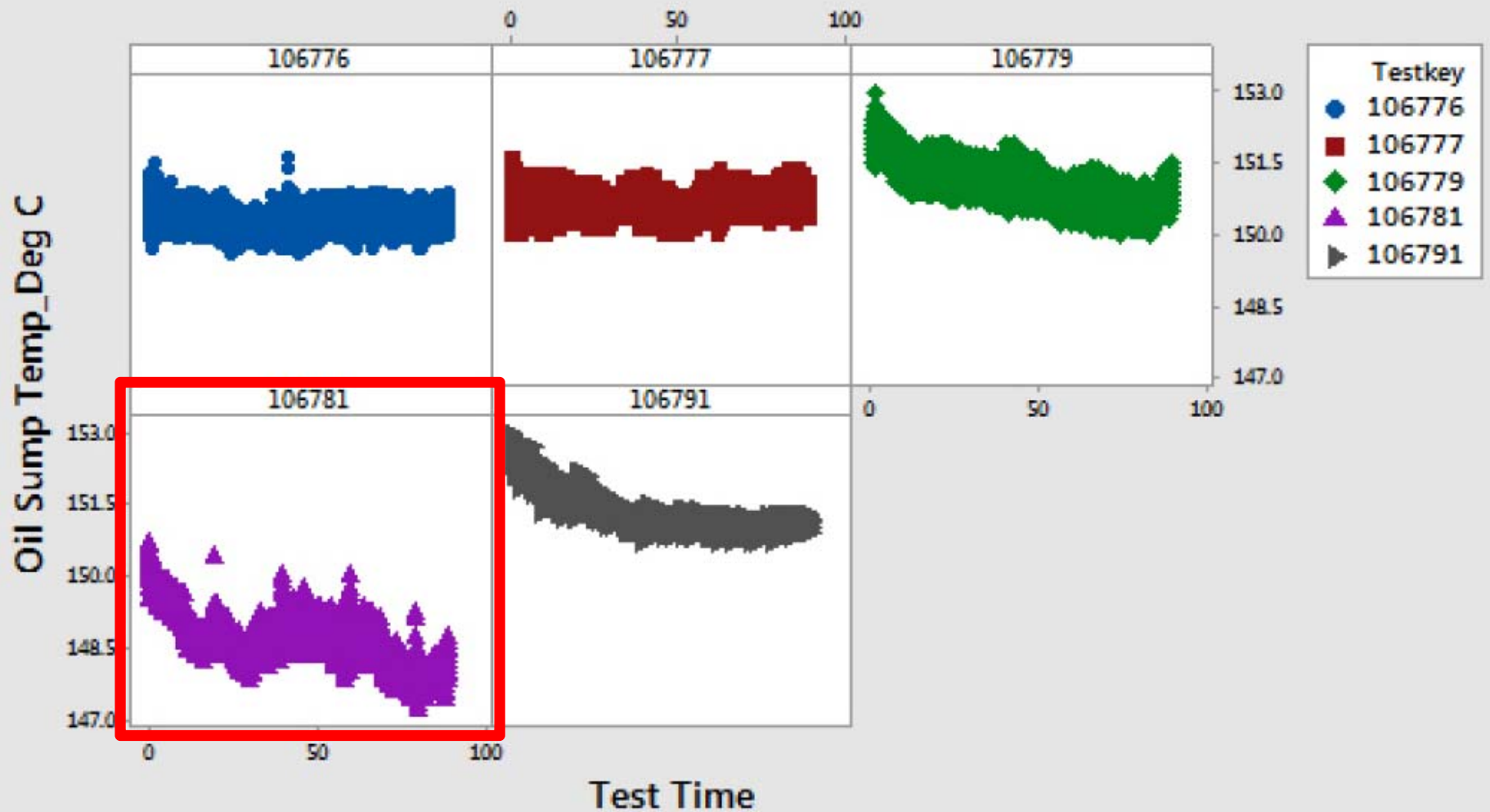


Scatterplot of Oil Pump Temp_Deg C vs Test Time



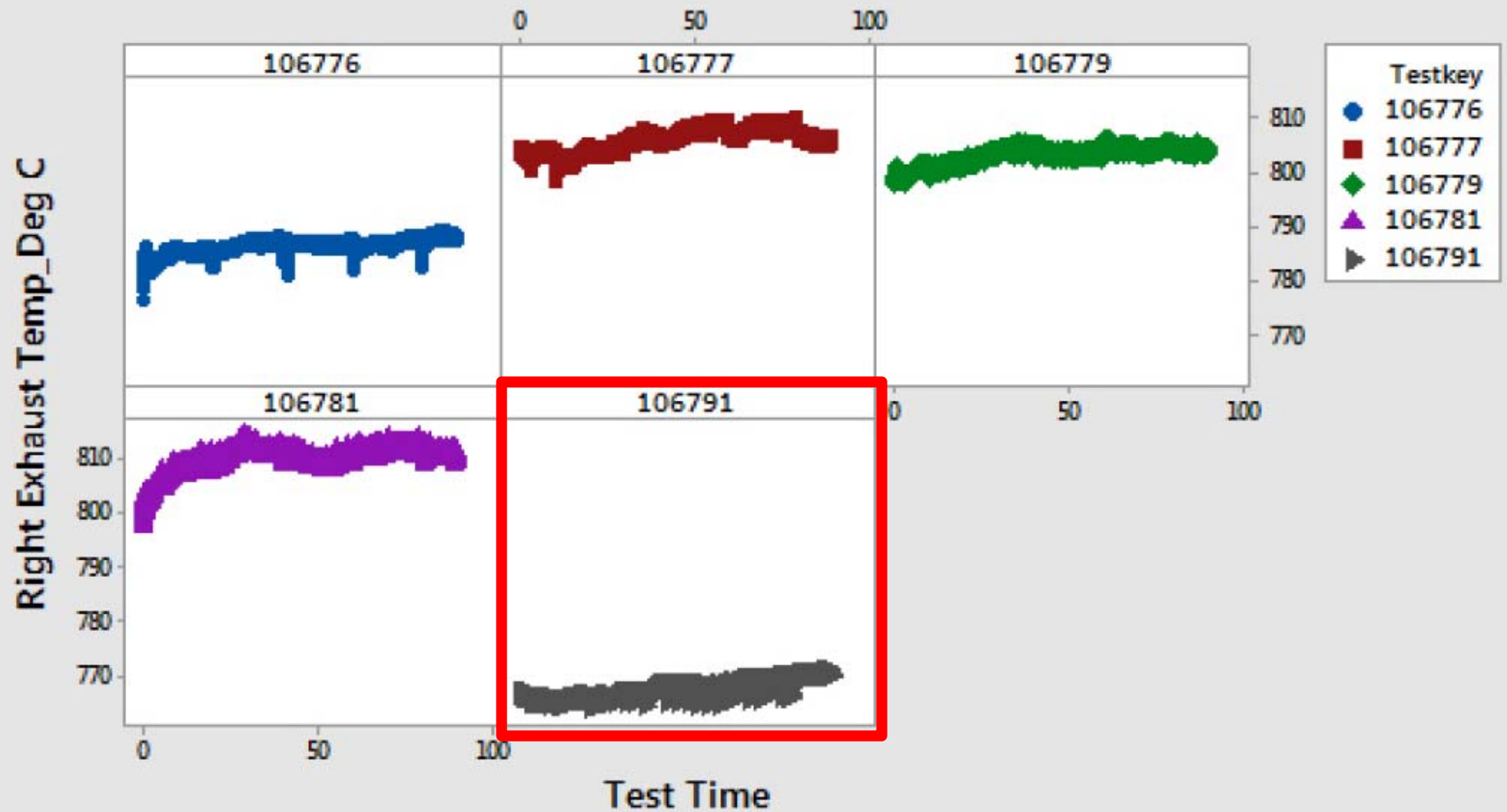
Panel variable: Testkey

Scatterplot of Oil Sump Temp_Deg C vs Test Time



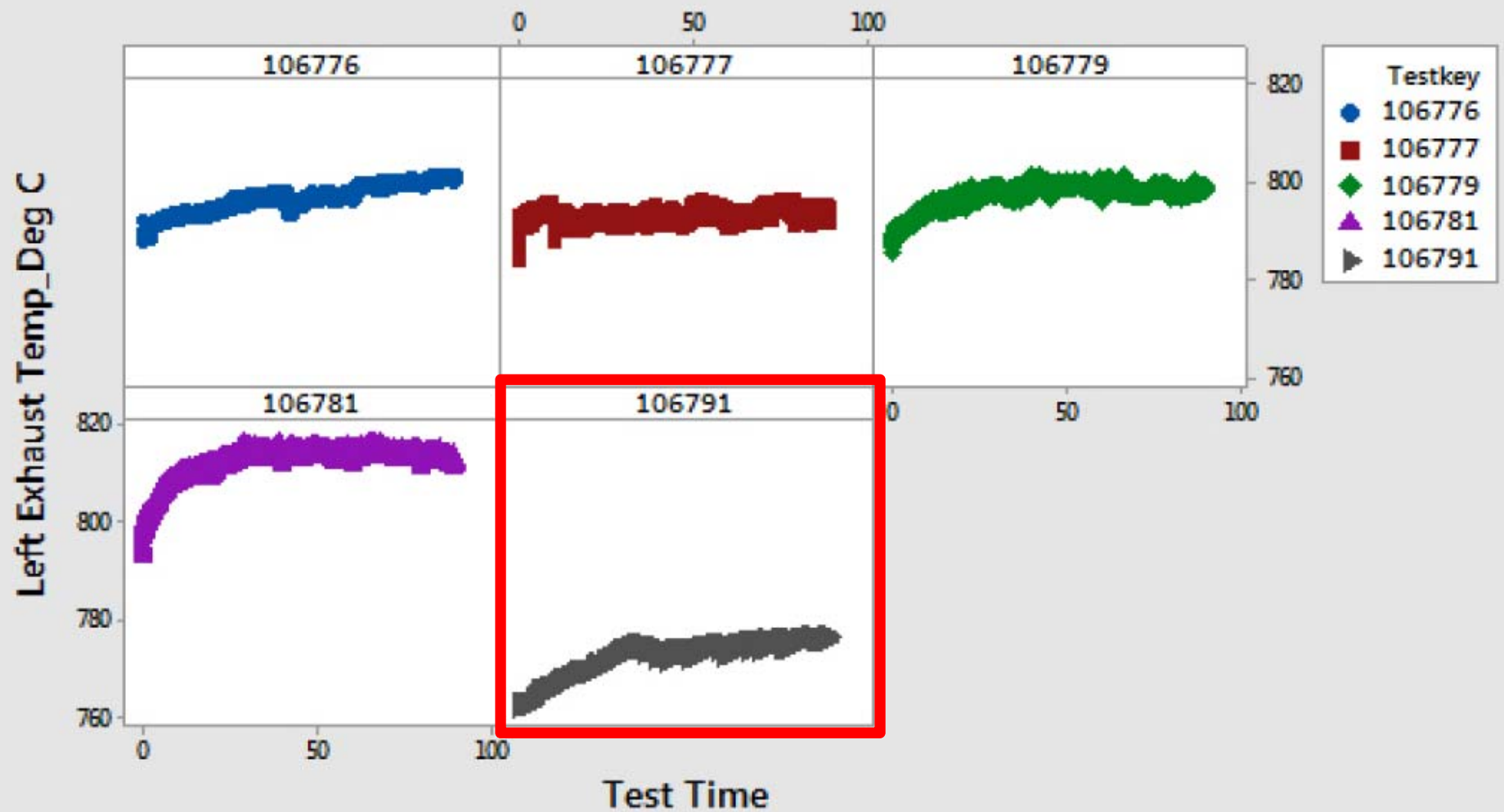
Panel variable: Testkey

Scatterplot of Right Exhaust Temp_Deg C vs Test Time



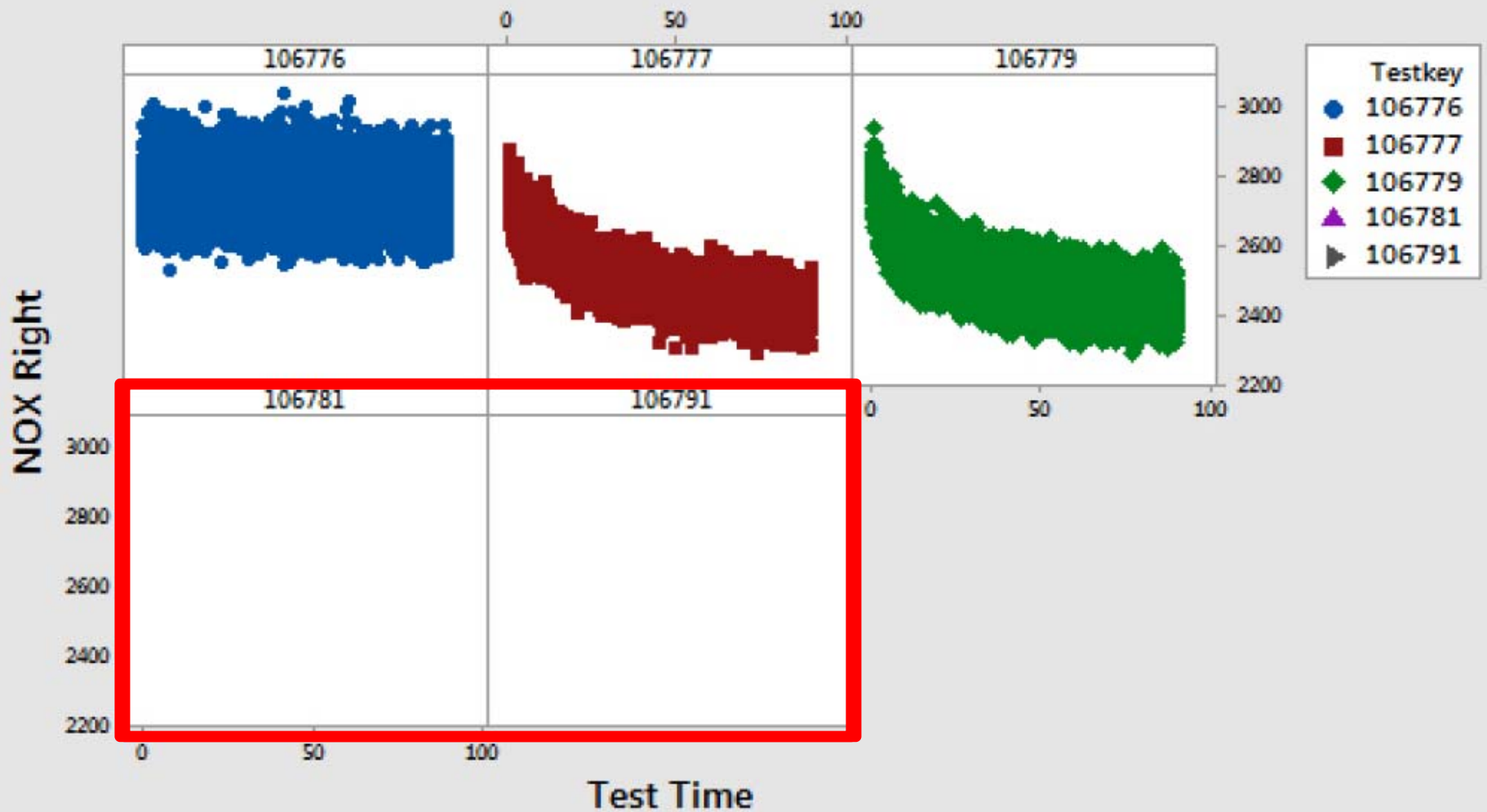
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Scatterplot of Left Exhaust Temp_Deg C vs Test Time



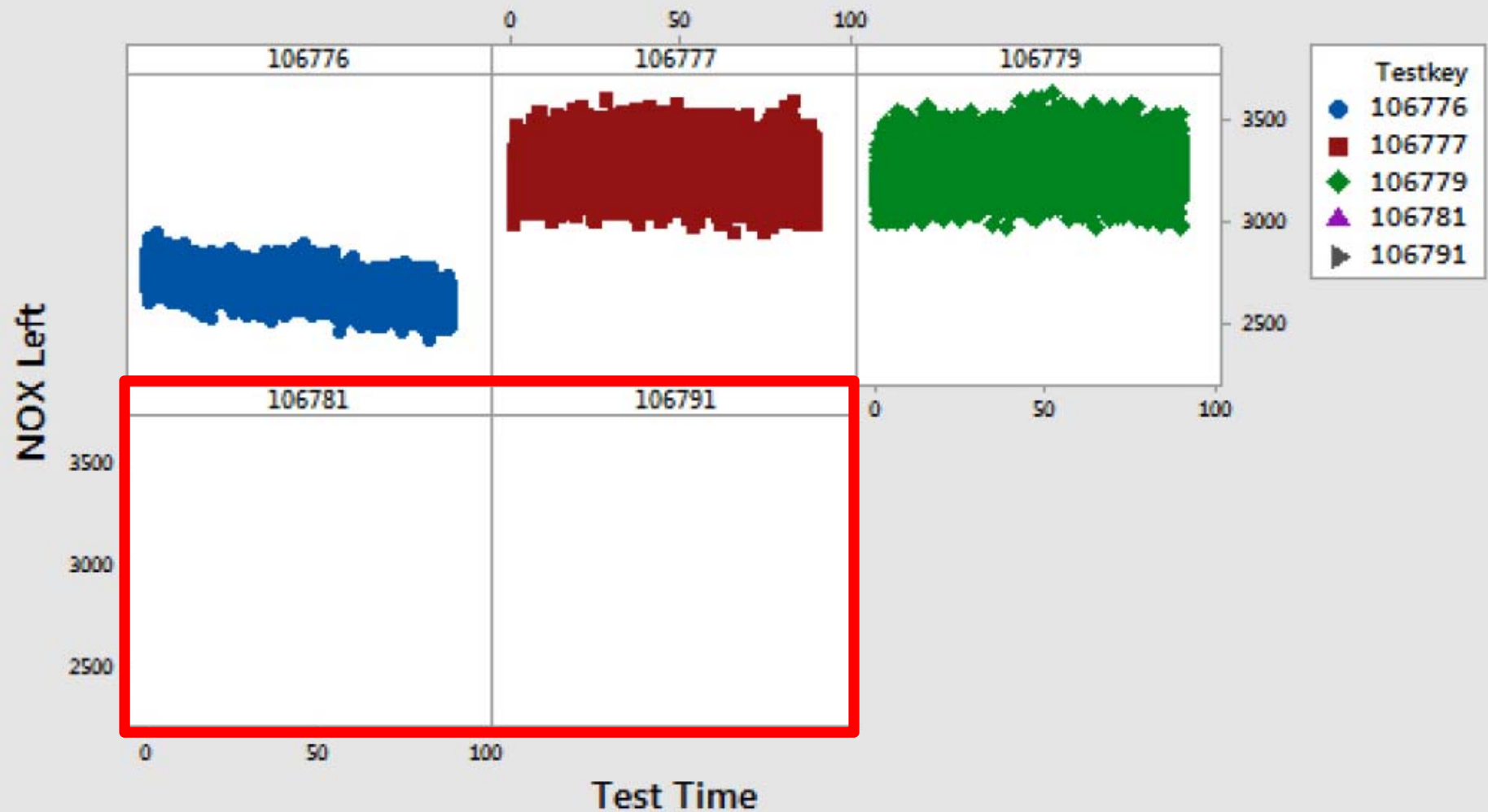
Panel variable: Testkey

Scatterplot of NOX Right vs Test Time



Panel variable: Testkey

Scatterplot of NOX Left vs Test Time



Panel variable: Testkey

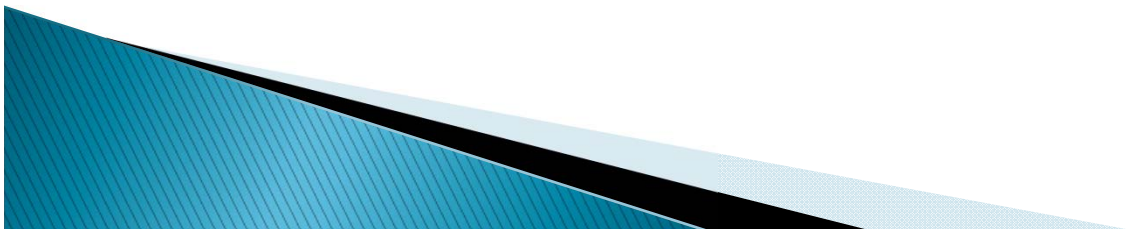
CMIR 106781

- ▶ Oil Pump Temperature
 - Found -1.3°C offset relative to T-block control temp. Large ambient temp. swings were also observed (75F to 57F for 1st 2 days and 80 F to 47 F for last 2 days) believed to be cause of undulations observed.
- ▶ Oil Sump Temperature
 - Found -1.3°C offset relative to T-block control temp. This thermocouple might have been in the wrong drain plug hole (on the side of pan instead of under-bottom of the pan). These exceptions believed to have been the cause of Oil Sump Temp. showing lower than others.
- ▶ NOx Left and Right
 - NOx gas analysis was performed manually and not with a real time NOx sensor.

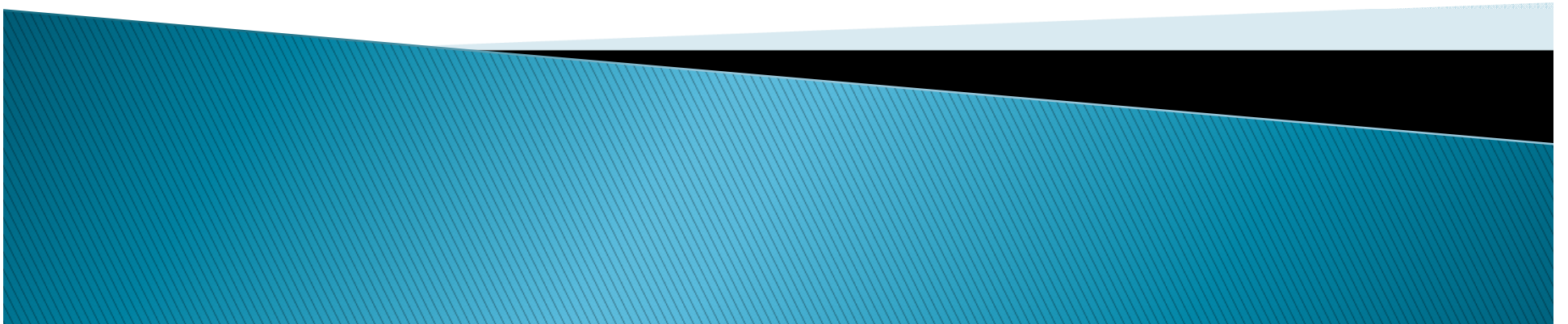


CMIR 106791

- ▶ Right and Left Exhaust Temperature
 - Fans are utilized per procedure to cool the exhaust turndown pipes. This parameter is also highly dependent on thermocouple insertion depth.
- ▶ NOx Left and Right
 - NOx gas analysis was performed manually and not with a real time NOx sensor.



Questions?





A Program of ASTM International

Test Monitoring Center

<http://astmtmc.cmu.edu>

Attachment #2

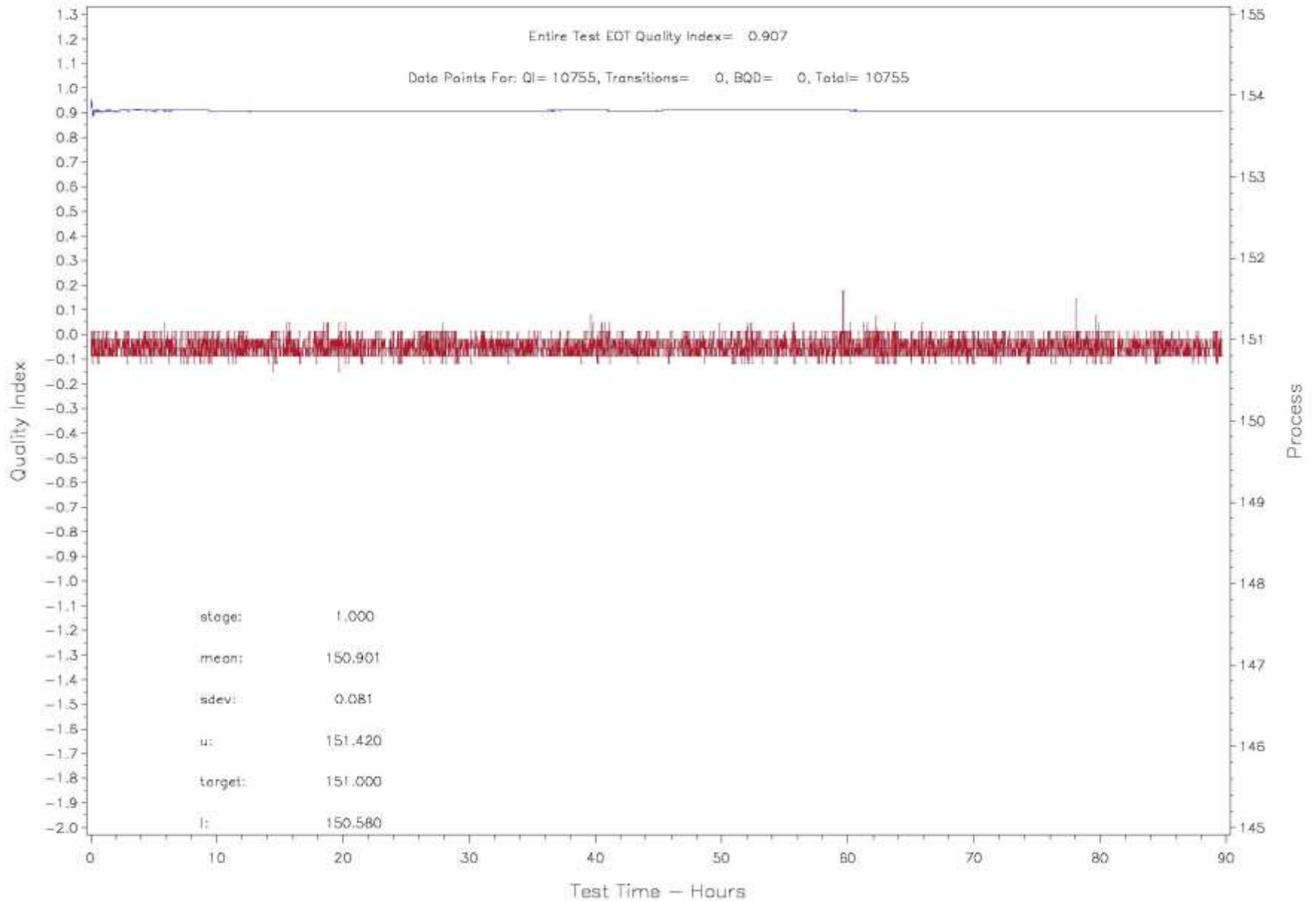
QI Plots from I c@Matrix Tests

Block Oil Temperature

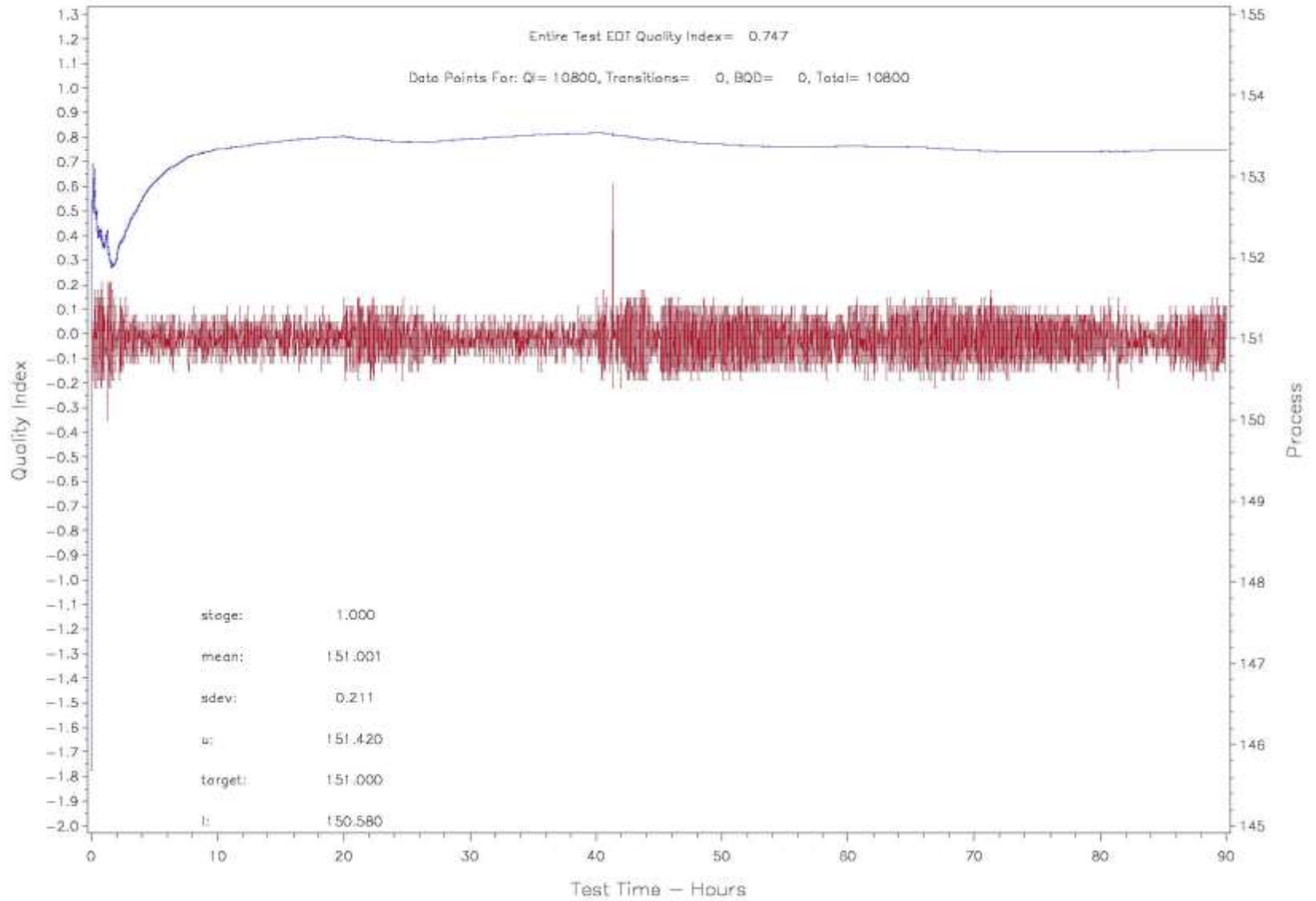
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Oil Filter Block Temperature - Degrees C (CONTROL)
 LAB= D Stand= CB106 CMR= 106791

Entire Test EOT Quality Index= 0.907

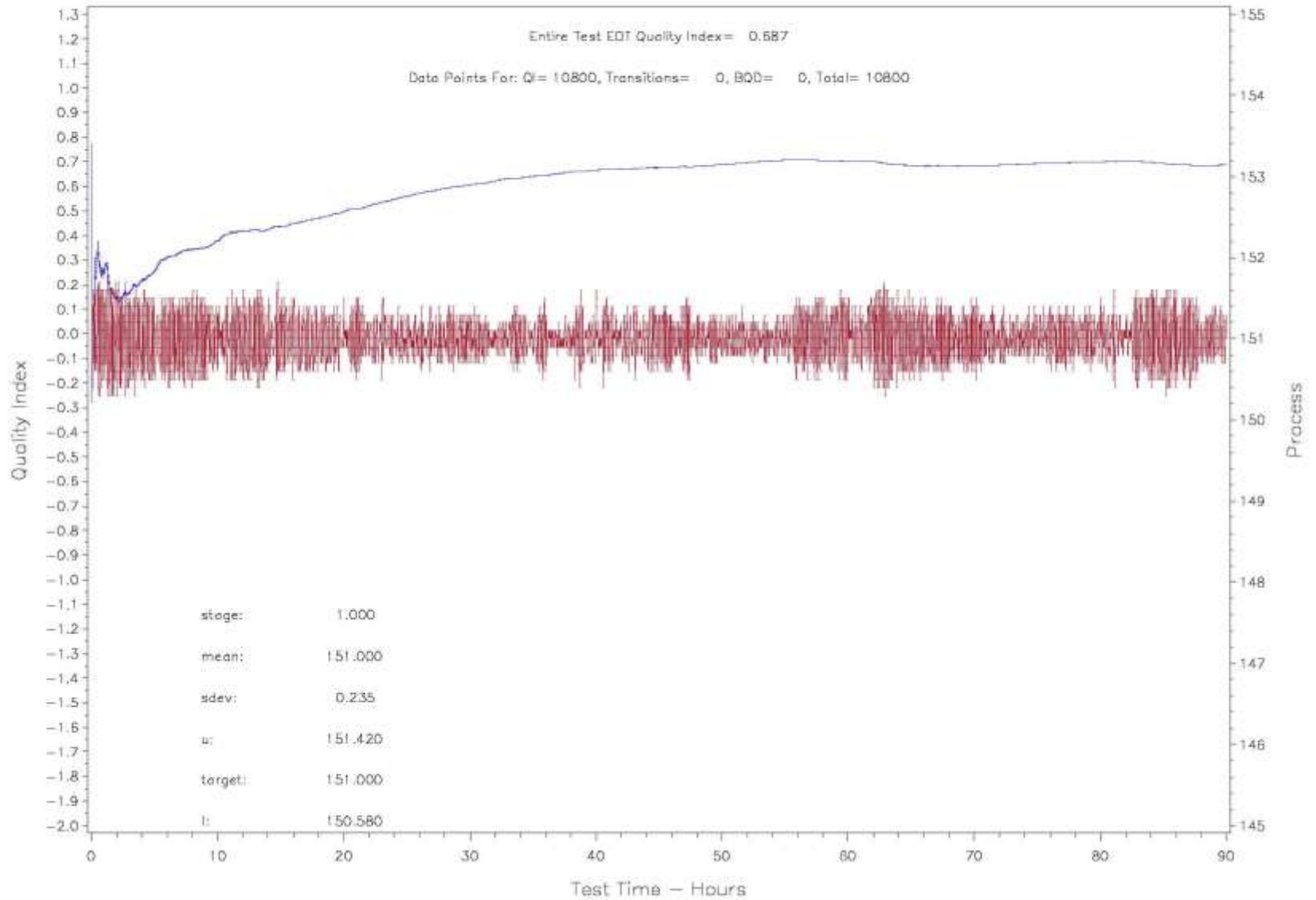
Data Points For: QI= 10755, Transitions= 0, BQD= 0, Total= 10755



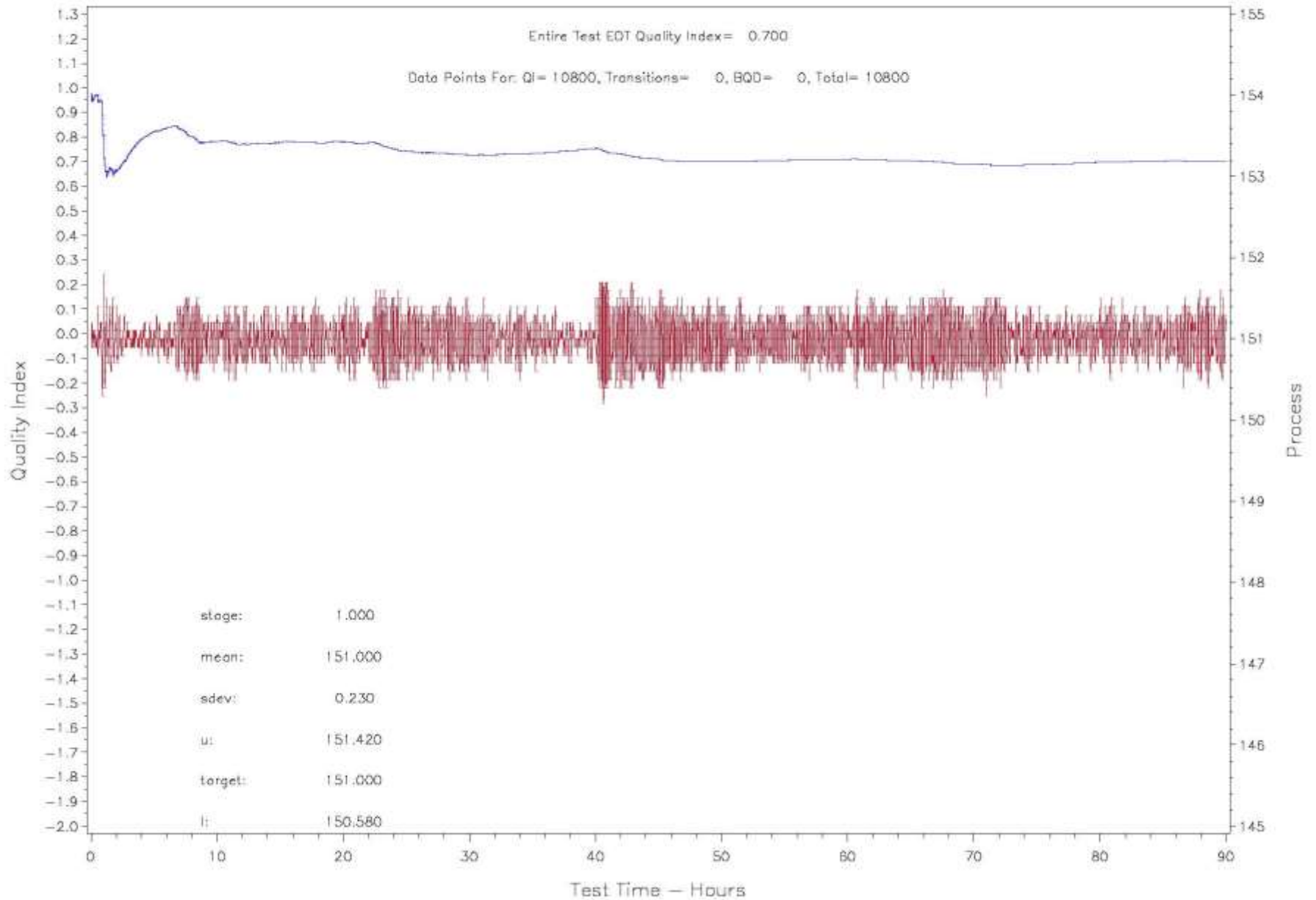
IIIH QUALITY INDEX OPERATIONAL REVIEW
QI Filter Block Temperature - Degrees C (CONTROL)
LAB= A Stand= 2 CMIR= 106776



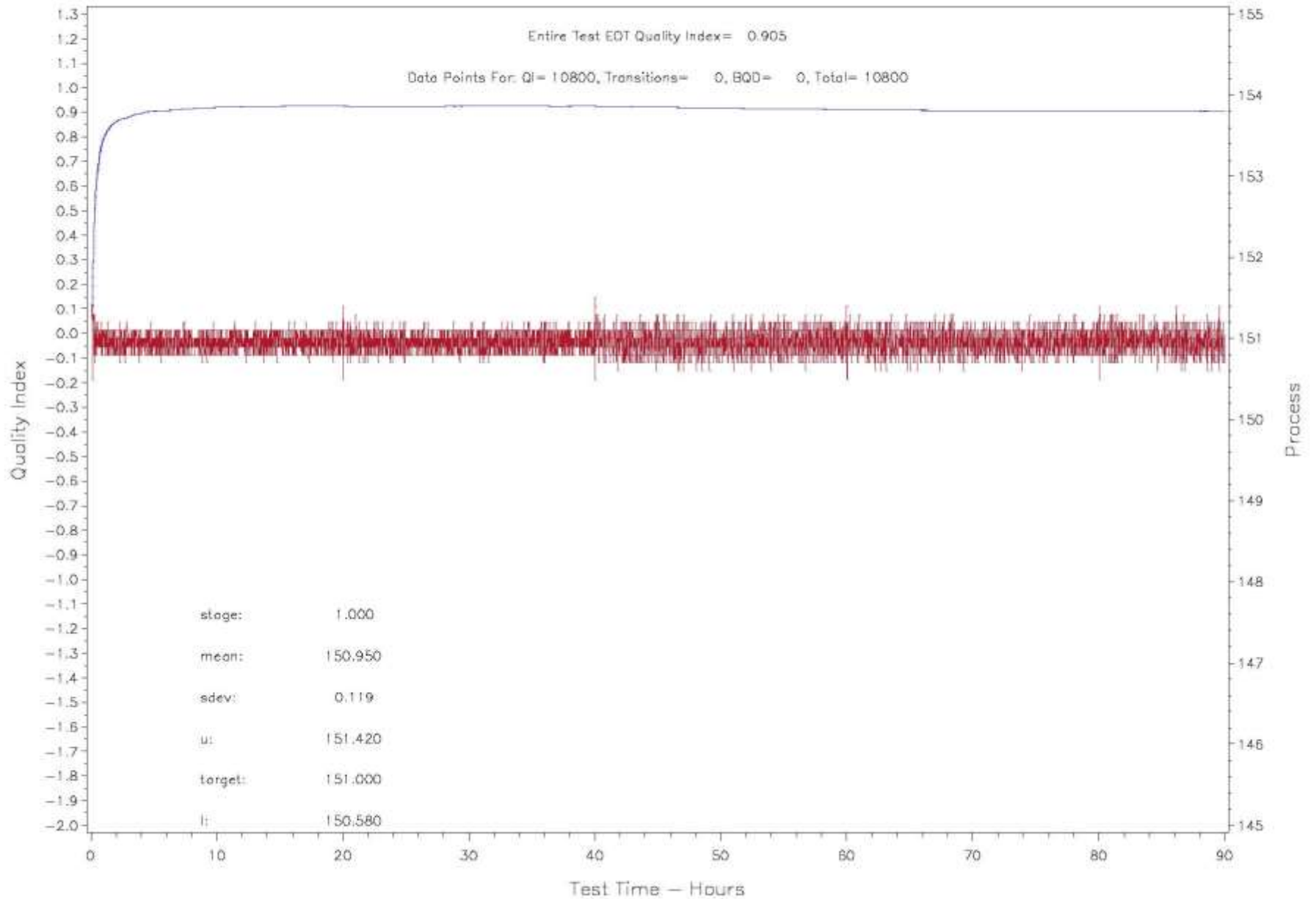
IIIH QUALITY INDEX OPERATIONAL REVIEW
QI Filter Block Temperature - Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 106777



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Oil Filter Block Temperature – Degrees C (CONTROL)
 LAB= A Stand= 1 CMR= 106779

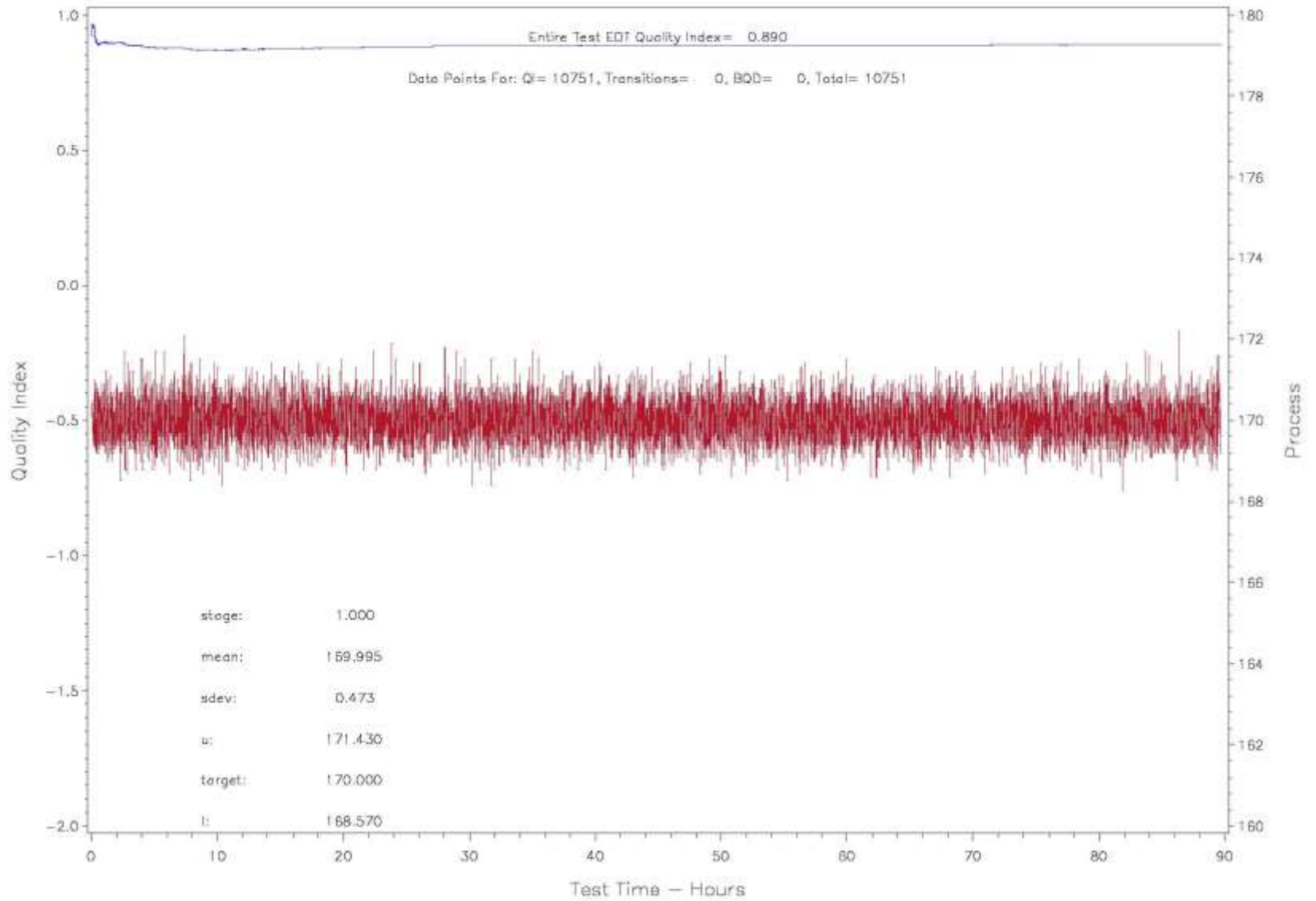


IIIH QUALITY INDEX OPERATIONAL REVIEW
 Oil Filter Block Temperature - Degrees C (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

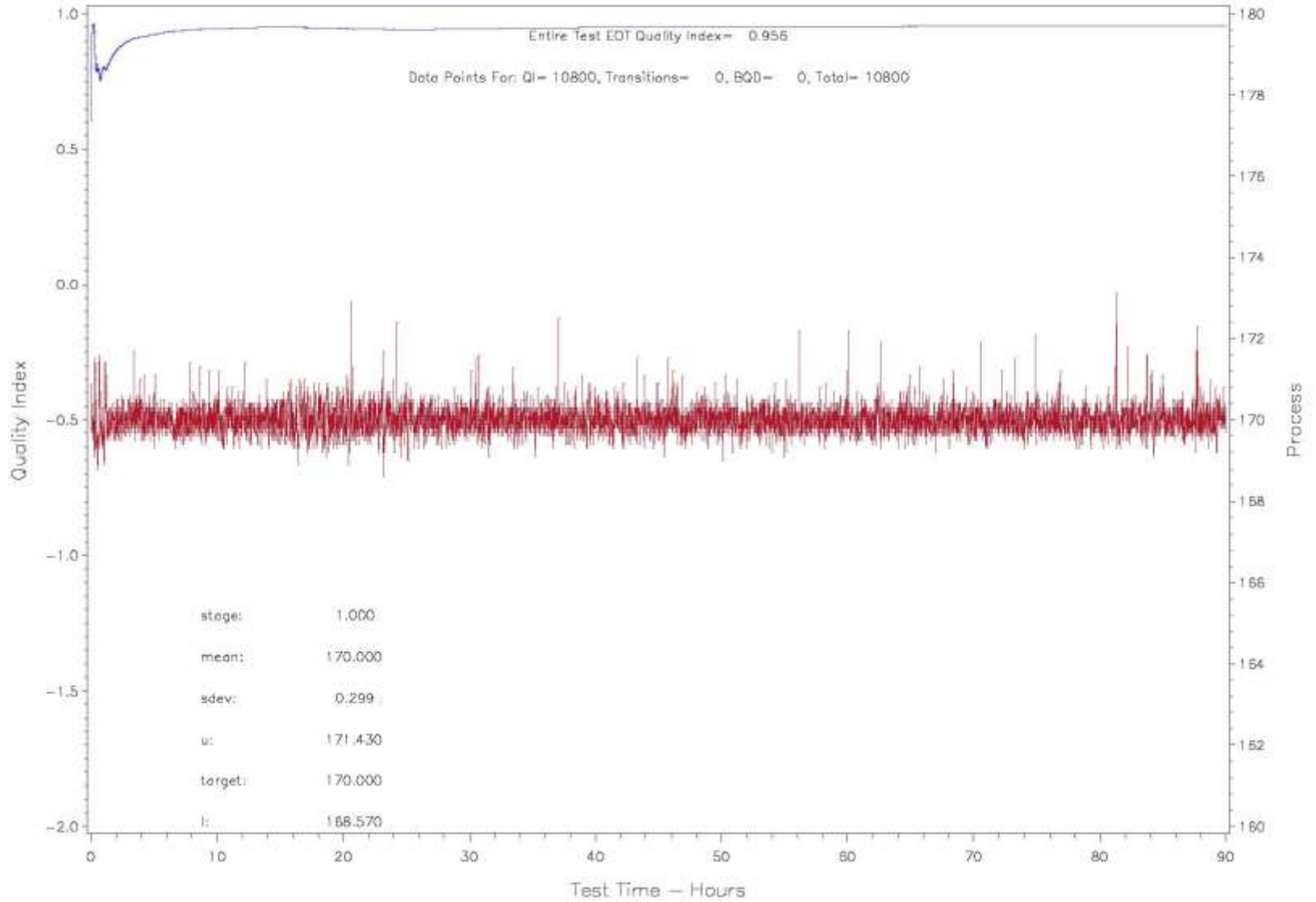


Coolant Flow

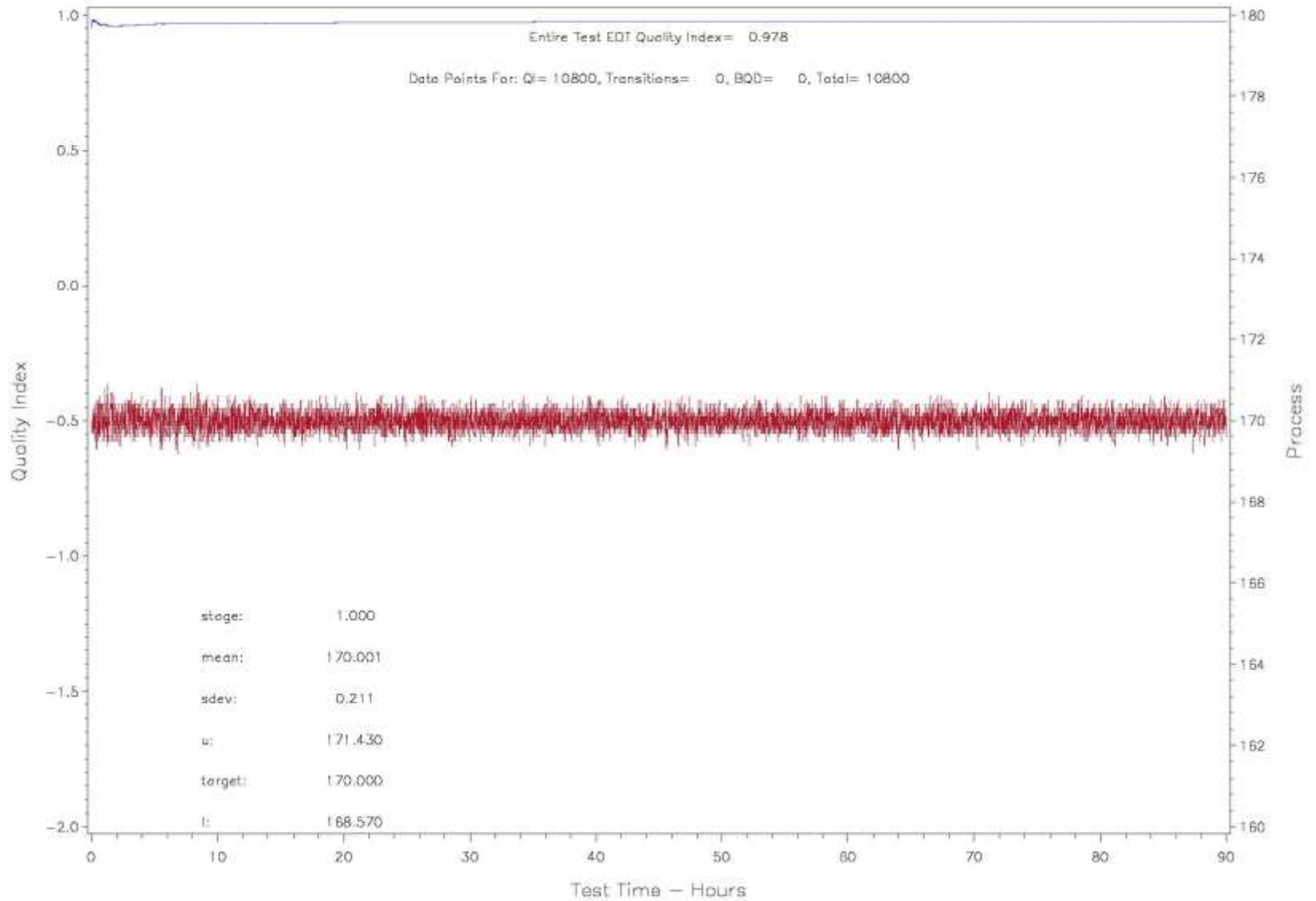
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Coolant Flow - L/min (CONTROL)
LAB= D Stand= DB1DB DMR= 106791



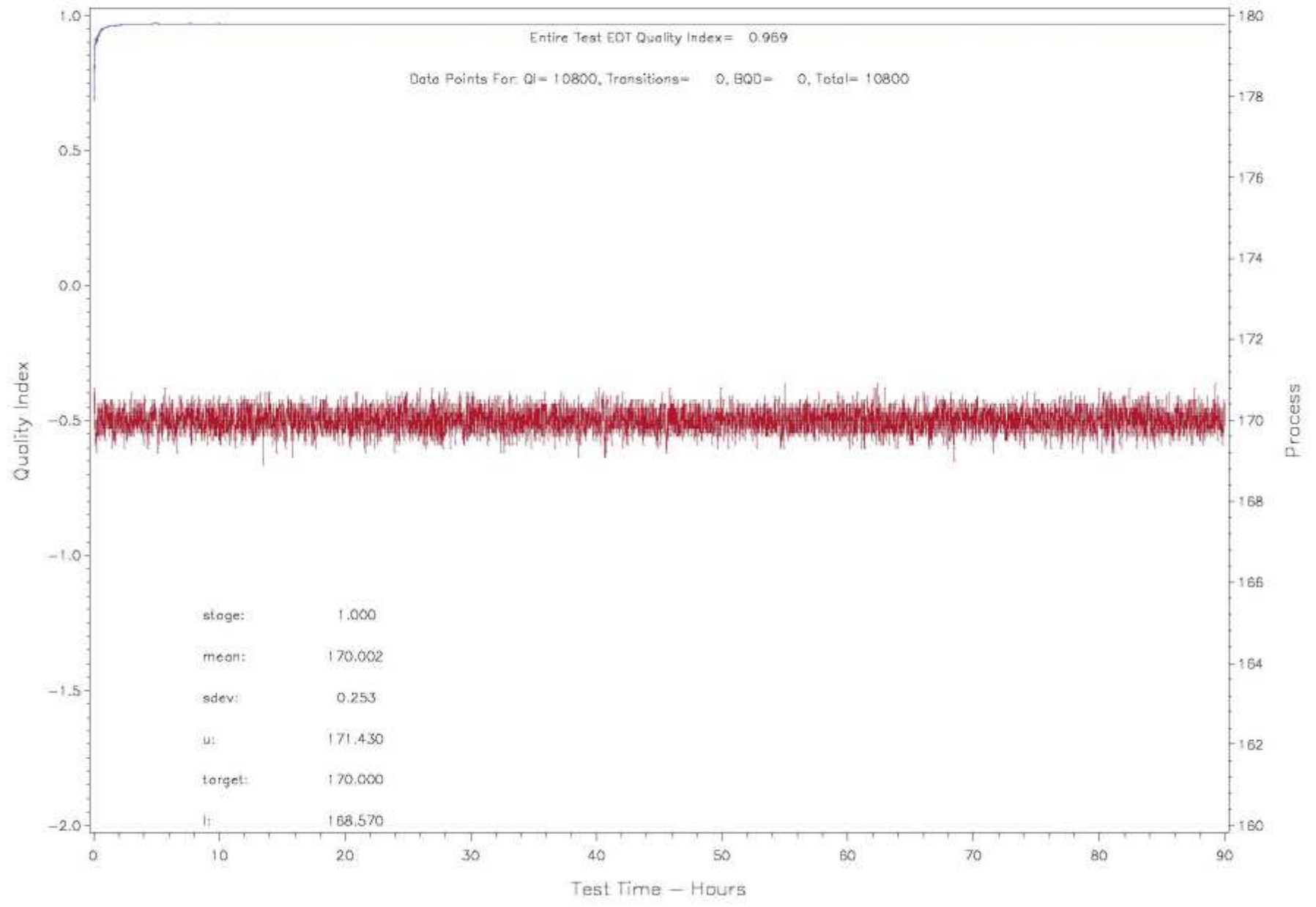
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Engine Coolant Flow - L/min (CONTROL)
 LAB= A, Stand= 2, DM# = 106776



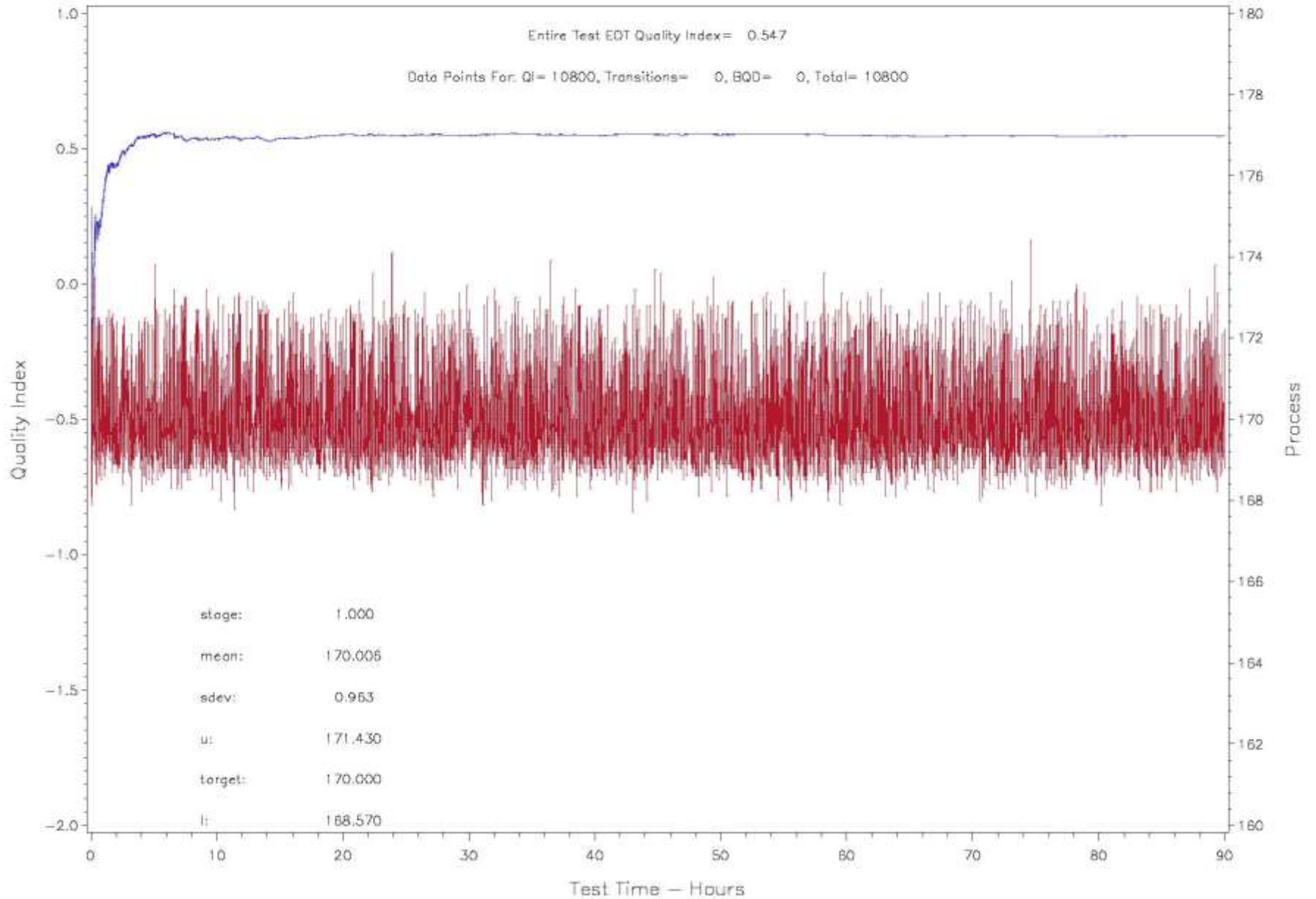
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Engine Coolant Flow - L/min (CONTROL)
 LAB= A Stand= 1 CMIR= 106777



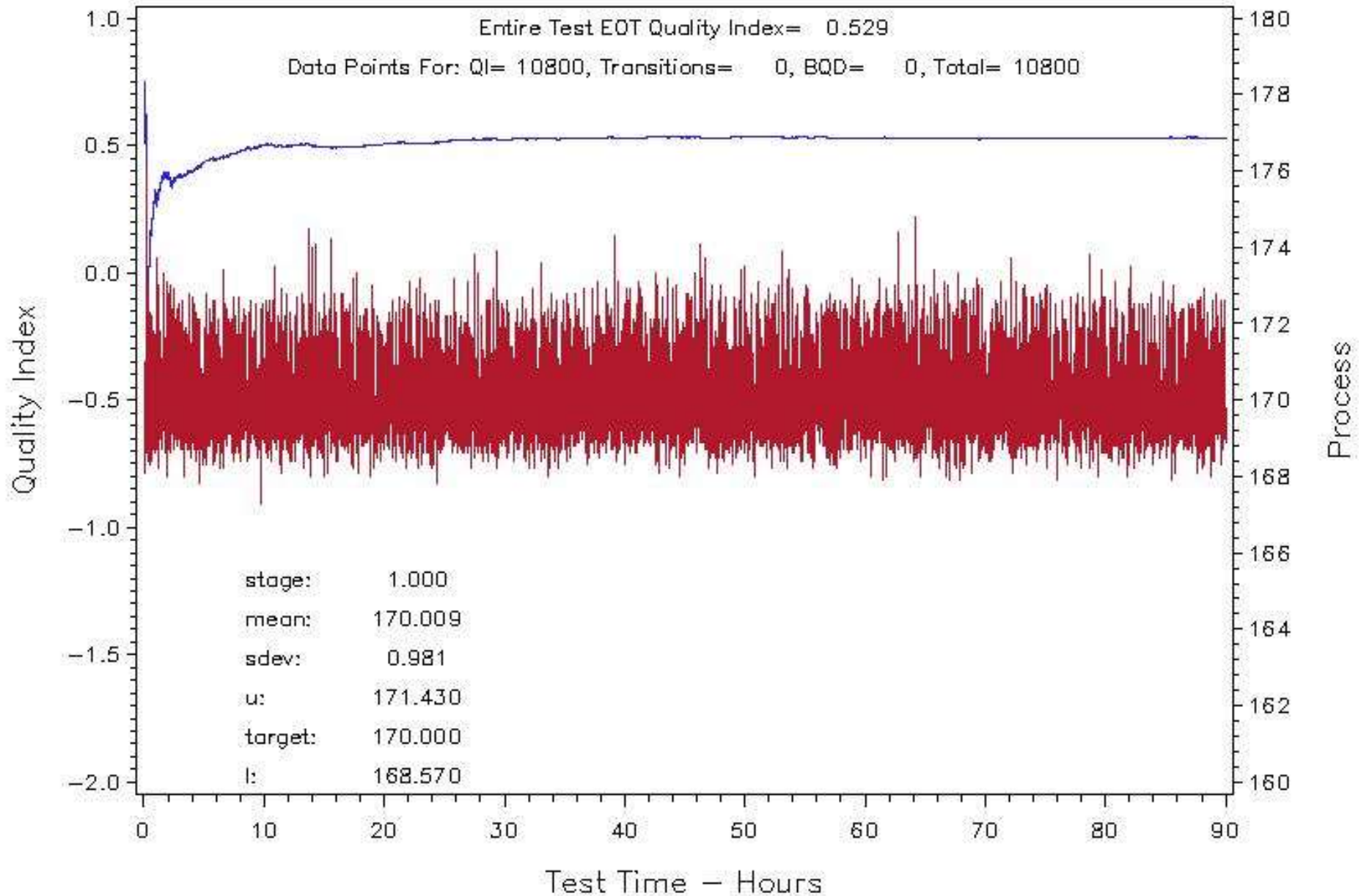
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Coolant Flow - L/min (CONTROL)
LAB= A Stand= 1 CMR= 10677B



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Engine Coolant Flow - L/min (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

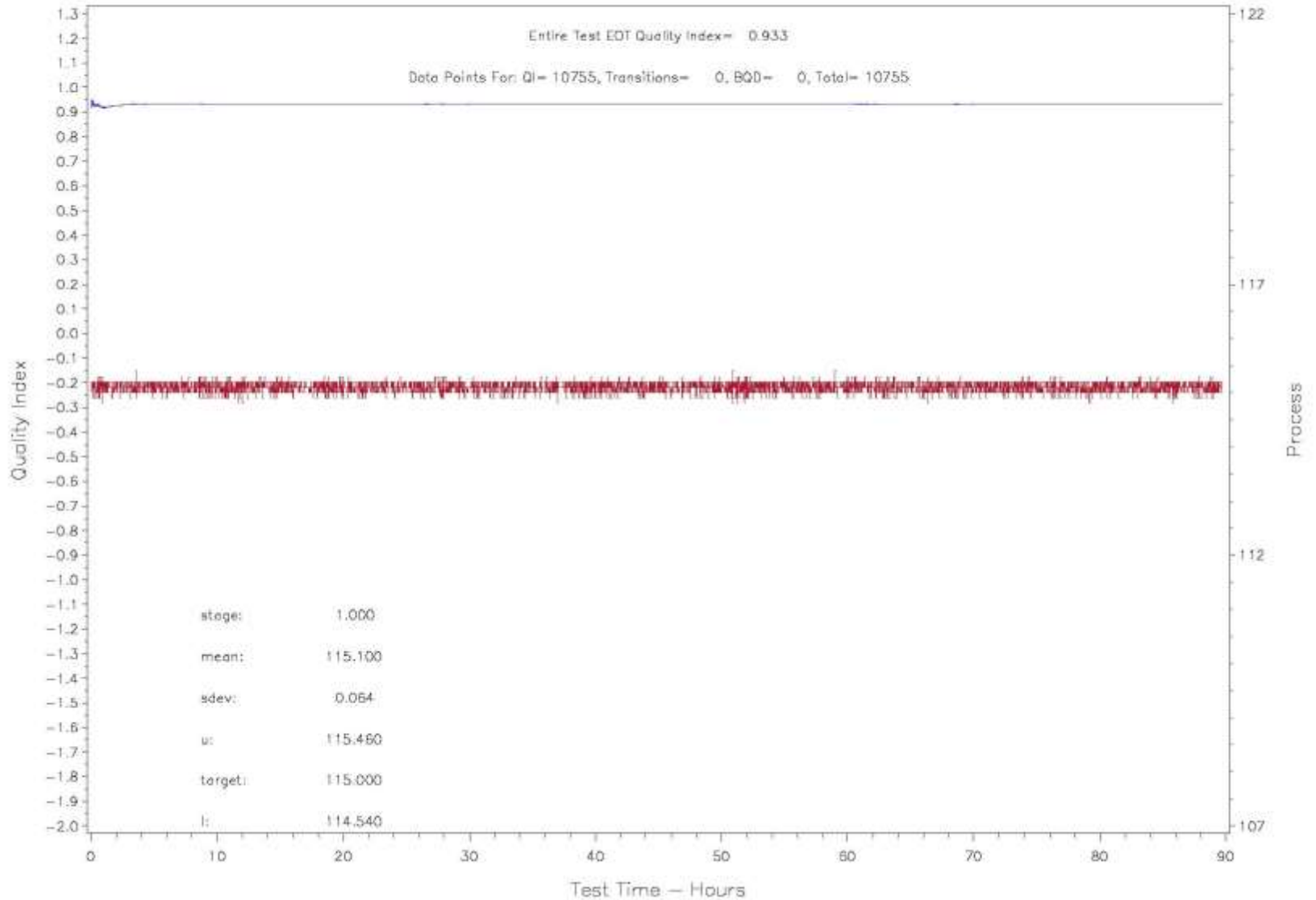


IIH QUALITY INDEX OPERATIONAL REVIEW
Engine Coolant Flow – L/min (CONTROL)
LAB= E Stand= 3 CMIR= 106780

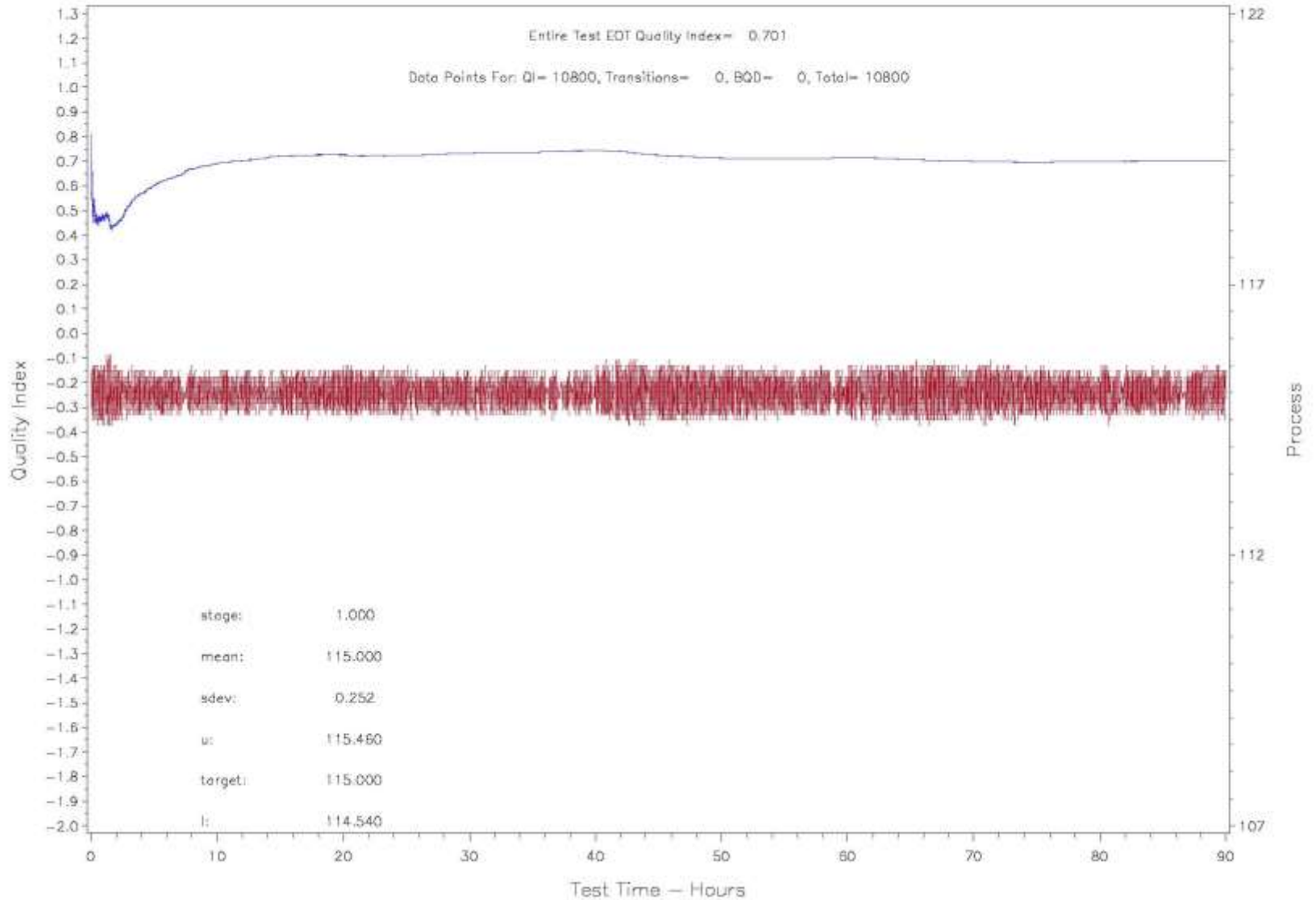


Coolant Out Temperature

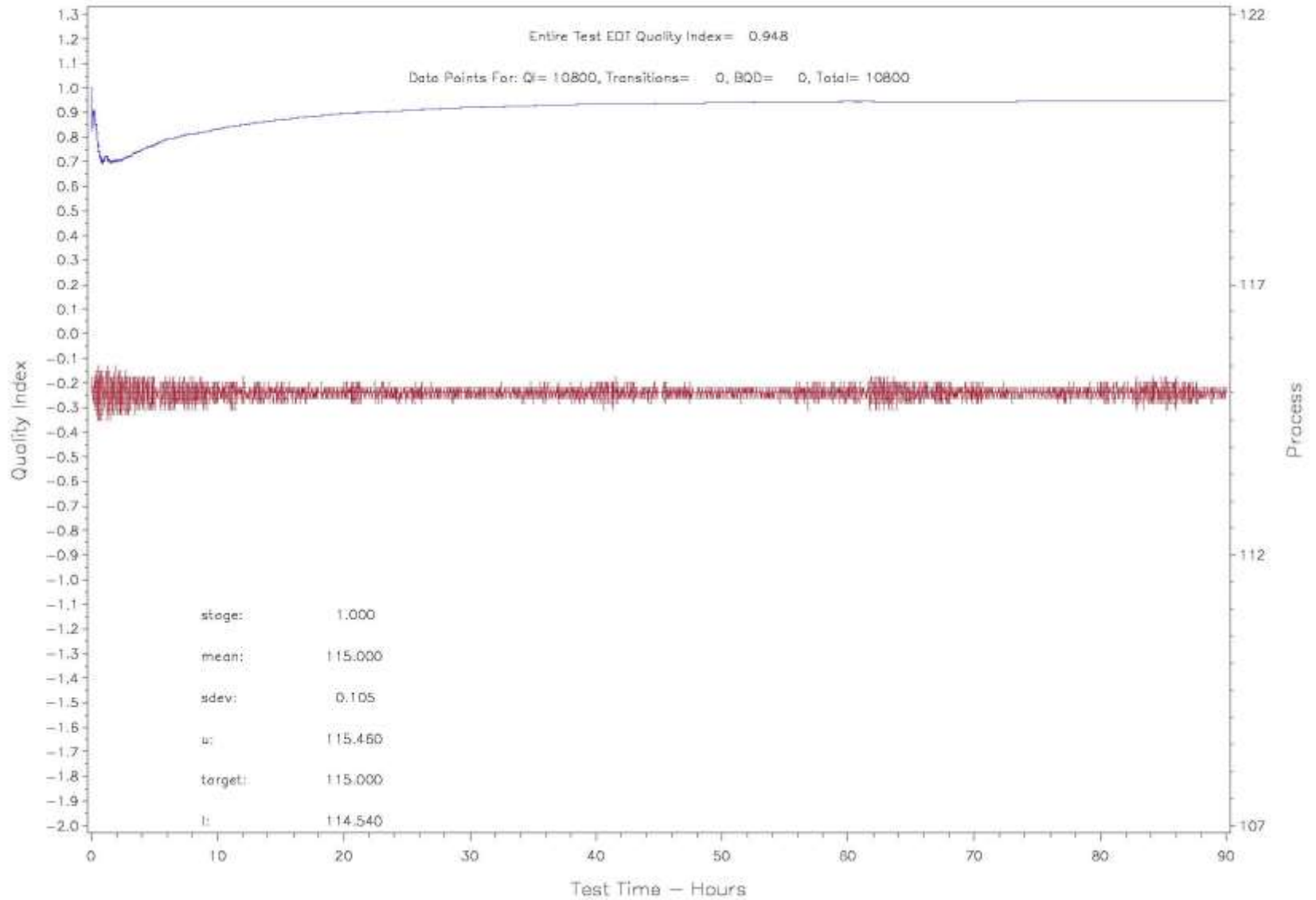
IIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature - Degrees C (CONTROL)
LAB= D Stand= CB106 CMIR= 106793



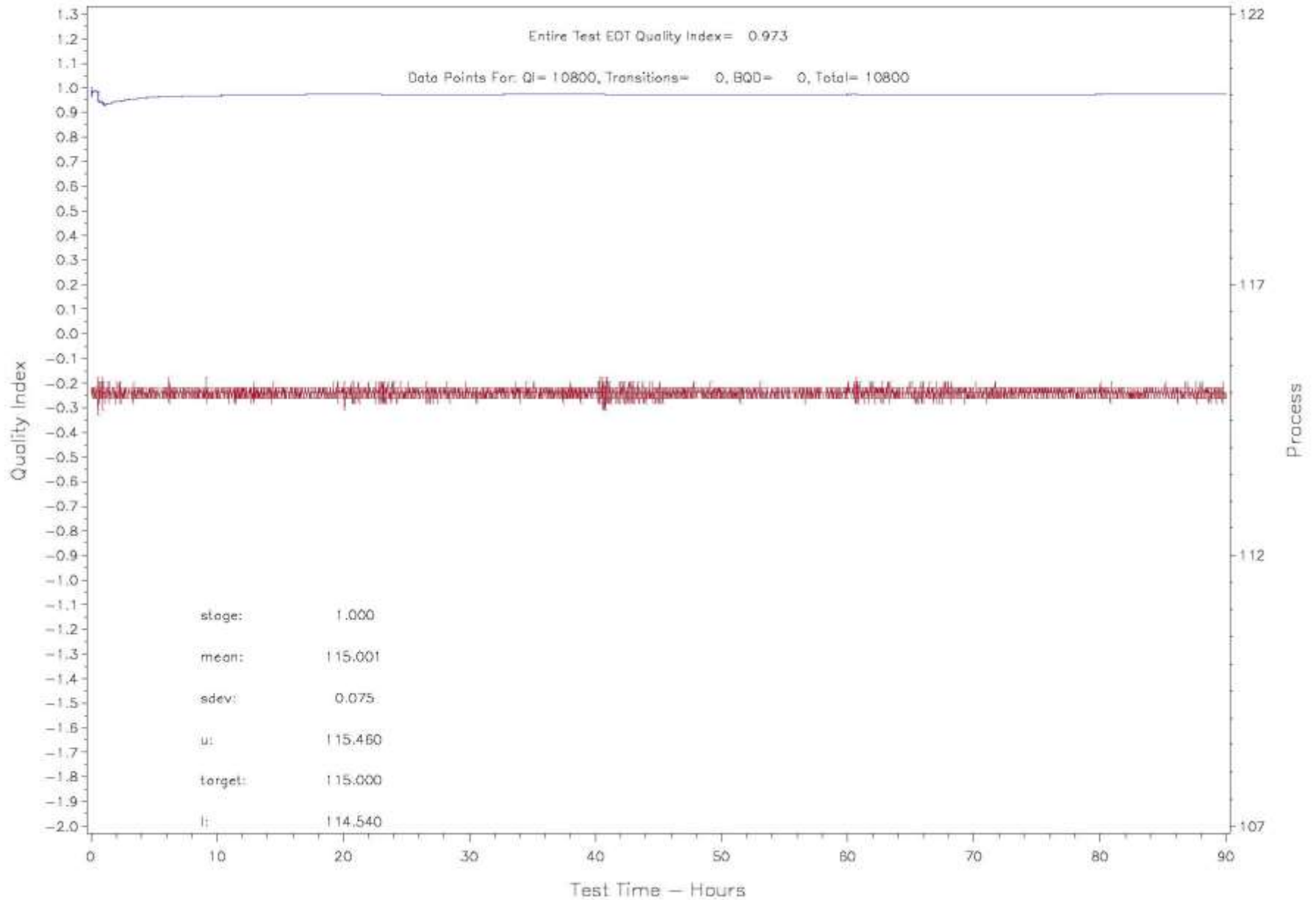
IIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature - Degrees C (CONTROL)
LAB= A Stand= 2 DMR= 106776



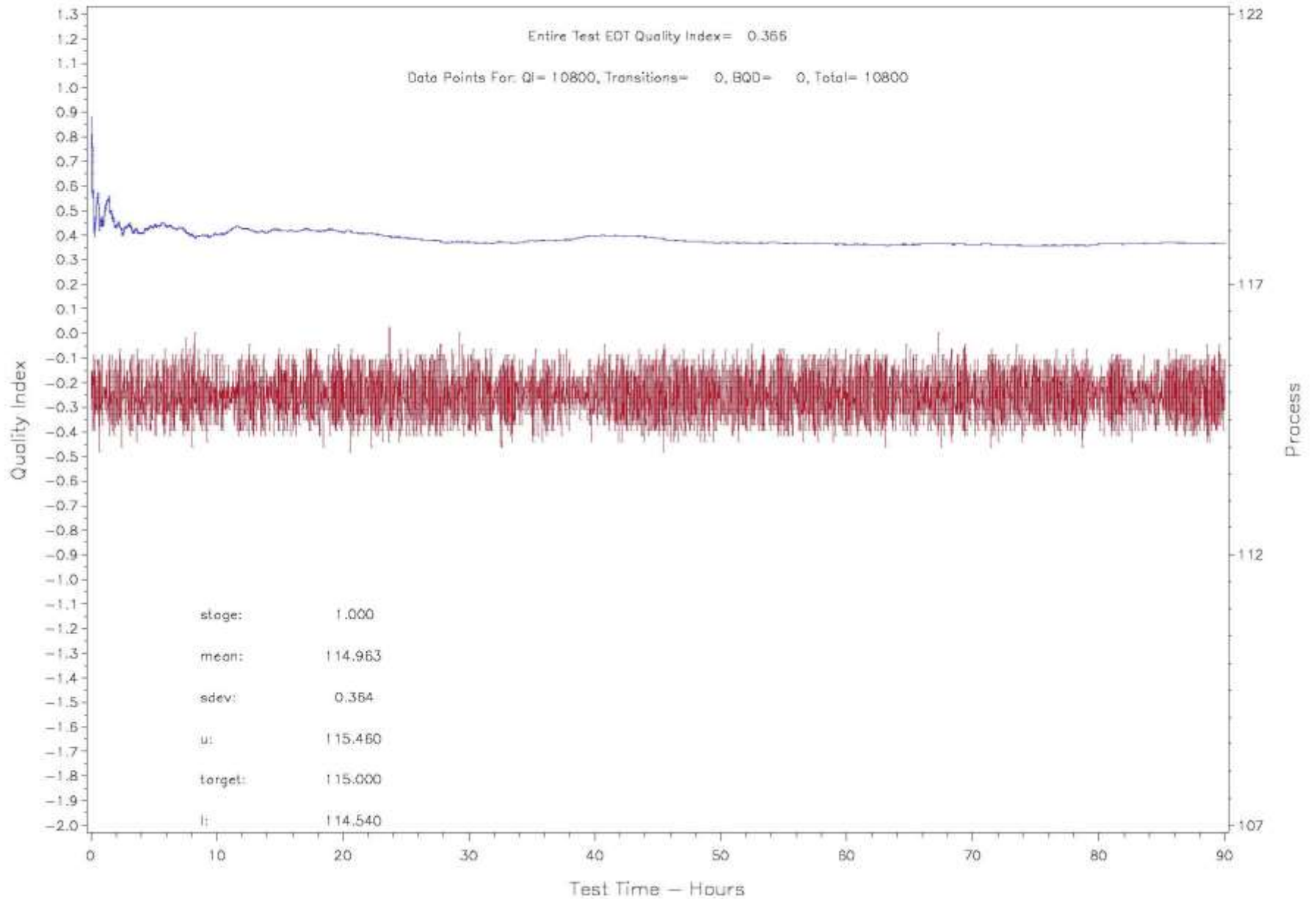
IIIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature - Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 106777



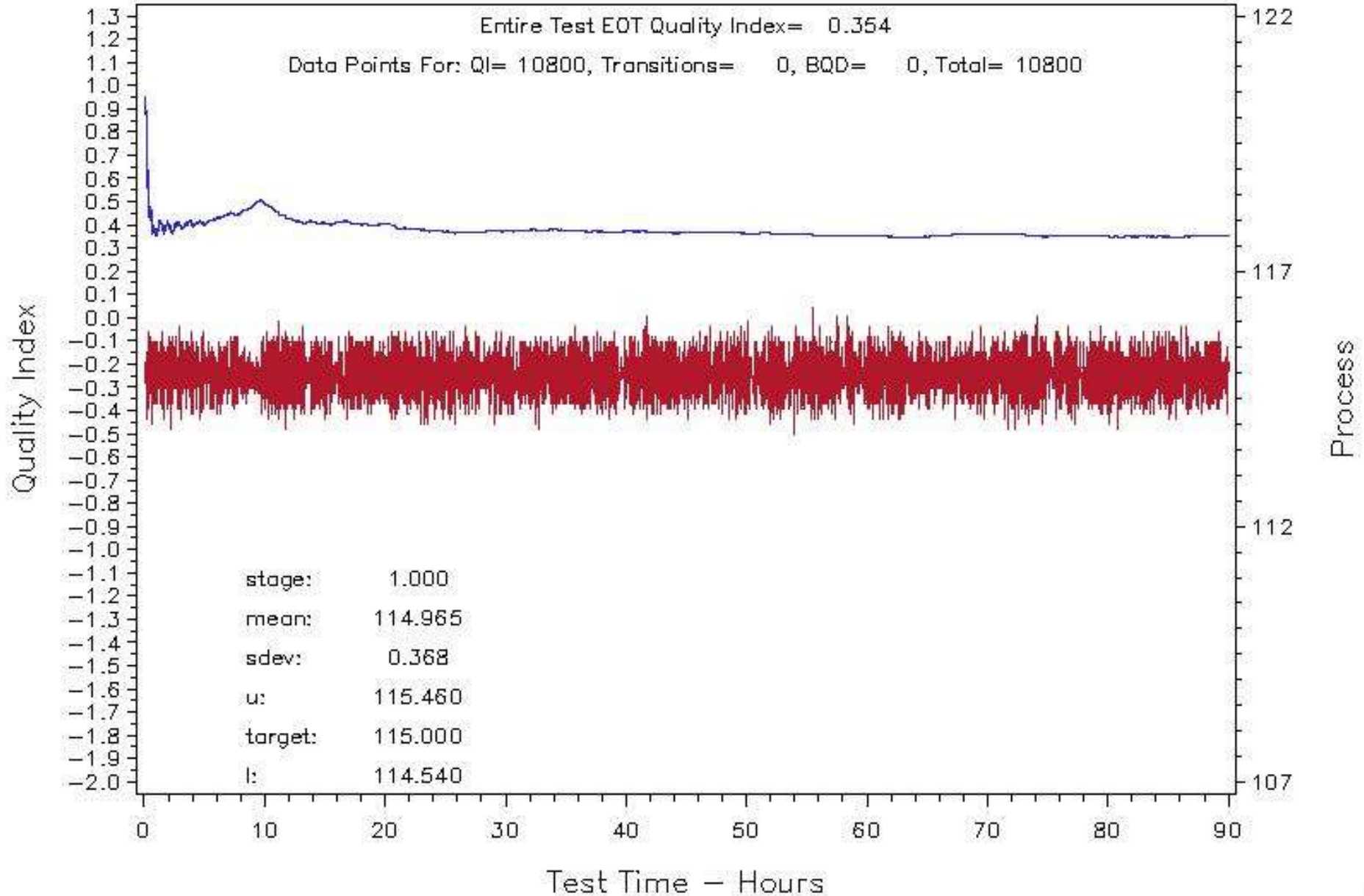
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Coolant Out Temperature – Degrees C (CONTROL)
 LAB= A Stand= 1 CMR= 10677B



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Coolant Out Temperature – Degrees C (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

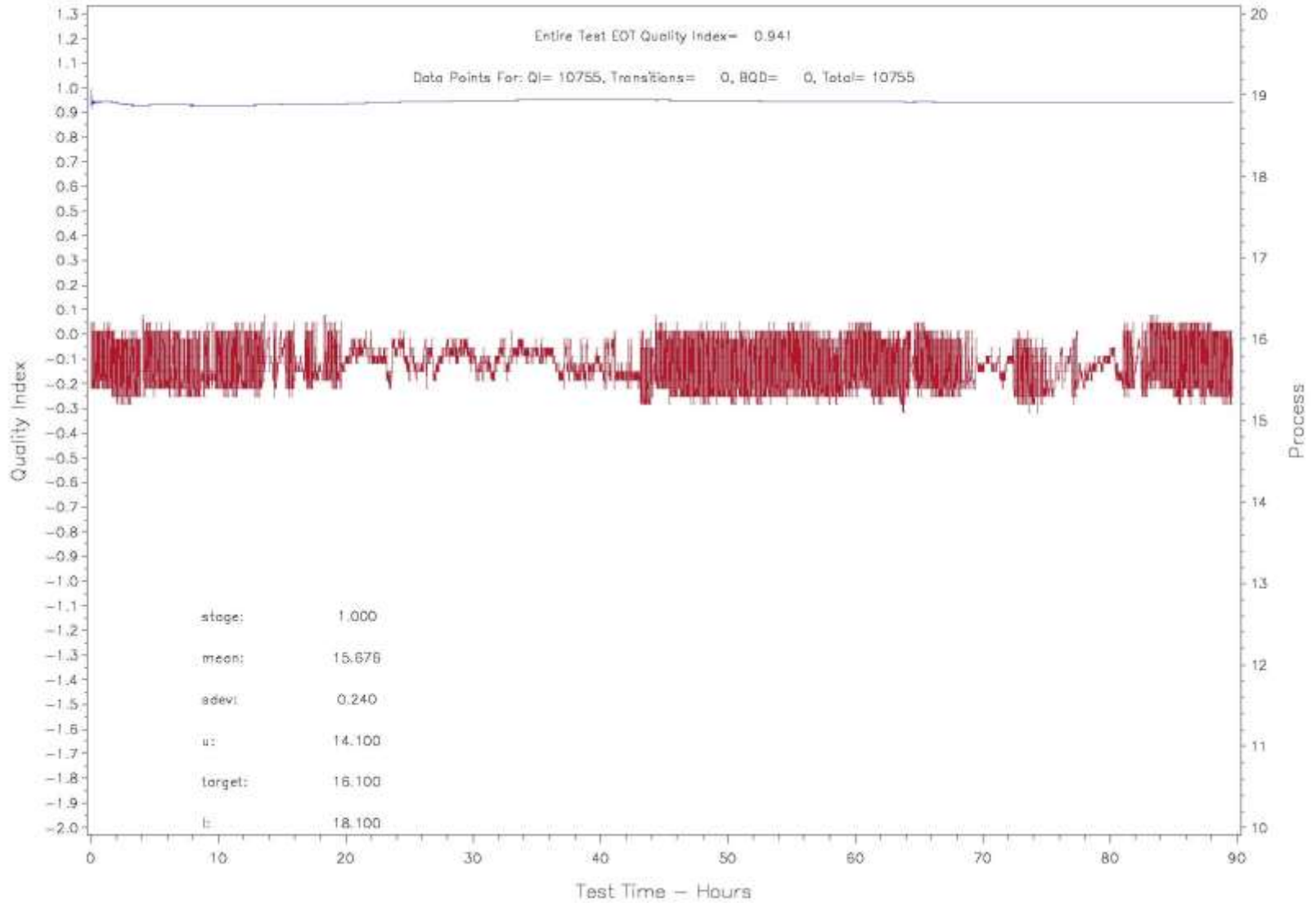


IIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

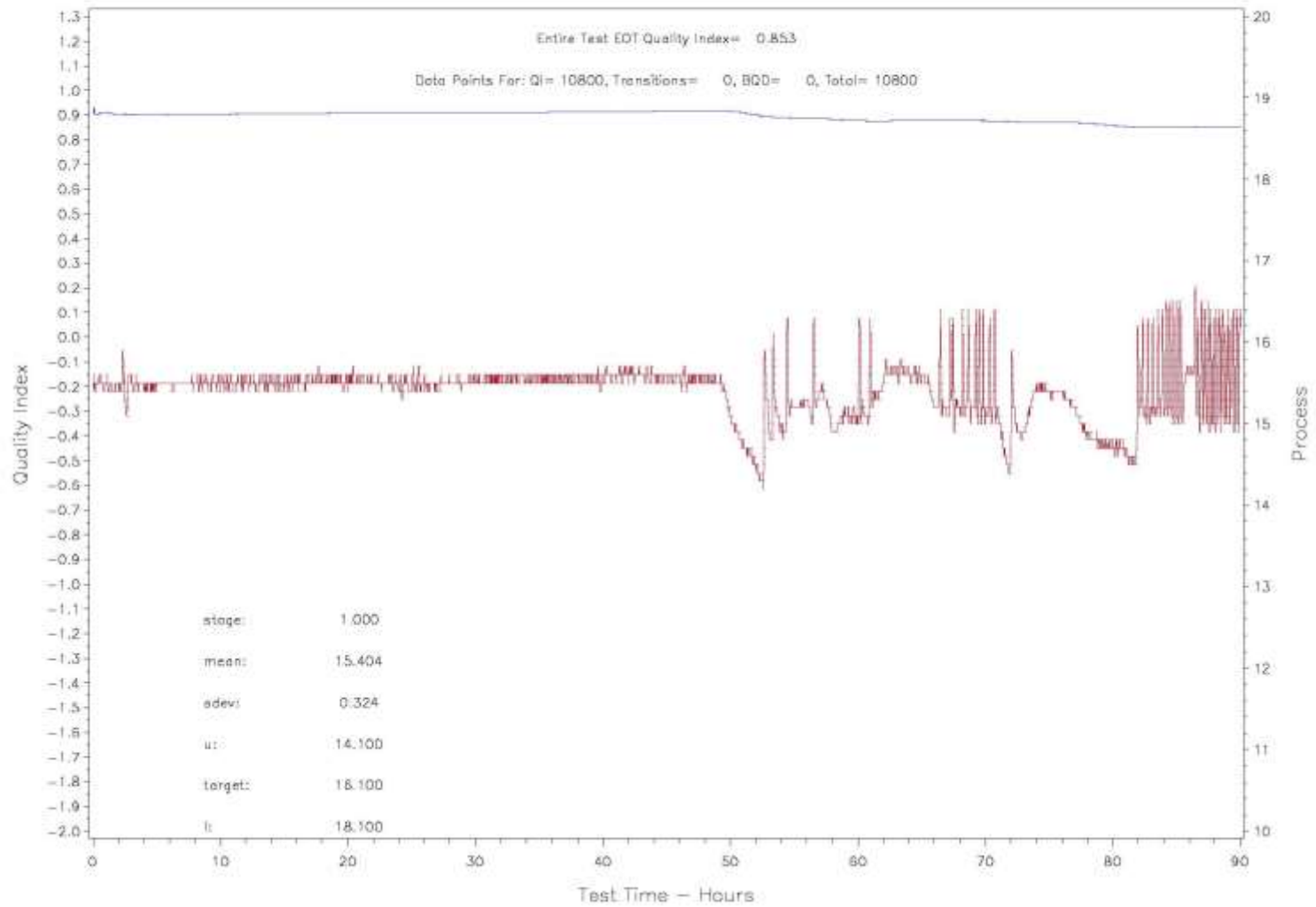


Dew Point Temperature

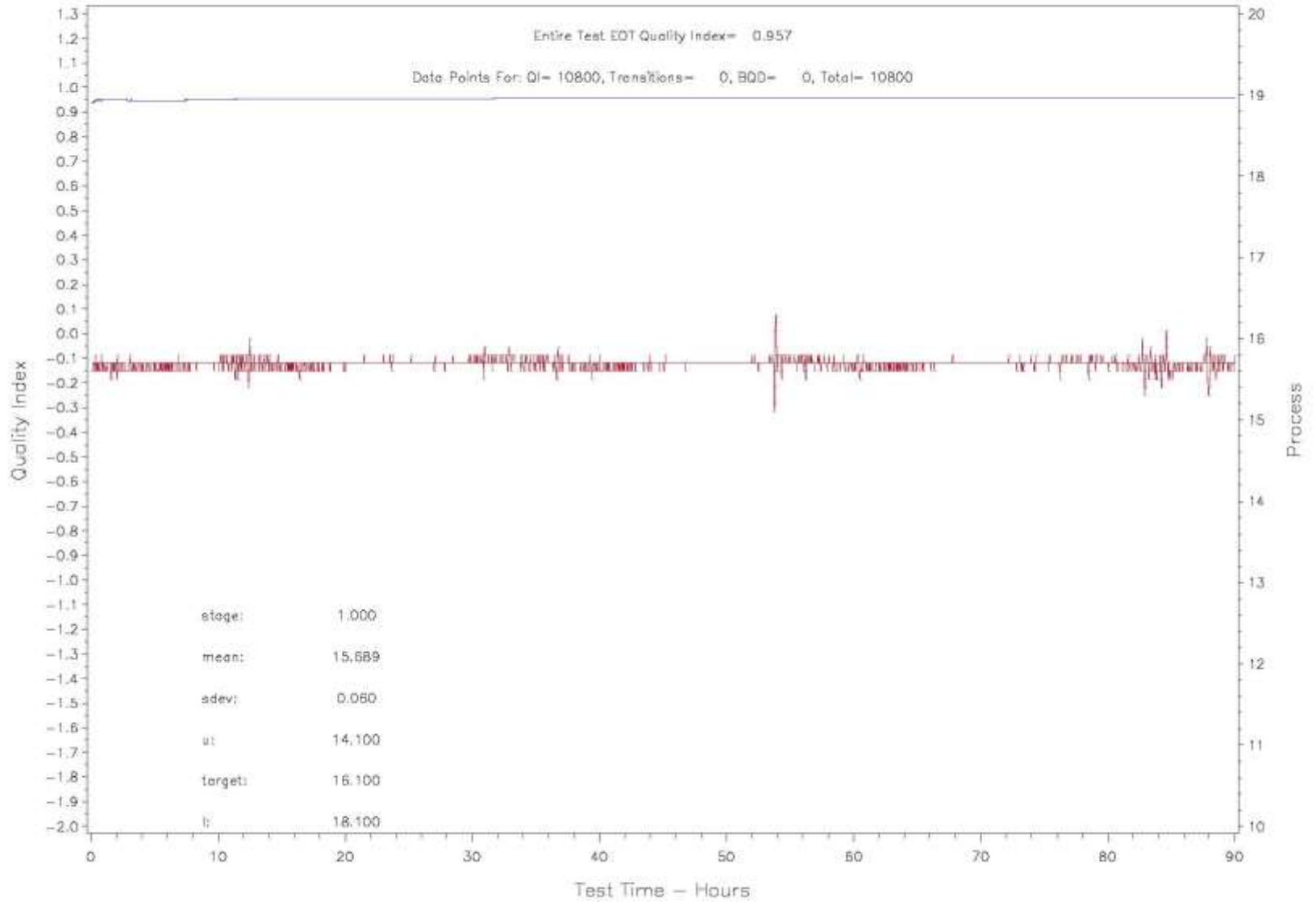
III QUALITY INDEX OPERATIONAL REVIEW
Inlet Air Dew Point Temperature - Degree C (CONTROL)
LAB= D Stand= CB105-DWR= 106791



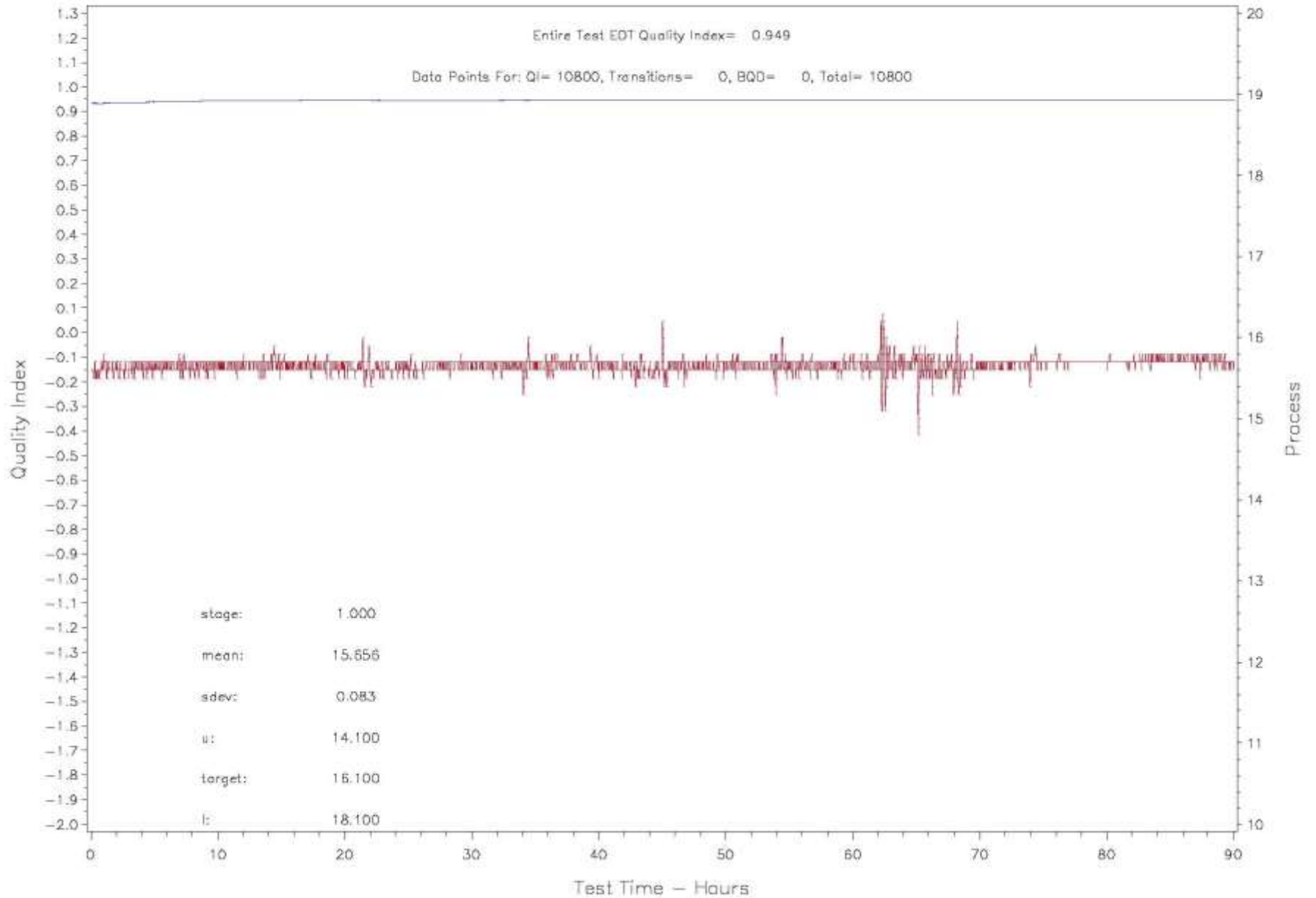
IH QUALITY INDEX OPERATIONAL REVIEW
 Inlet Air Dew Point Temperature — Degree C (CONTROL)
 LAlt= A Stand= 2 CWIR= 156776



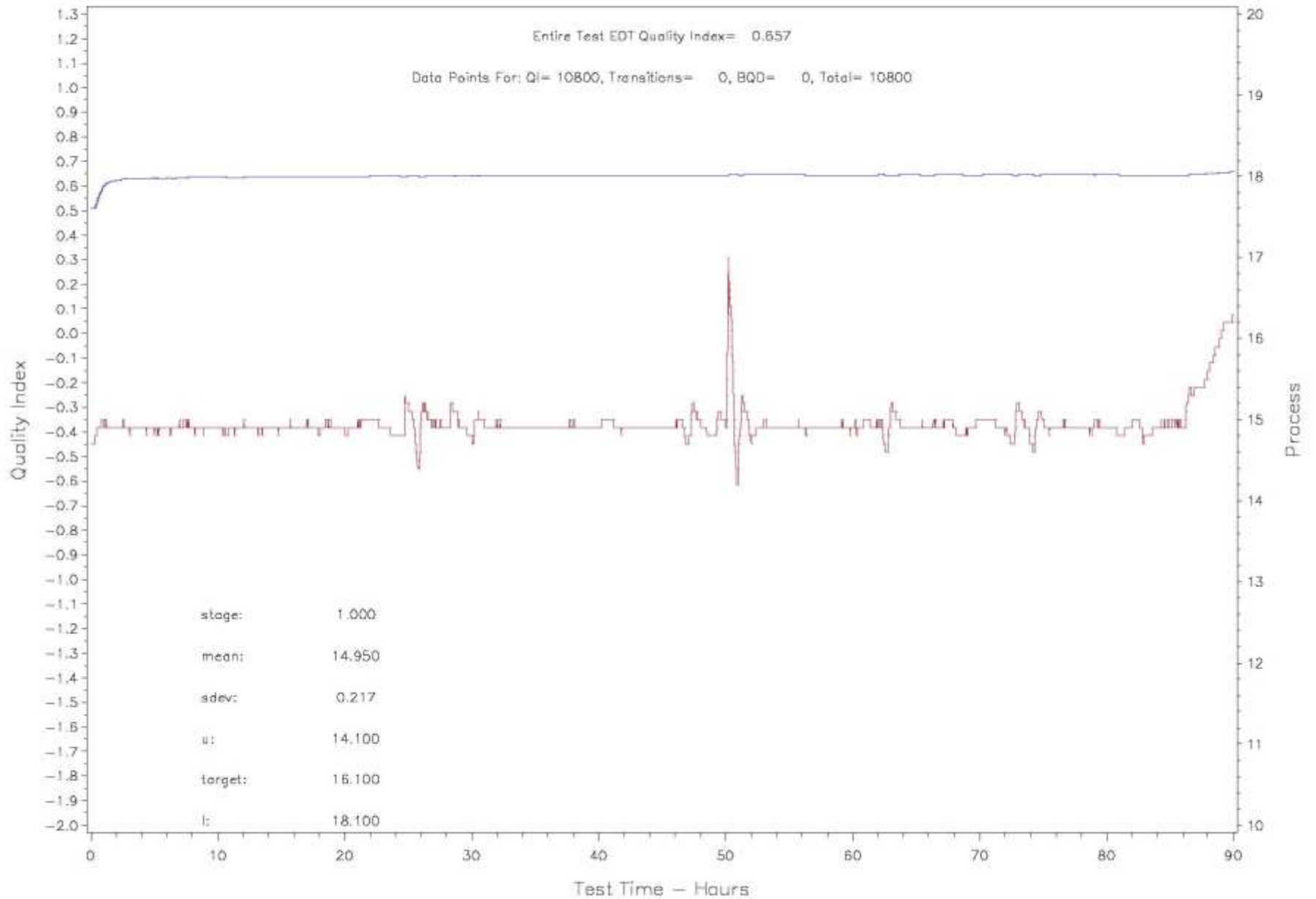
IIH QUALITY INDEX OPERATIONAL REVIEW
Ink Air Dew Point Temperature - Degree C (CONTROL)
LAB= A Stand= 1 DM#= 106777



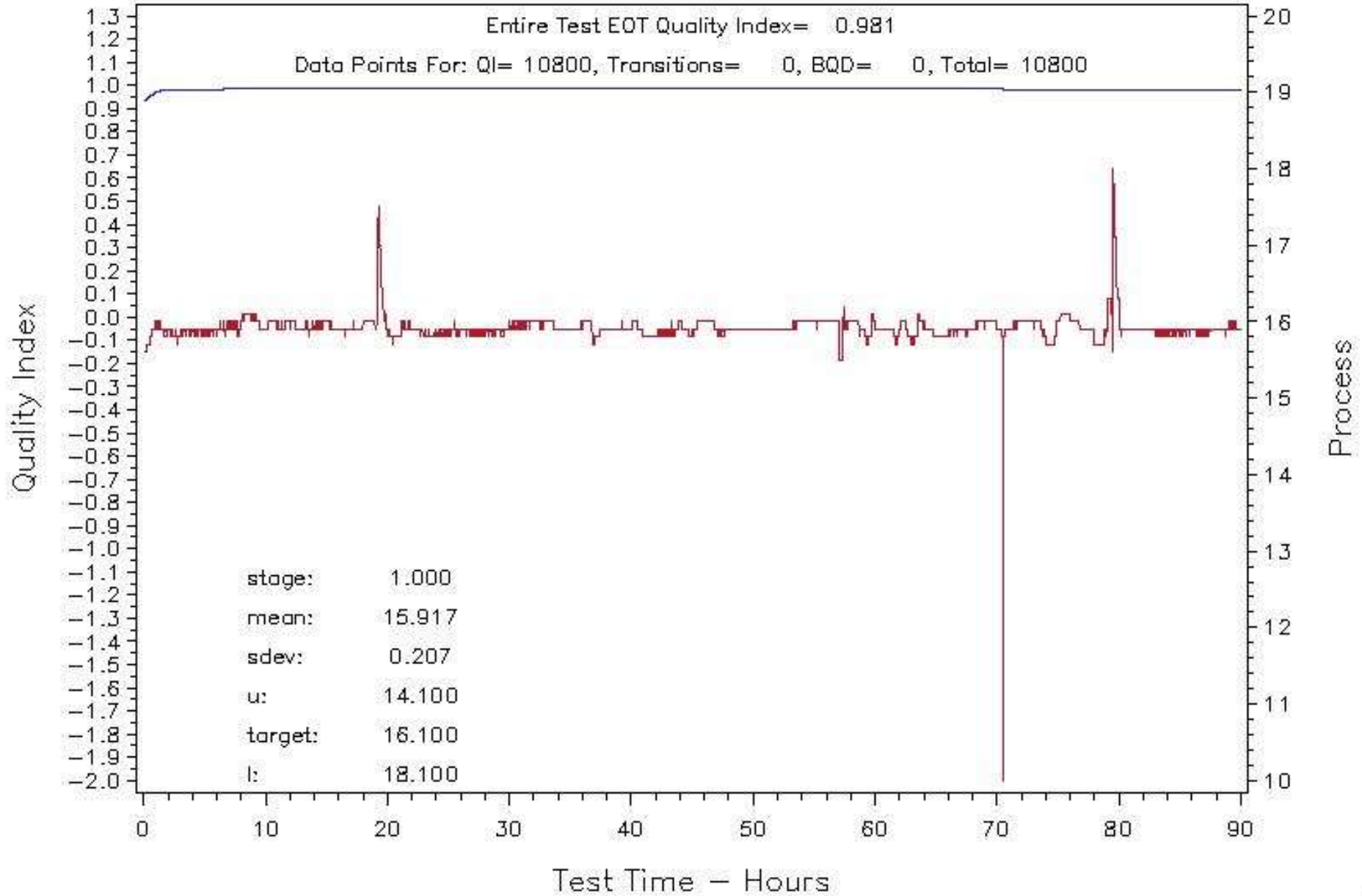
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Inke Air Dew Point Temperature - Degree C (CONTROL)
 LAB= A Stand= 1 CMR= 106779



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Inke Air Dew Point Temperature - Degree C (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

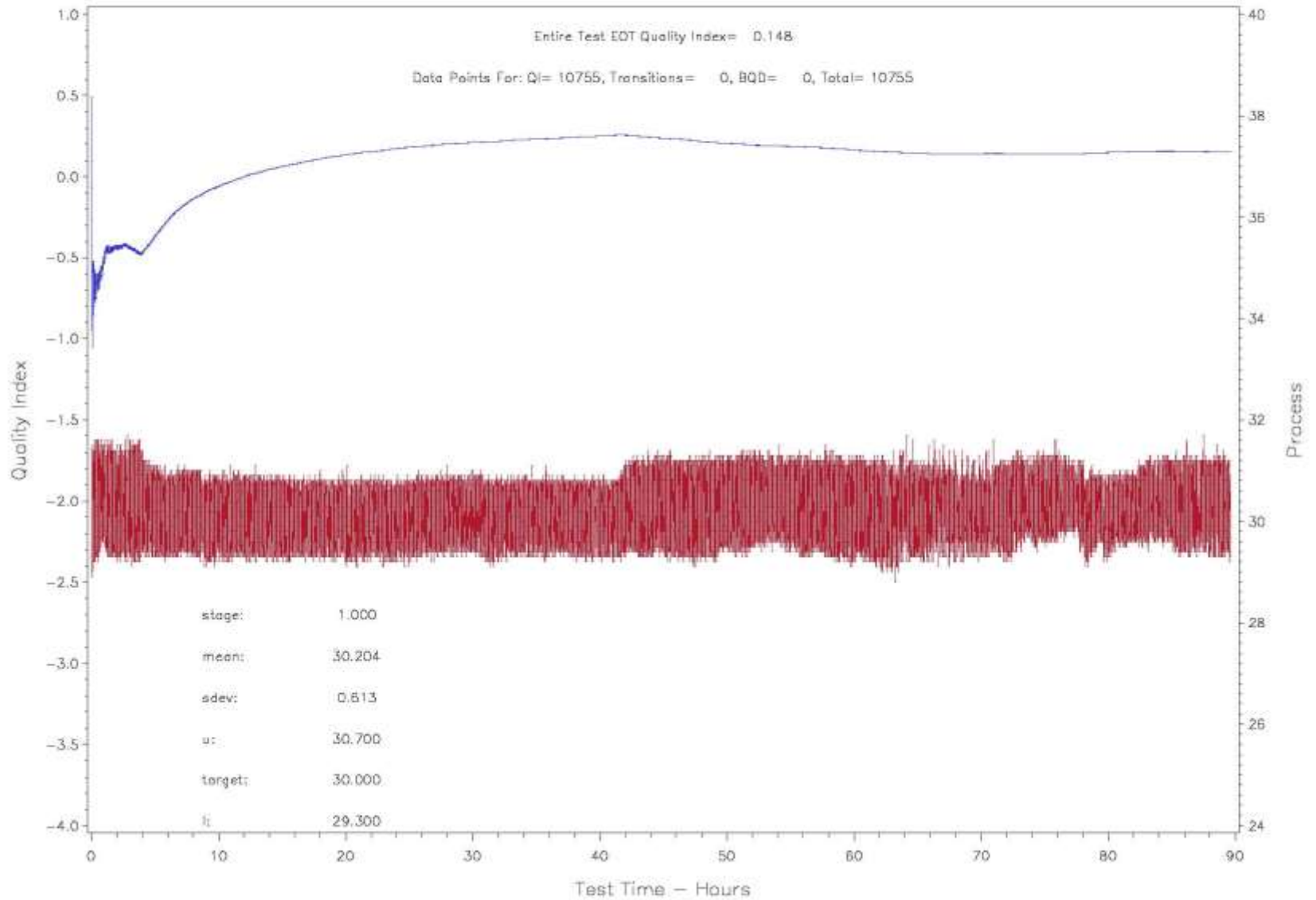


IIH QUALITY INDEX OPERATIONAL REVIEW
Inke Air Dew Point Temperature – Degree C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

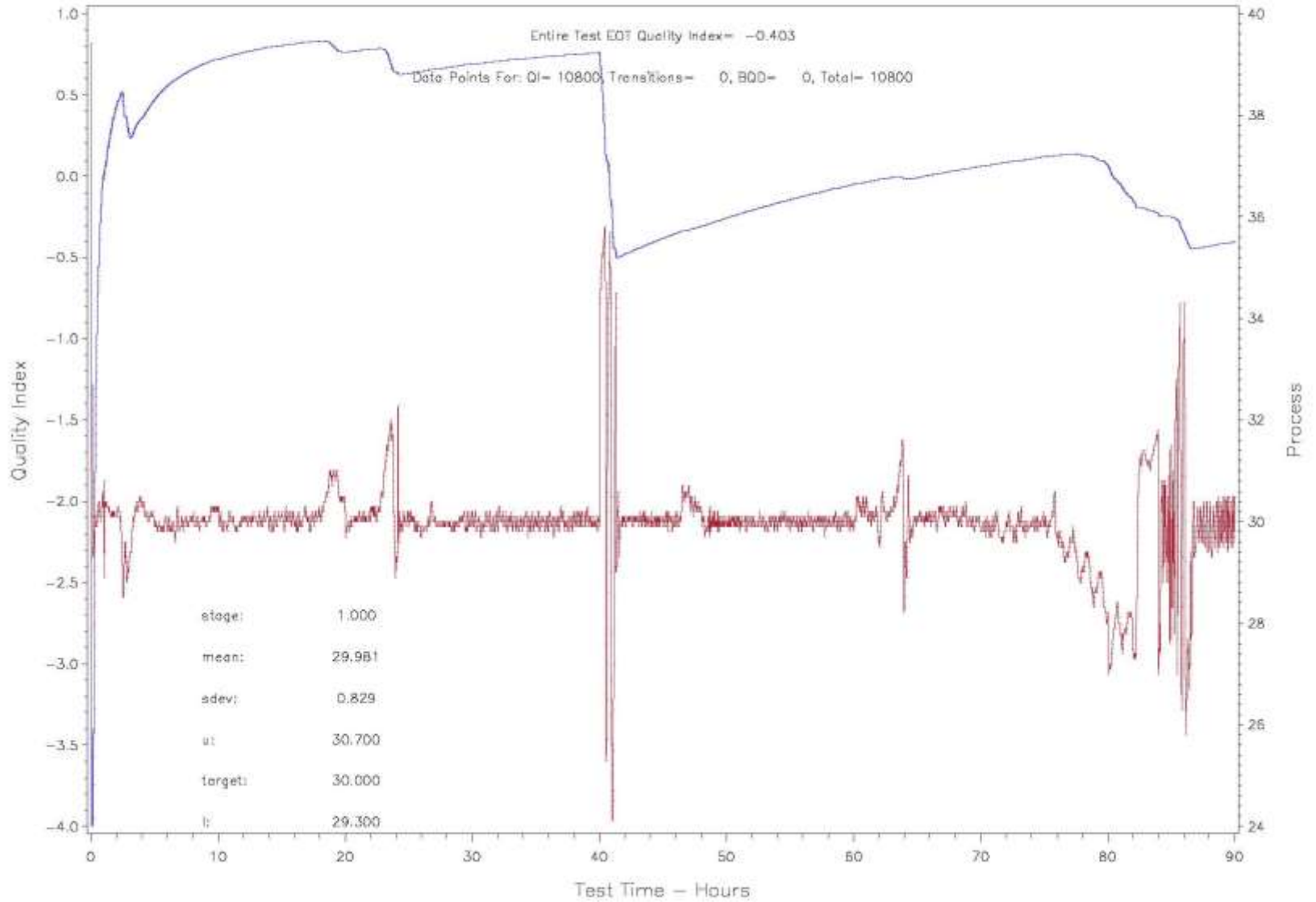


Fuel Temperature

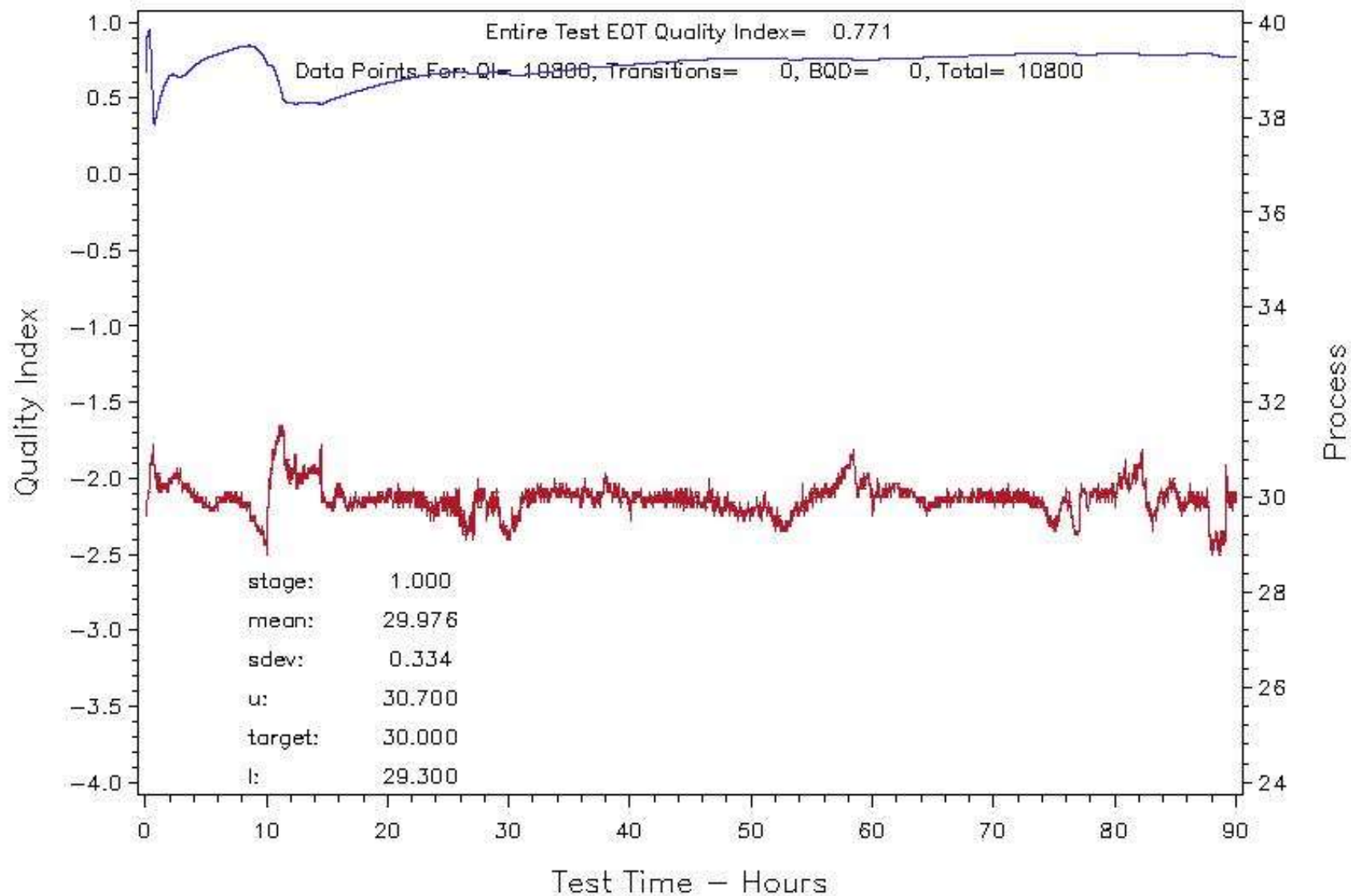
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Fuel Inlet Temperature – Degrees C (CONTROL)
 LAB= D Stand= DB106 DMR= 106791



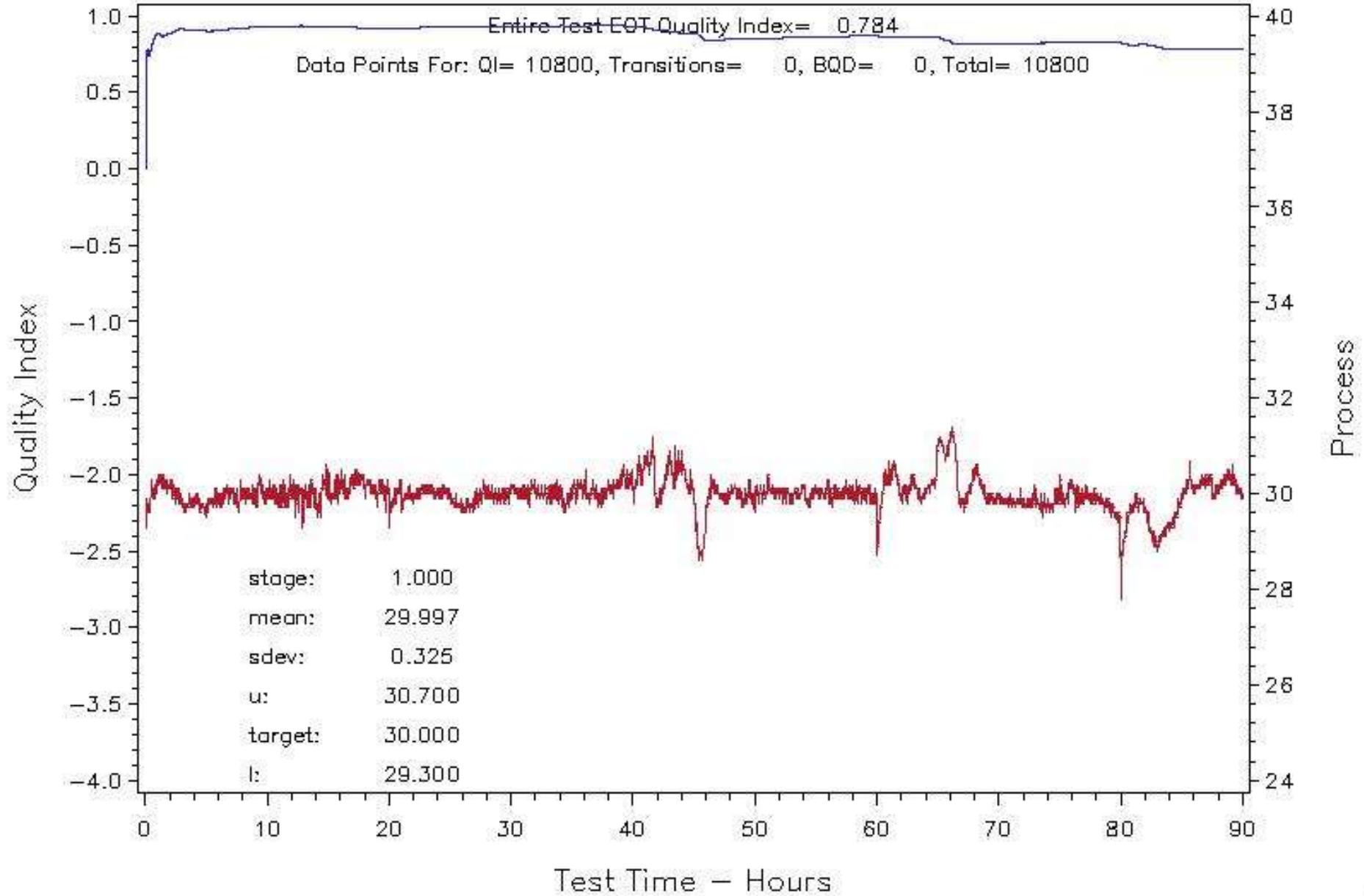
IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature - Degrees C (CONTROL)
LAB= A Stand= 2 DM#= 106776



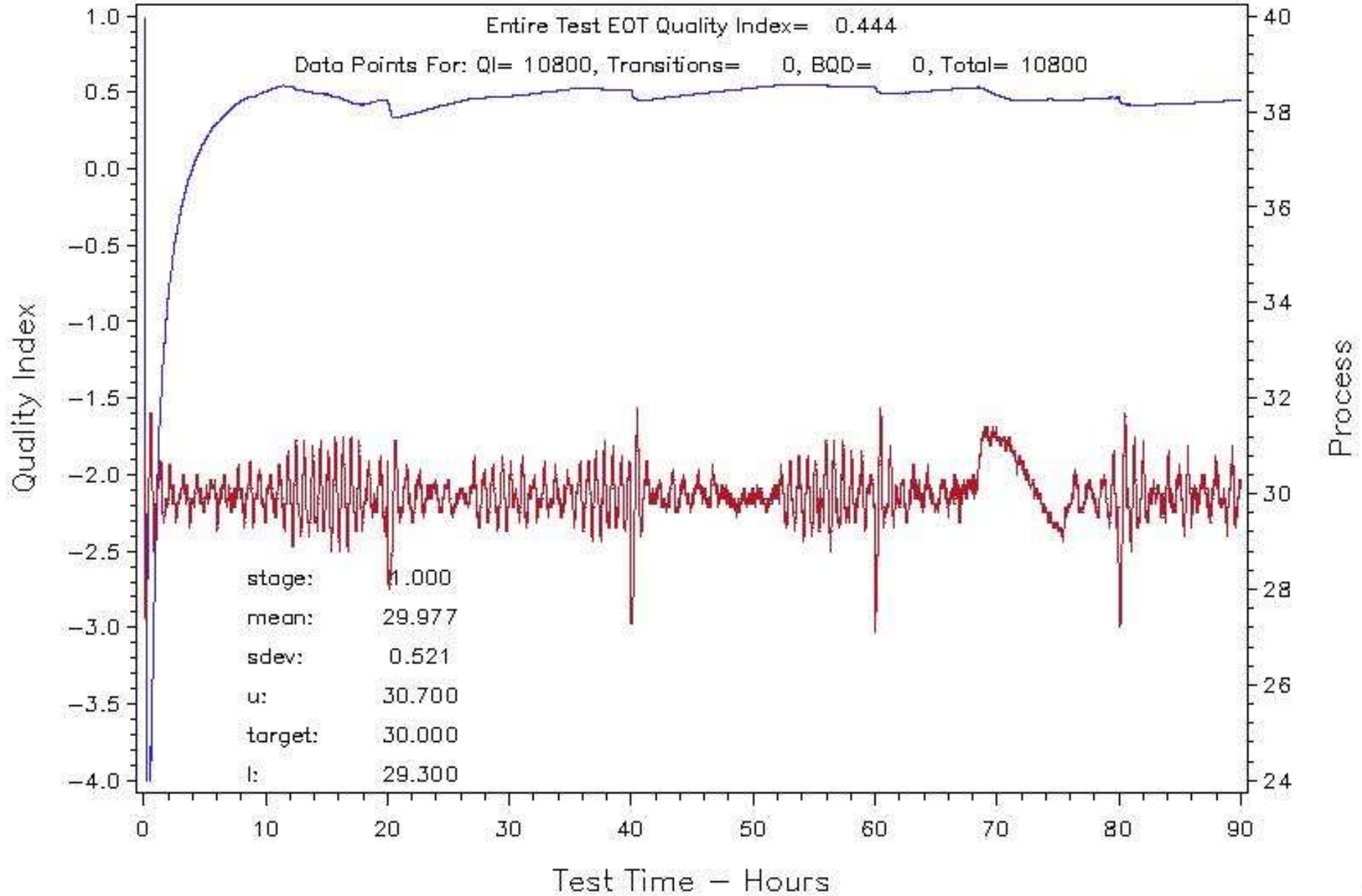
IIIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 108777



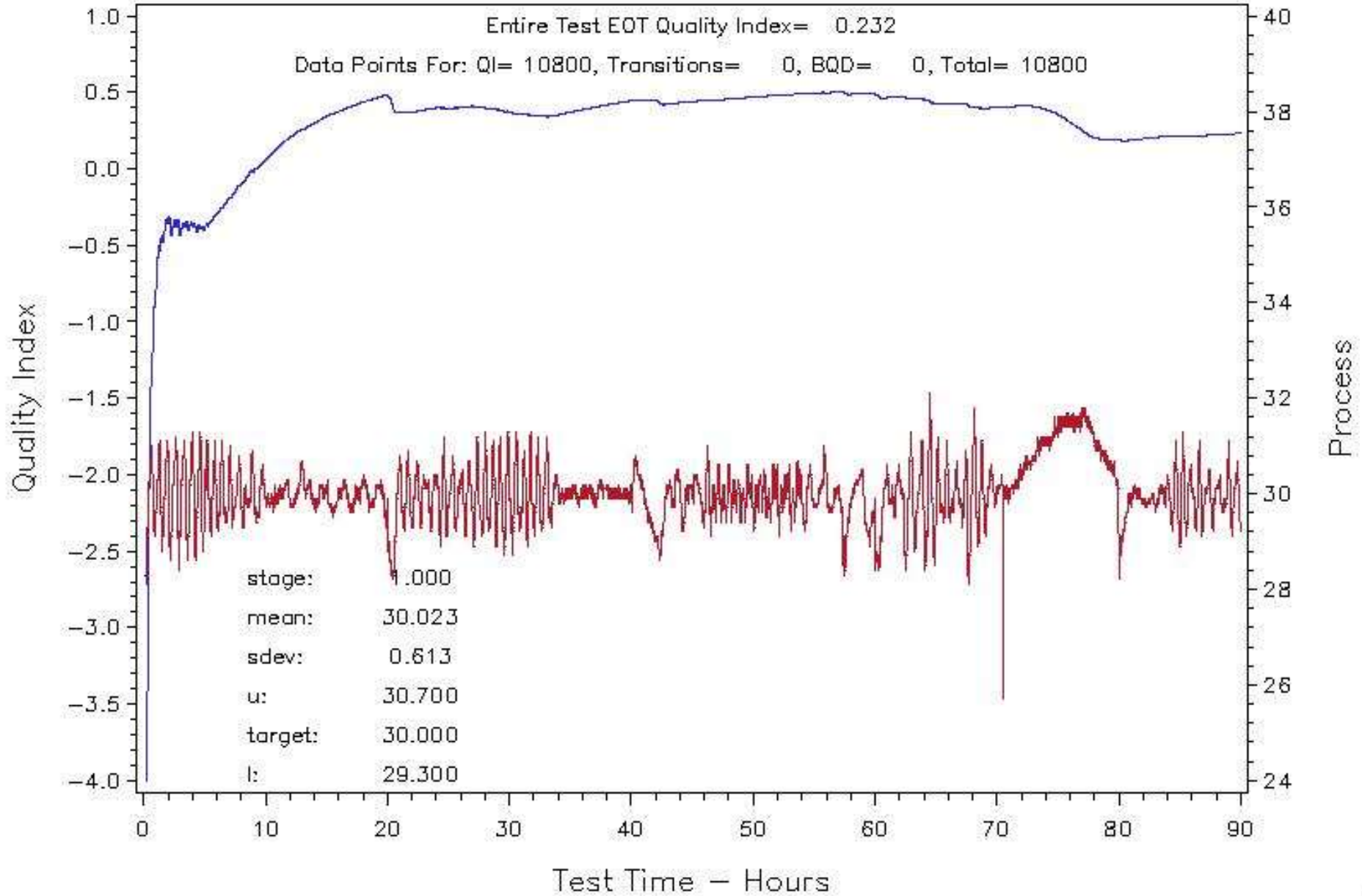
IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 106779



IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106781

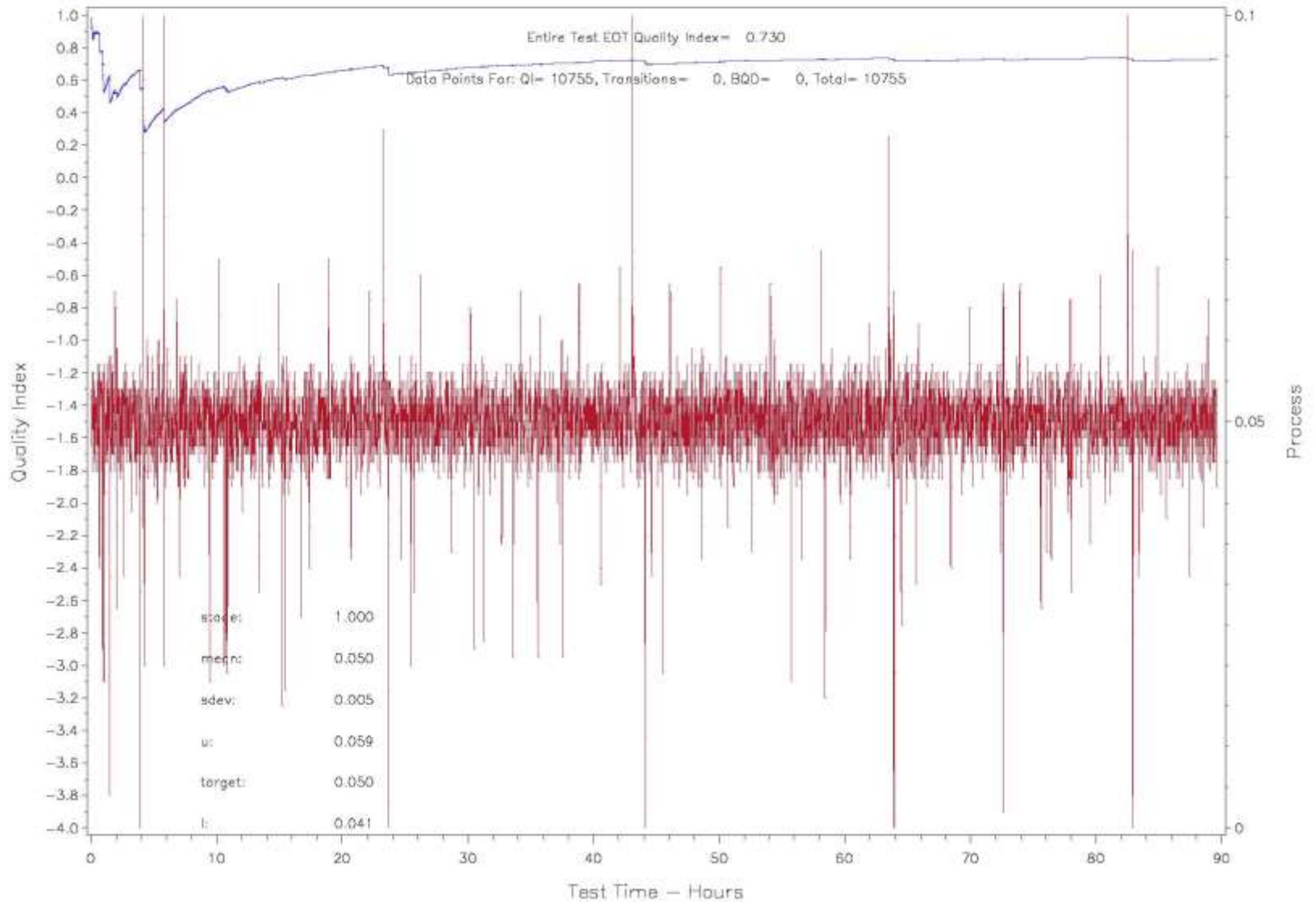


IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

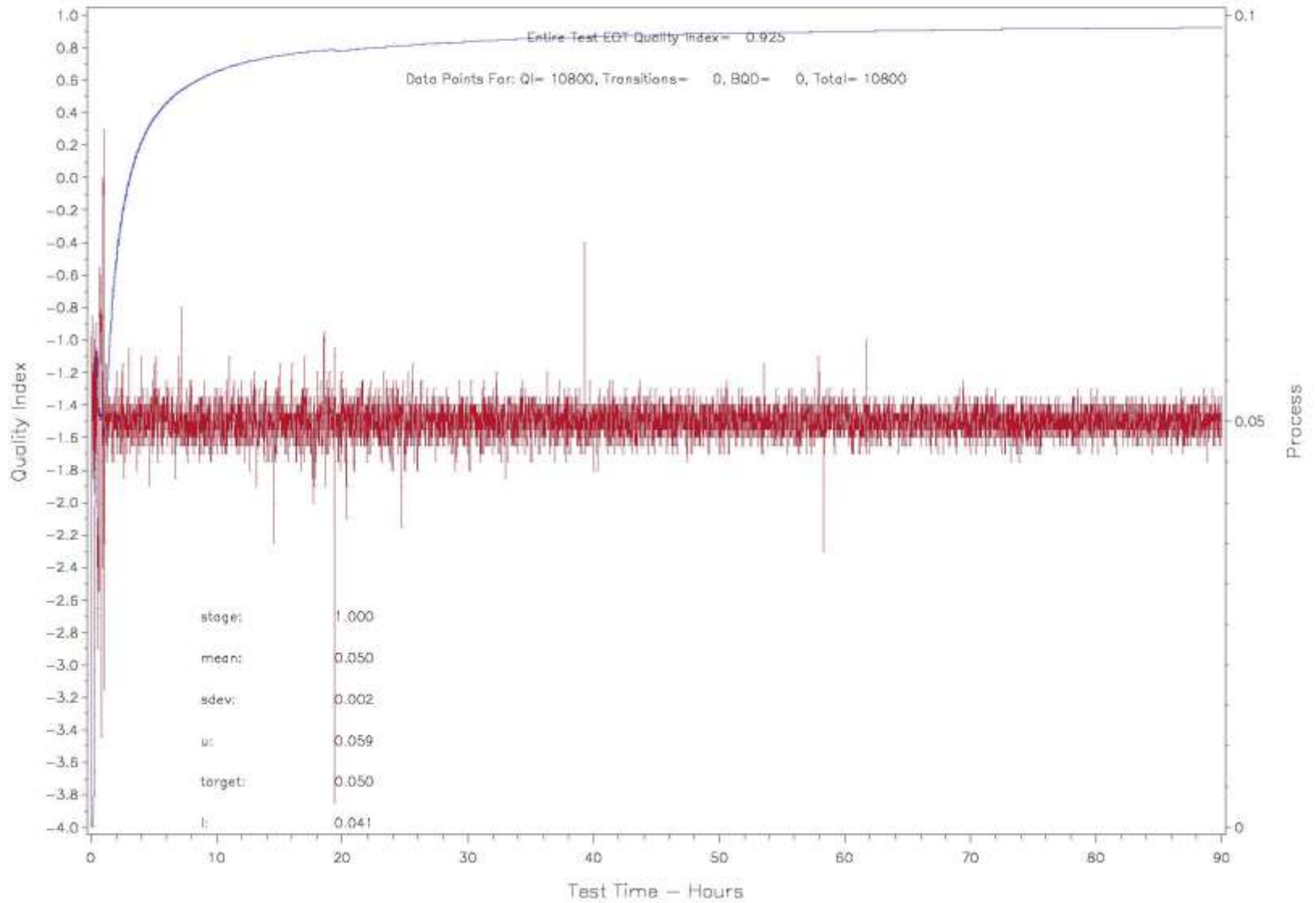


Intake Air Pressure

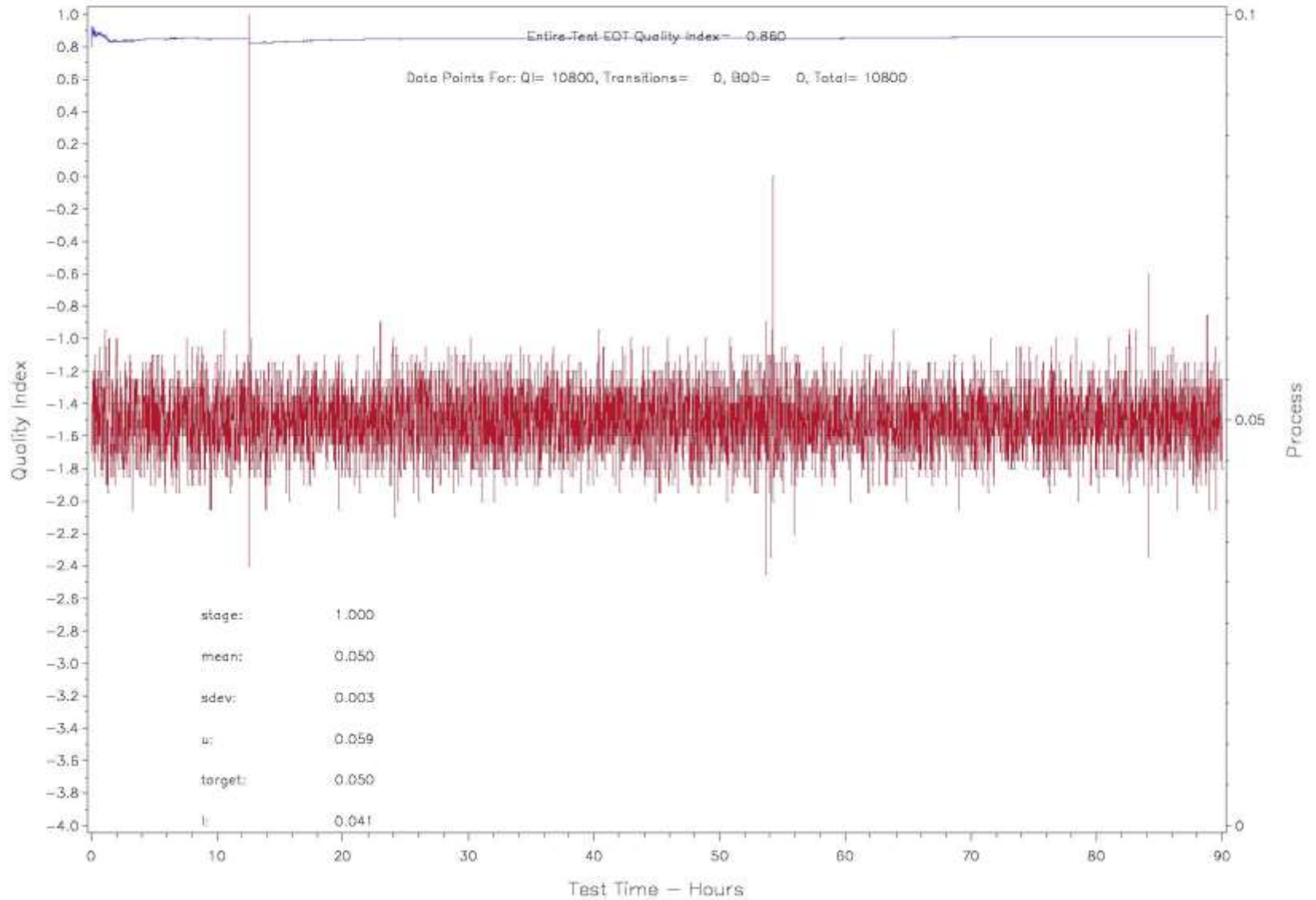
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure - kPa (CONTROL)
LAB= 0 Stand= CB106 CMIR= 106793



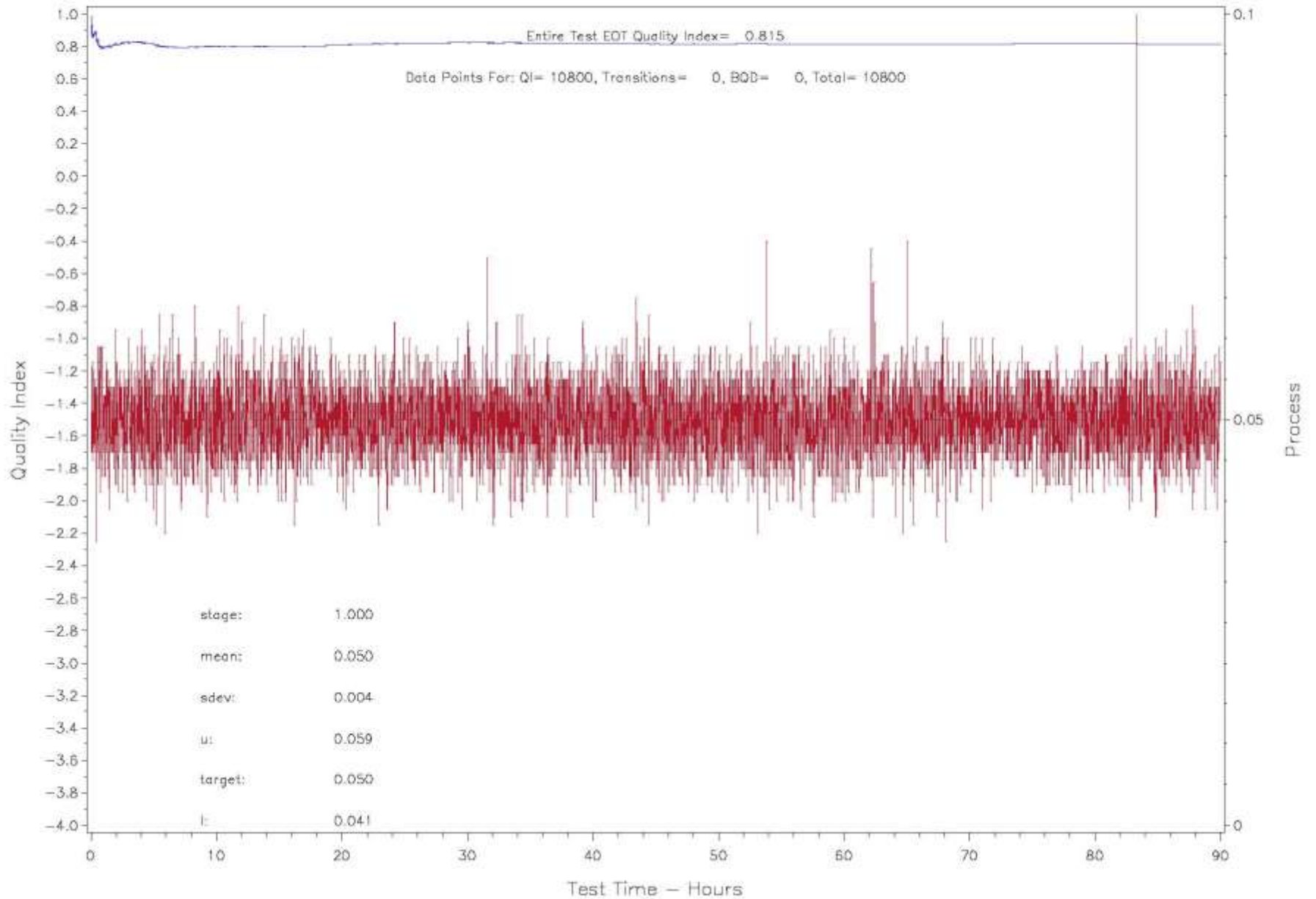
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure - kPa (CONTROL)
LAB= A, Stand= 2, DM#= 106776



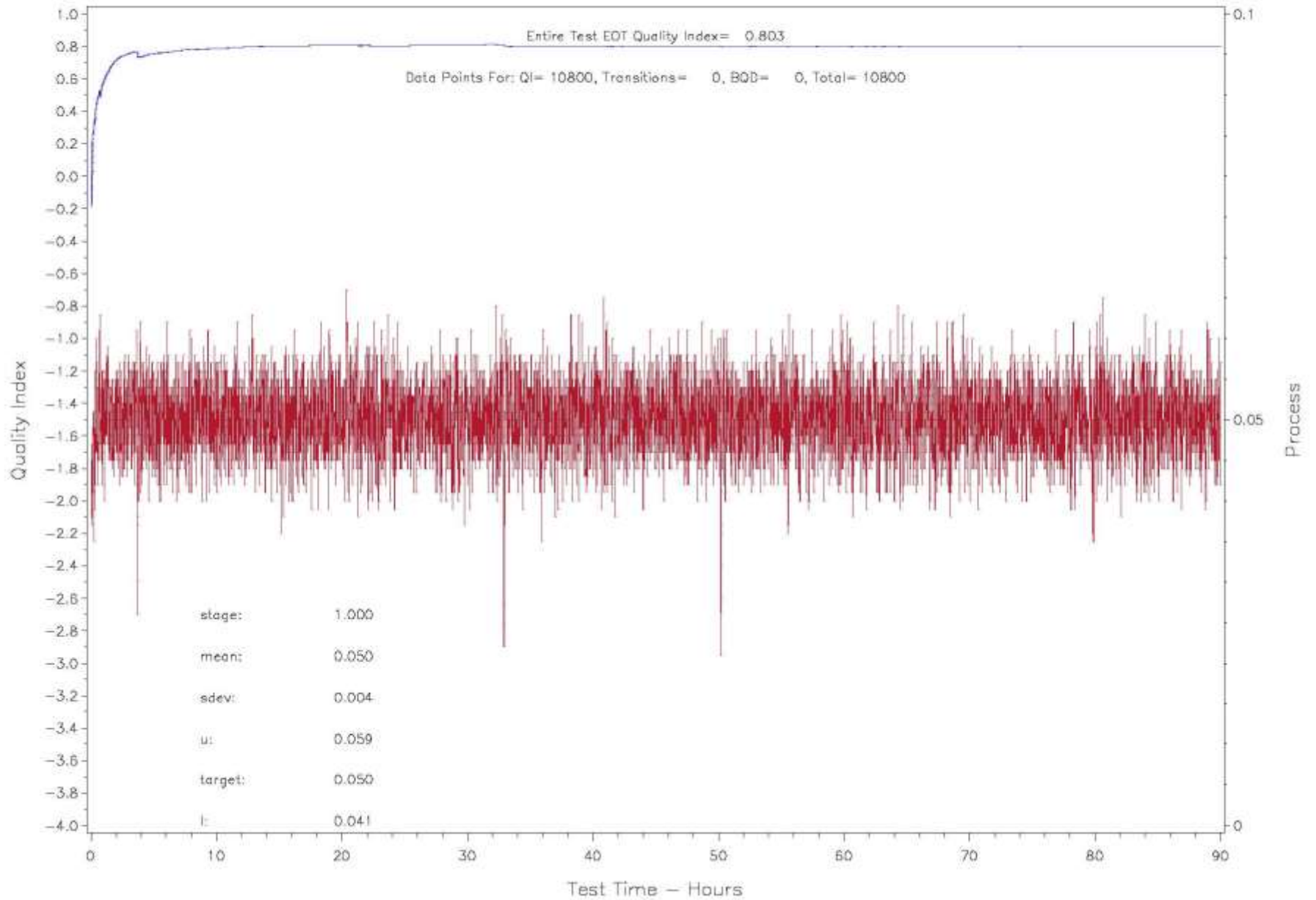
IIIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure - kPa (CONTROL)
LAB= A Stand= 1 CMIR= 106777



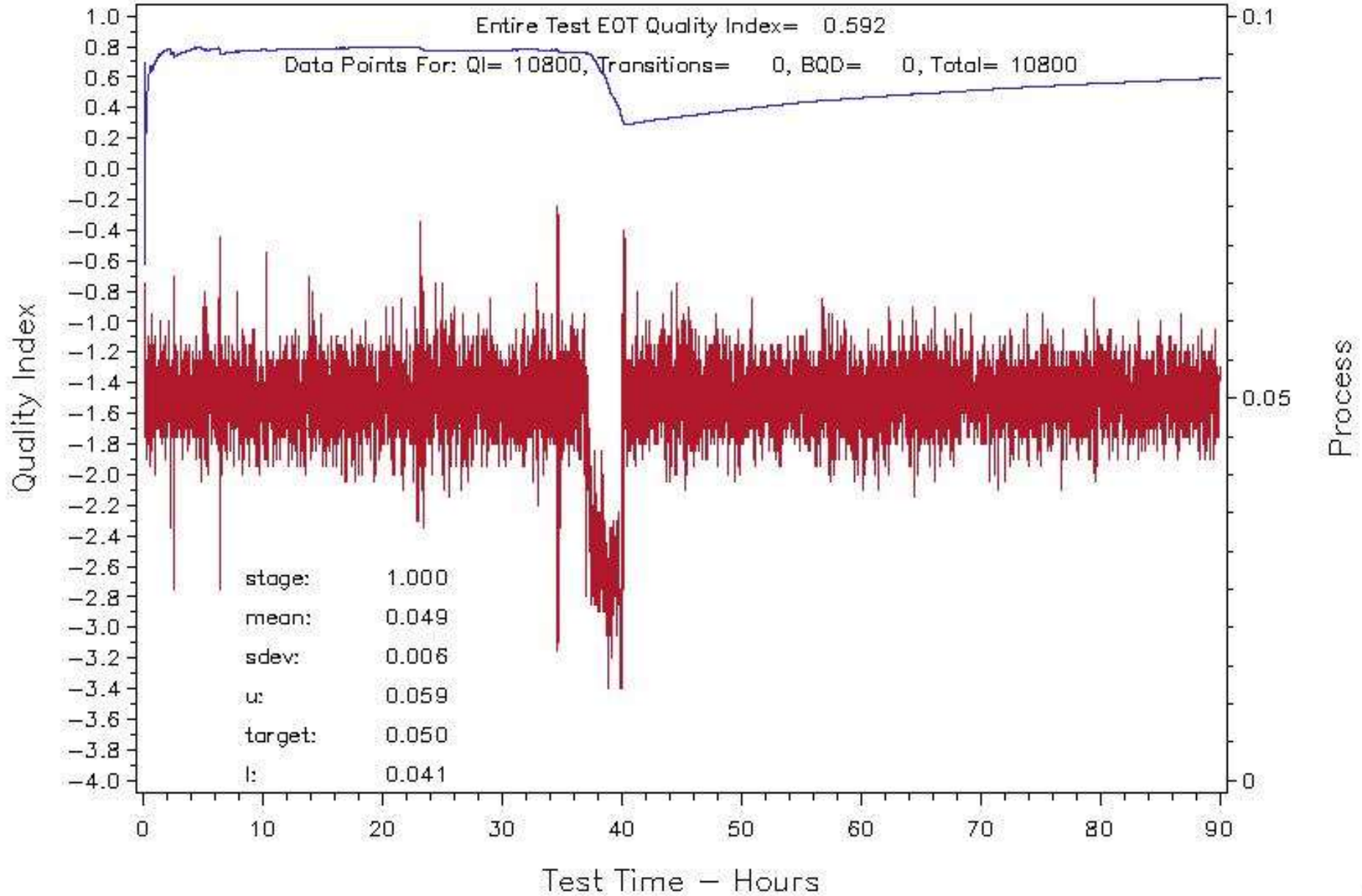
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Intake Air Pressure - kPa (CONTROL)
 LAB= A Stand= 1 CMR= 106779



IIIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure - kPa (CONTROL)
LAB= E Stand= 3 CMIR= 106781

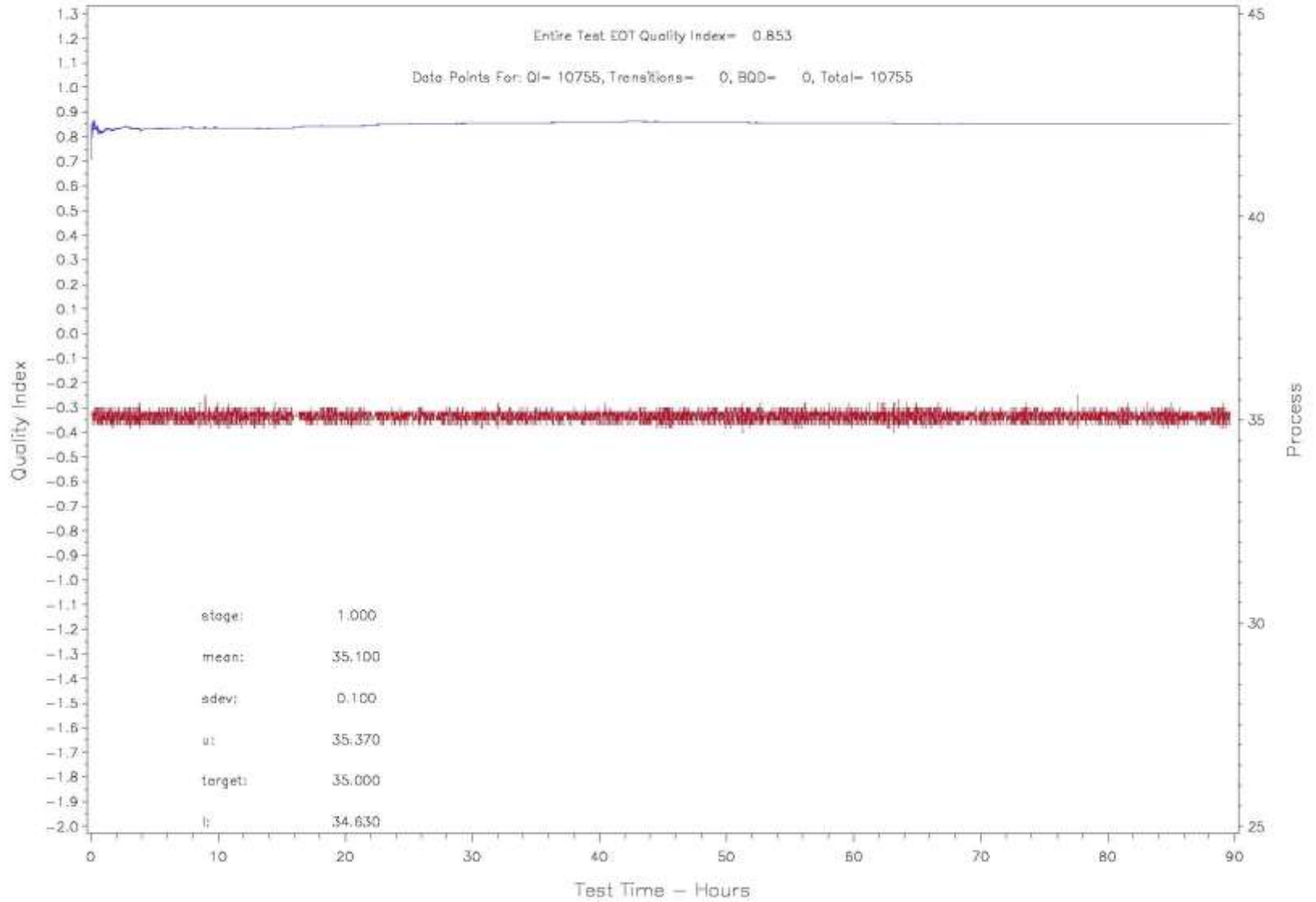


IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure – kPa (CONTROL)
LAB= E Stand= 3 CMIR= 106780

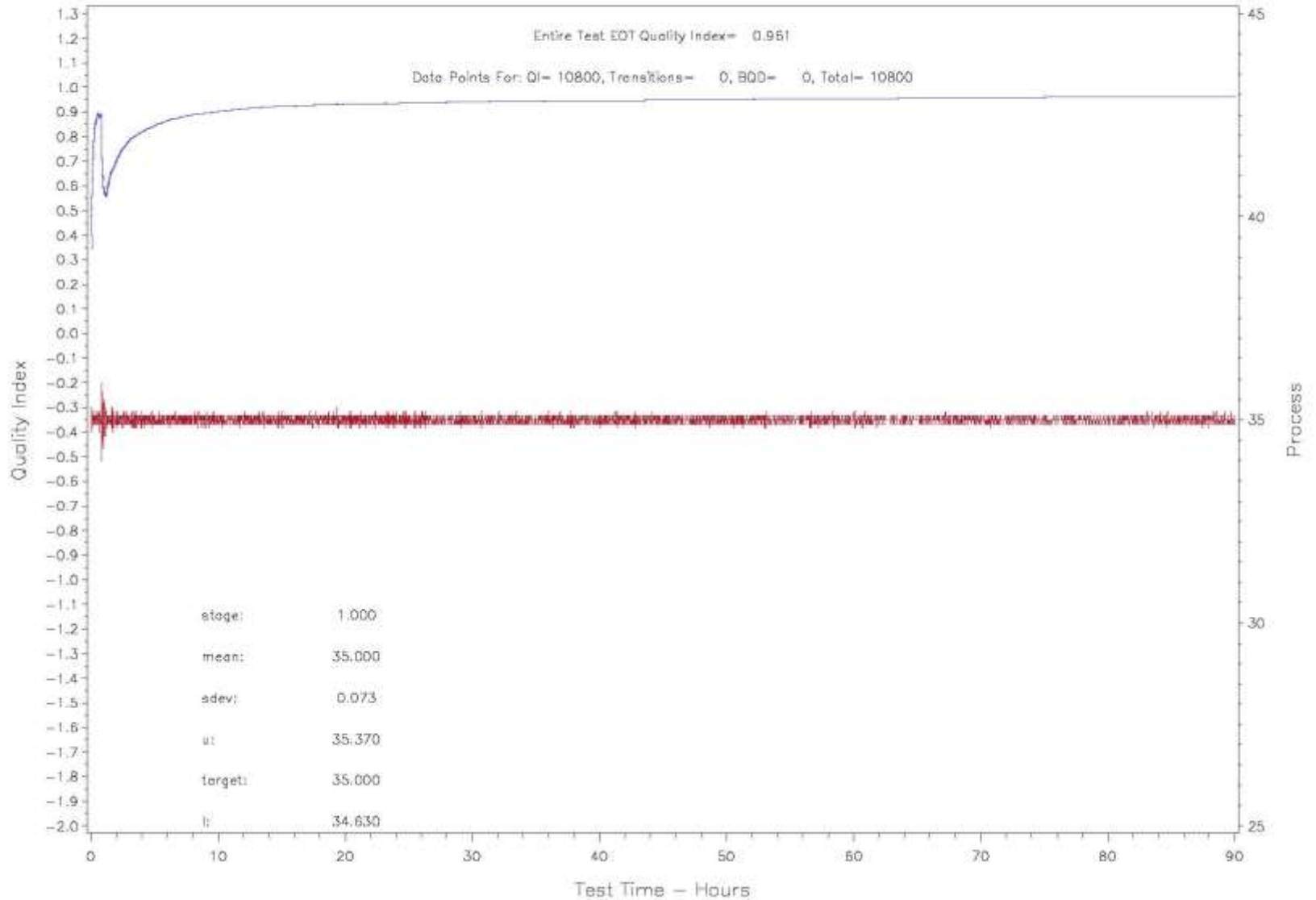


Intake Air Temperature

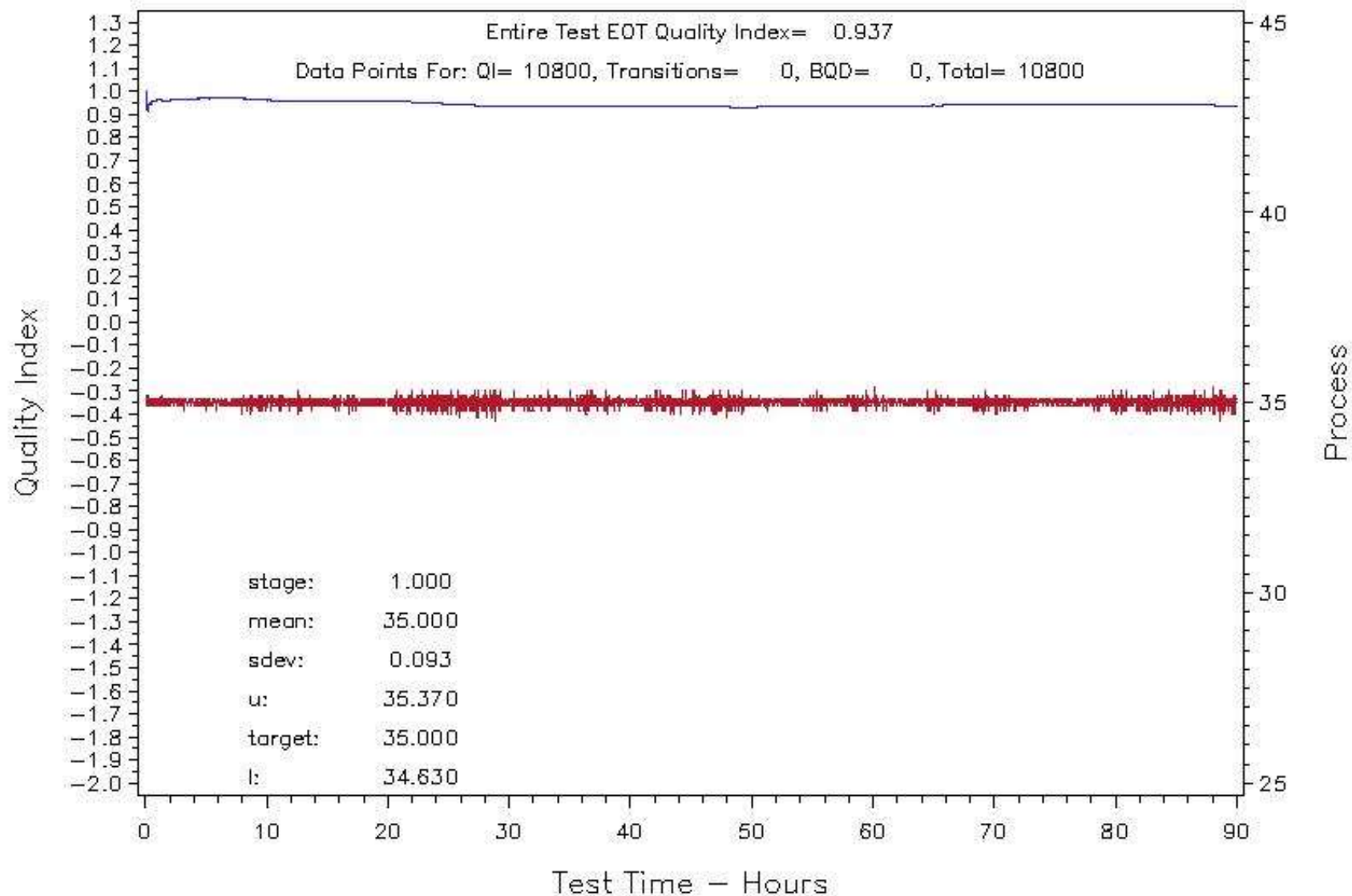
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature - Degrees C (CONTROL)
LAB= D Stand= CB106 CMR= 106793



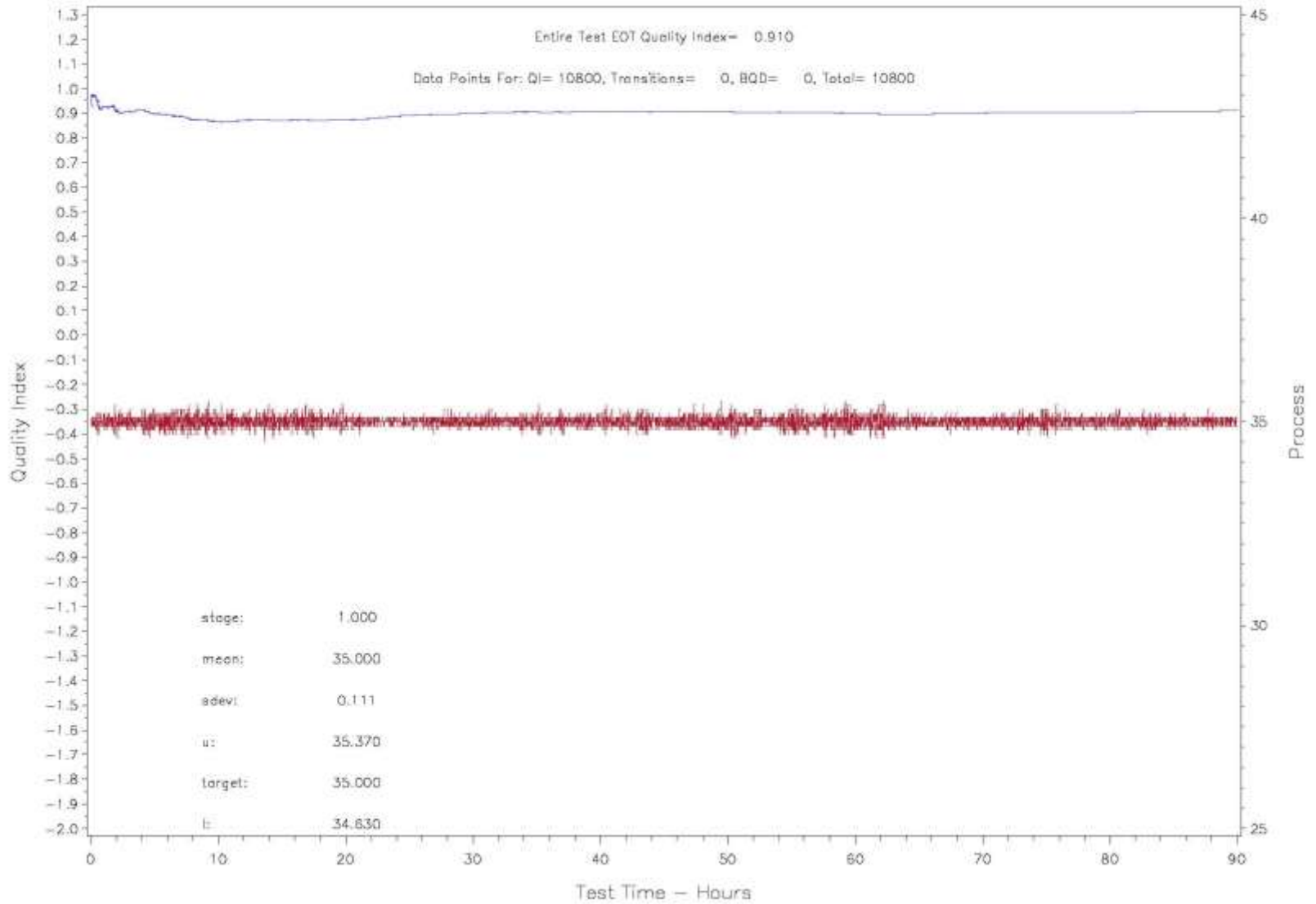
IIH QUALITY INDEX OPERATIONAL REVIEW
 Intake Air Temperature - Degrees C (CONTROL)
 LAB= A Stand= 2 DMR= 106776



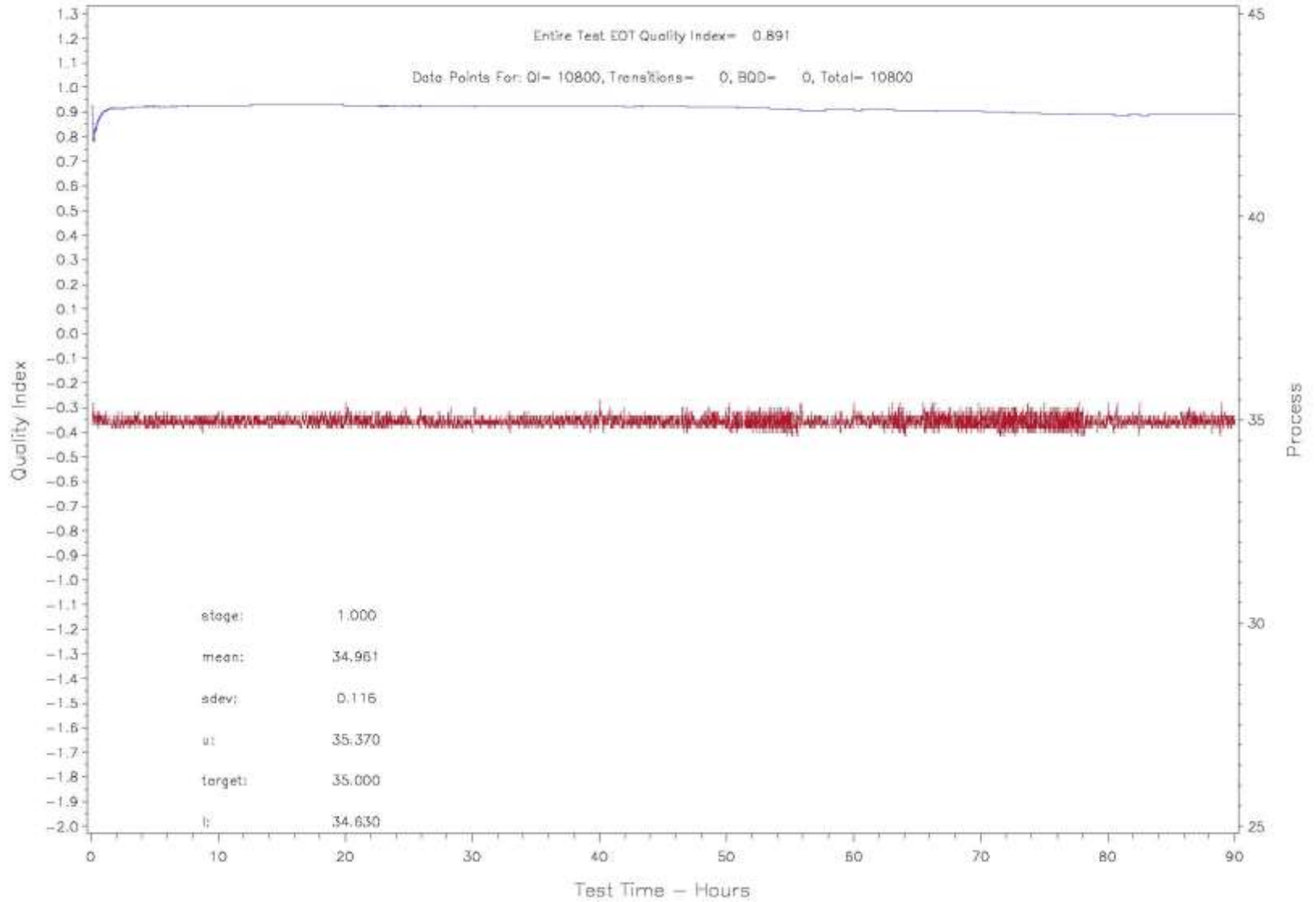
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature – Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 106777



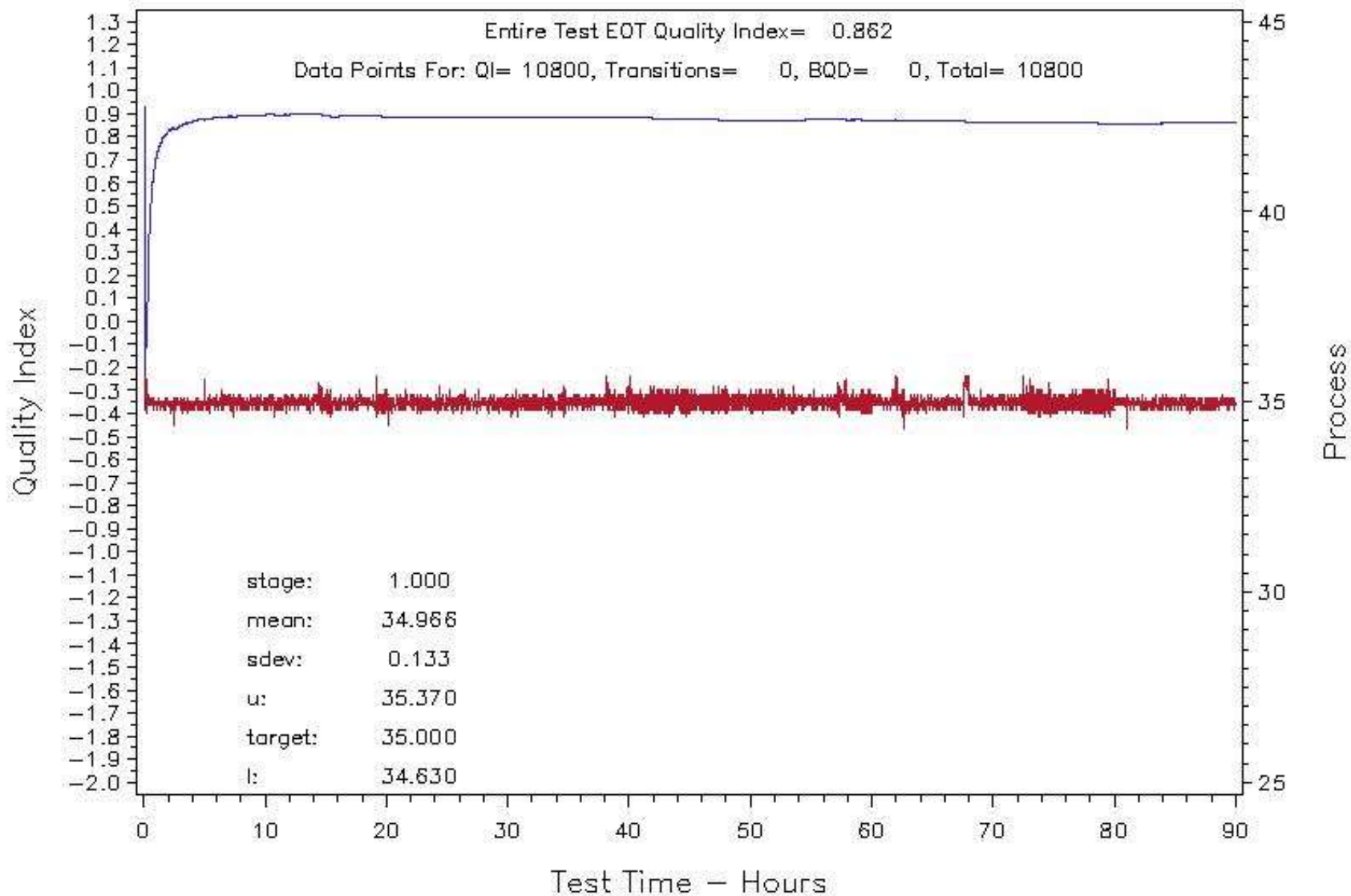
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Intake Air Temperature - Degrees C (CONTROL)
 LAB= A Stand= 1 CWIR= 106779



IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature - Degrees C (CONTROL)
LAB= E, Stand= 3 QMIR= 106781

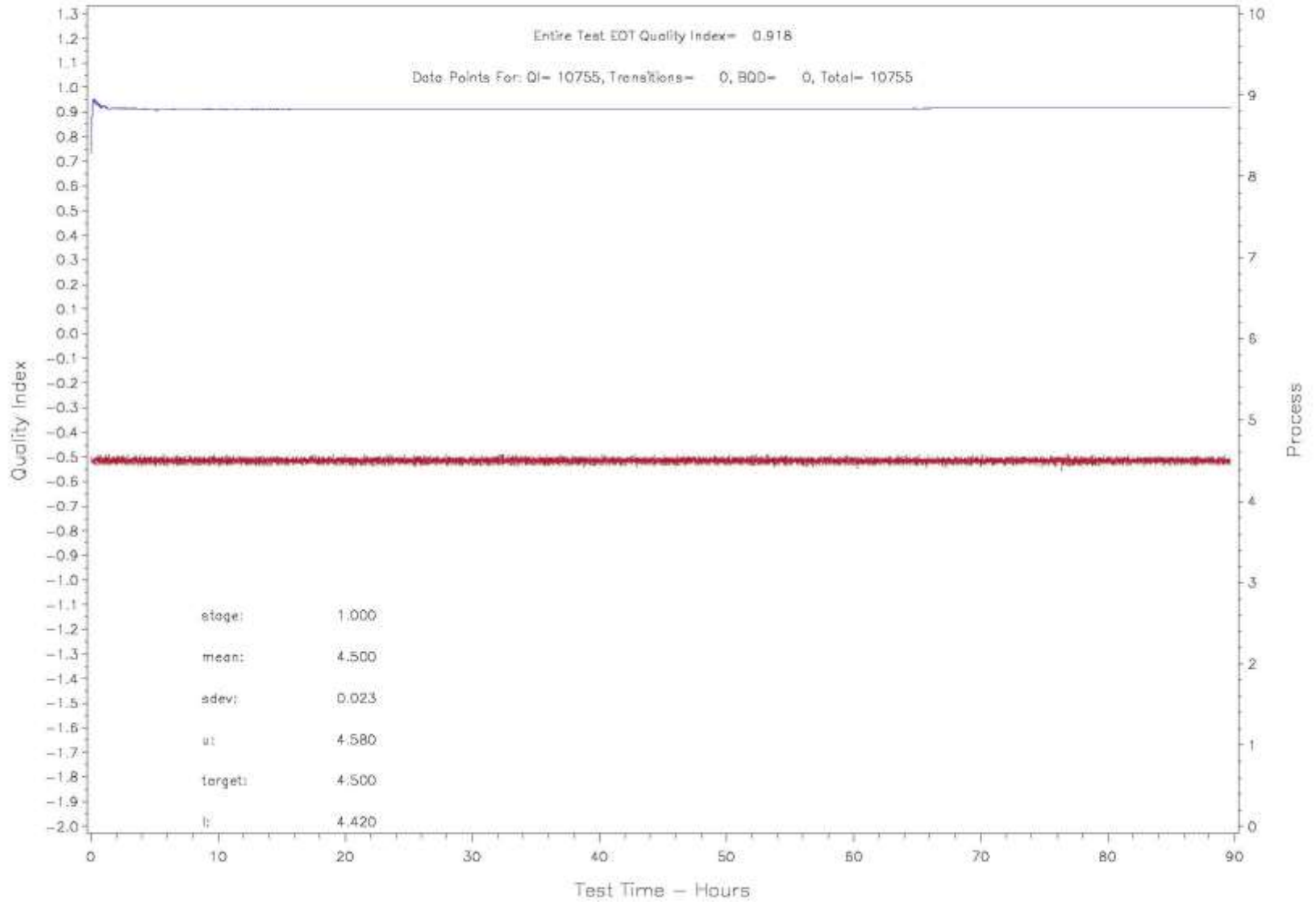


IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

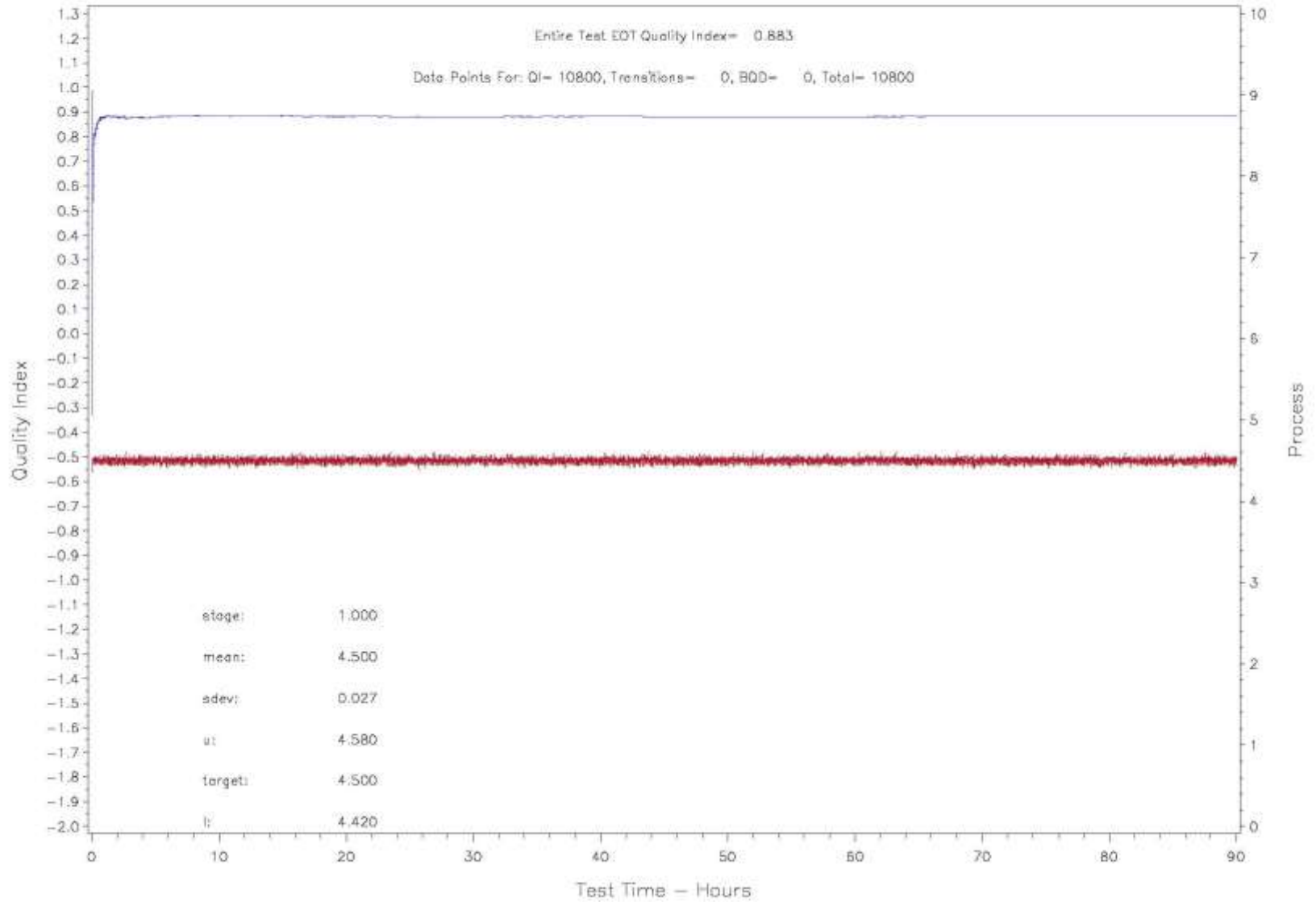


Left Exhaust Back Pressure

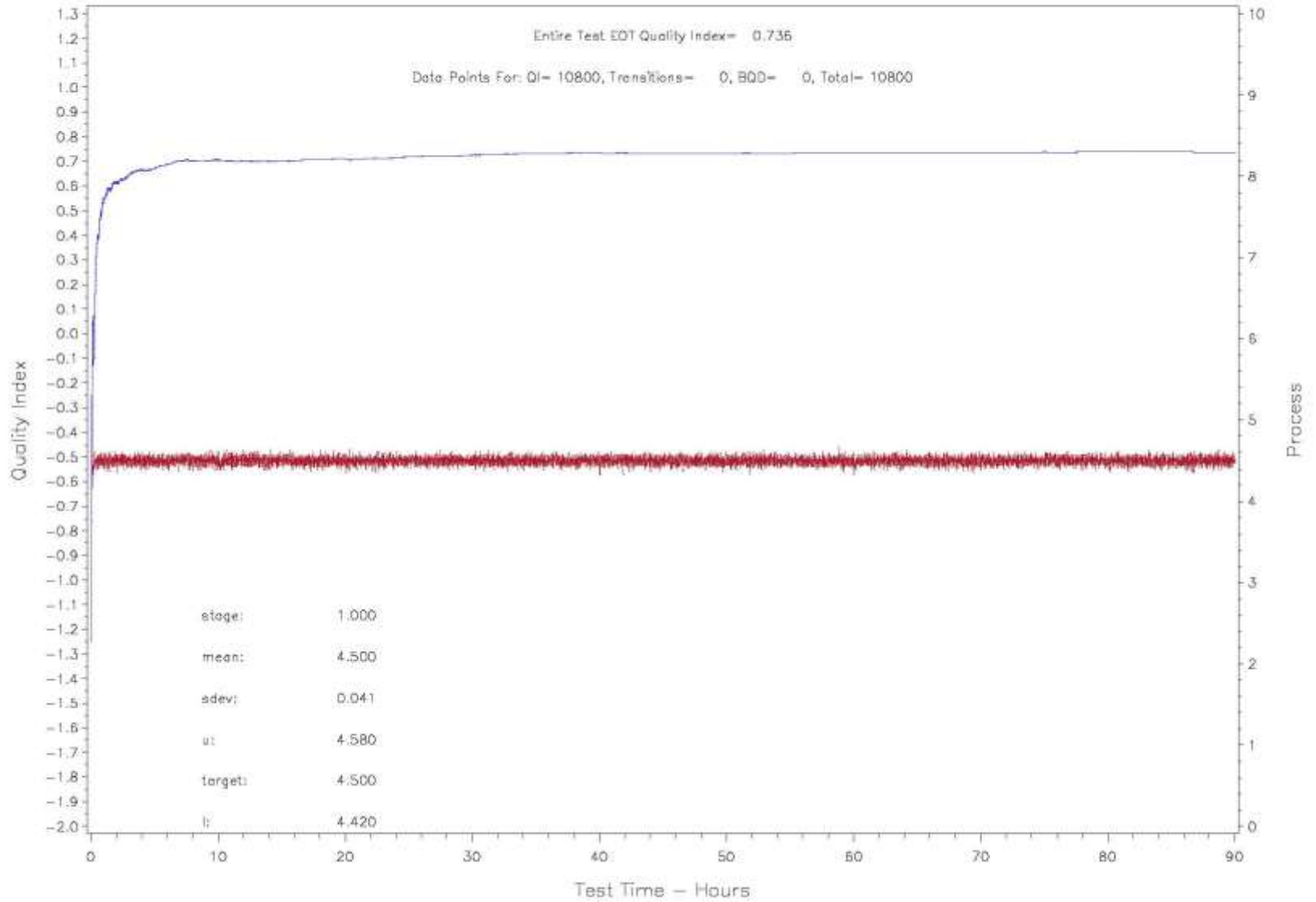
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= D Stand= CB106 CMR= 106791



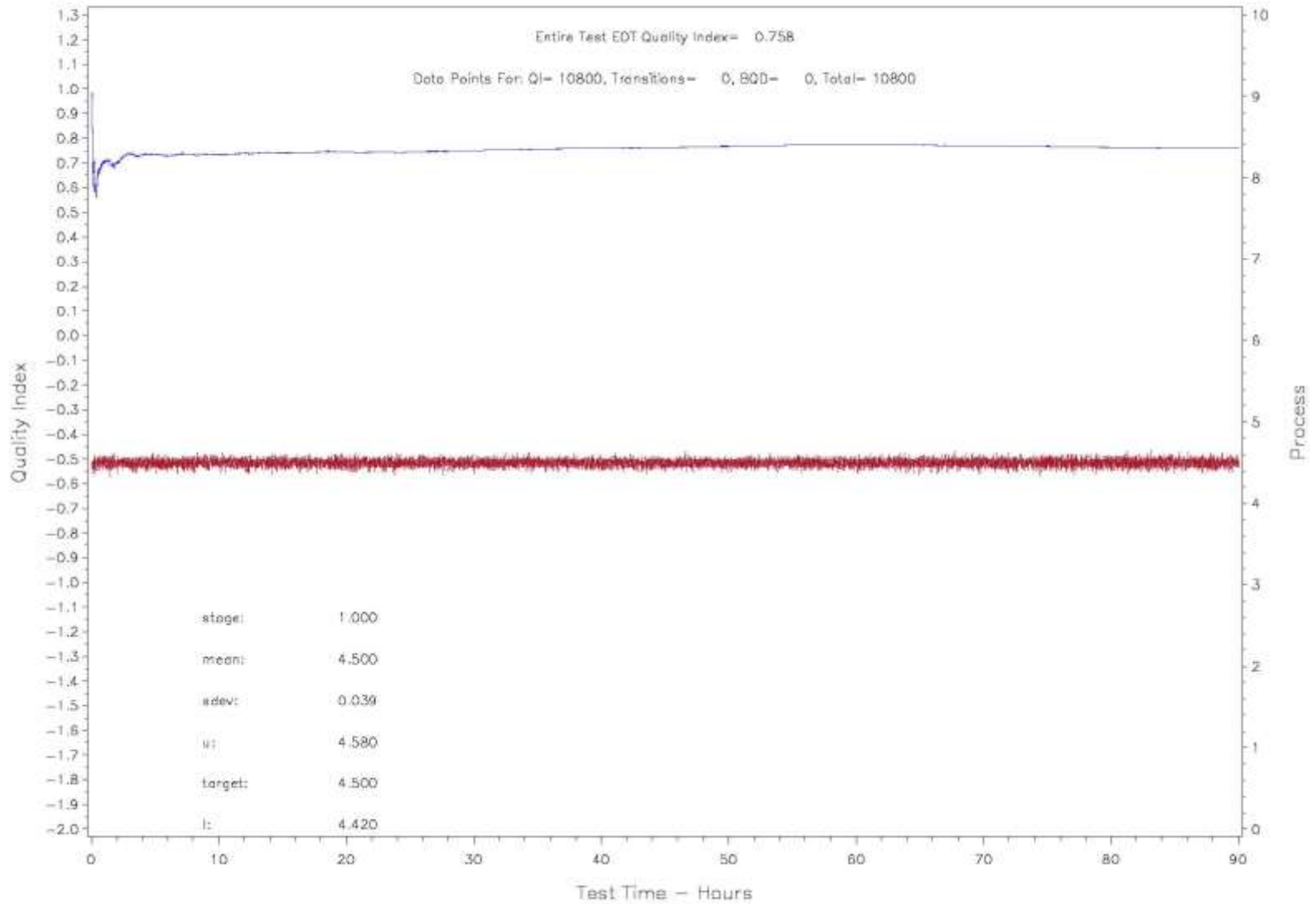
IIIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= A Stand= 2 DMR= 106776



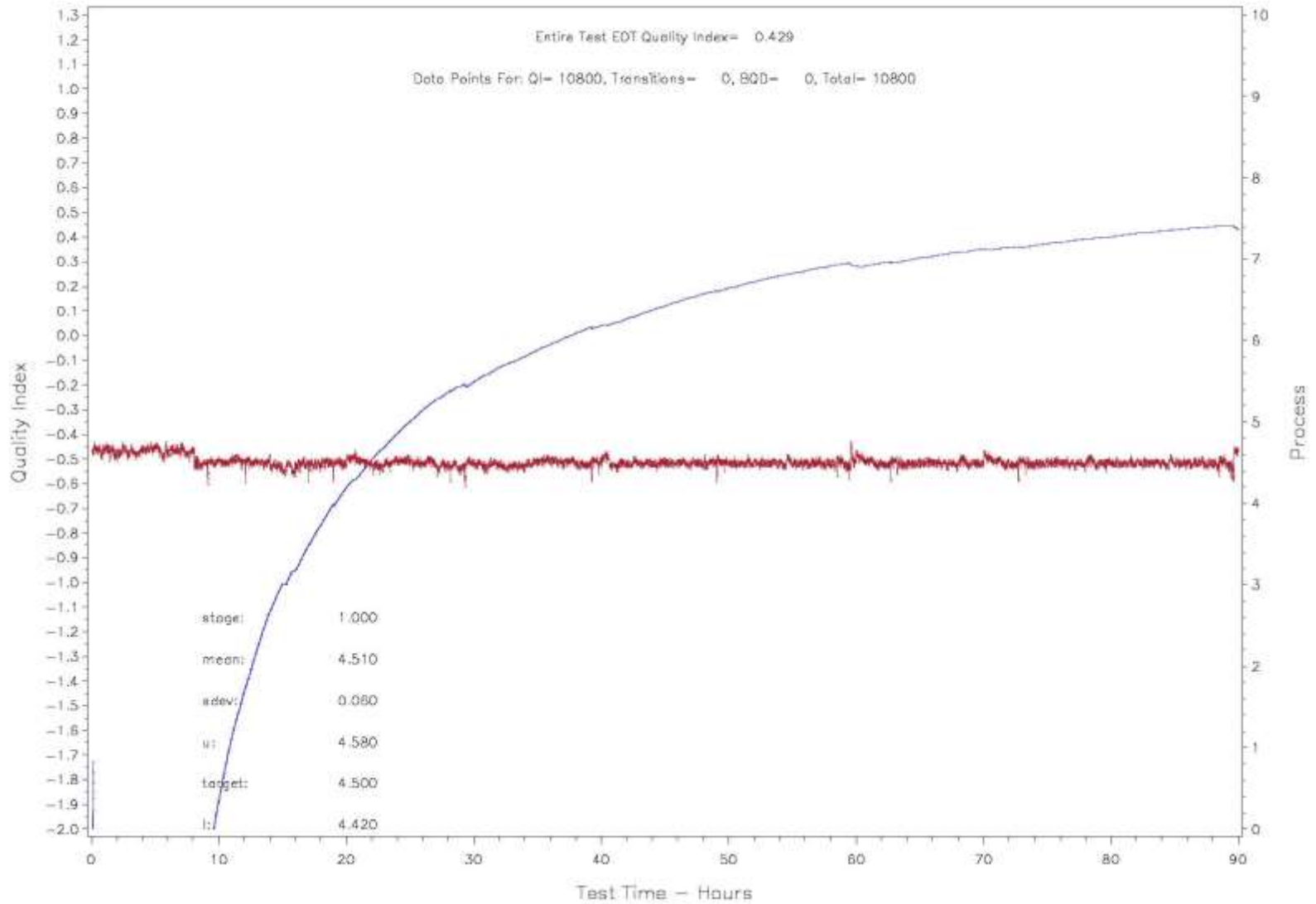
IIIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= A Stand= 1 DM#= 106777



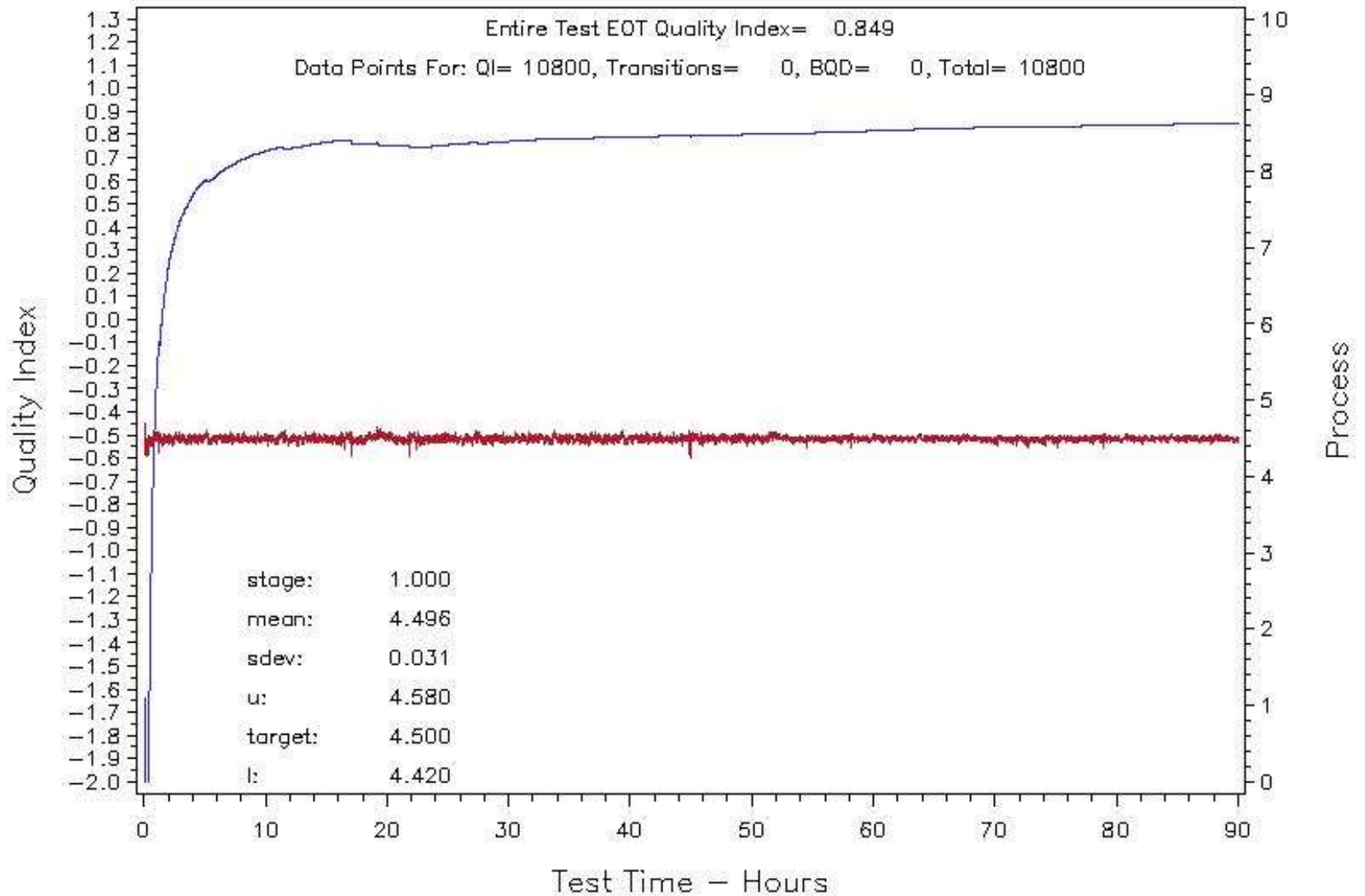
IIIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= A Stand= 1 DMIR= 105778



III QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= E Stand= 3 OMR= 105781

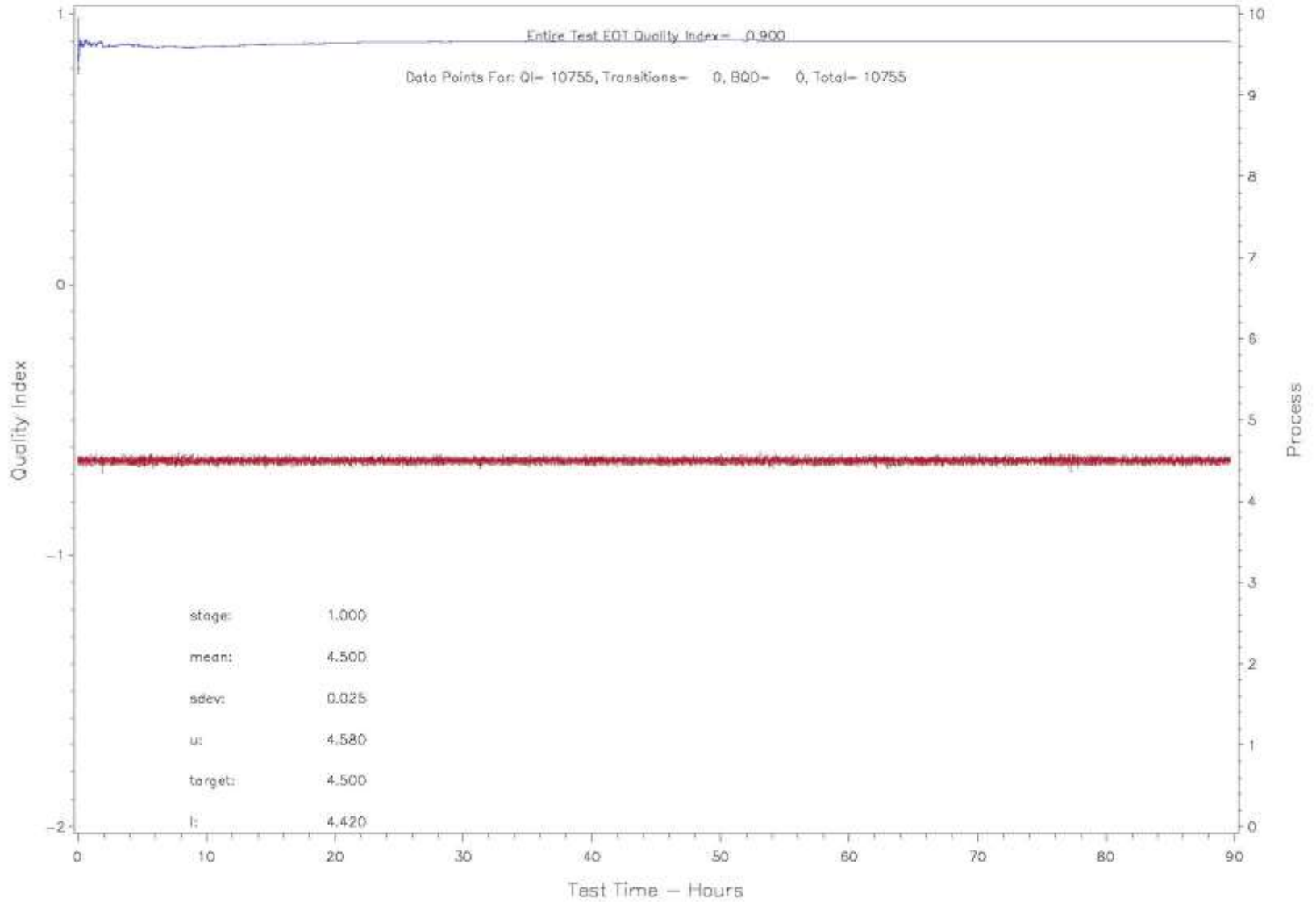


IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left – kPa (CONTROL)
LAB= E Stand= 3 CMIR= 106780

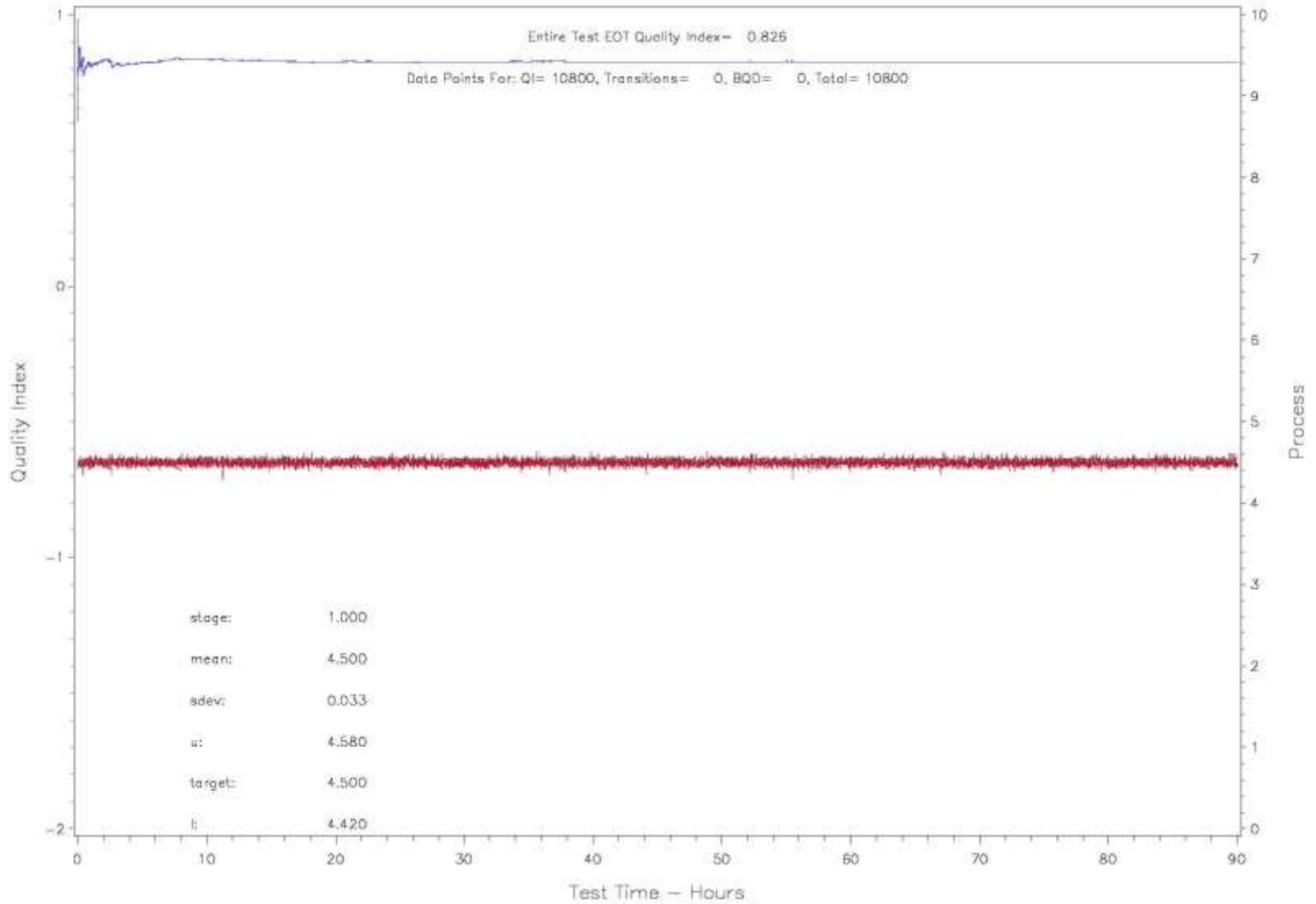


Right Exhaust Back Pressure

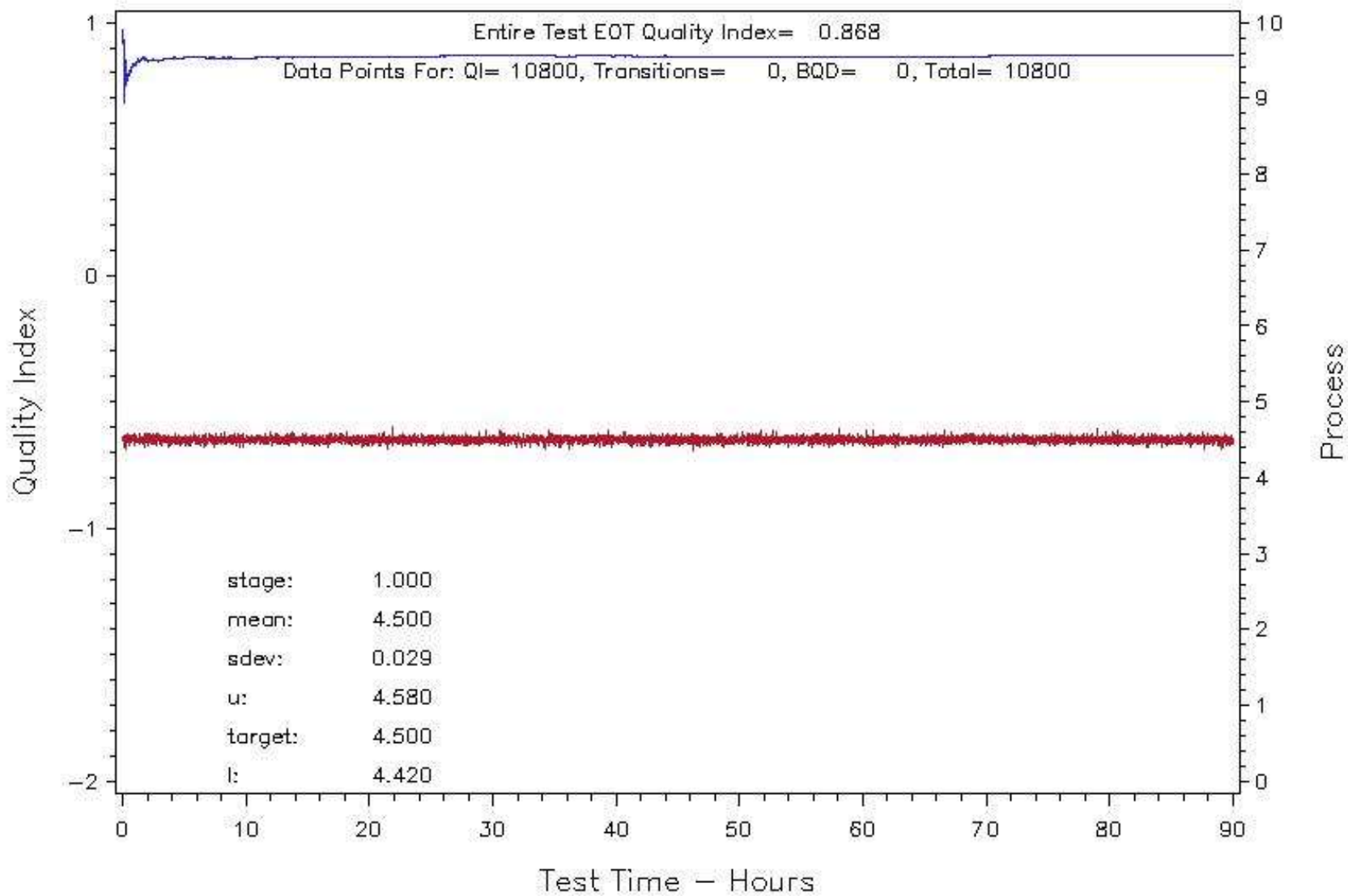
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= D Stand= CB106 CMR= 106791



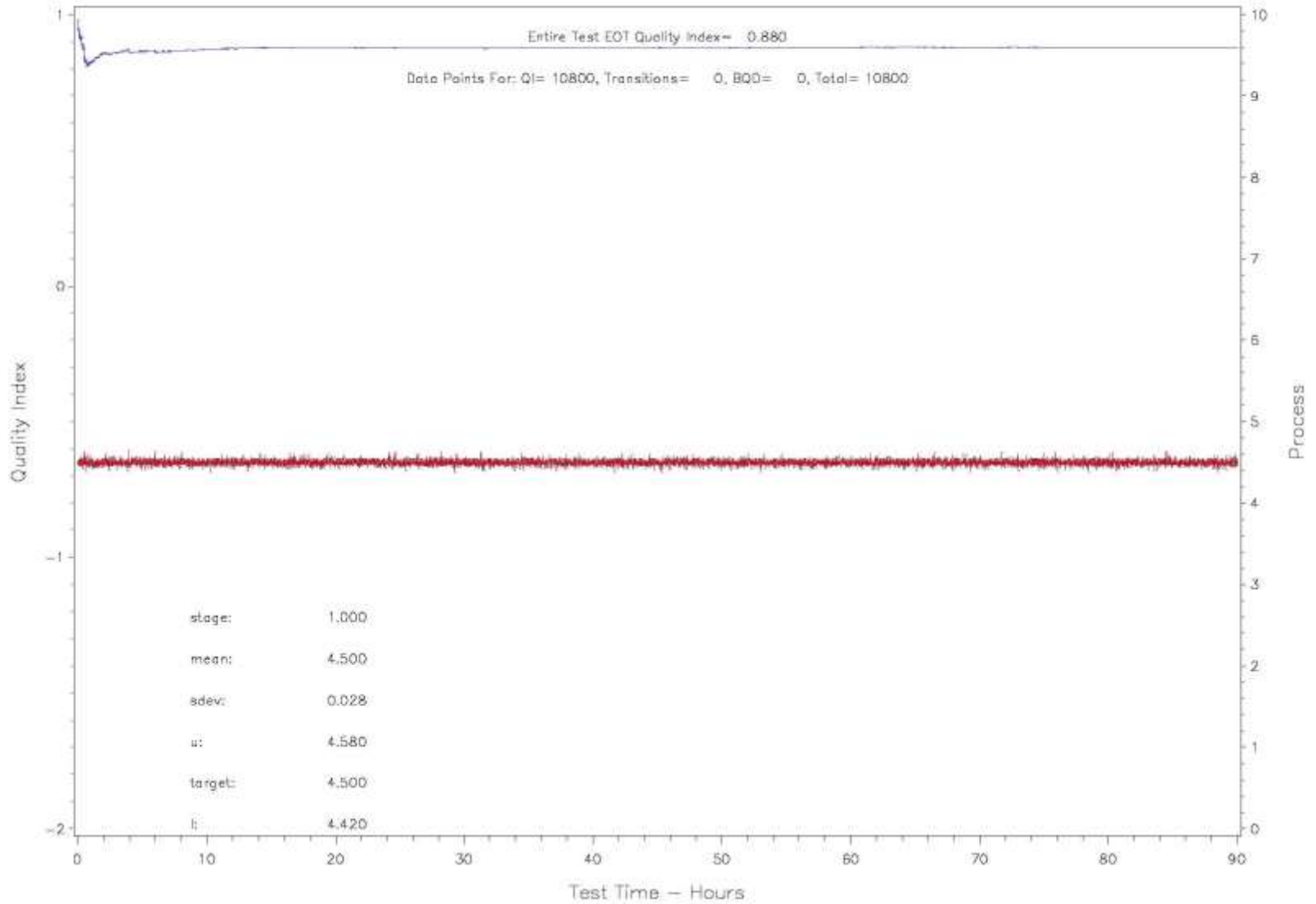
III QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= A Stand= 2 DMIR= 106776



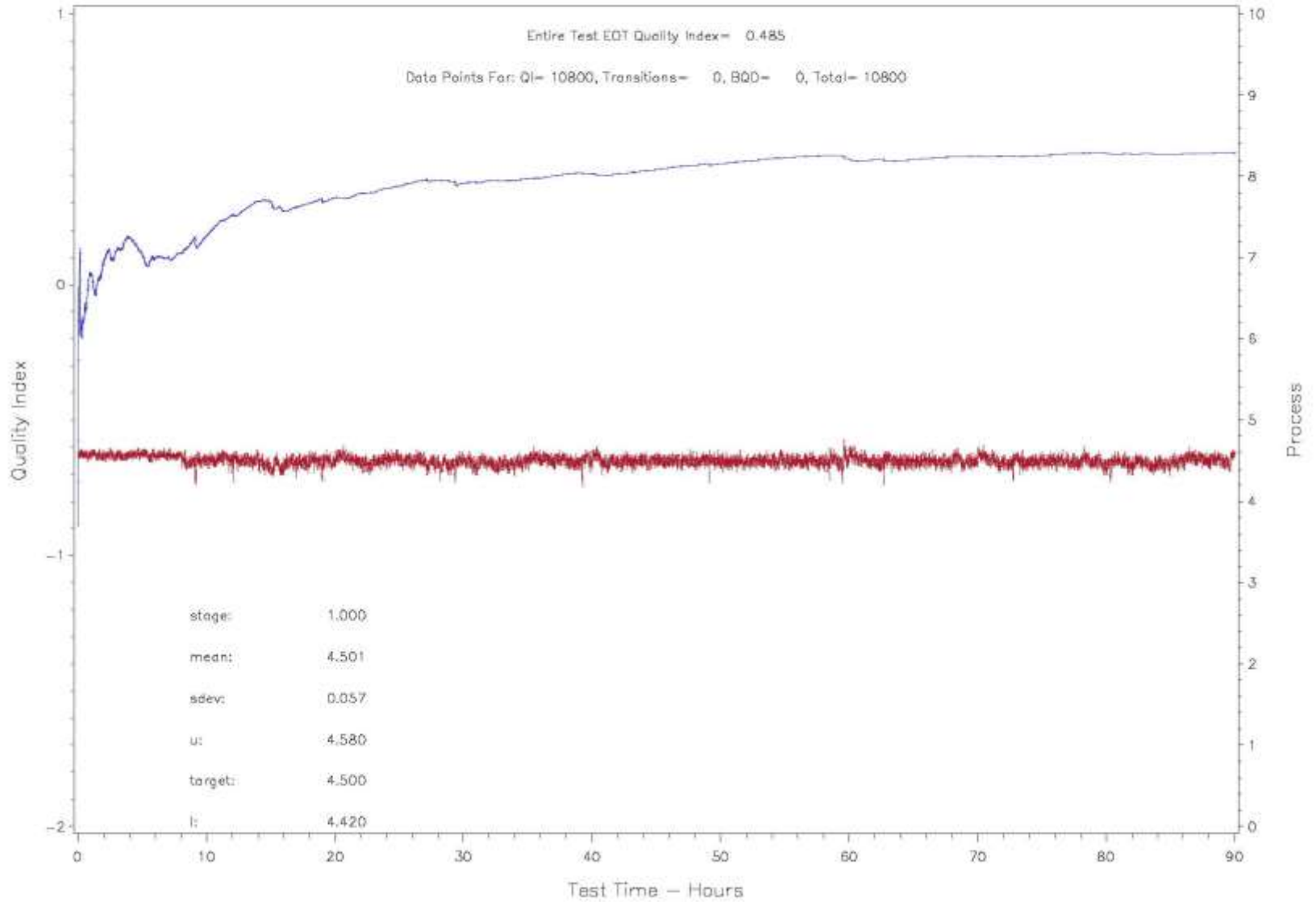
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right – kPa (CONTROL)
LAB= A Stand= 1 CMIR= 106777



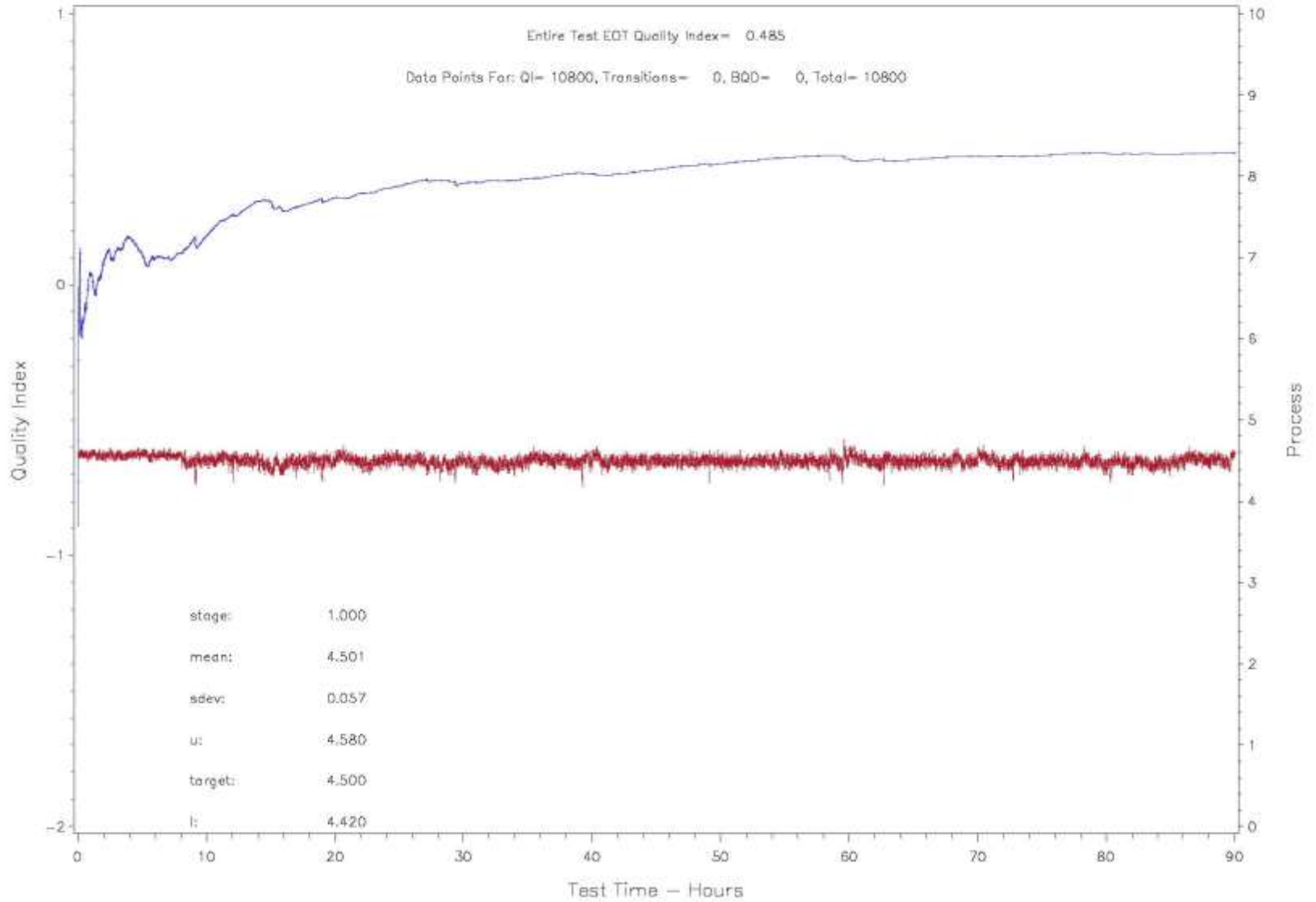
IIIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= A Stand= 1 DMIR= 106779



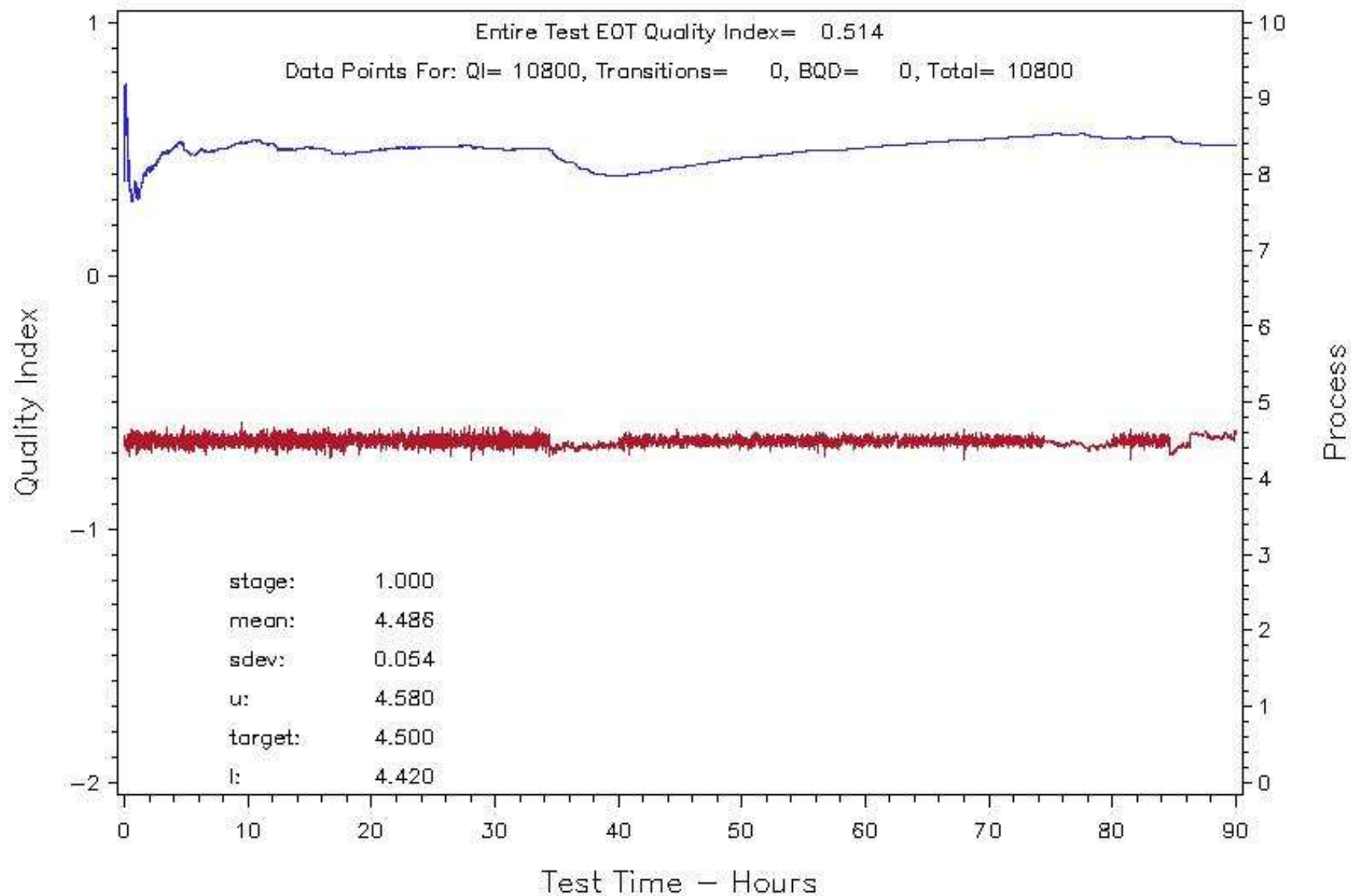
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= E Stand= 3 QMID= 106781



IIH QUALITY INDEX OPERATIONAL REVIEW
 Exhaust Back Pressure Right - kPa (CONTROL)
 LAB= E Stand= 3 QMID= 106781

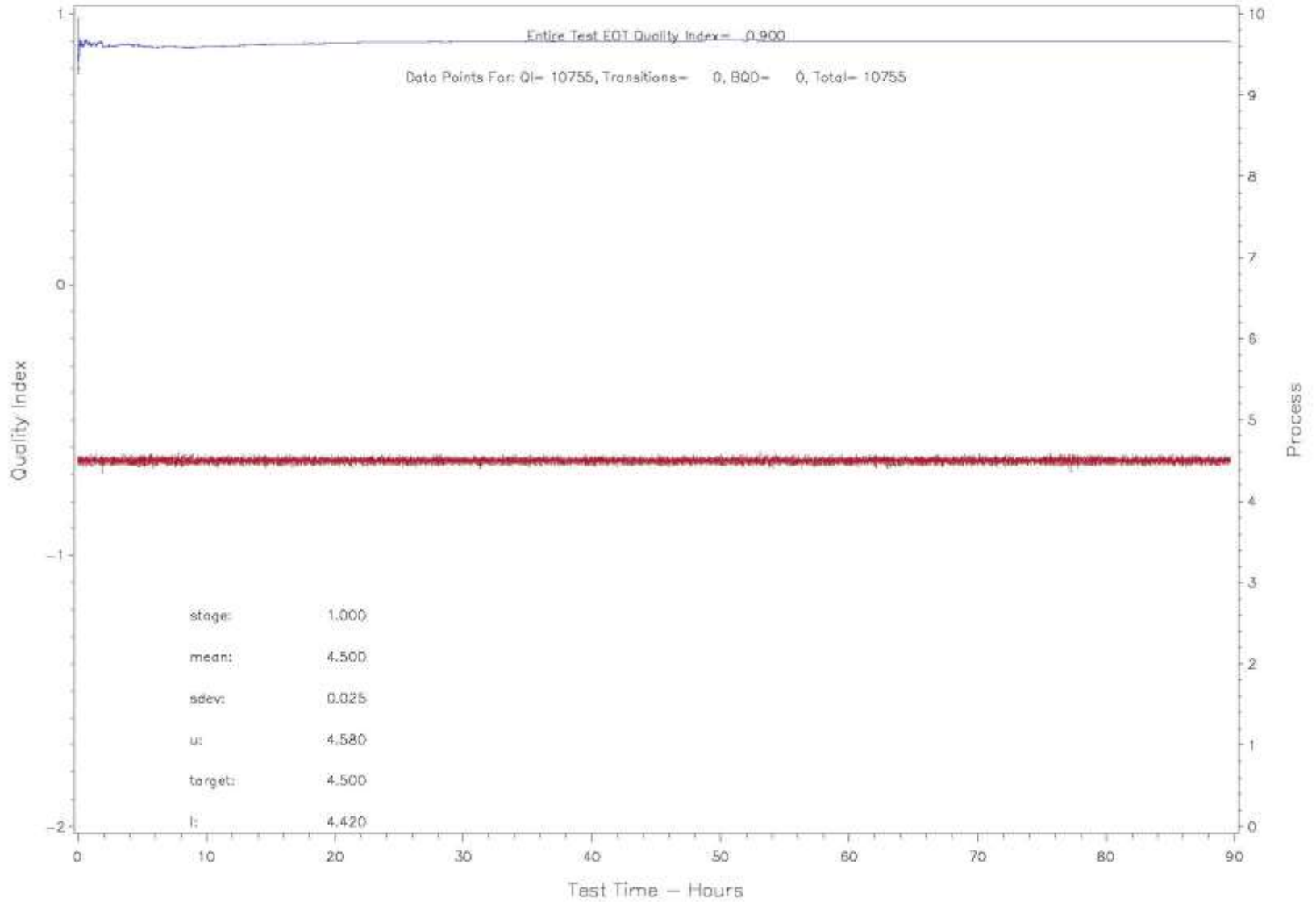


IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right – kPa (CONTROL)
LAB= E Stand= 3 CMIR= 106780

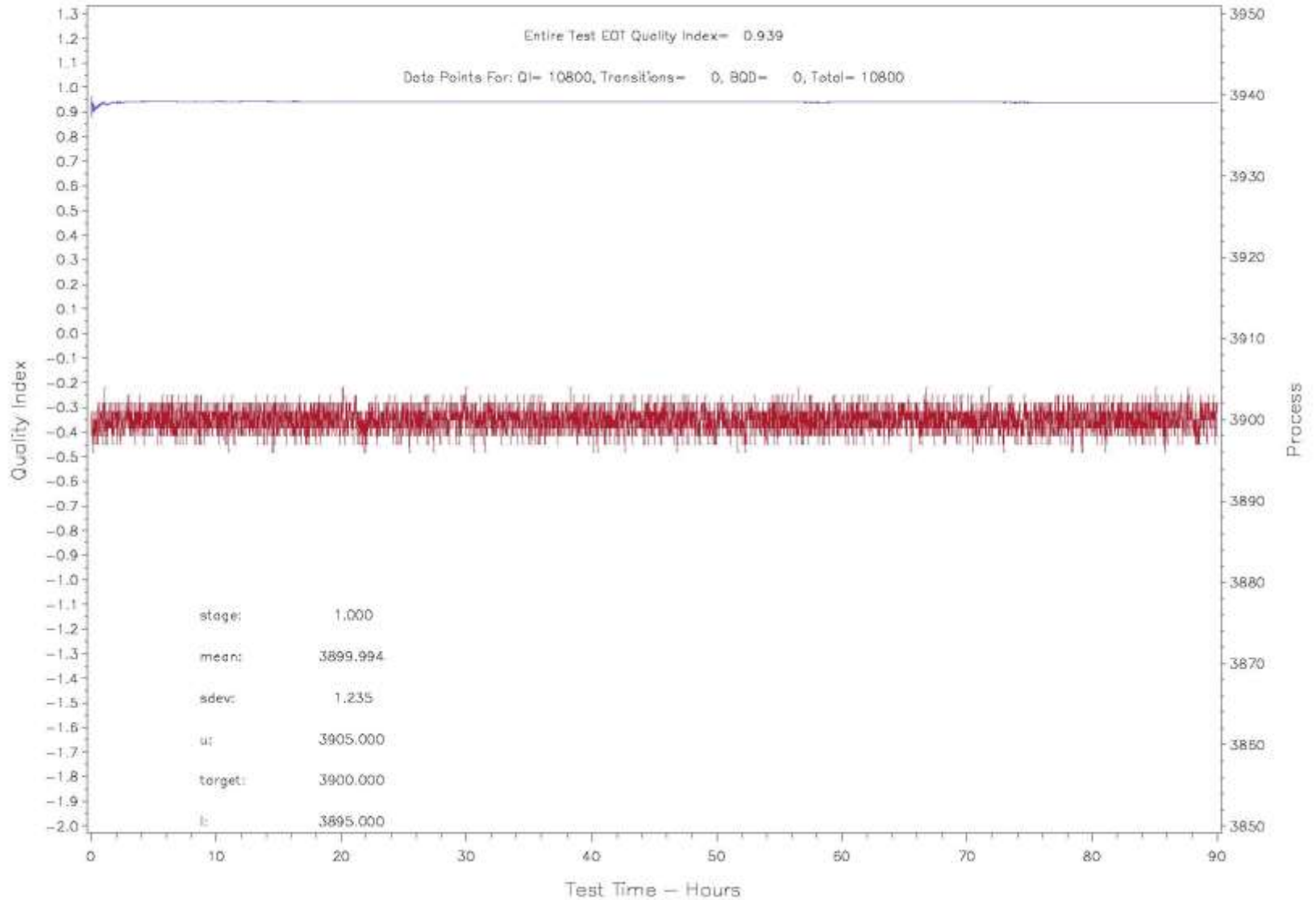


Speed

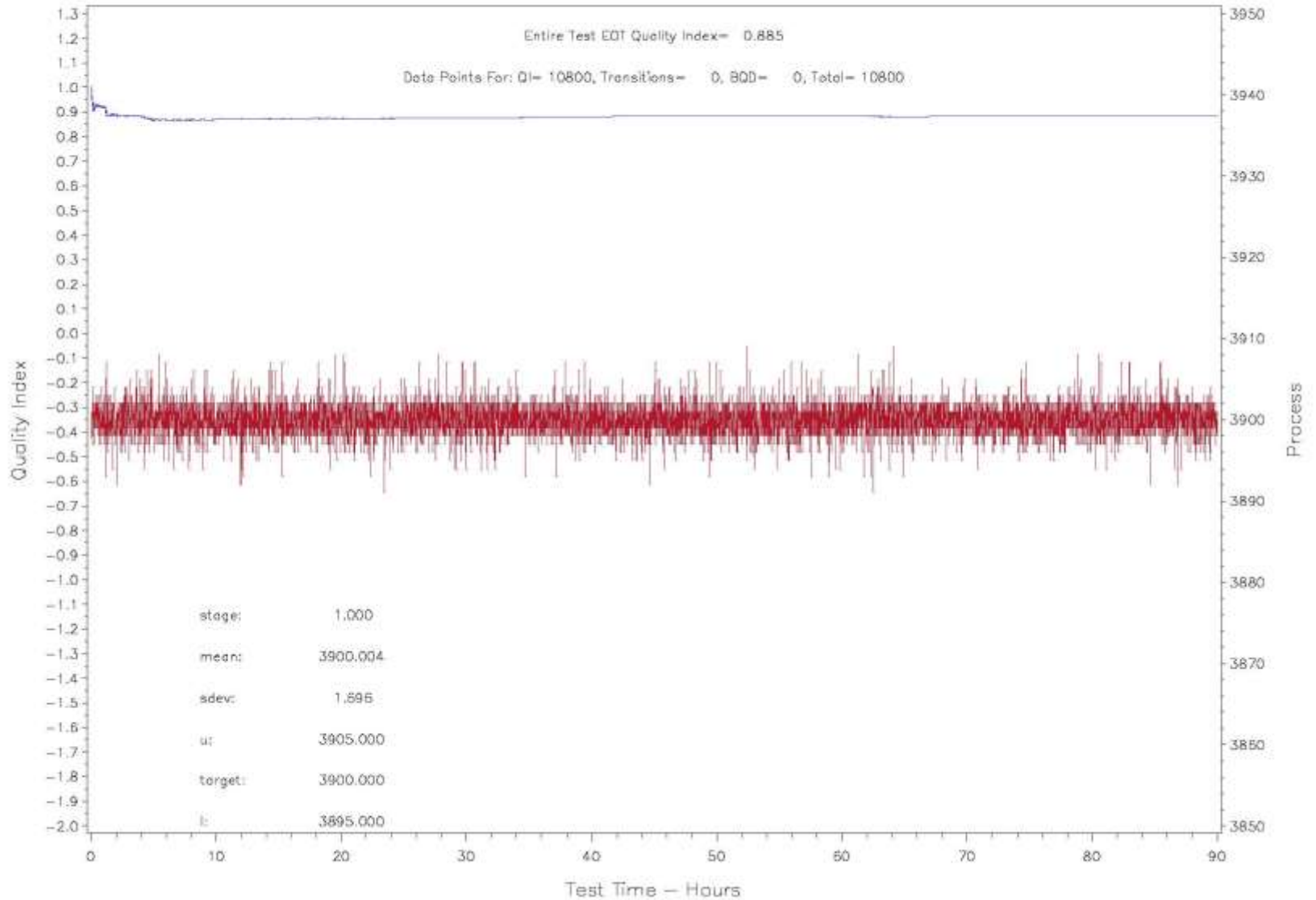
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= D Stand= CB106 CMR= 106791



IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Speed - r/min (CONTROL)
LAB= A, Stand= 2, DM#= 106776



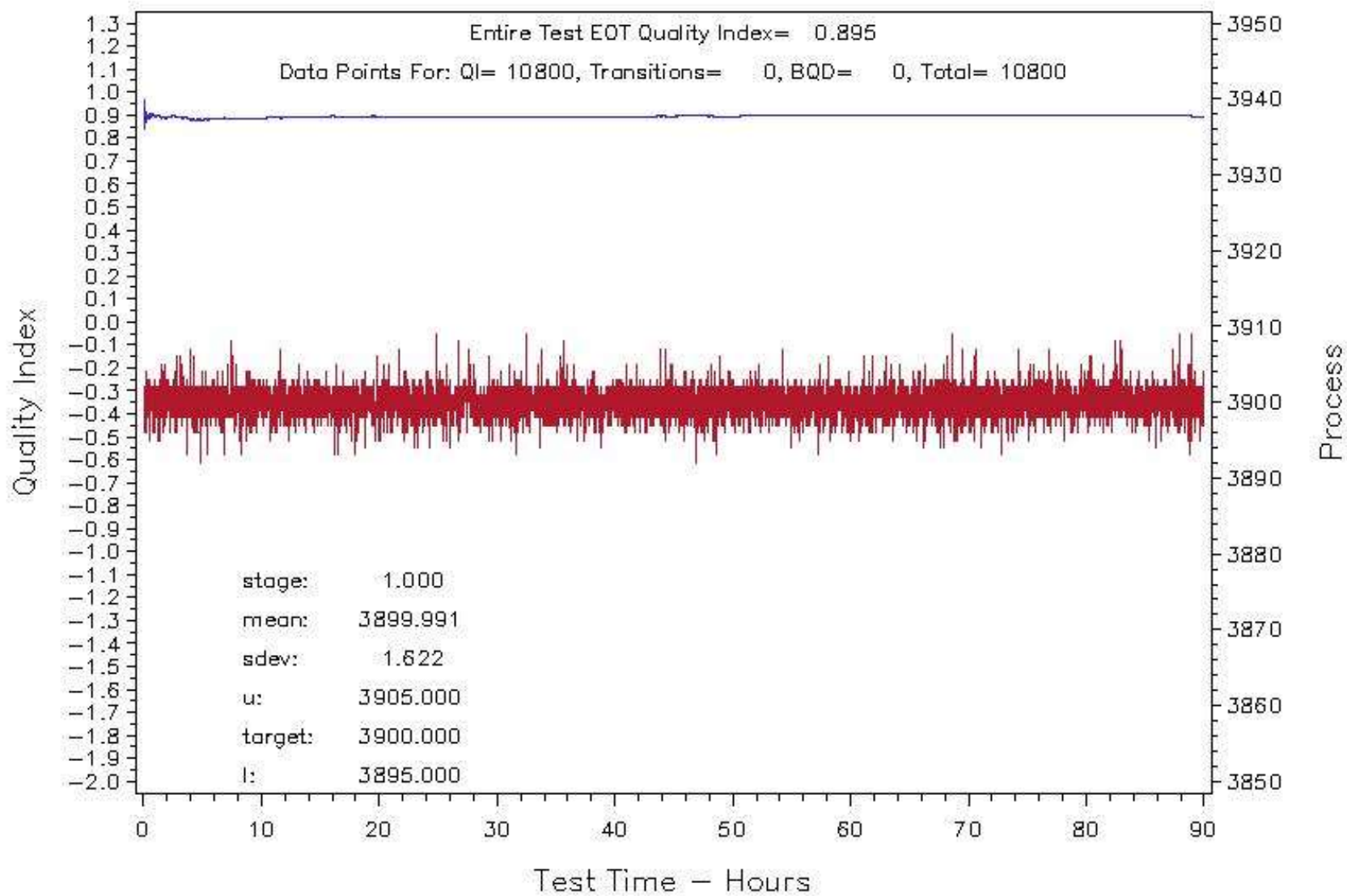
IIH QUALITY INDEX OPERATIONAL REVIEW
Engine Speed - r/min (CONTROL)
LAB= A, Stand= 1, DM#= 106777



IIIH QUALITY INDEX OPERATIONAL REVIEW

Engine Speed - r/min (CONTROL)

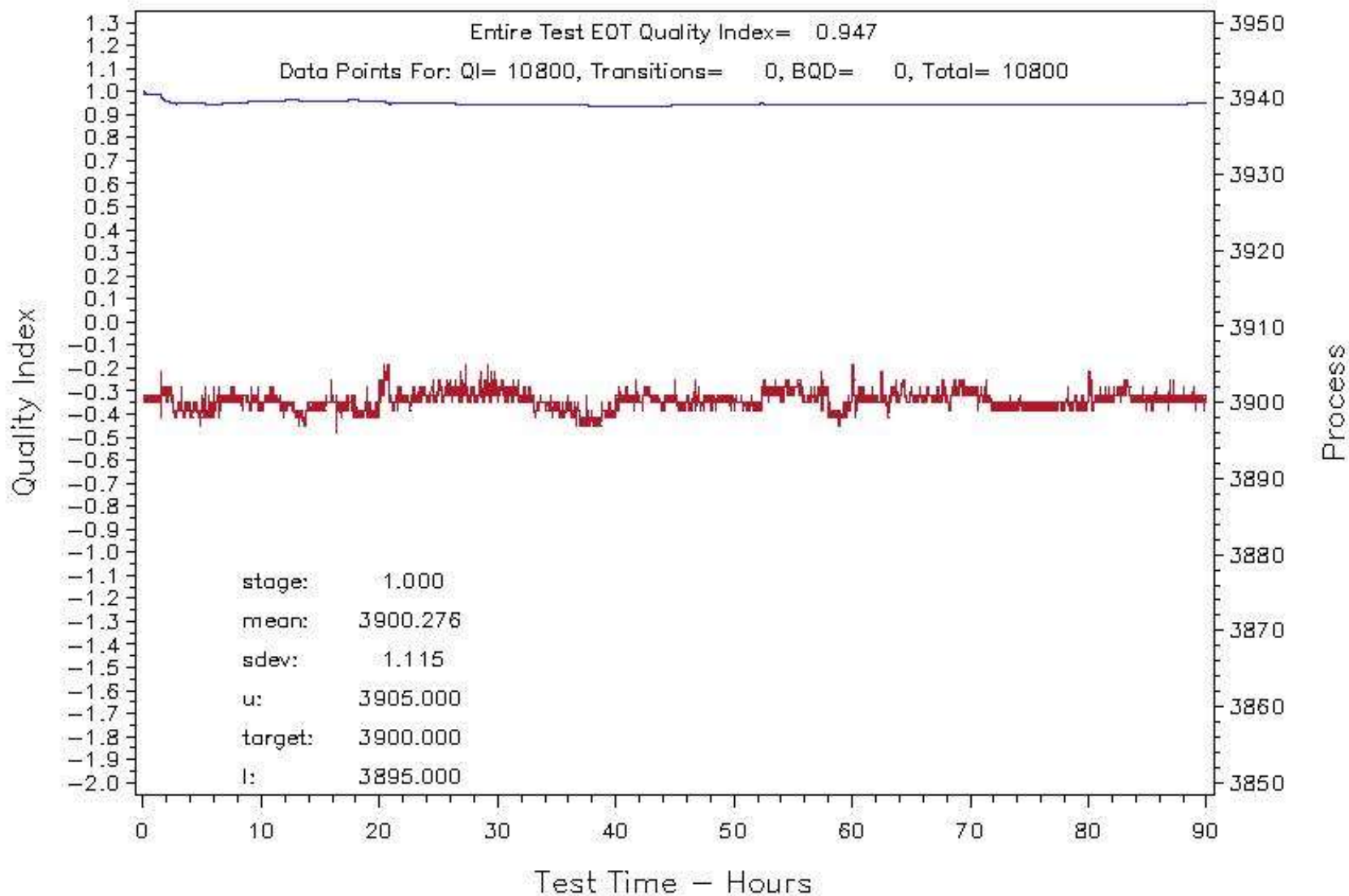
LAB= A Stand= 1 CMIR= 106779



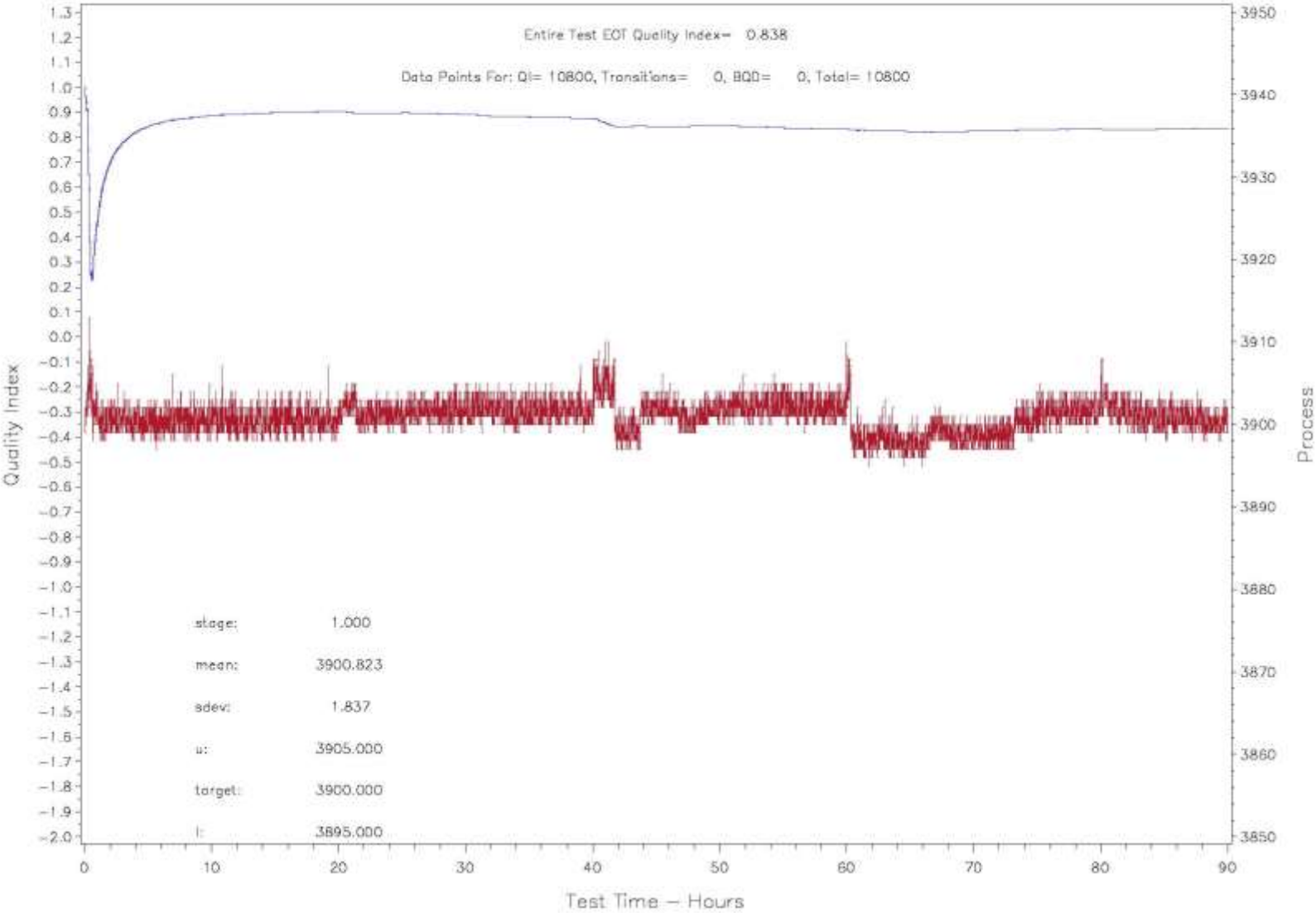
IIH QUALITY INDEX OPERATIONAL REVIEW

Engine Speed - r/min (CONTROL)

LAB= E Stand= 3 CMIR= 106780

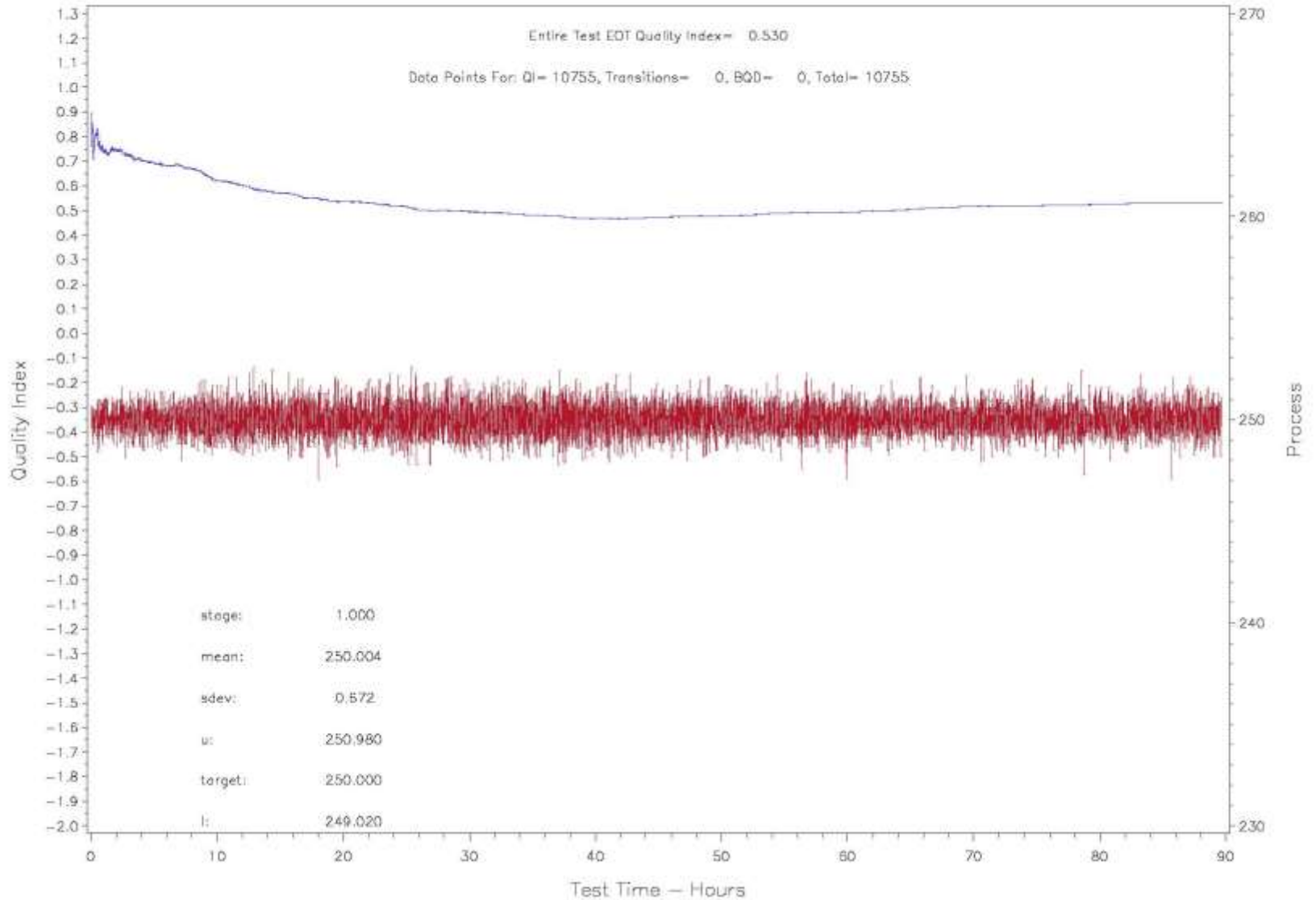


IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Speed - r/min (CONTROL)
LAB= E Stand= 3 QMR= 106781

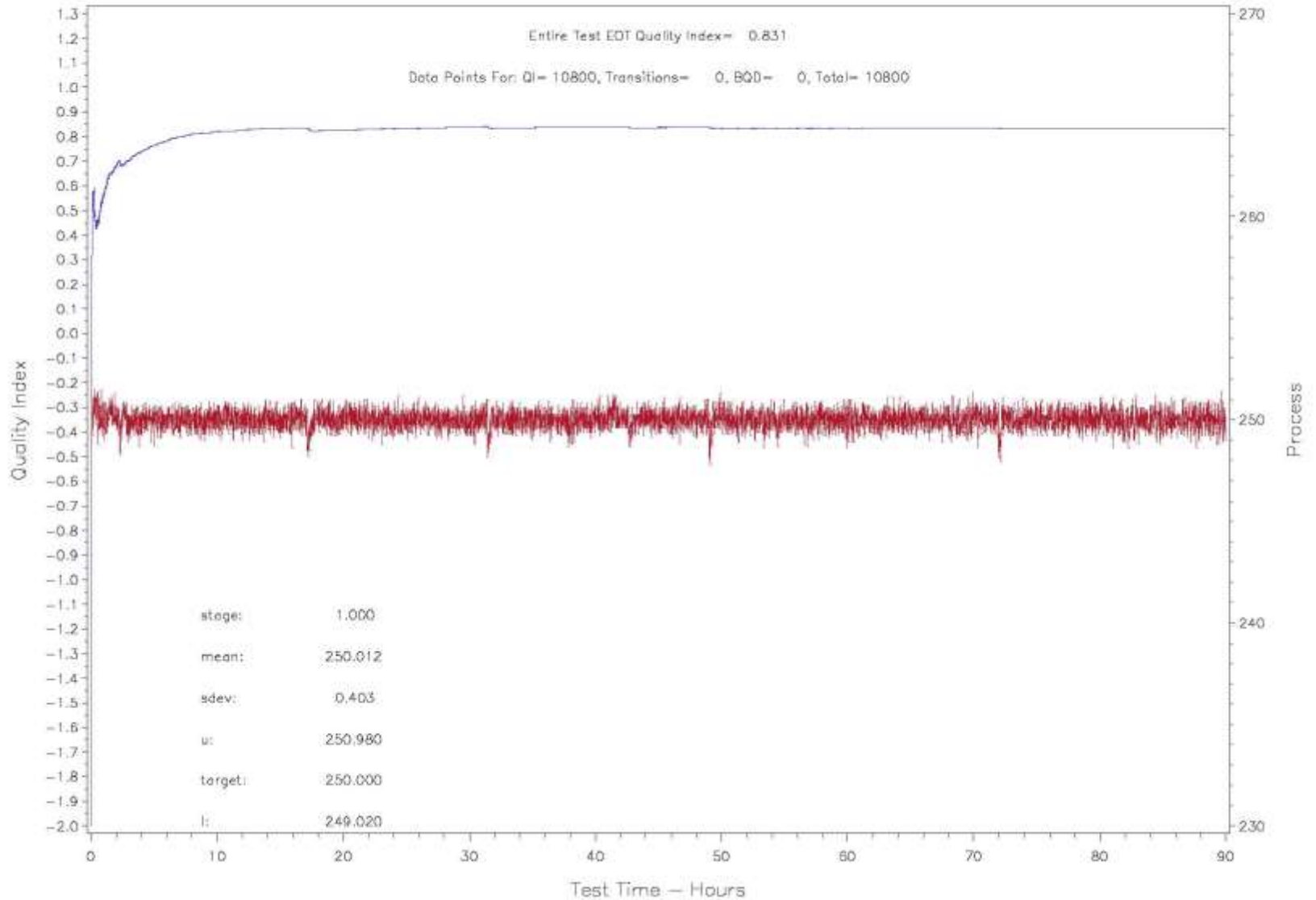


Load

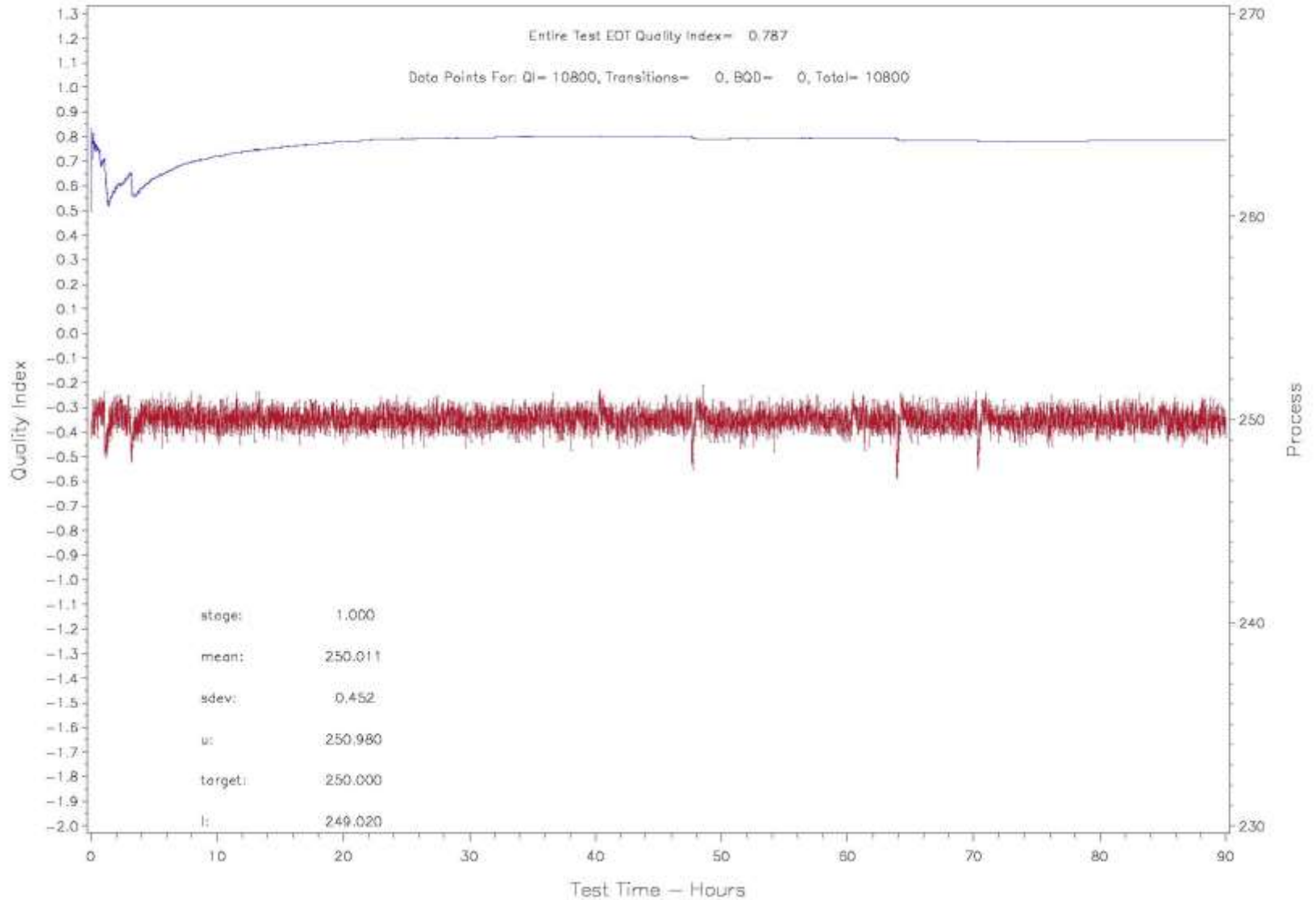
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Torque - Nm (CONTROL)
LAB= D Stand= CB106 CMR= 106791



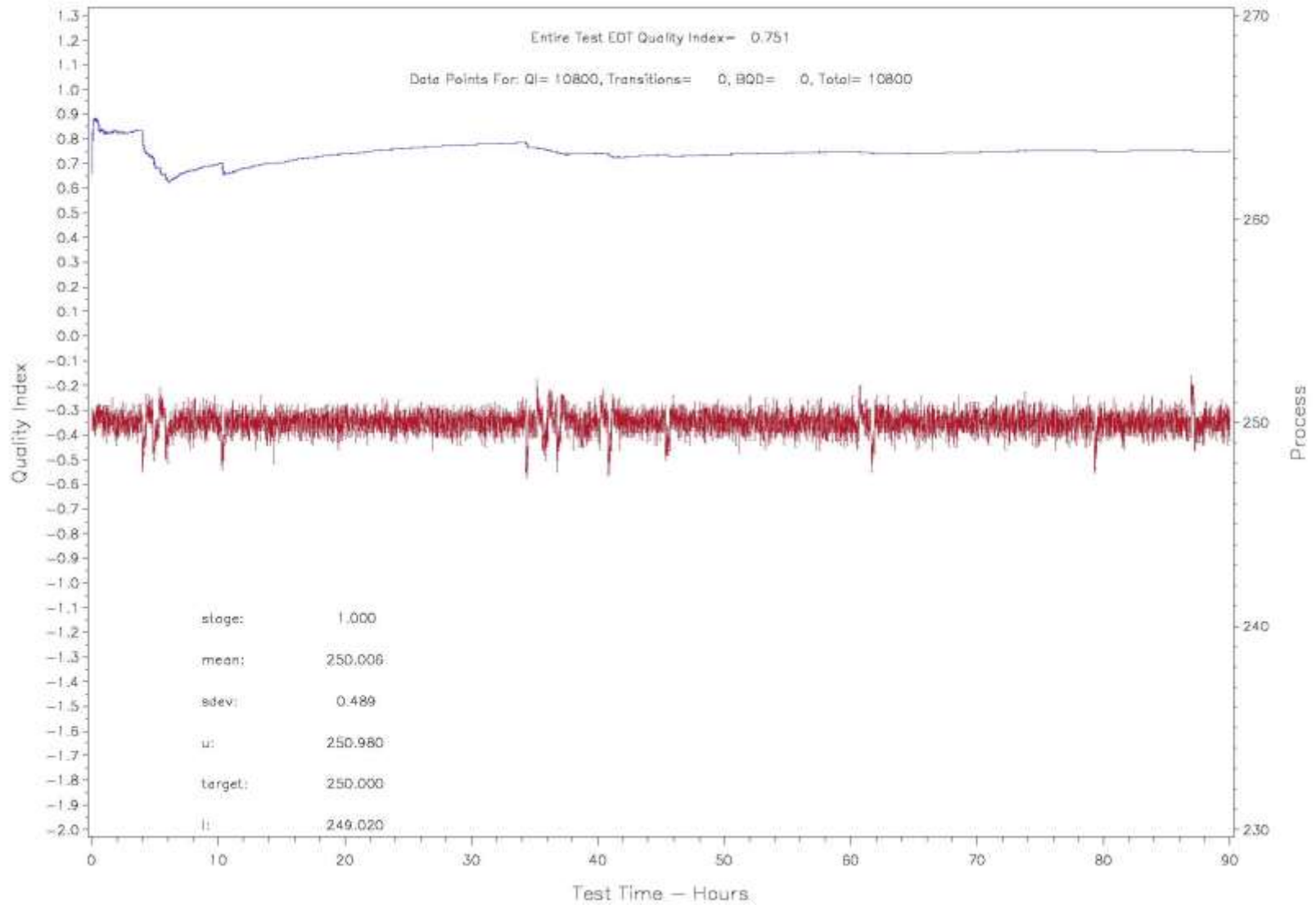
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Torque - Nm (CONTROL)
LAB= A Stand= 2 DMR= 106776



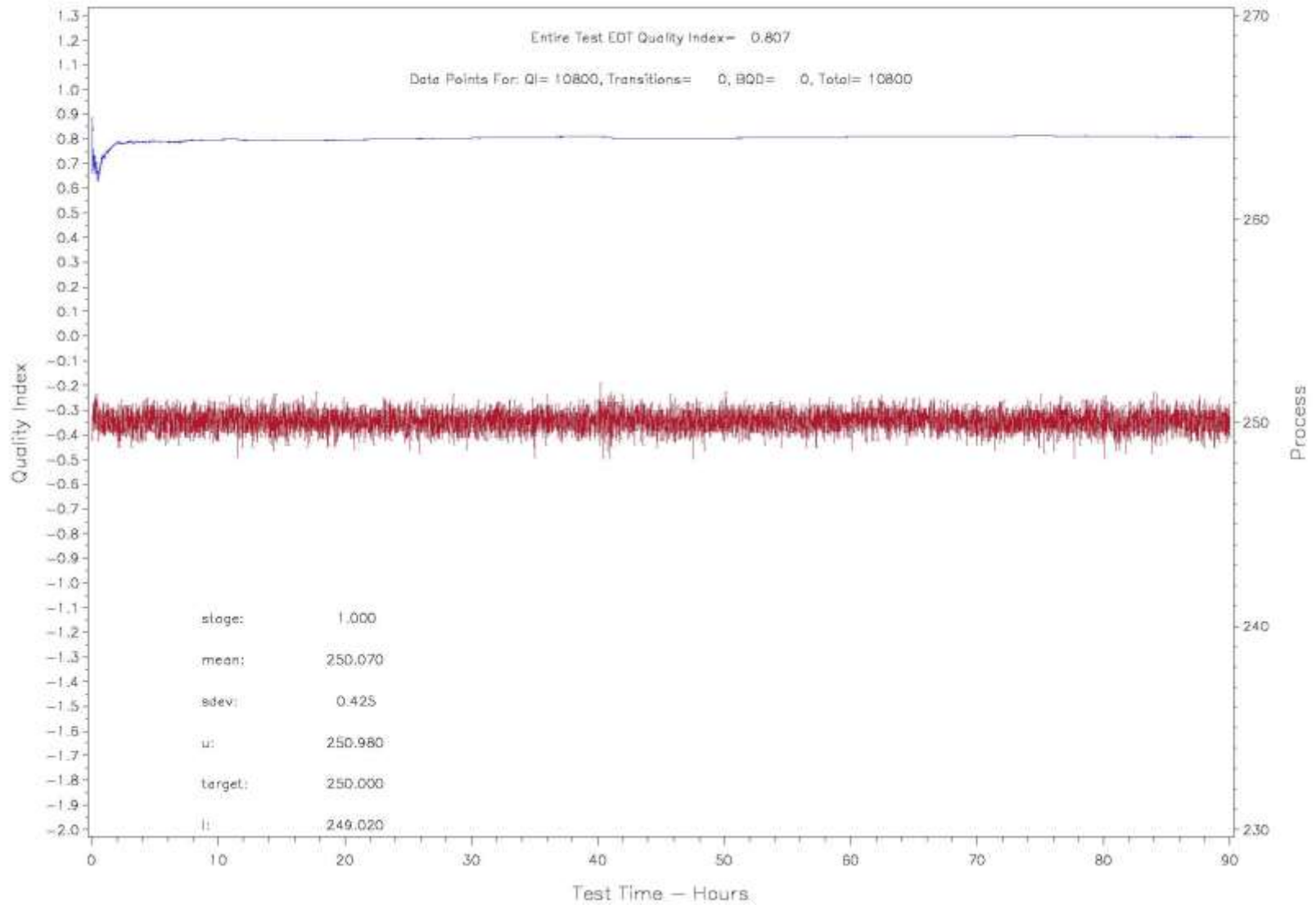
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Torque - Nm (CONTROL)
LAB= A Stand= 1 DMR= 106777



III QUALITY INDEX OPERATIONAL REVIEW
 Engine Torque - Nm (CONTROL)
 LAB= A Stand= 1 CMR= 106779



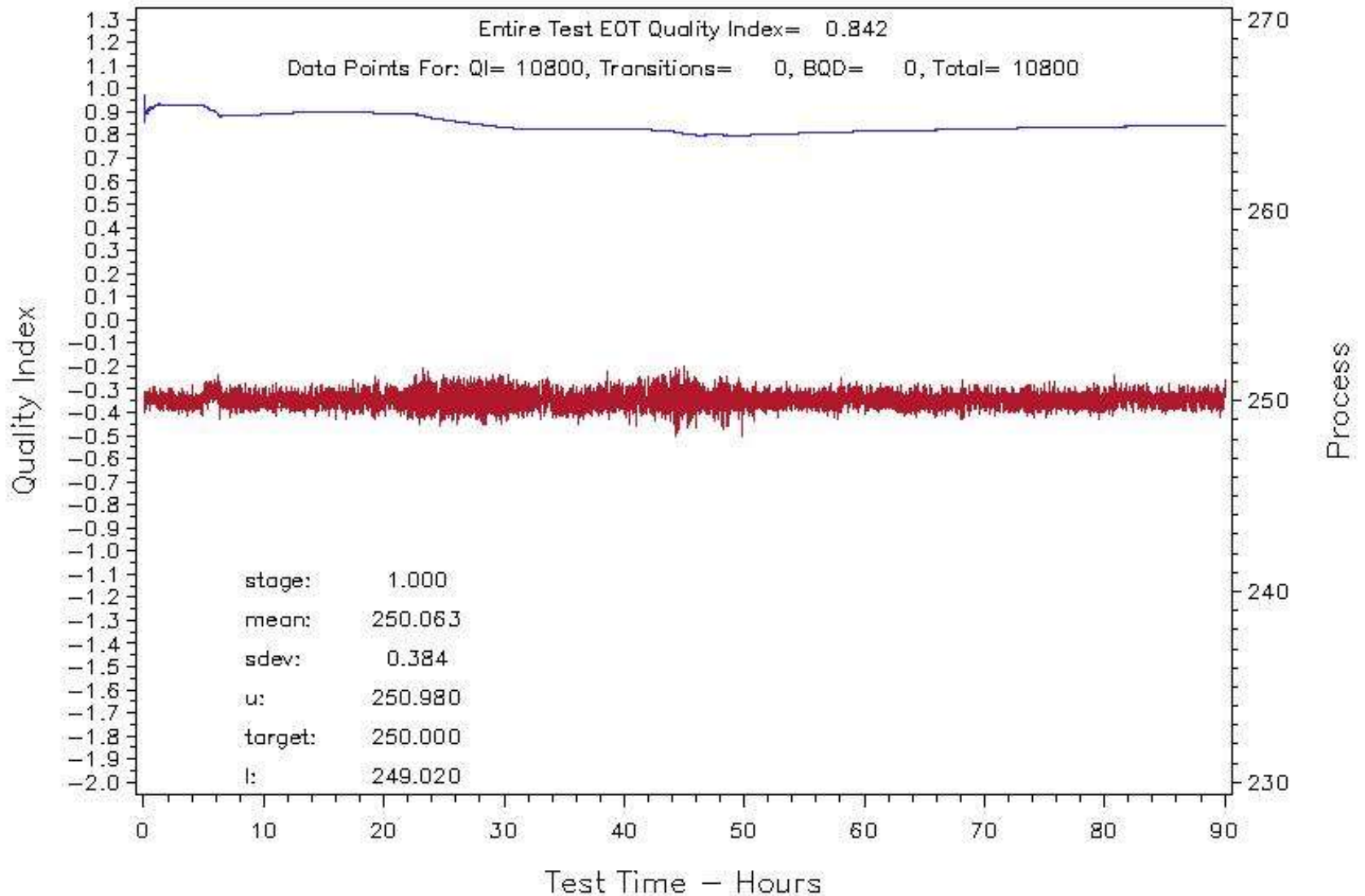
III QUALITY INDEX OPERATIONAL REVIEW
 Engine Torque - Nm (CONTROL)
 LAB= E Stand= 3 QMIR= 106781



IIH QUALITY INDEX OPERATIONAL REVIEW

Engine Torque – Nm (CONTROL)

LAB= E Stand= 3 CMIR= 106780





A Program of ASTM International



A Program of ASTM International

Test Monitoring Center

<http://astmtmc.cmu.edu>

Attachment #2

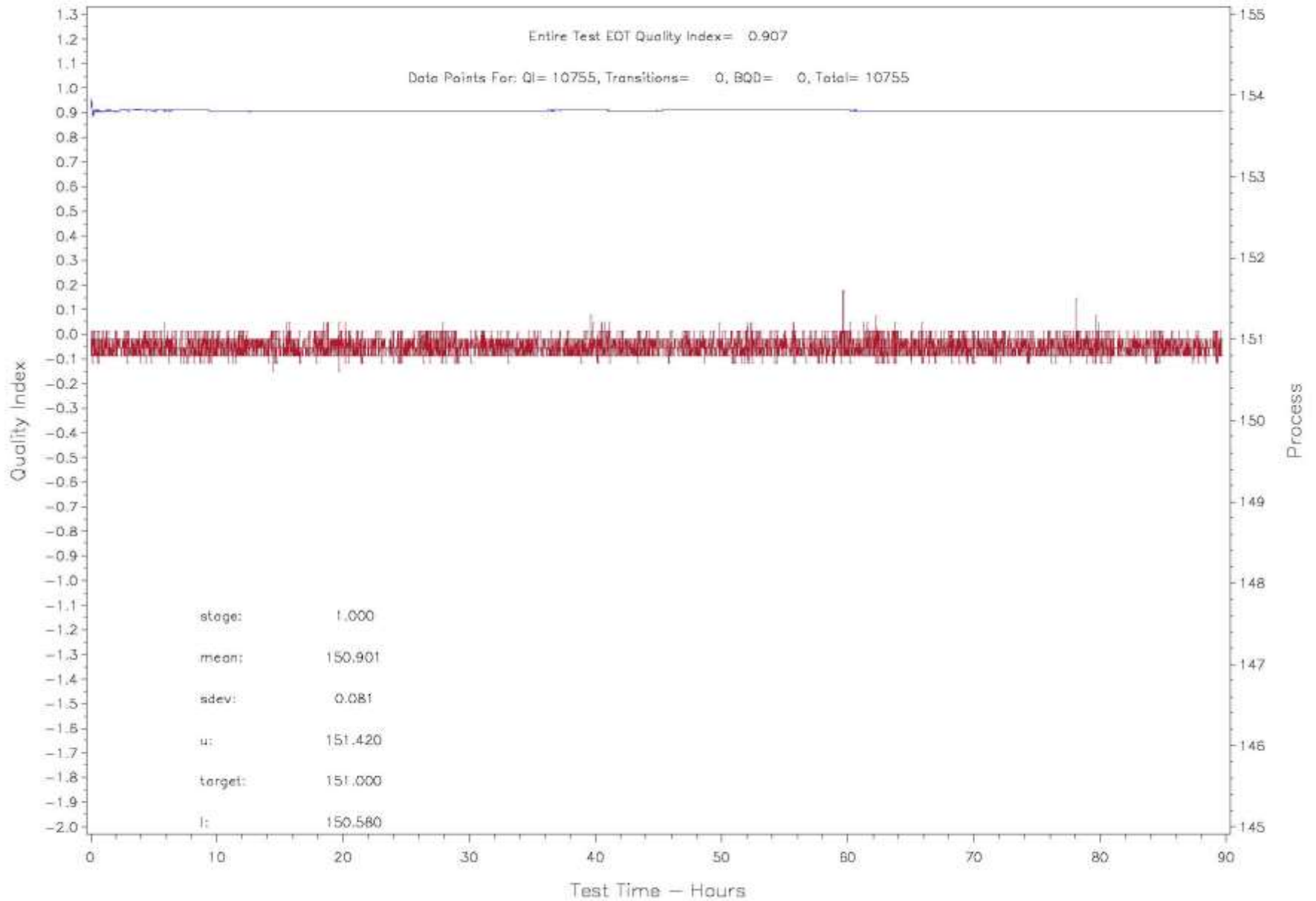
QI Plots from 3rd Matrix Tests

Block Oil Temperature

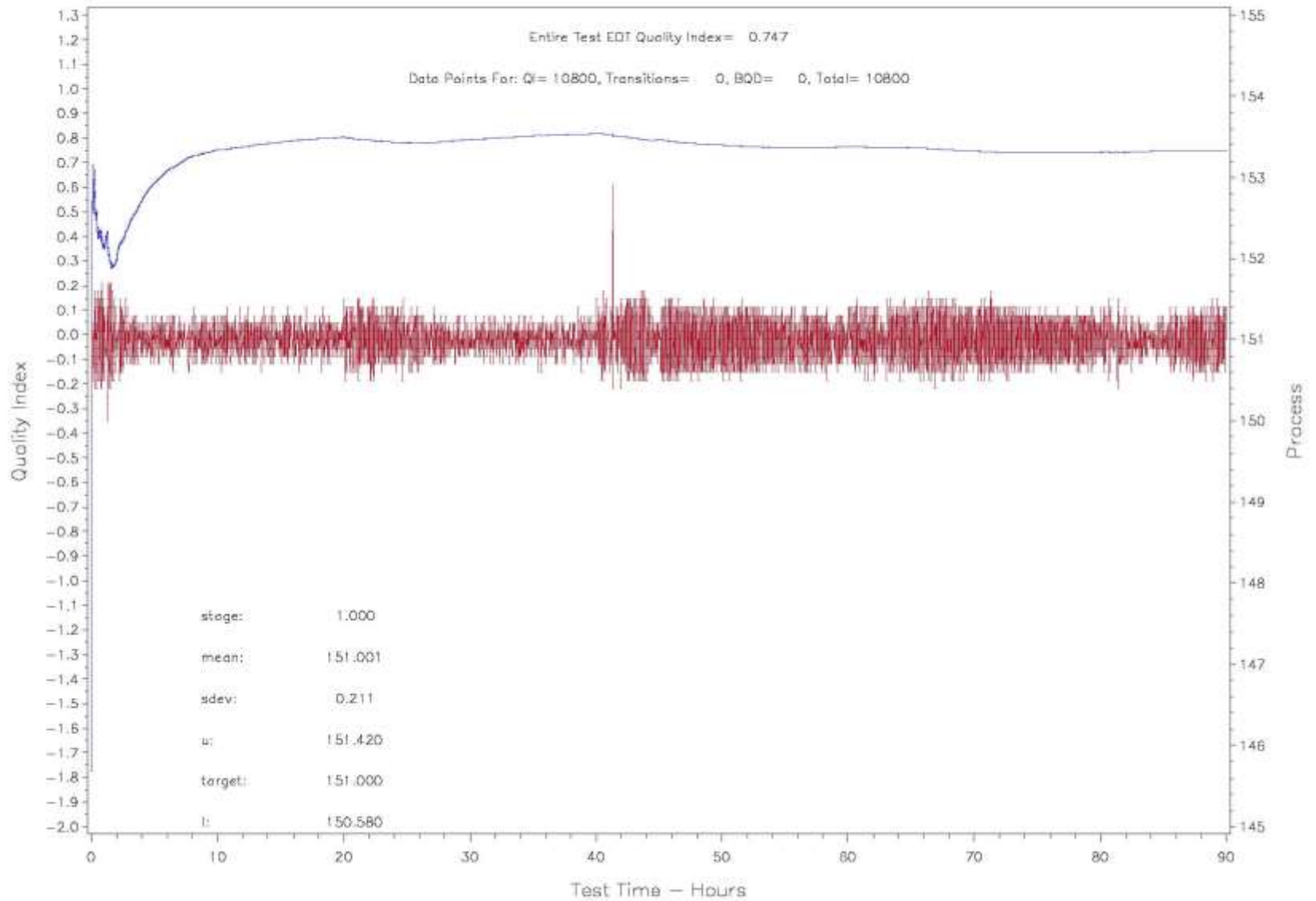
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Oil Filter Block Temperature - Degrees C (CONTROL)
 LAB= D Stand= CB106 CMR= 106791

Entire Test EOT Quality Index= 0.907

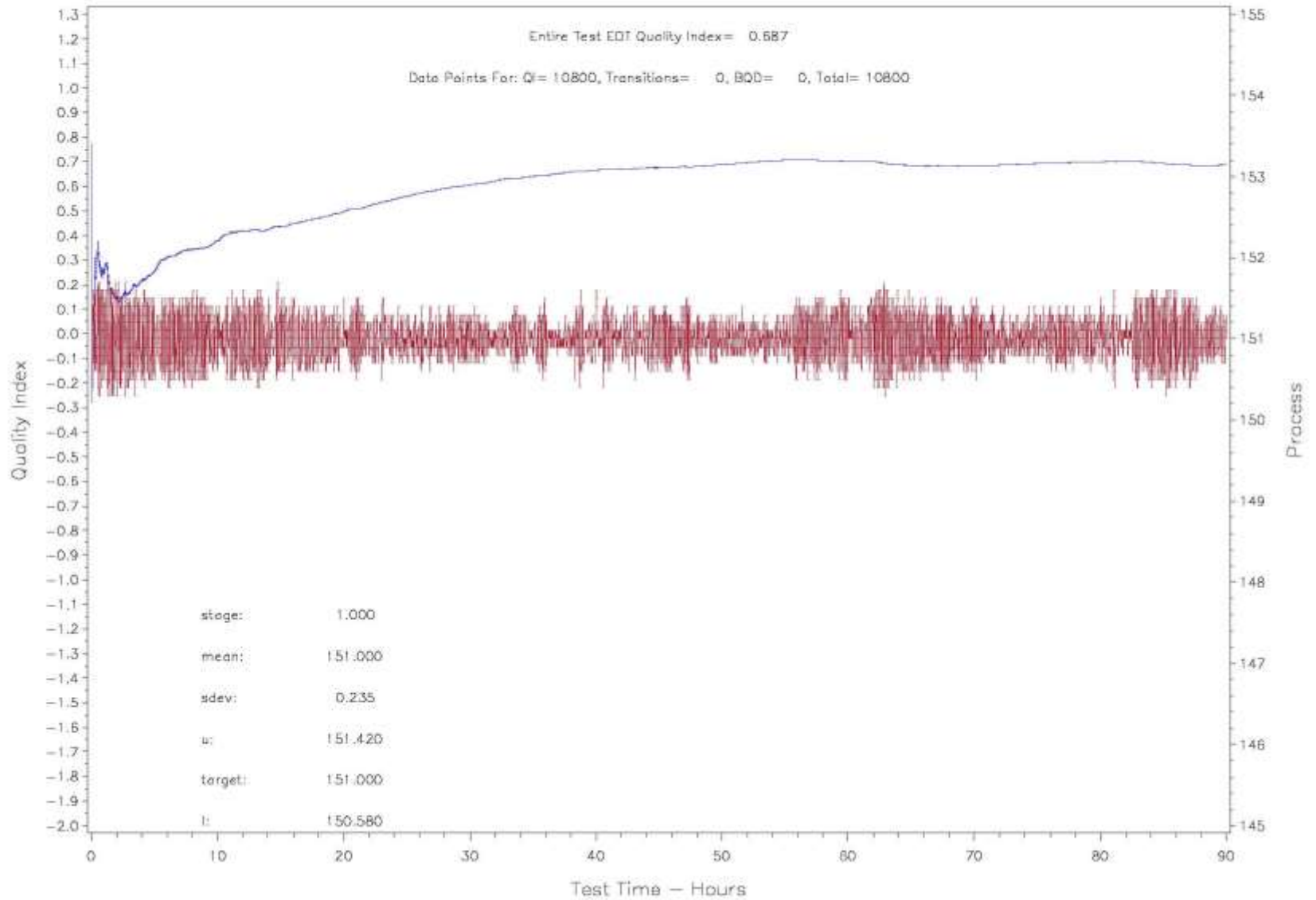
Data Points For: QI= 10755, Transitions= 0, BQD= 0, Total= 10755



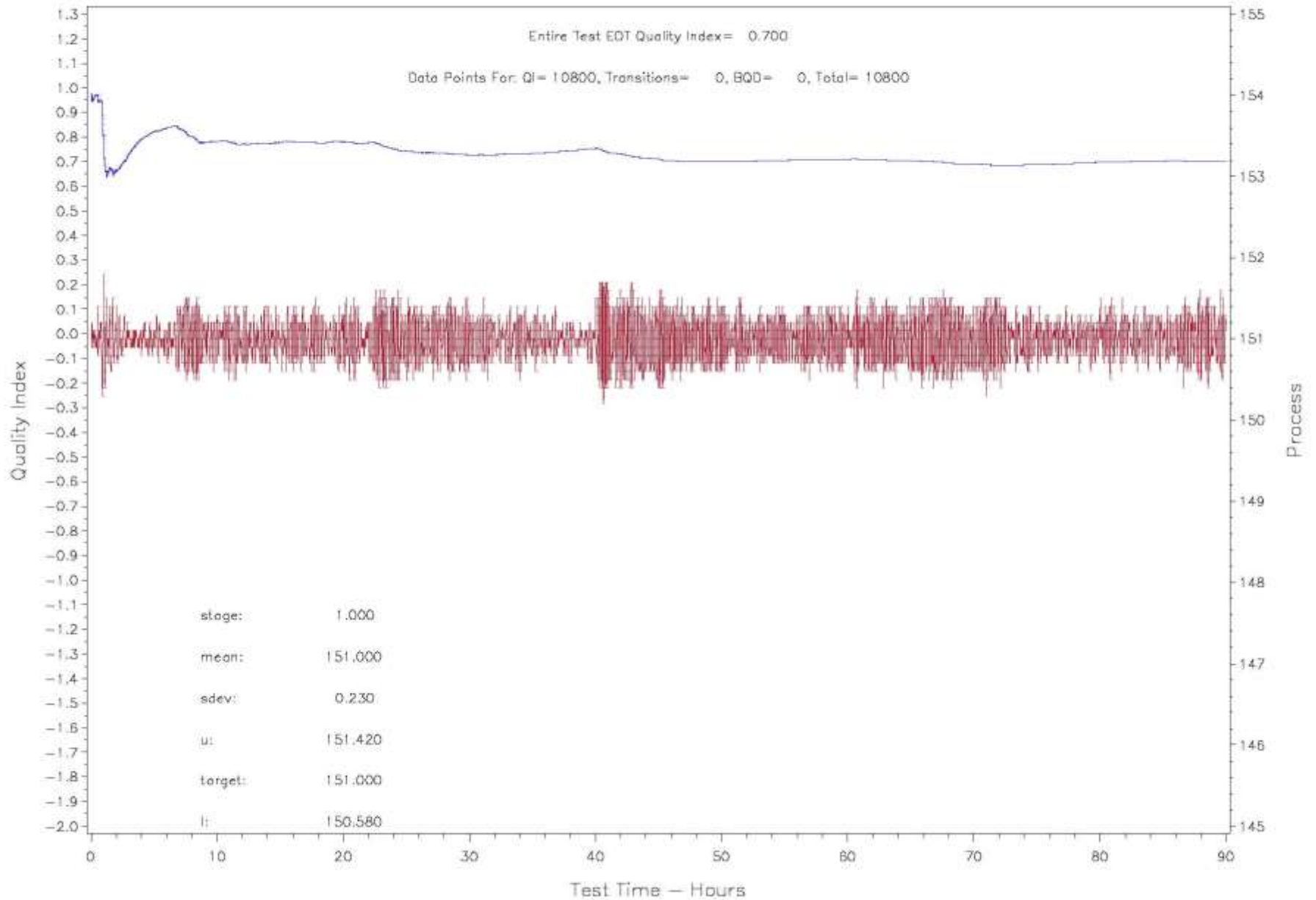
IIIH QUALITY INDEX OPERATIONAL REVIEW
 QI Filter Block Temperature - Degrees C (CONTROL)
 LAB= A Stand= 2 CMIR= 106776



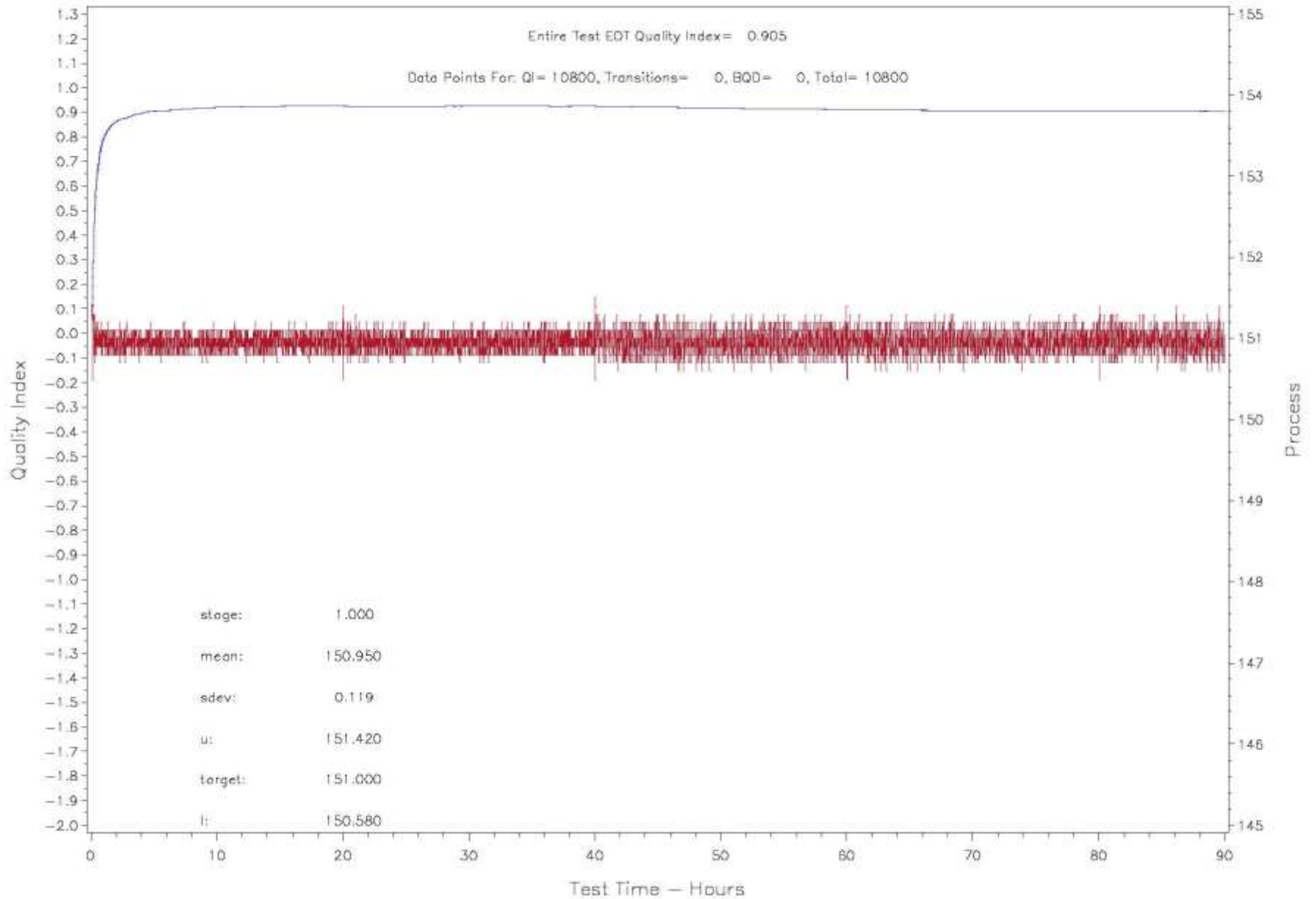
IIIH QUALITY INDEX OPERATIONAL REVIEW
 QI Filter Block Temperature - Degrees C (CONTROL)
 LAB= A Stand= 1 CMIR= 106777



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Oil Filter Block Temperature – Degrees C (CONTROL)
 LAB= A Stand= 1 CMR= 106779

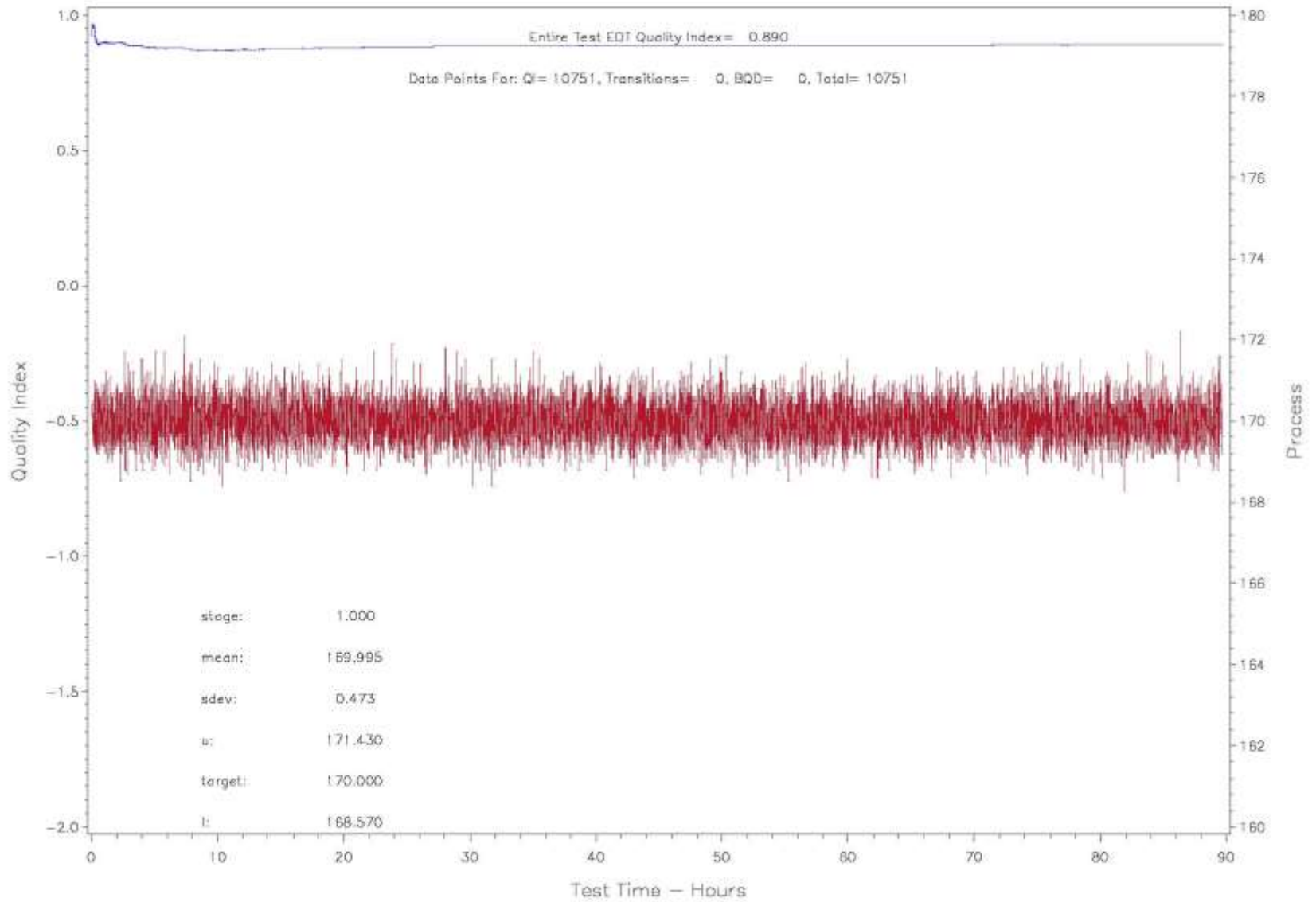


IIIH QUALITY INDEX OPERATIONAL REVIEW
 Oil Filter Block Temperature - Degrees C (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

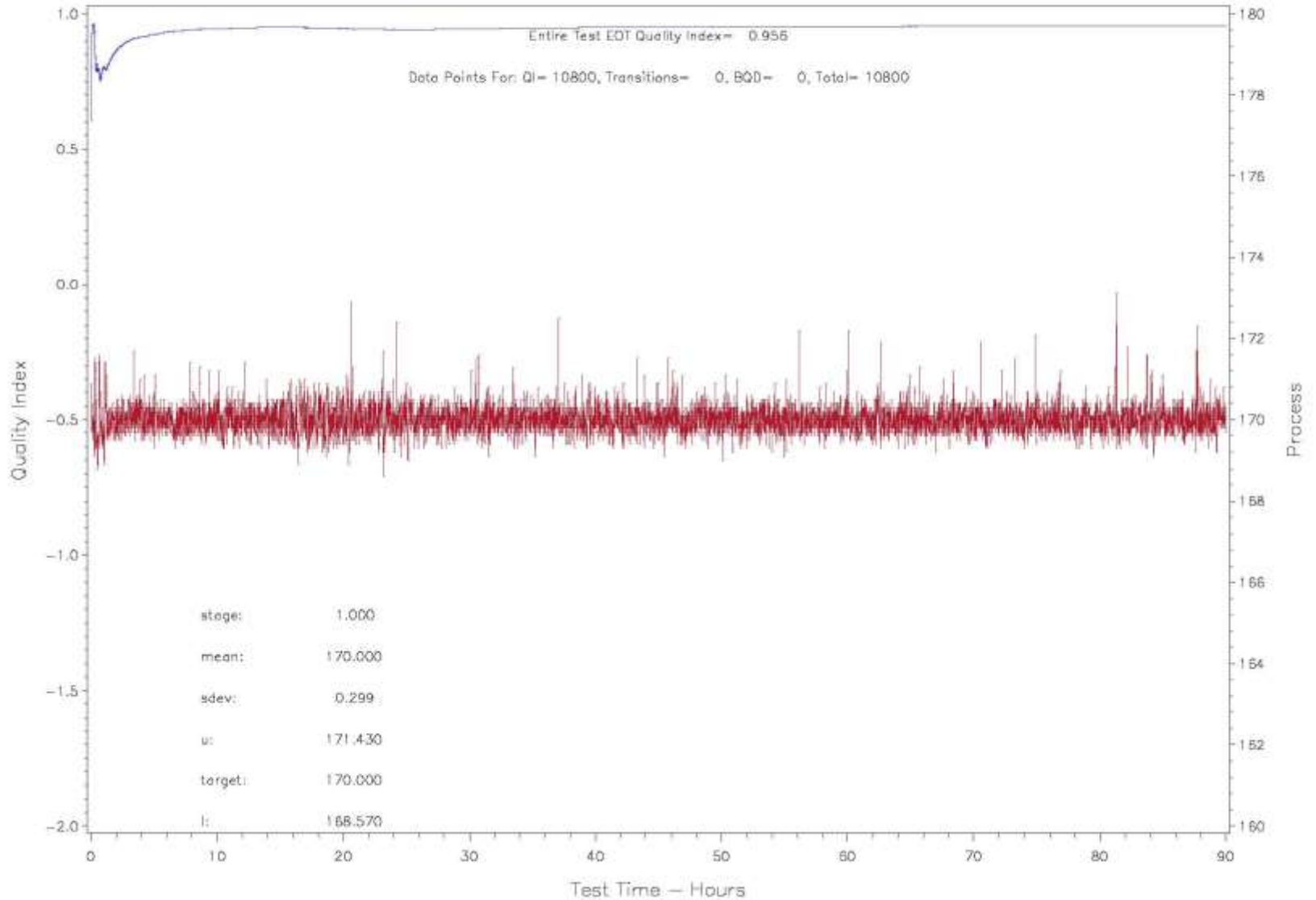


Coolant Flow

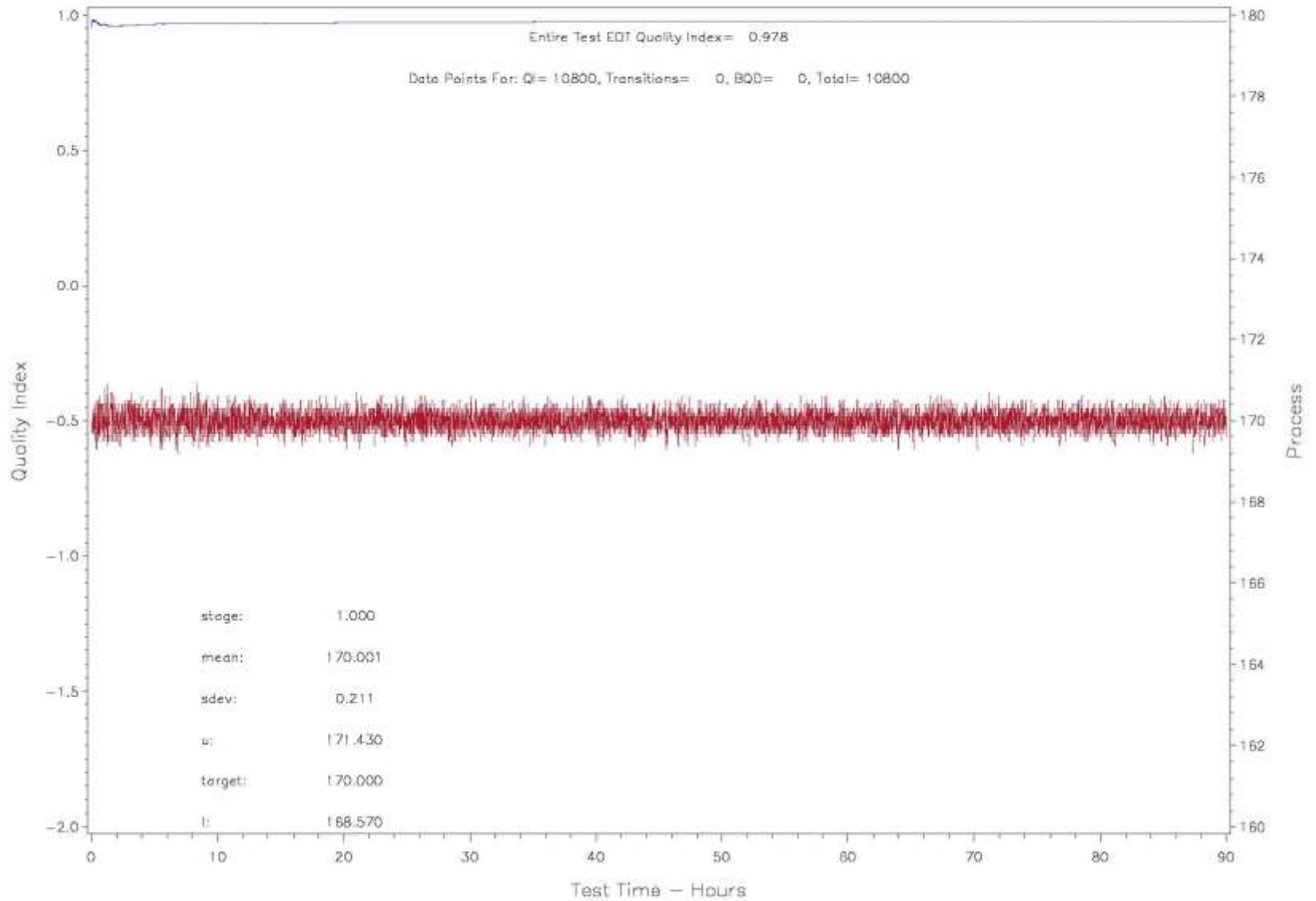
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Coolant Flow - L/min (CONTROL)
LAB= D Stand= DB1DB DMR= 106791



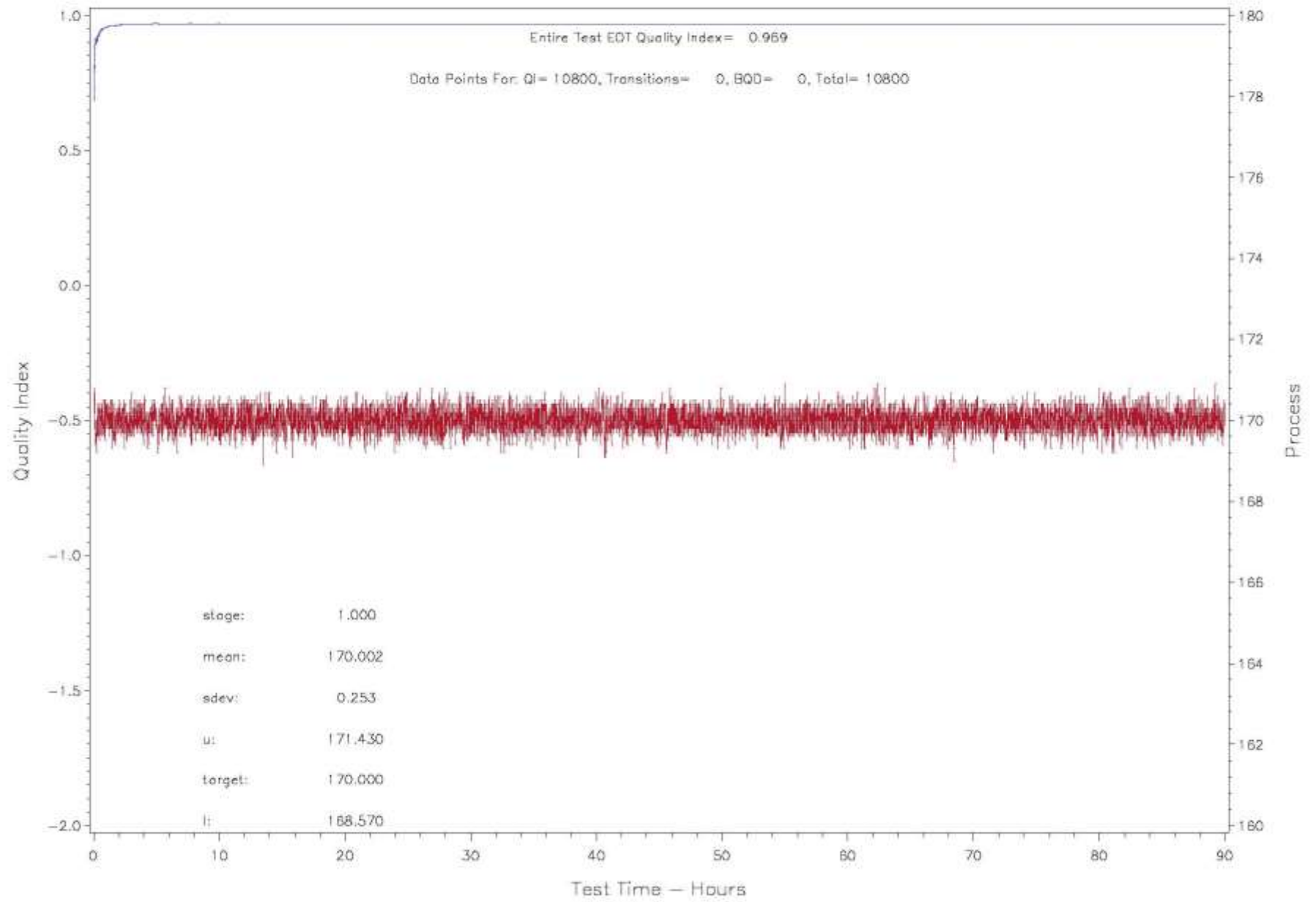
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Engine Coolant Flow - L/min (CONTROL)
 LAB= A, Stand= 2, DM# = 106776



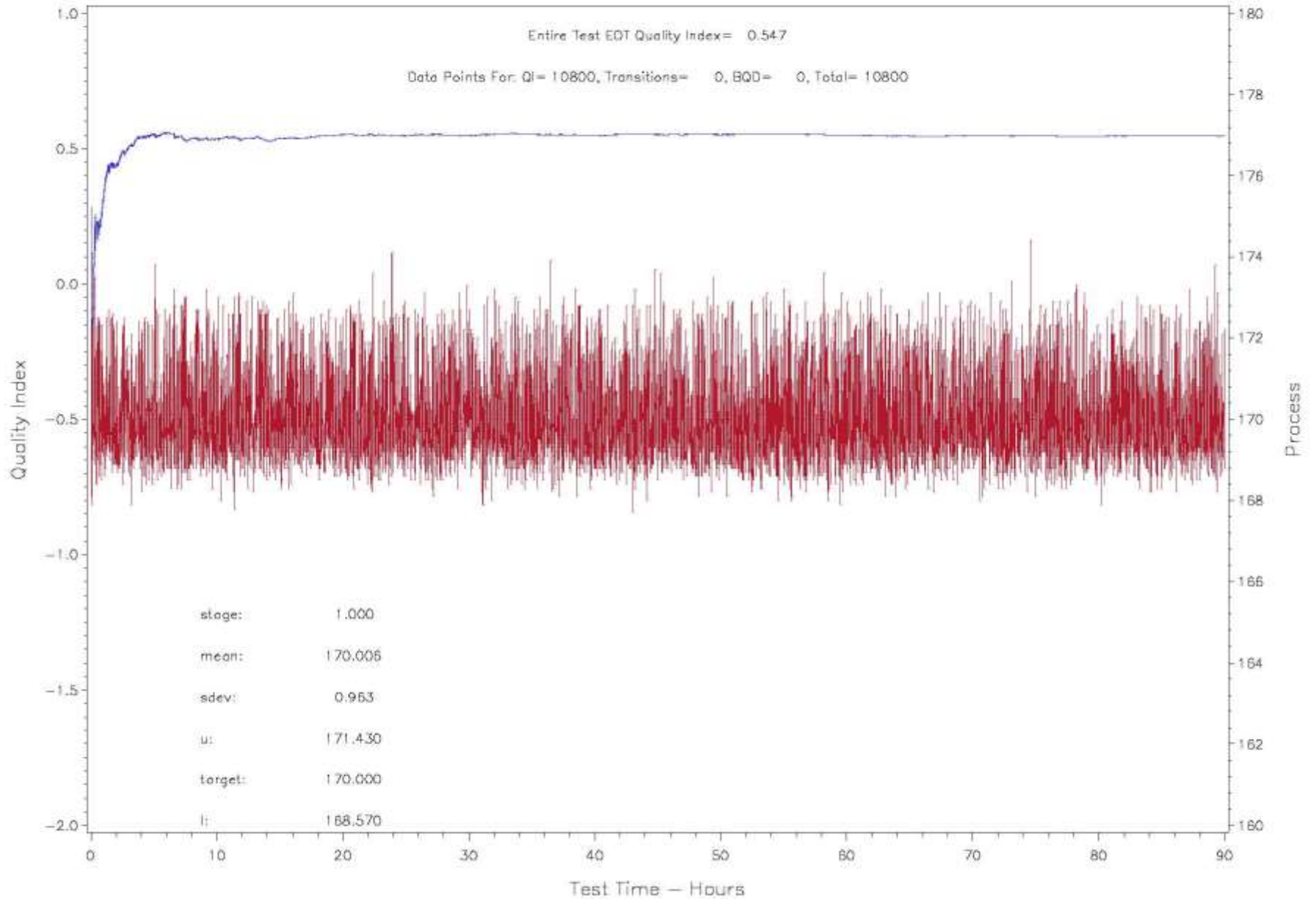
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Coolant Flow - L/min (CONTROL)
LAB= A Stand= 1 CMIR= 106777



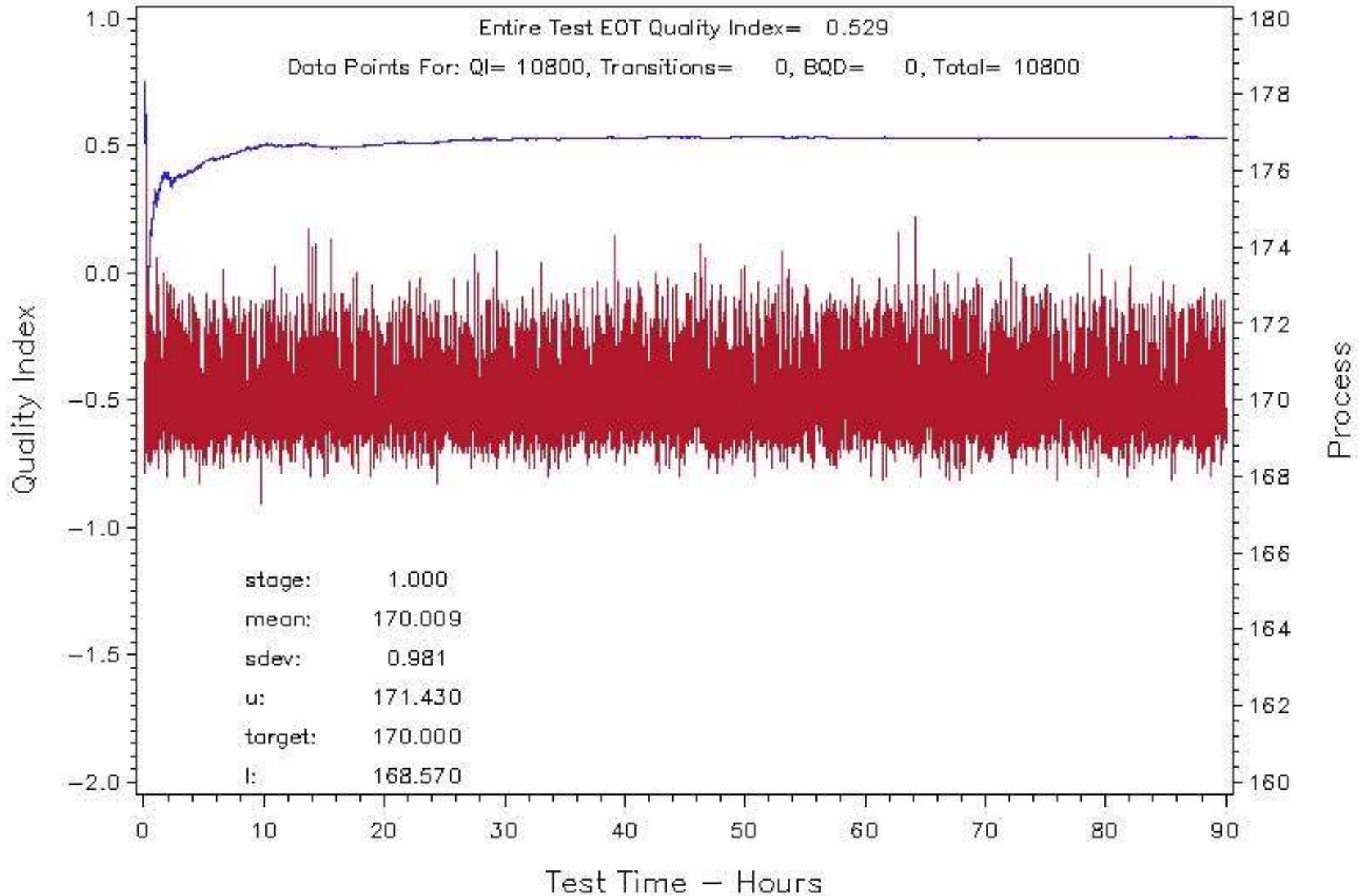
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Coolant Flow - L/min (CONTROL)
LAB= A Stand= 1 CMR= 10677B



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Engine Coolant Flow - L/min (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

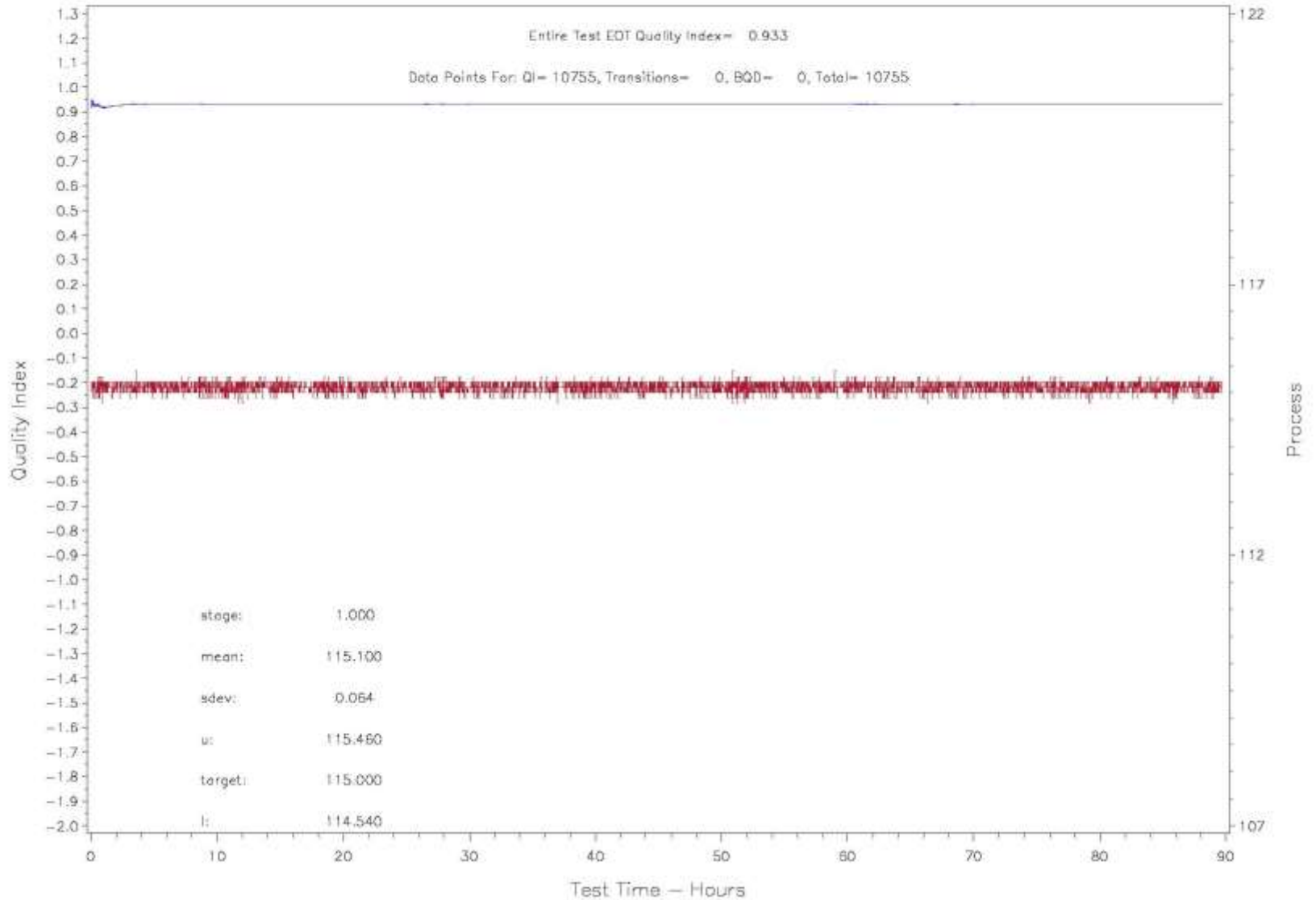


IIH QUALITY INDEX OPERATIONAL REVIEW
Engine Coolant Flow – L/min (CONTROL)
LAB= E Stand= 3 CMIR= 106780

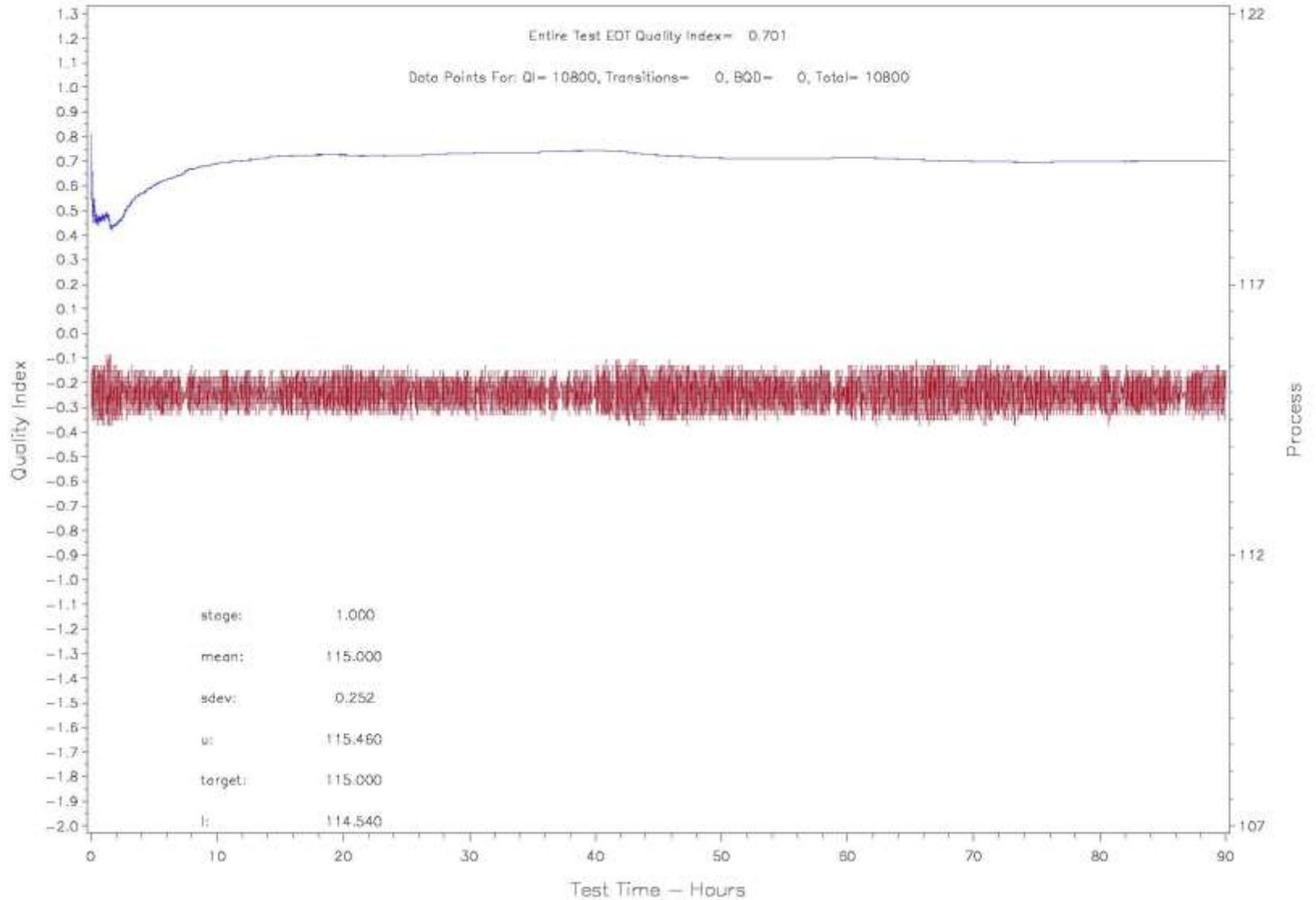


Coolant Out Temperature

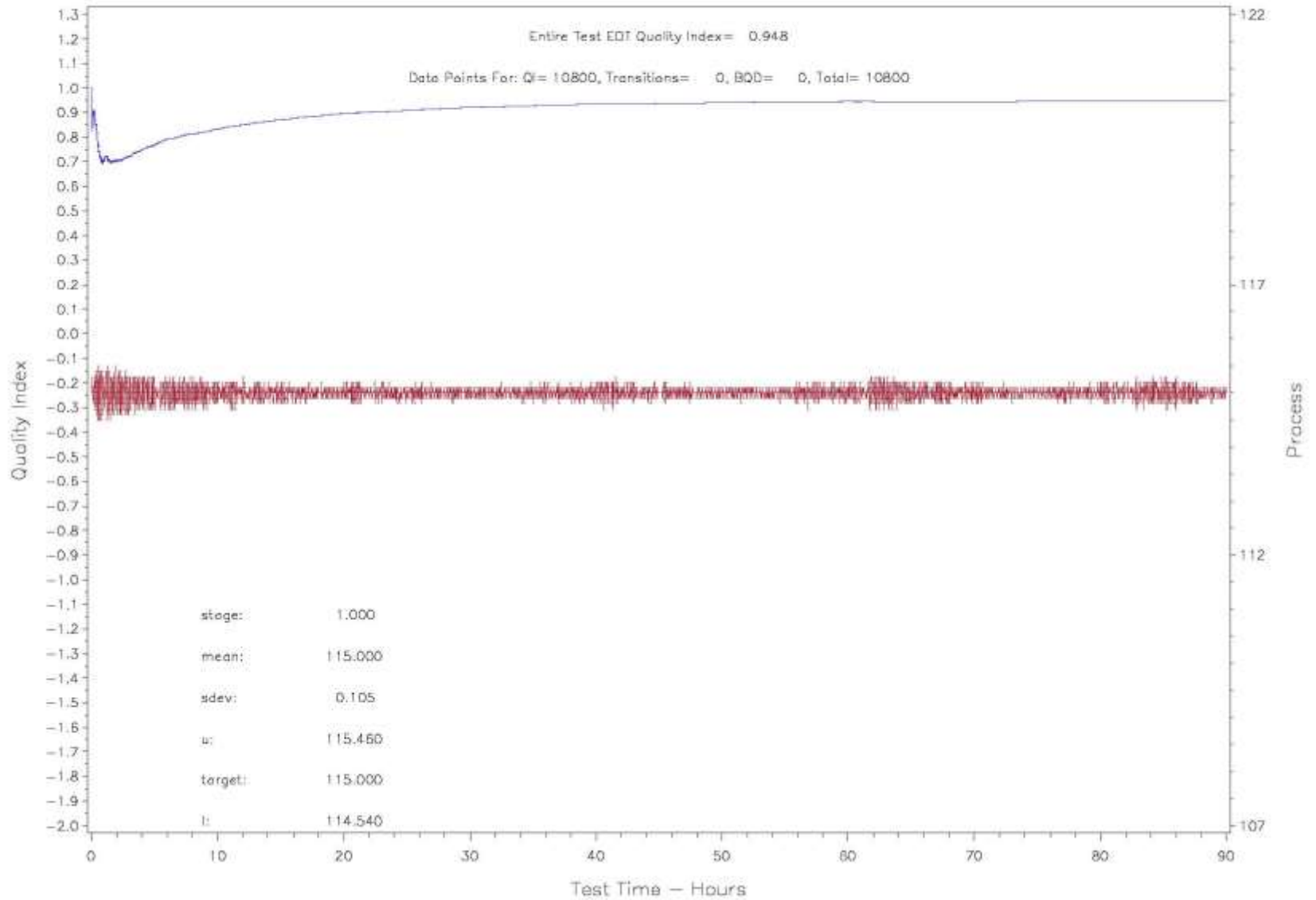
IIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature - Degrees C (CONTROL)
LAB= D Stand= CB106 CMR= 106793



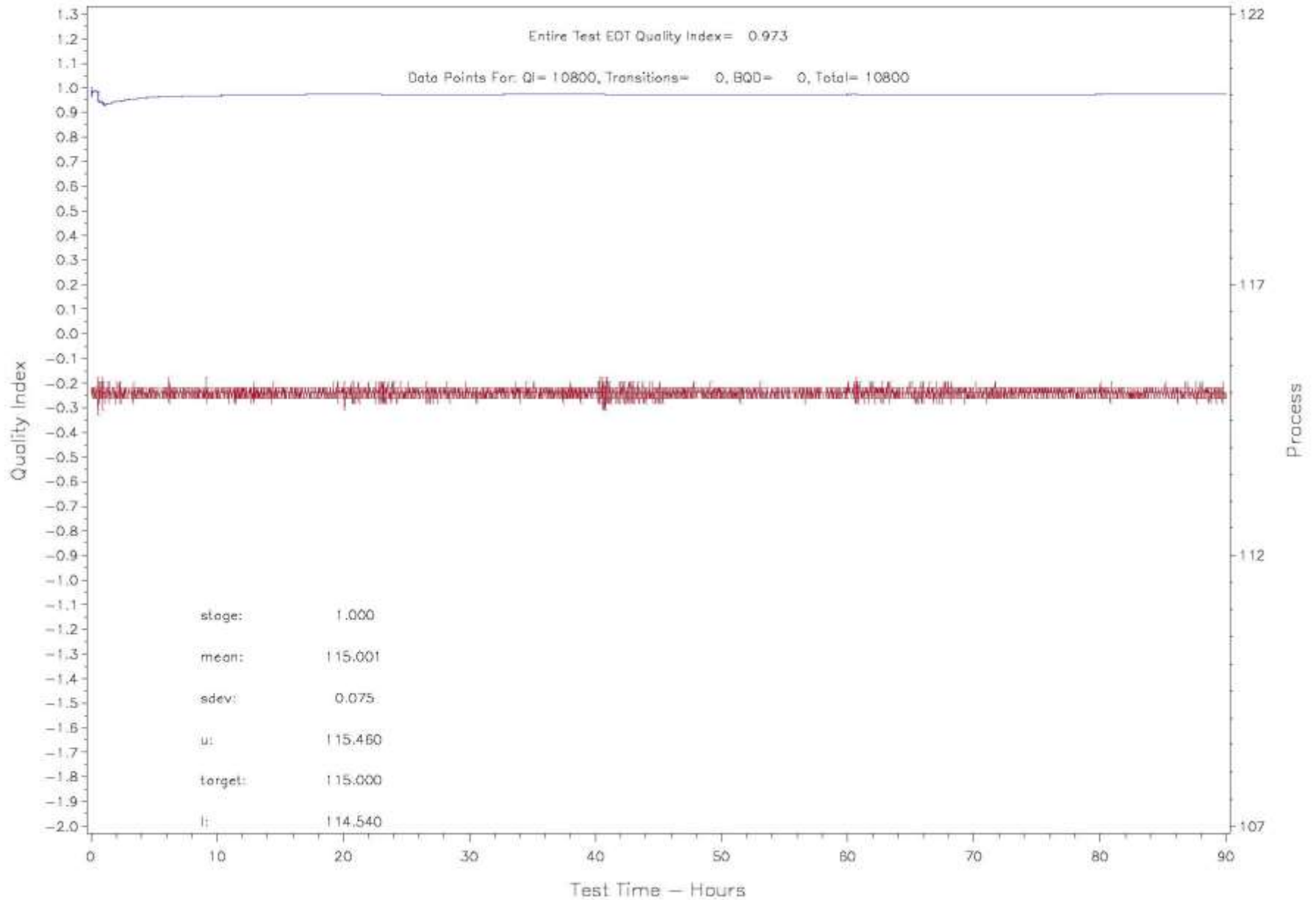
IIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature - Degrees C (CONTROL)
LAB= A Stand= 2 DMR= 106776



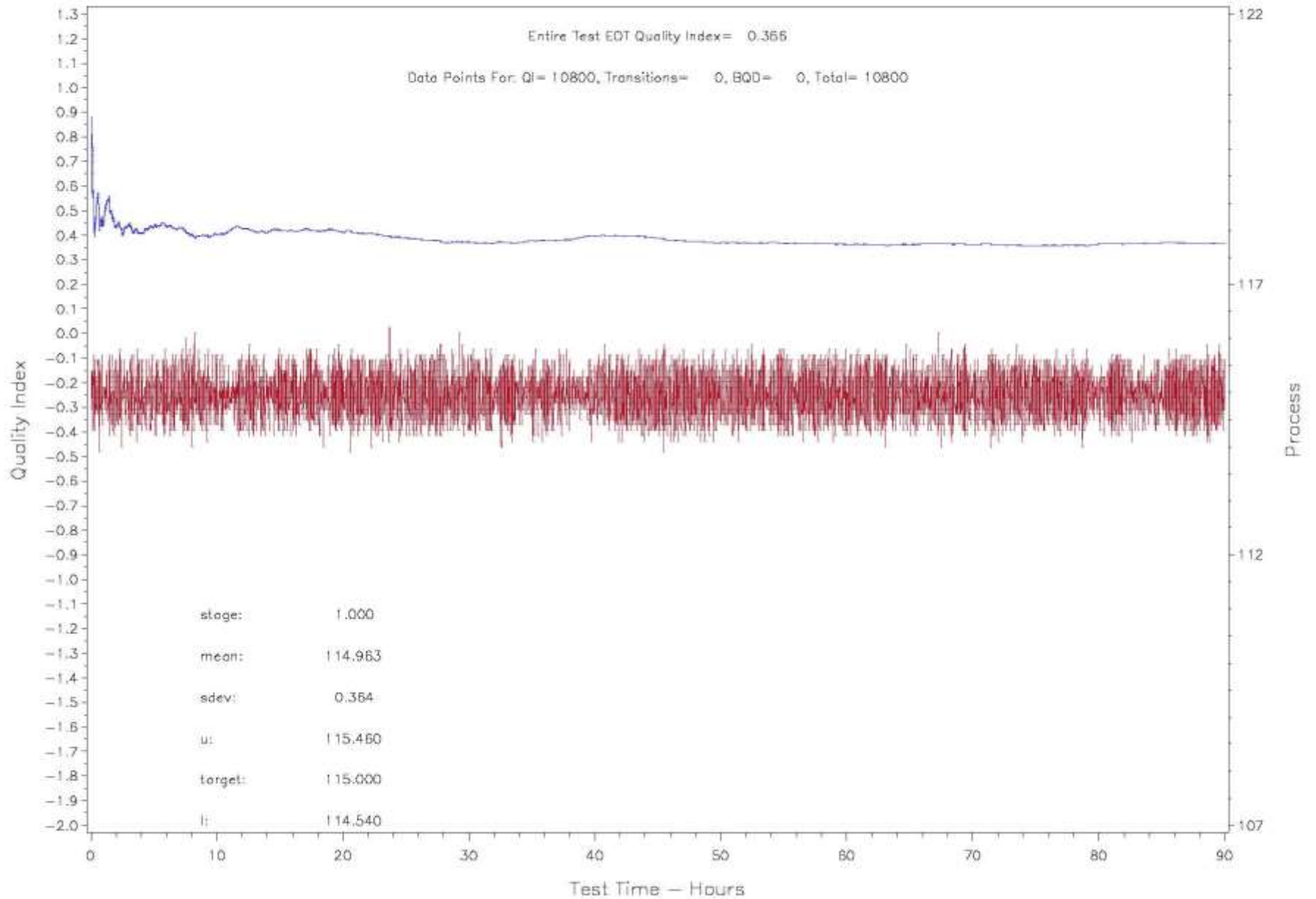
IIIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature - Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 106777



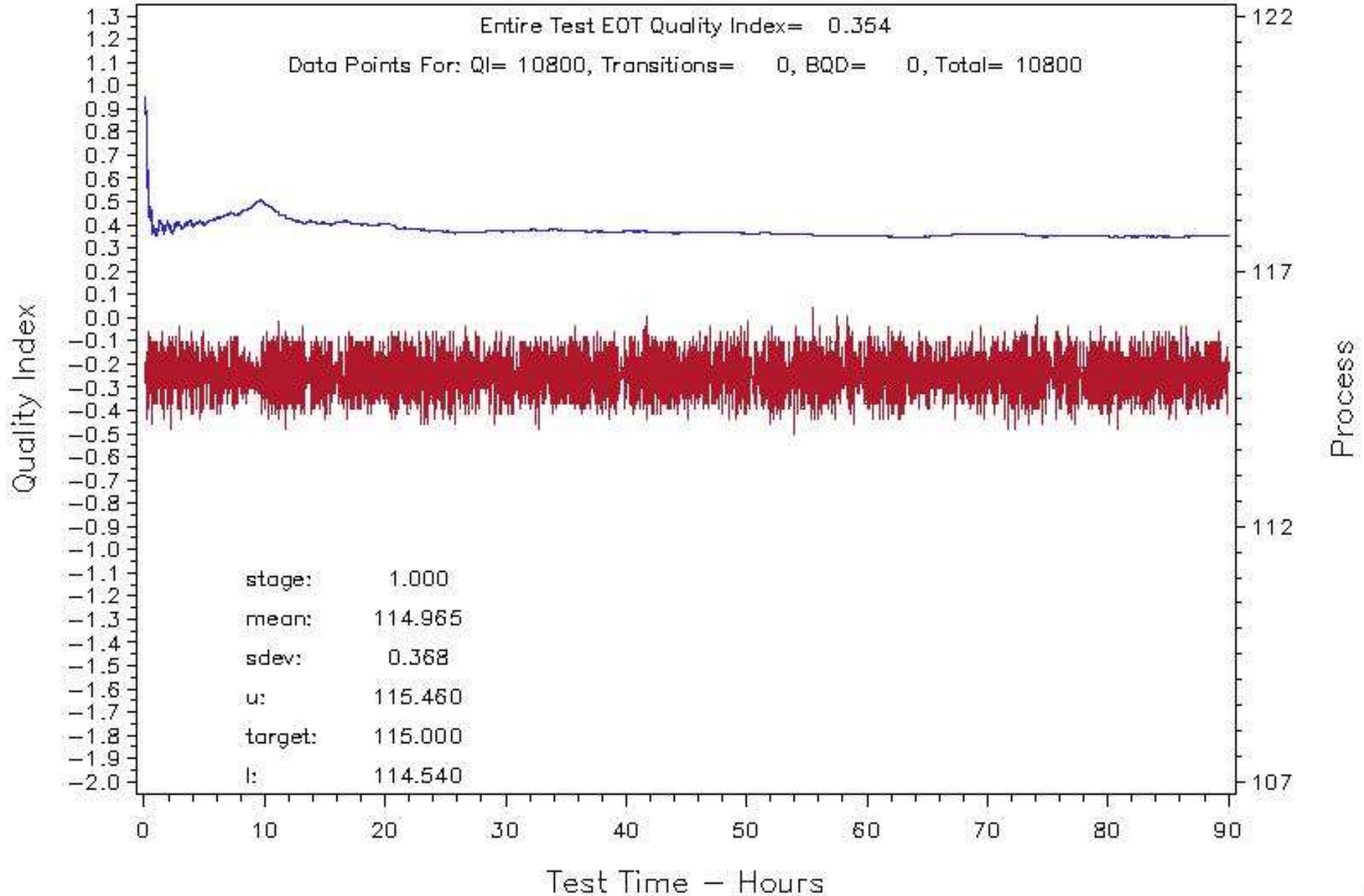
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Coolant Out Temperature – Degrees C (CONTROL)
 LAB= A Stand= 1 CMR= 10677B



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Coolant Out Temperature - Degrees C (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

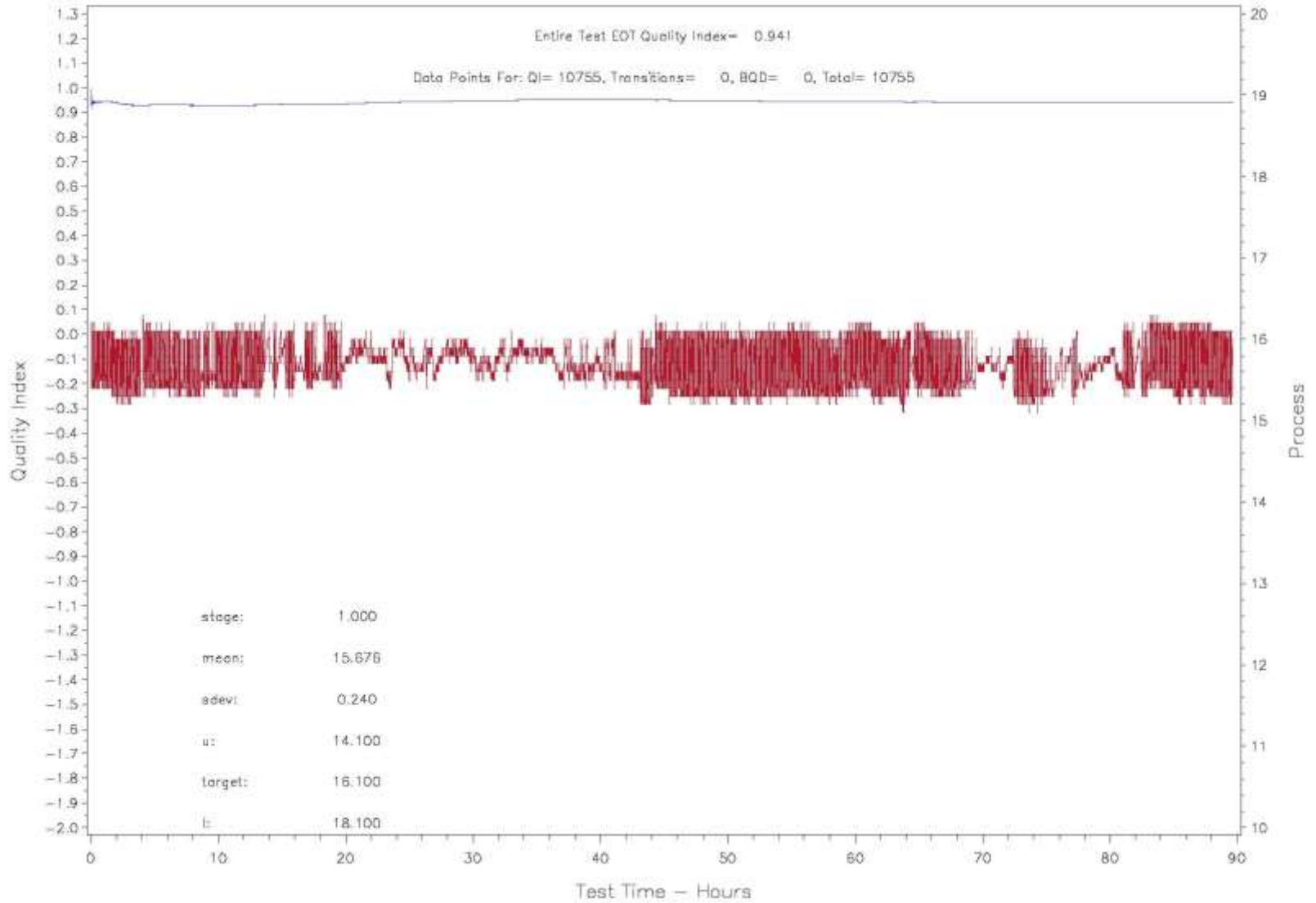


IIH QUALITY INDEX OPERATIONAL REVIEW
Coolant Out Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

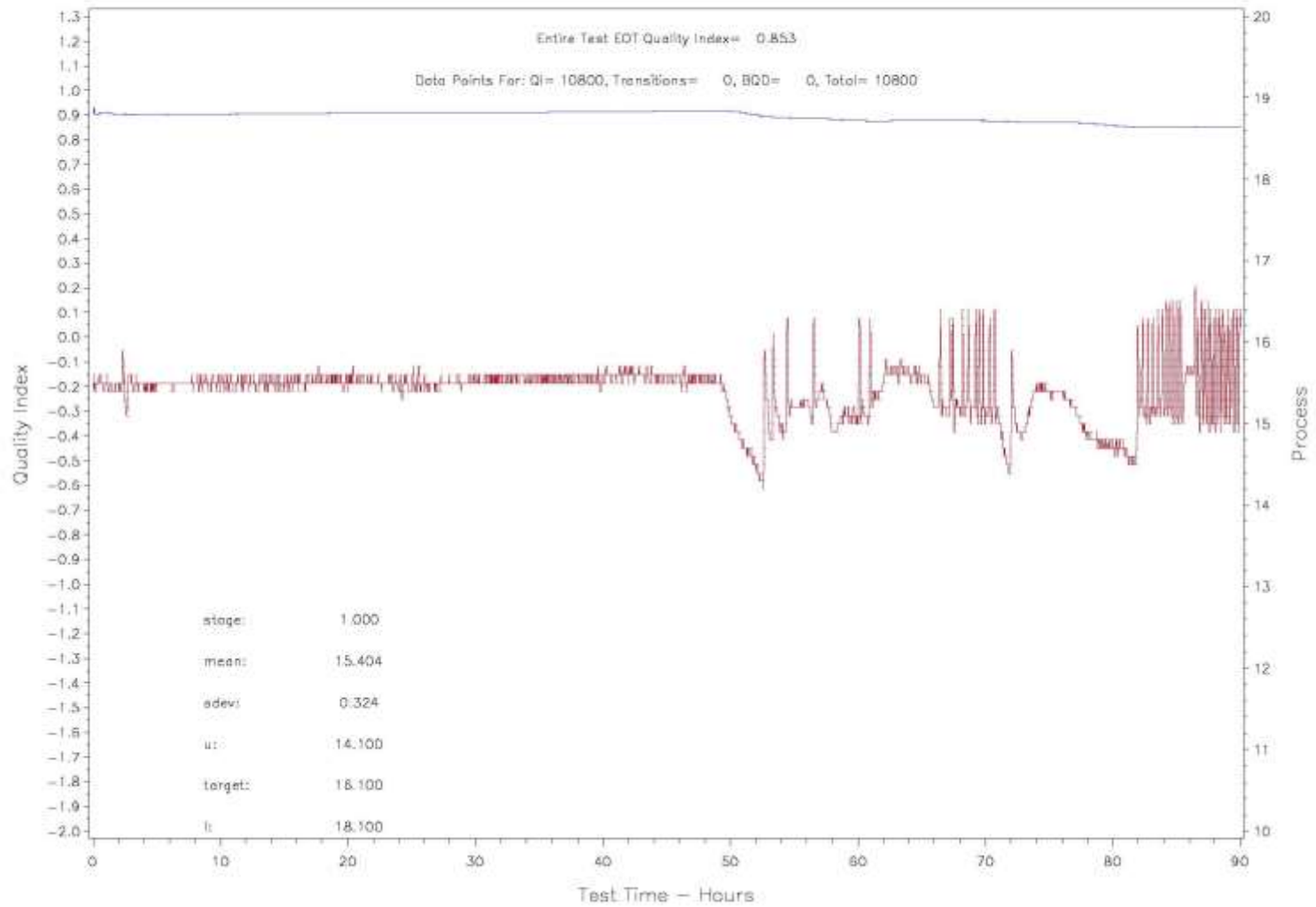


Dew Point Temperature

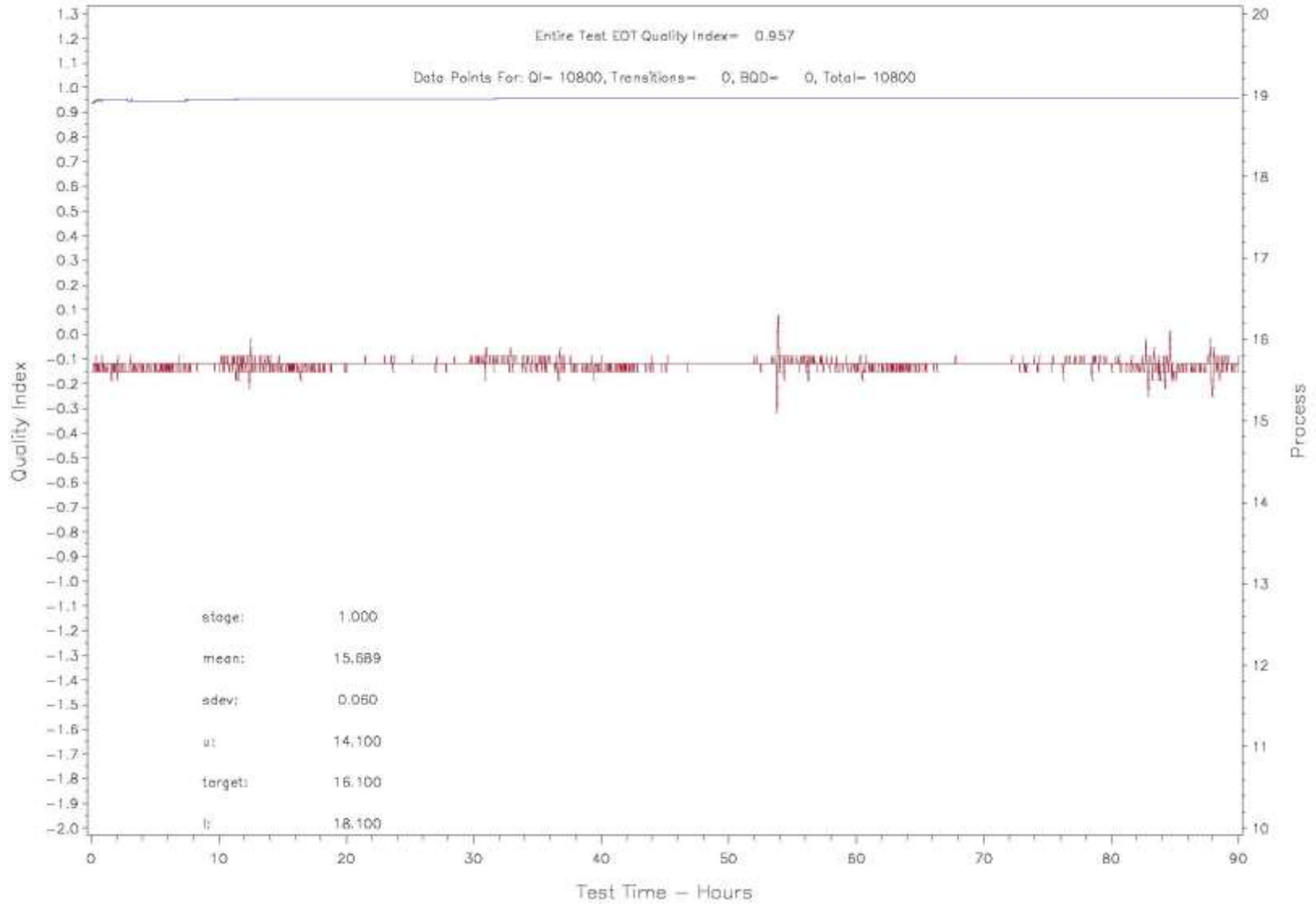
III QUALITY INDEX OPERATIONAL REVIEW
Inlet Air Dew Point Temperature - Degree C (CONTROL)
LAB= D Stand= CB105-DWR= 106791



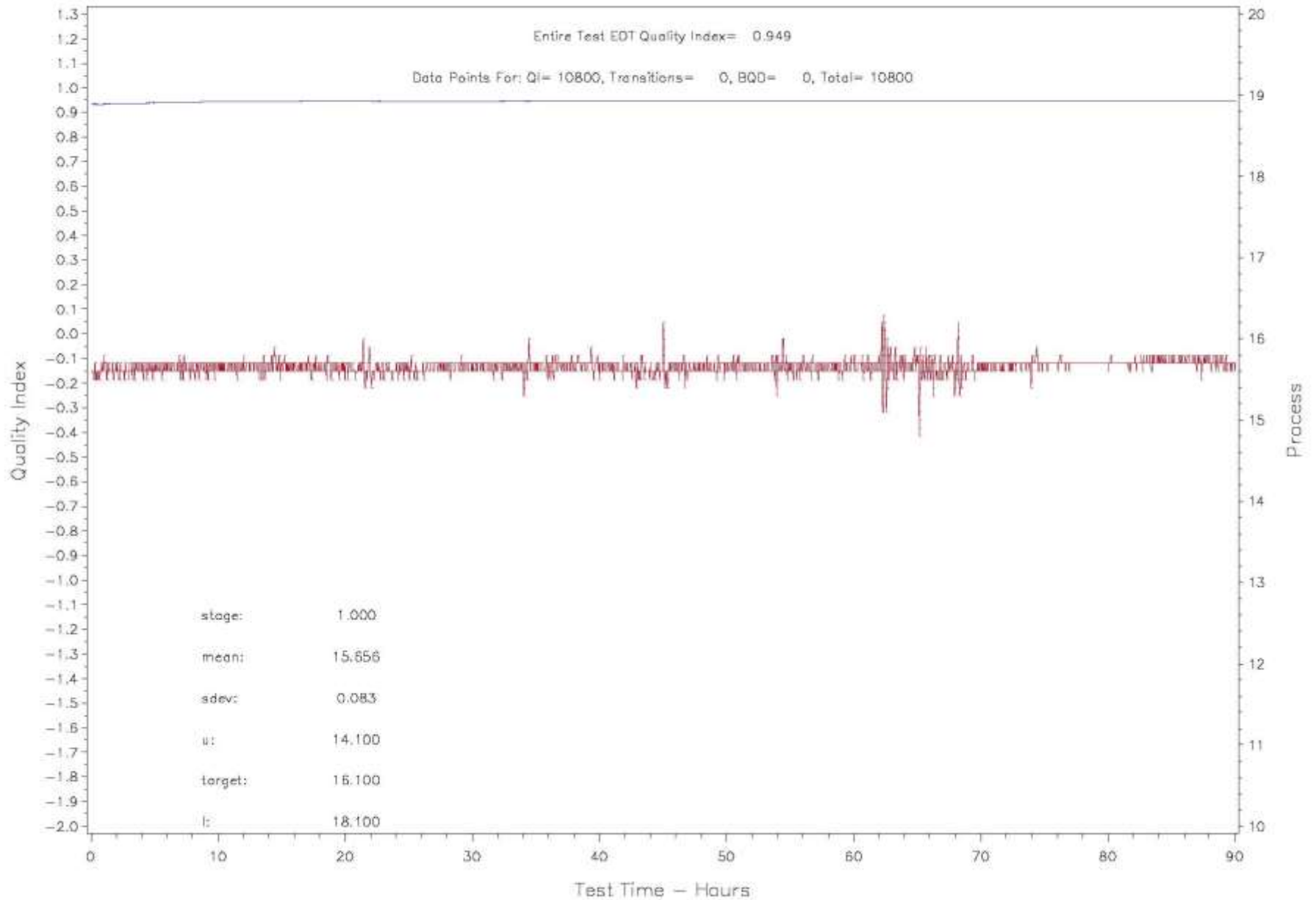
IH QUALITY INDEX OPERATIONAL REVIEW
Ink Air Dew Point Temperature — Degree C (CONTROL)
LN# A Stand= 2 CW# 156776



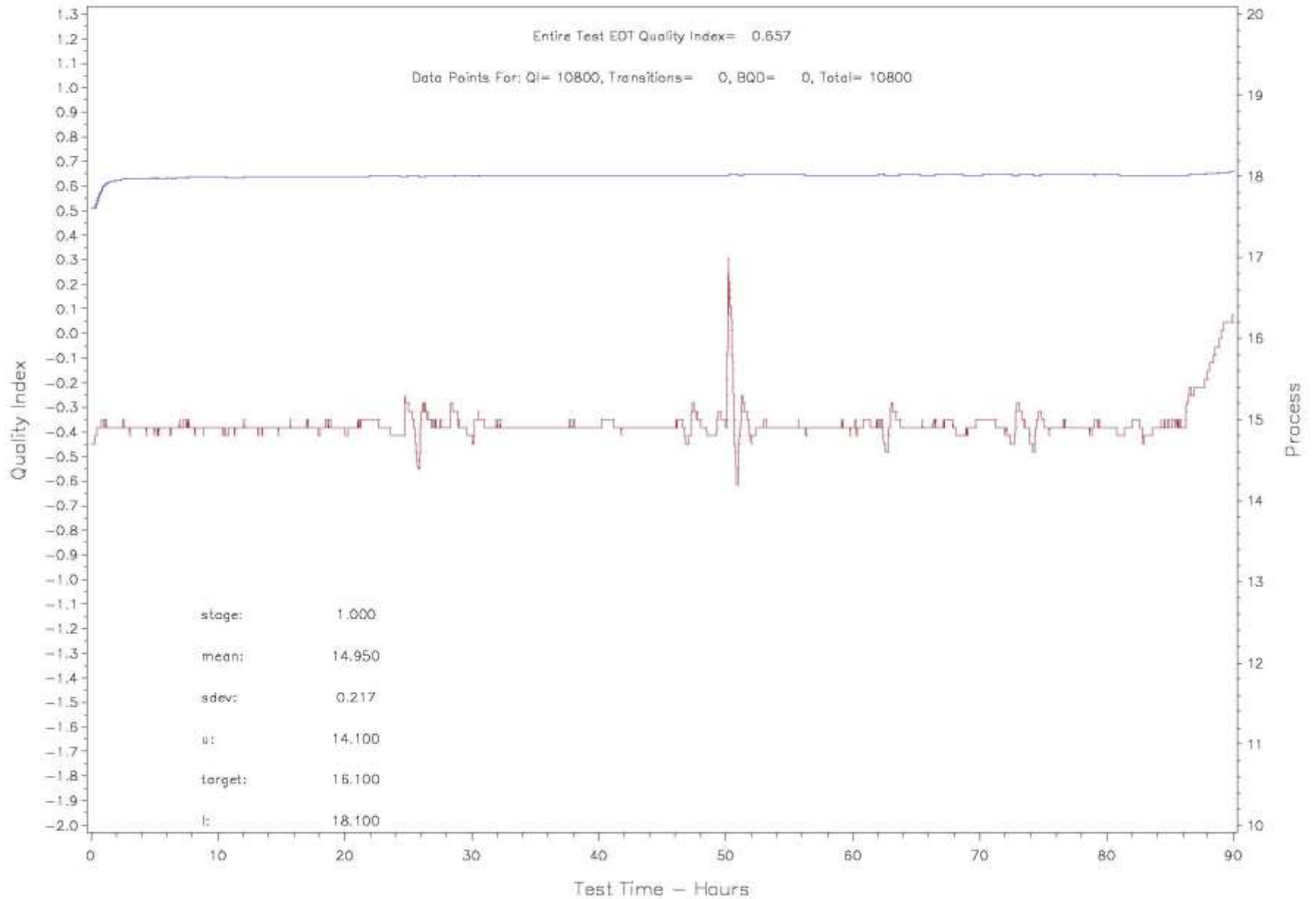
IIH QUALITY INDEX OPERATIONAL REVIEW
Ink Air Dew Point Temperature - Degree C (CONTROL)
LAB= A Stand= 1 DM#= 106777



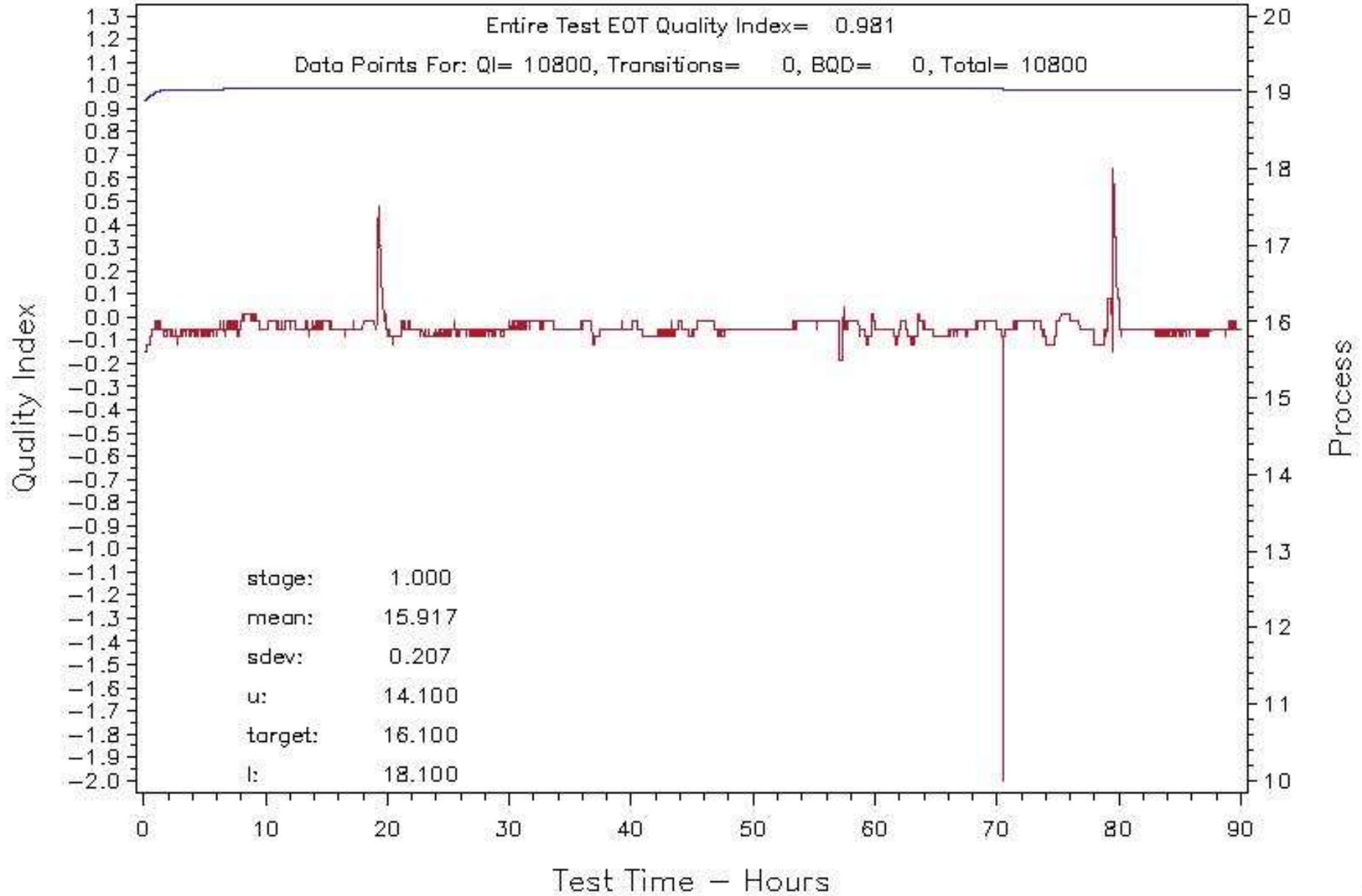
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Inke Air Dew Point Temperature – Degree C (CONTROL)
 LAB= A Stand= 1 CMR= 106779



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Inke Air Dew Point Temperature - Degree C (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

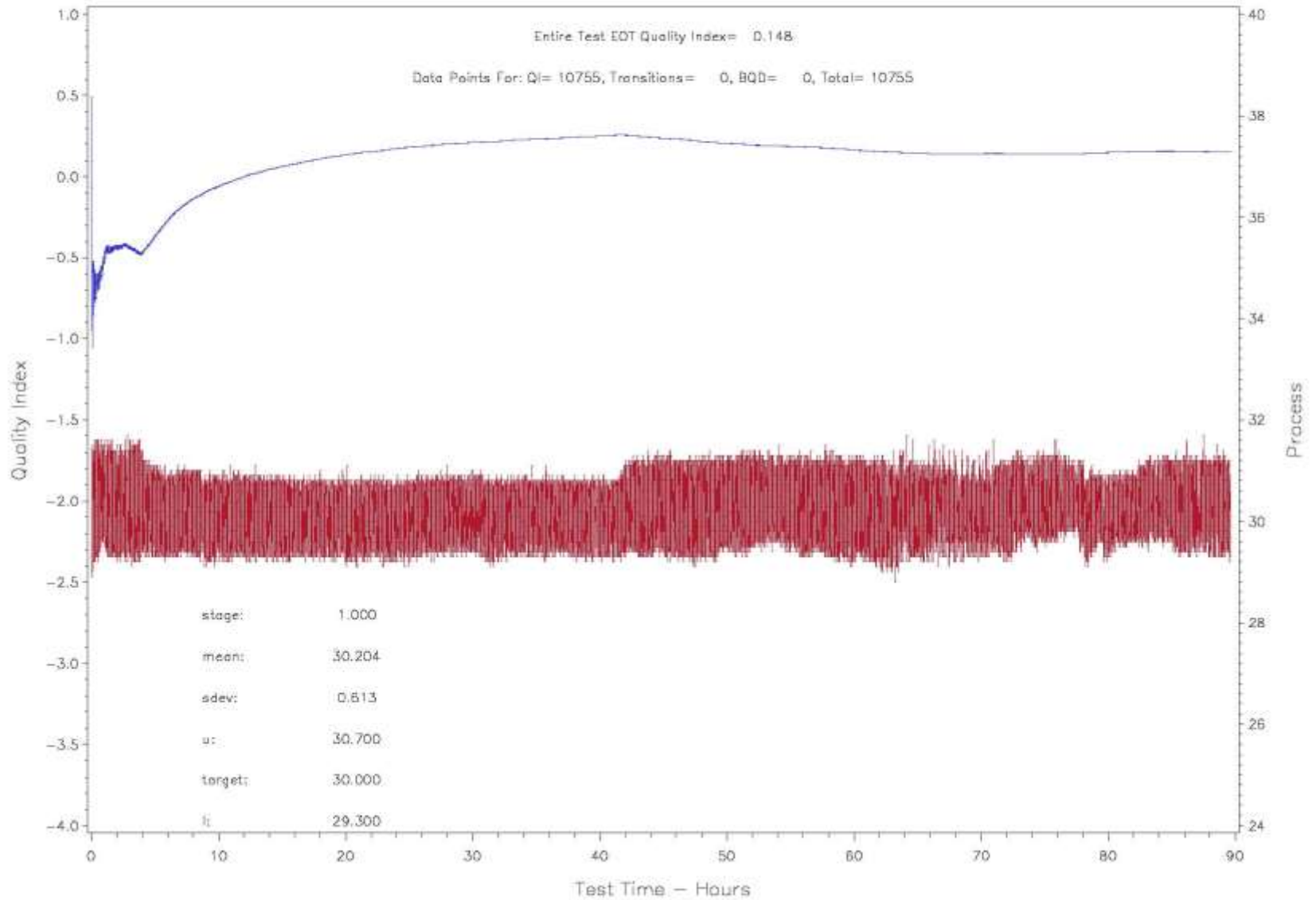


IIH QUALITY INDEX OPERATIONAL REVIEW
Inke Air Dew Point Temperature – Degree C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

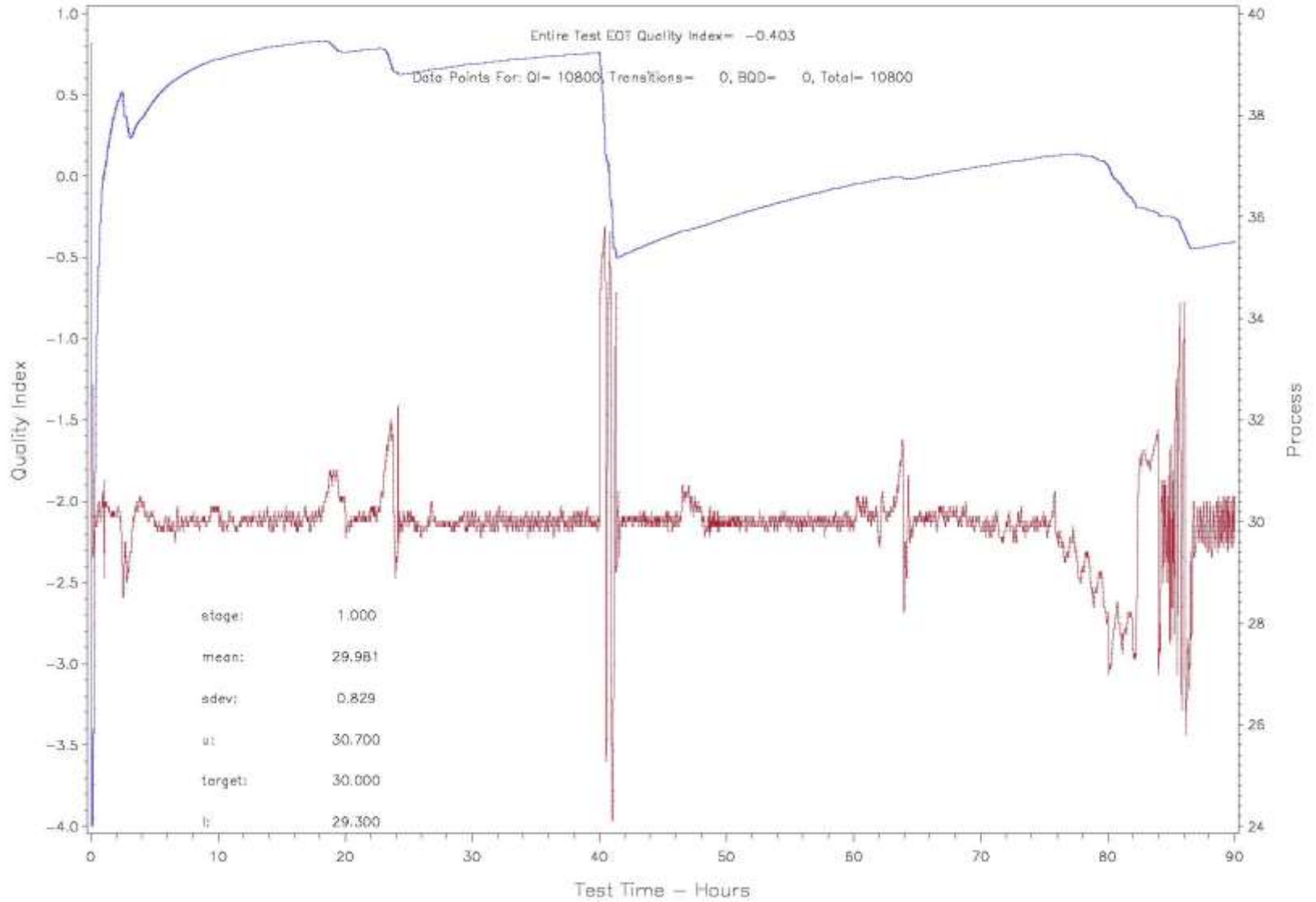


Fuel Temperature

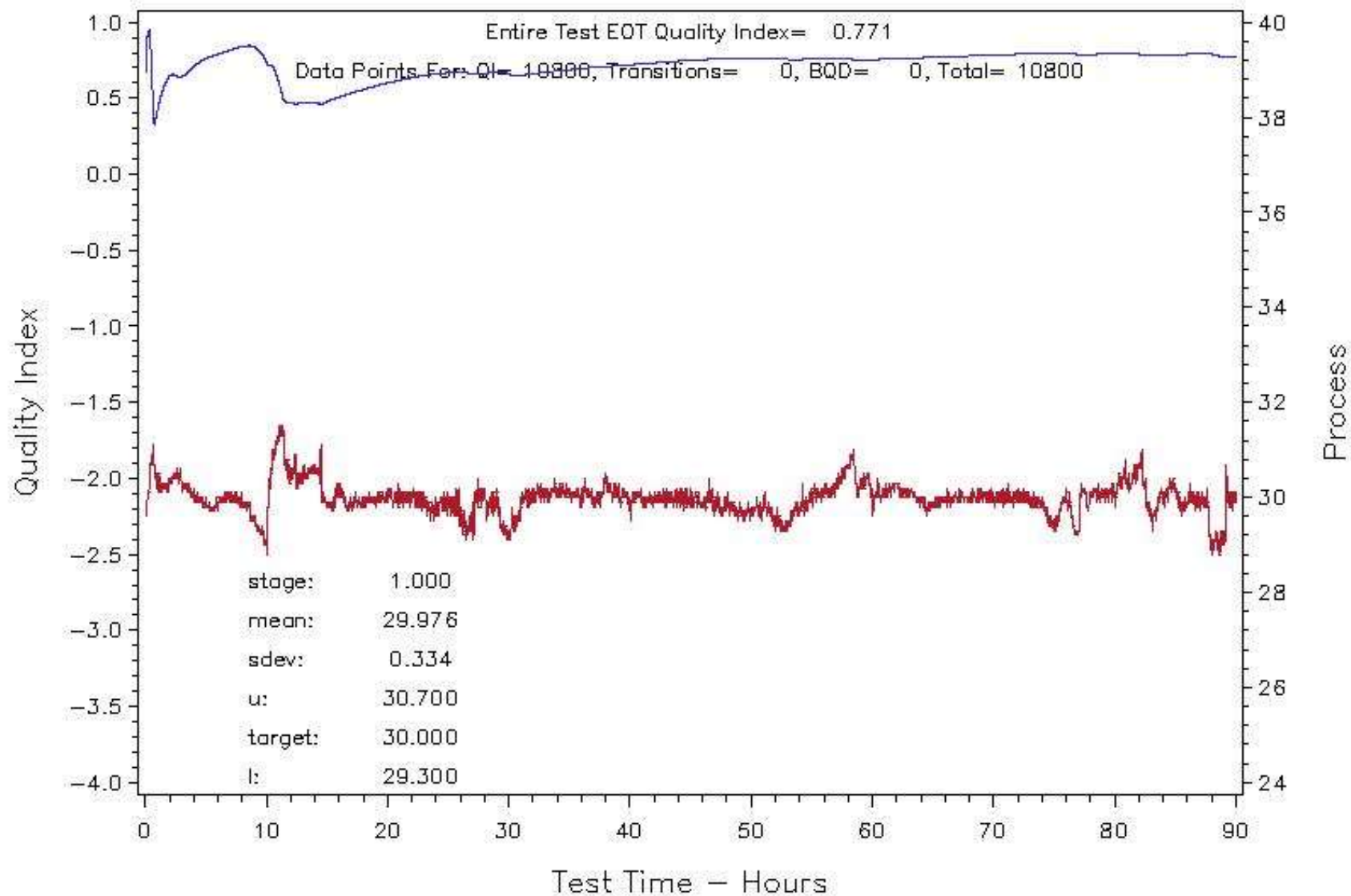
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Fuel Inlet Temperature – Degrees C (CONTROL)
 LAB= D Stand= DB106 DMR= 106791



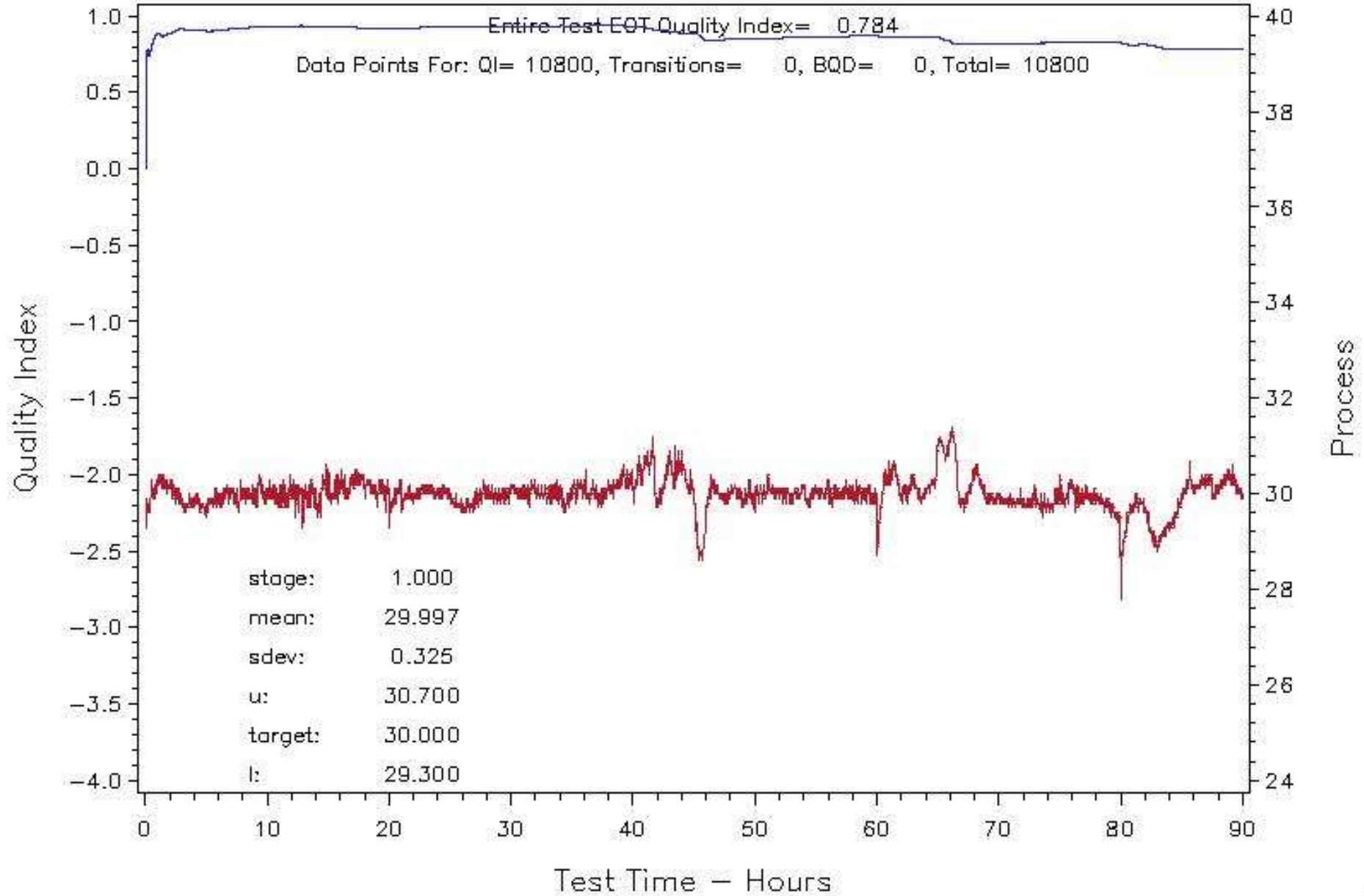
IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature - Degrees C (CONTROL)
LAB= A Stand= 2 DMR= 106776



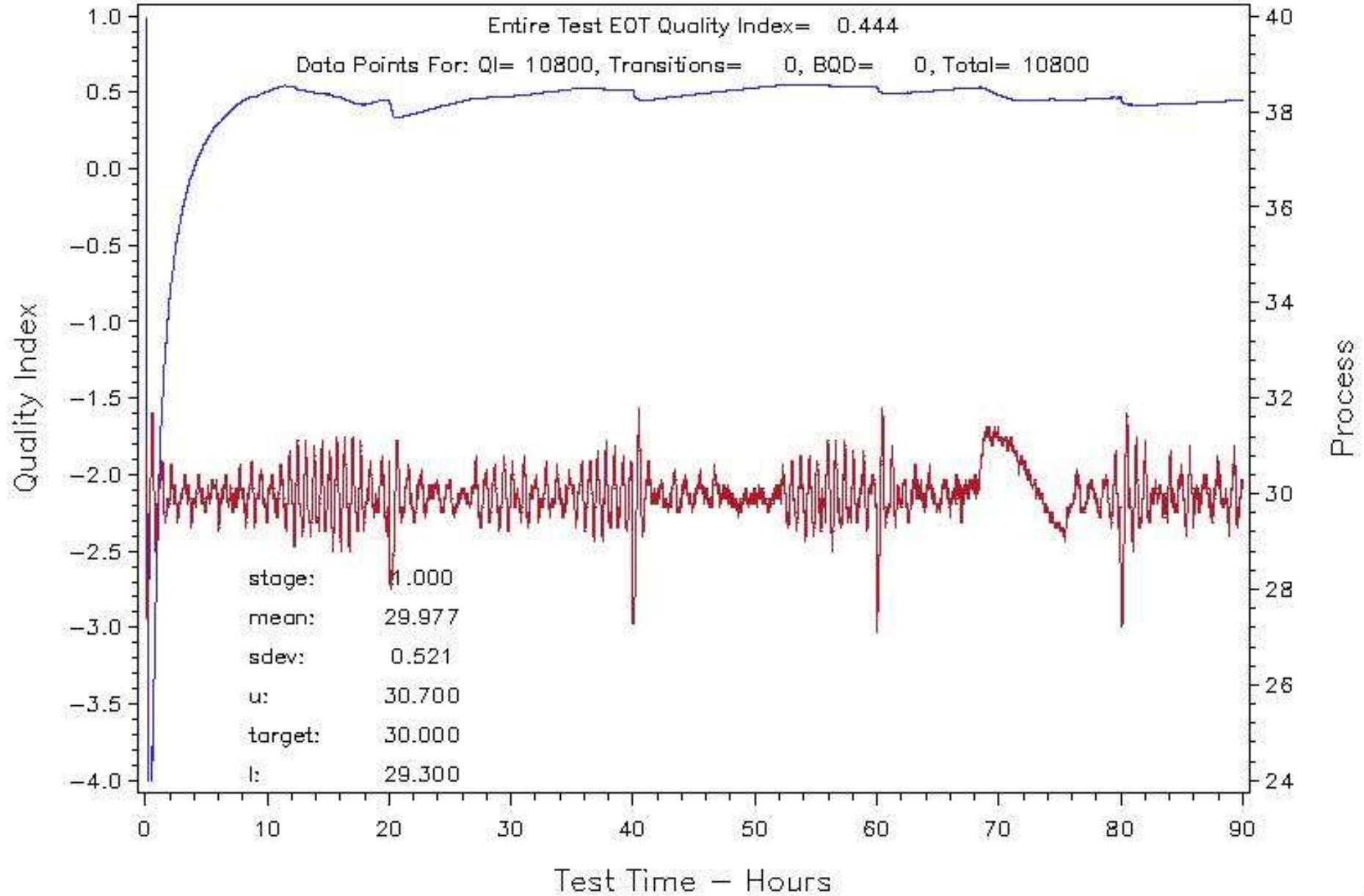
IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 108777



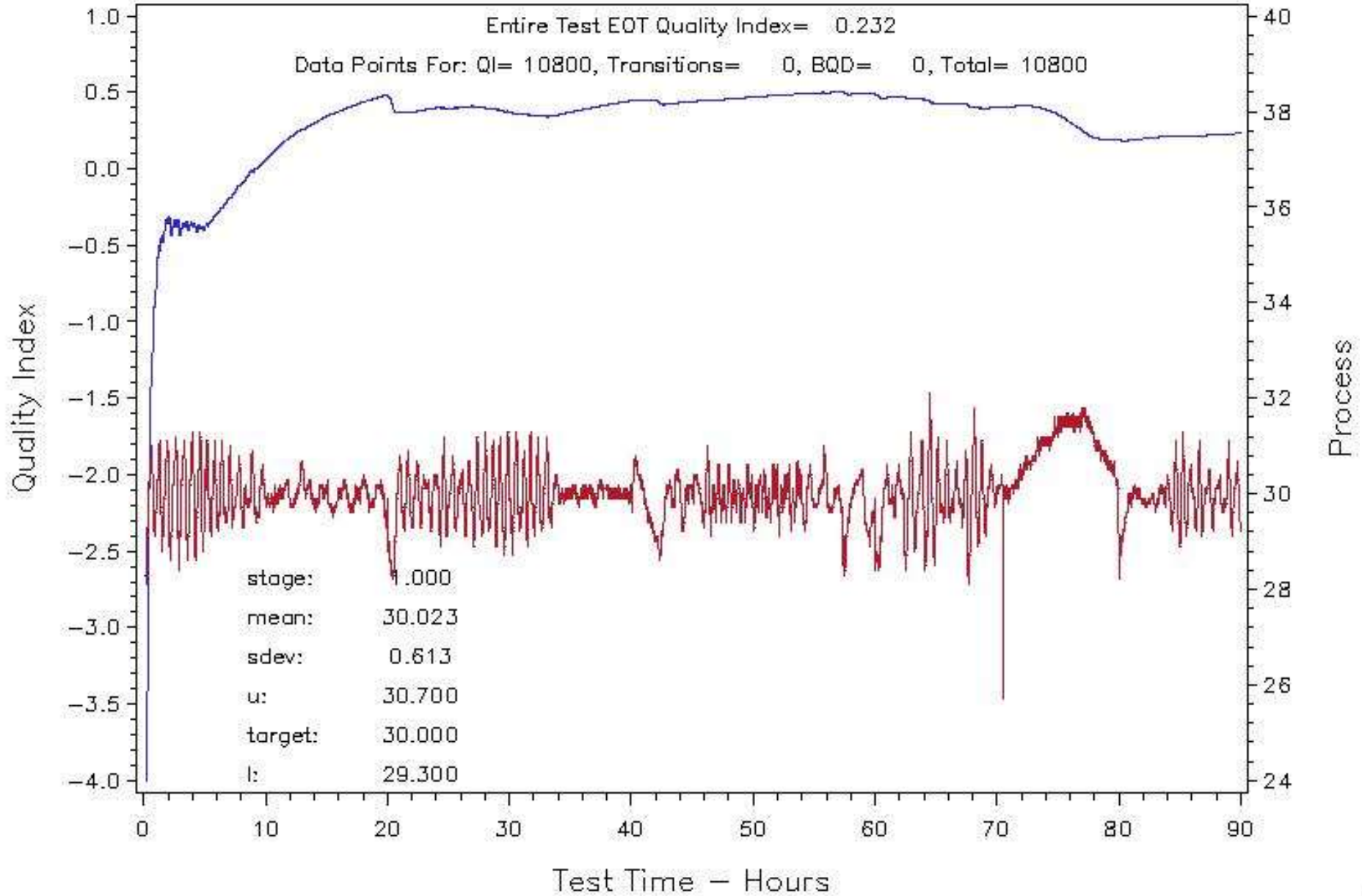
IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 106779



IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106781

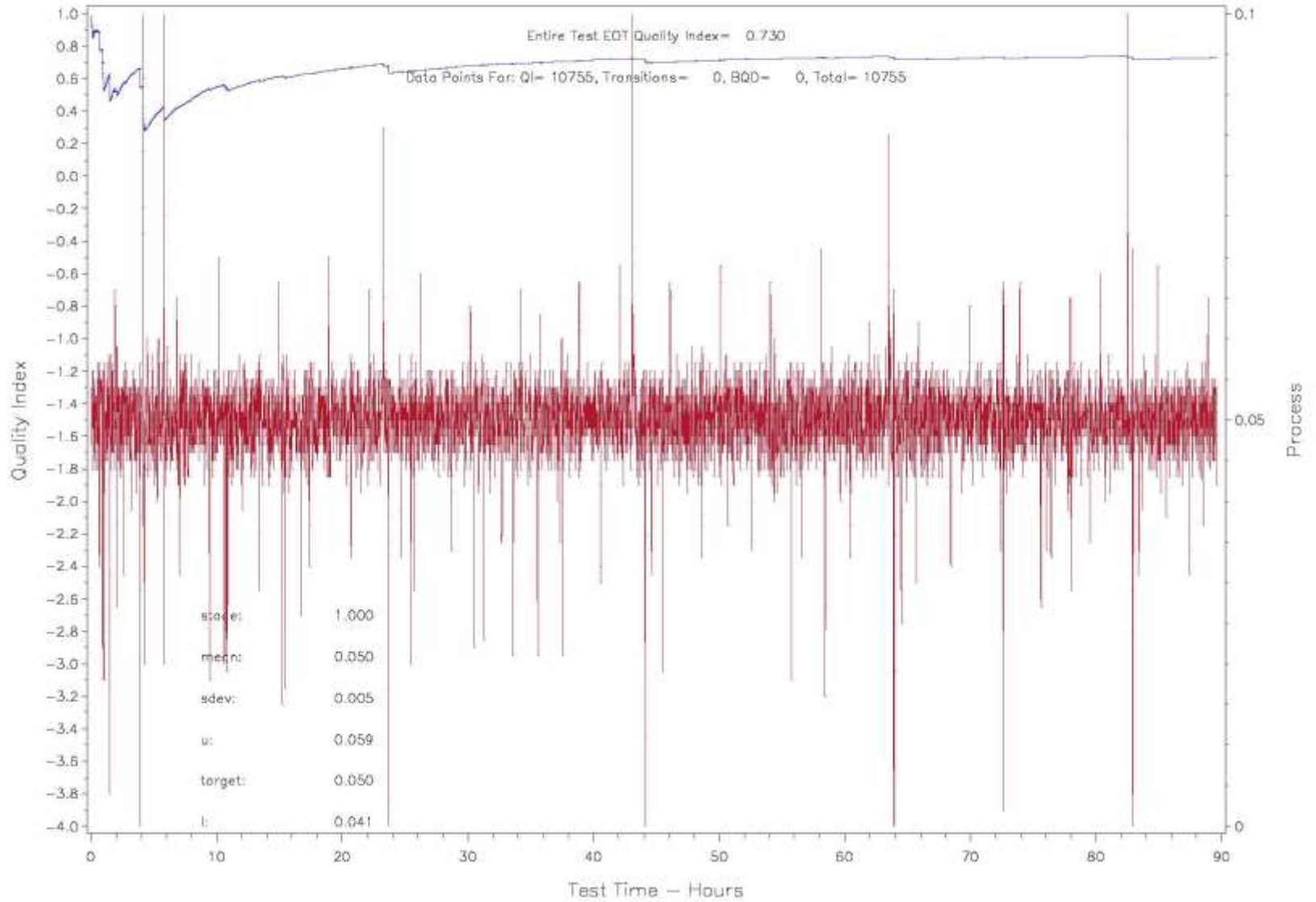


IIH QUALITY INDEX OPERATIONAL REVIEW
Fuel Inlet Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

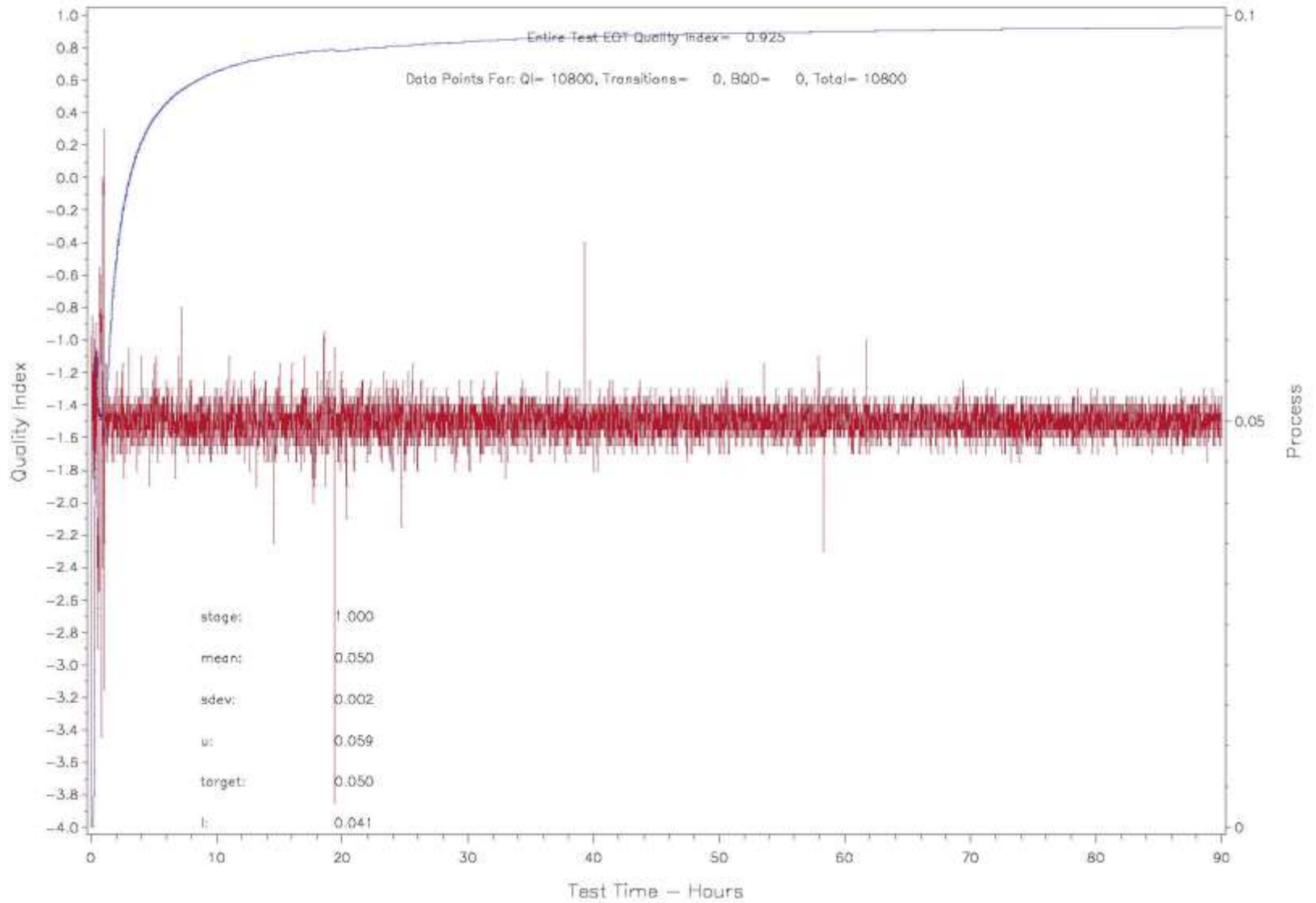


Intake Air Pressure

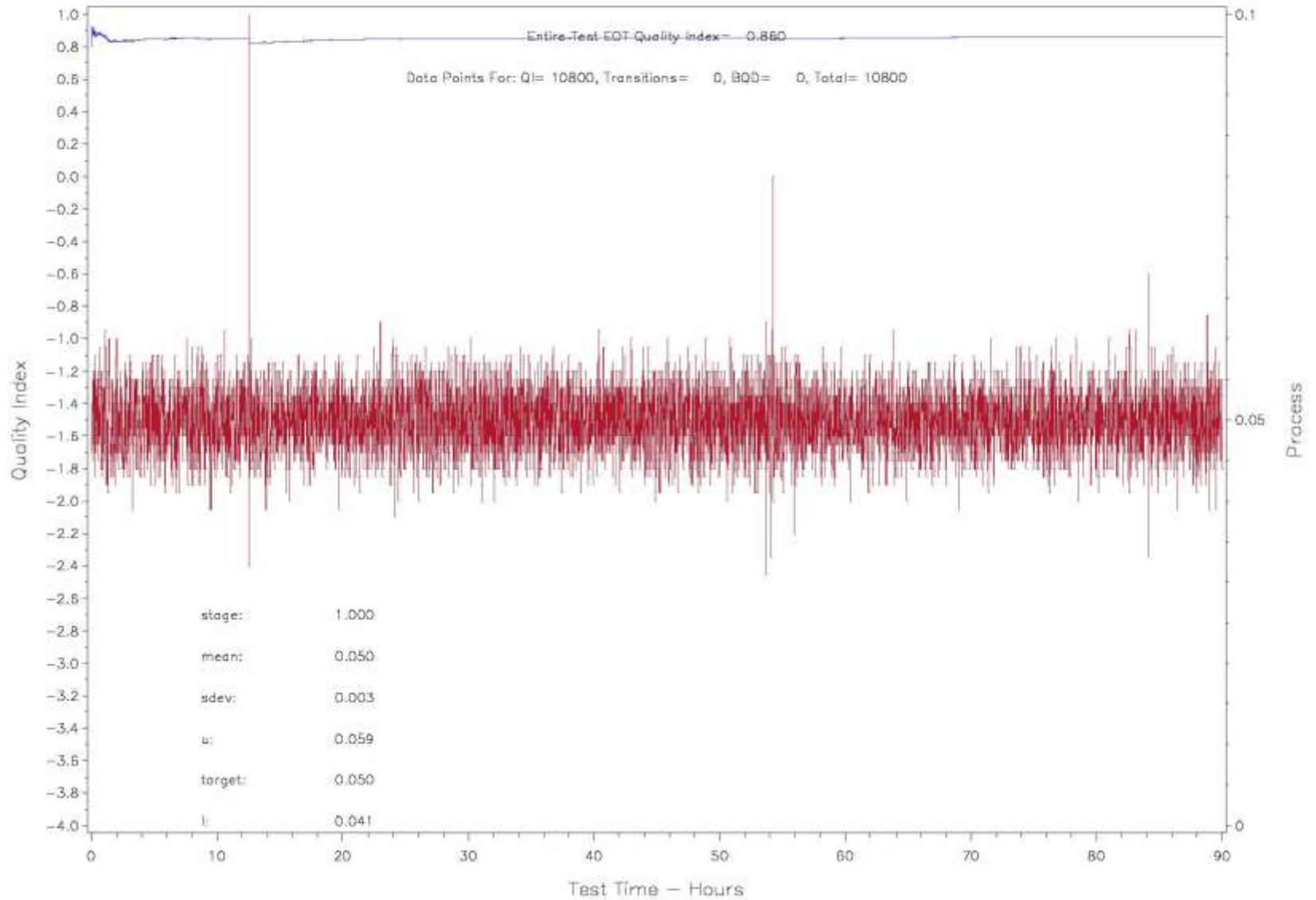
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure - kPa (CONTROL)
LAB= 0 Stand= CB106 CMIR= 106793



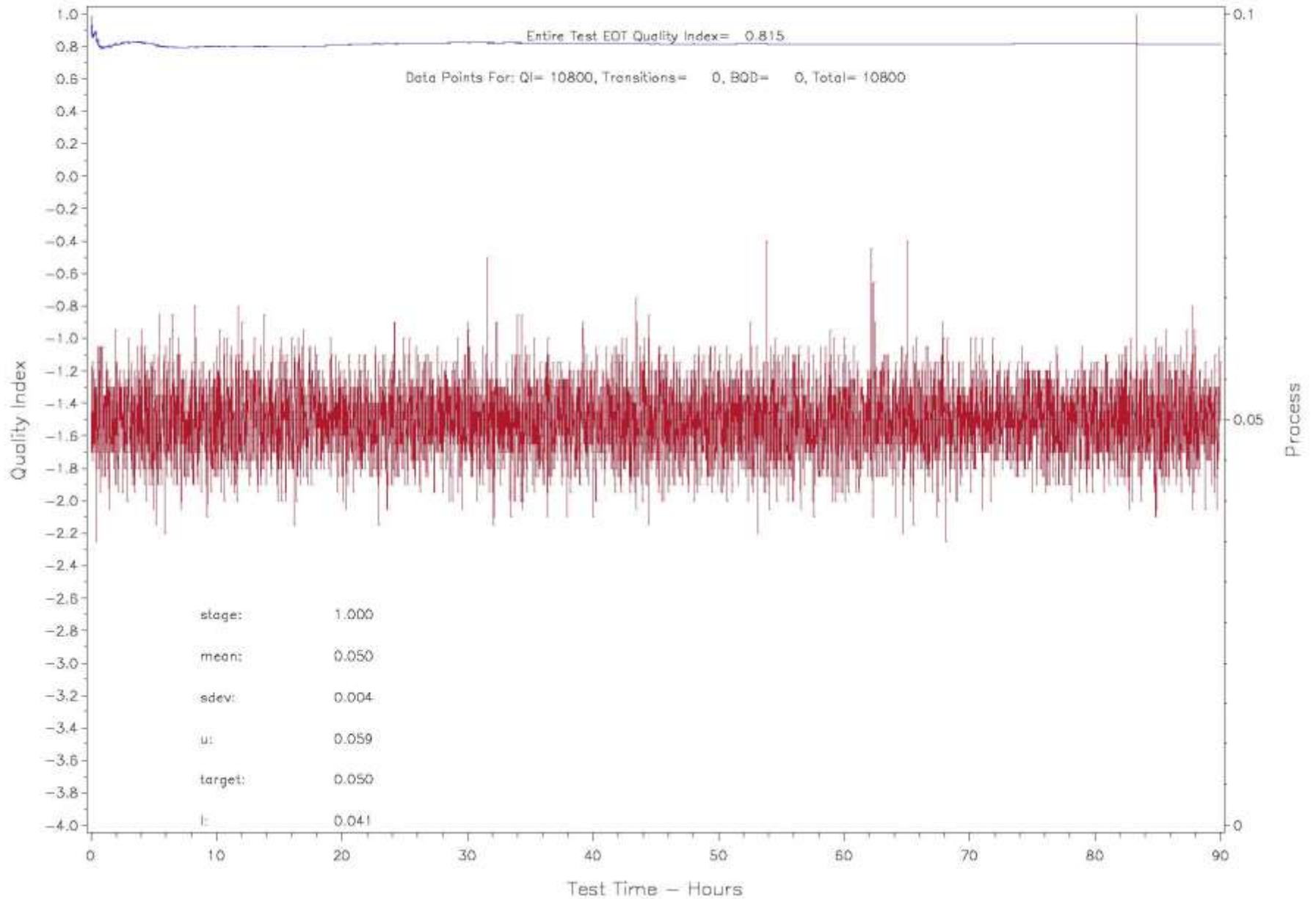
IIIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure - kPa (CONTROL)
LAB= A, Stand= 2, DM#= 106776



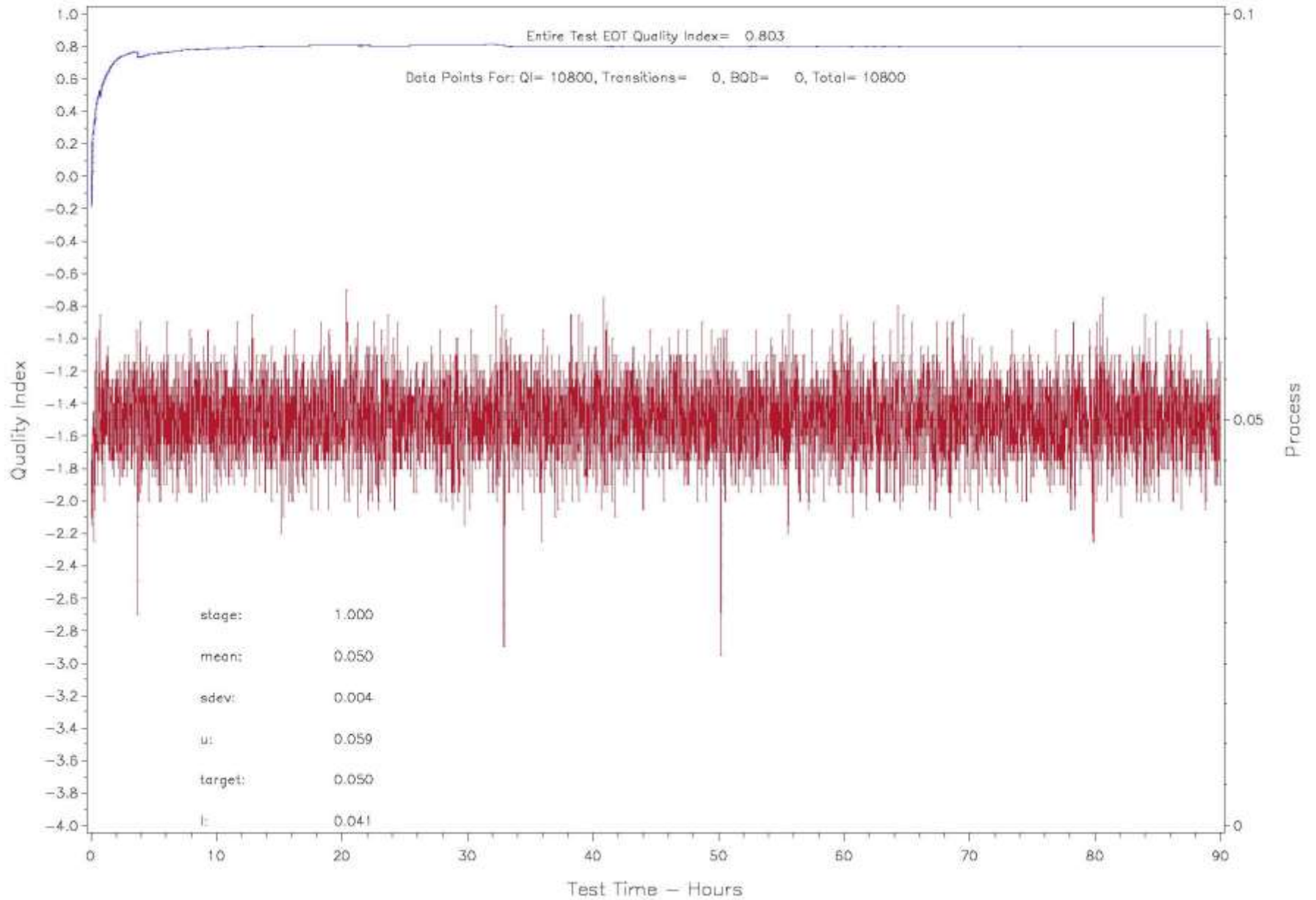
IIIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure - kPa (CONTROL)
LAB= A Stand= 1 CMIR= 106777



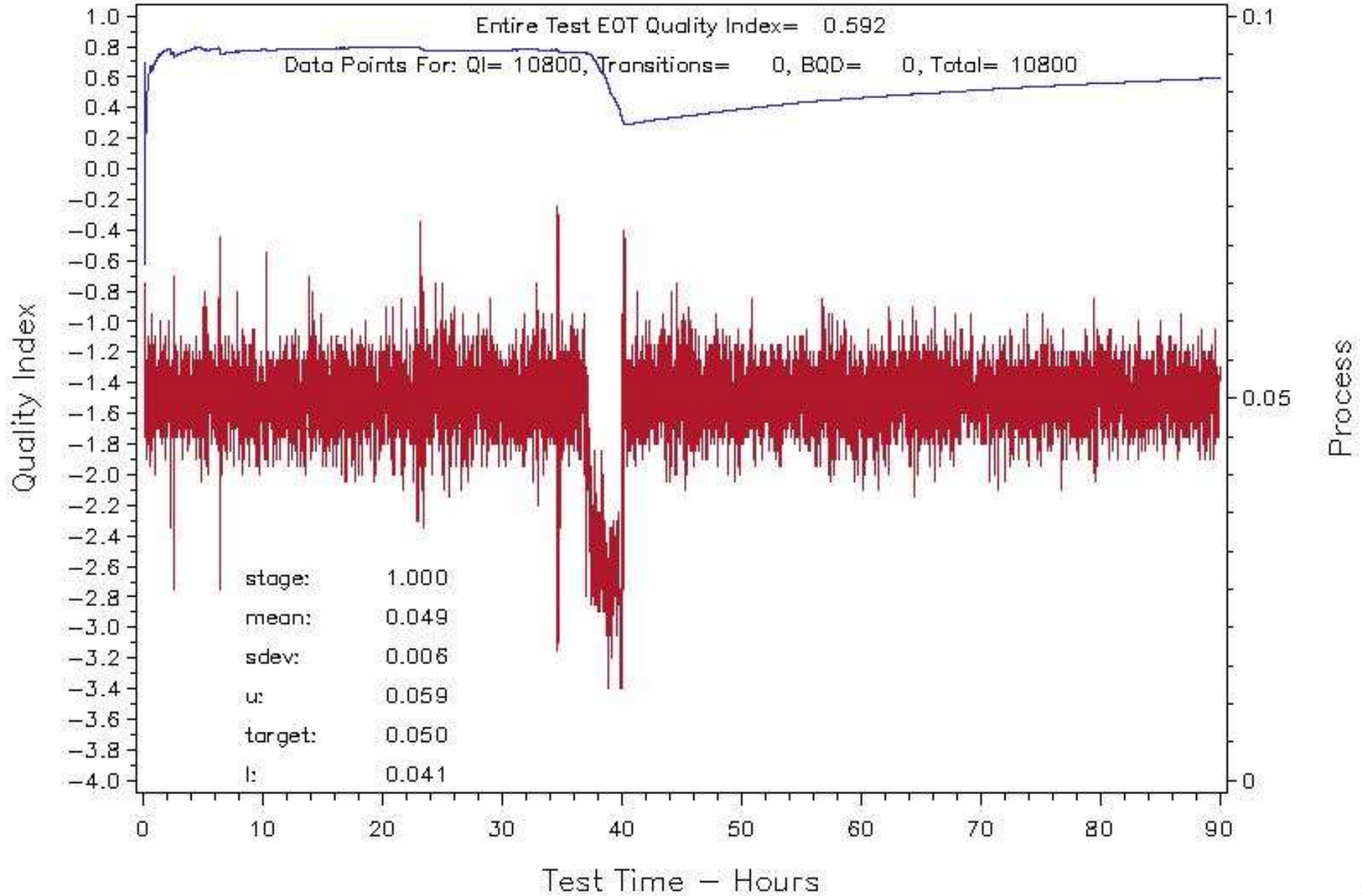
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Intake Air Pressure - kPa (CONTROL)
 LAB= A Stand= 1 CMR= 106779



IIIH QUALITY INDEX OPERATIONAL REVIEW
 Intake Air Pressure - kPa (CONTROL)
 LAB= E Stand= 3 CMIR= 106781

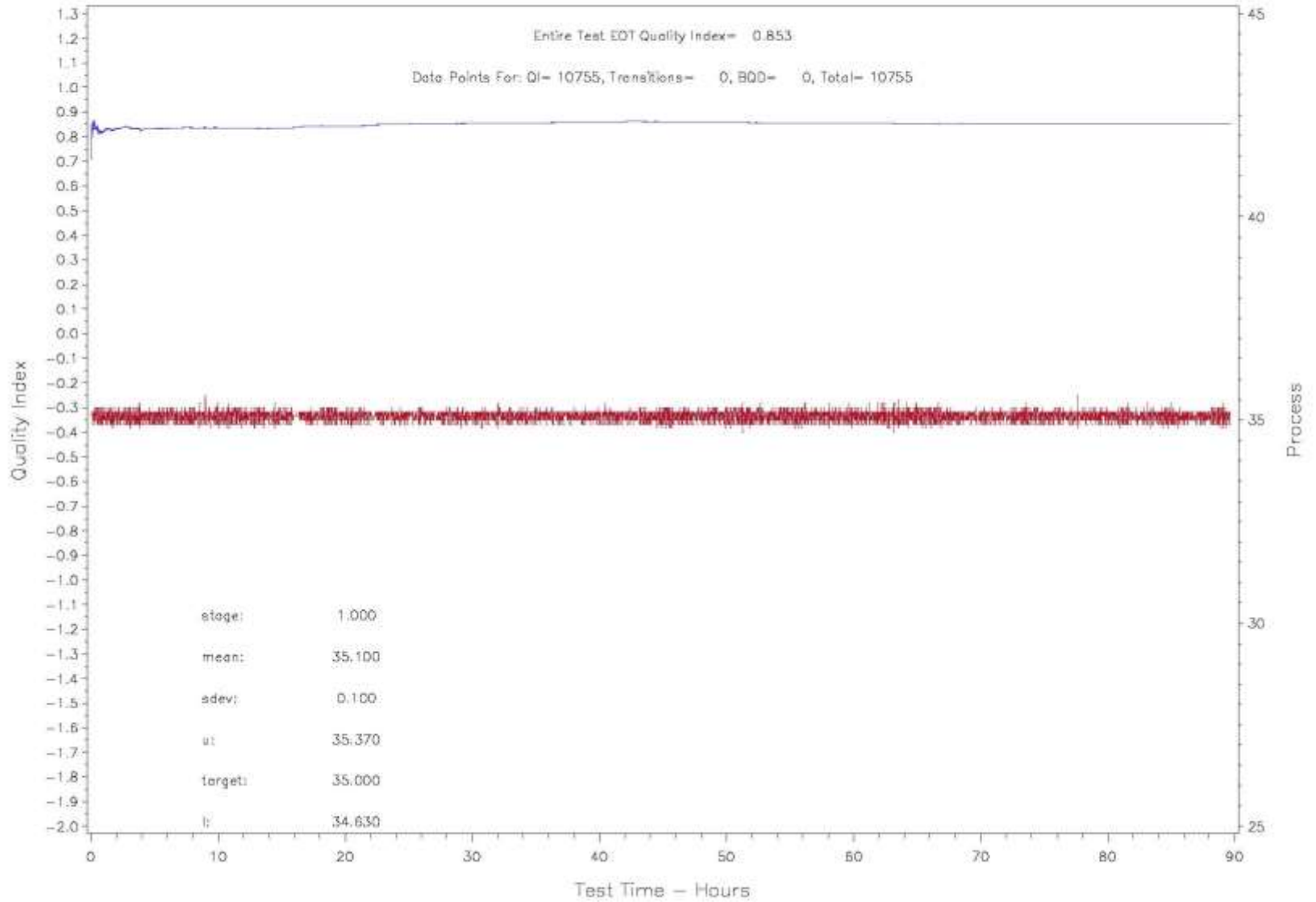


IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Pressure – kPa (CONTROL)
LAB= E Stand= 3 CMIR= 106780

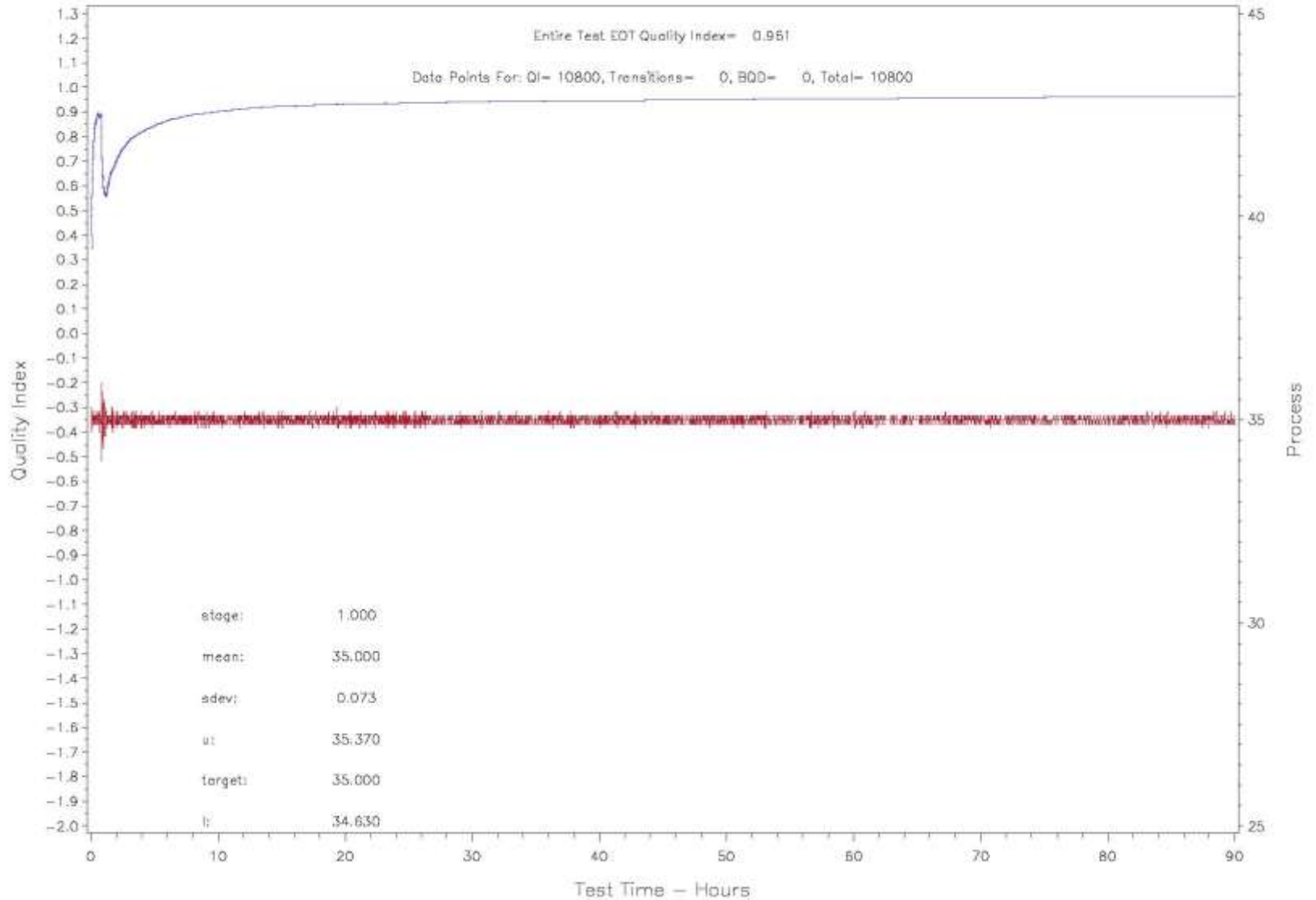


Intake Air Temperature

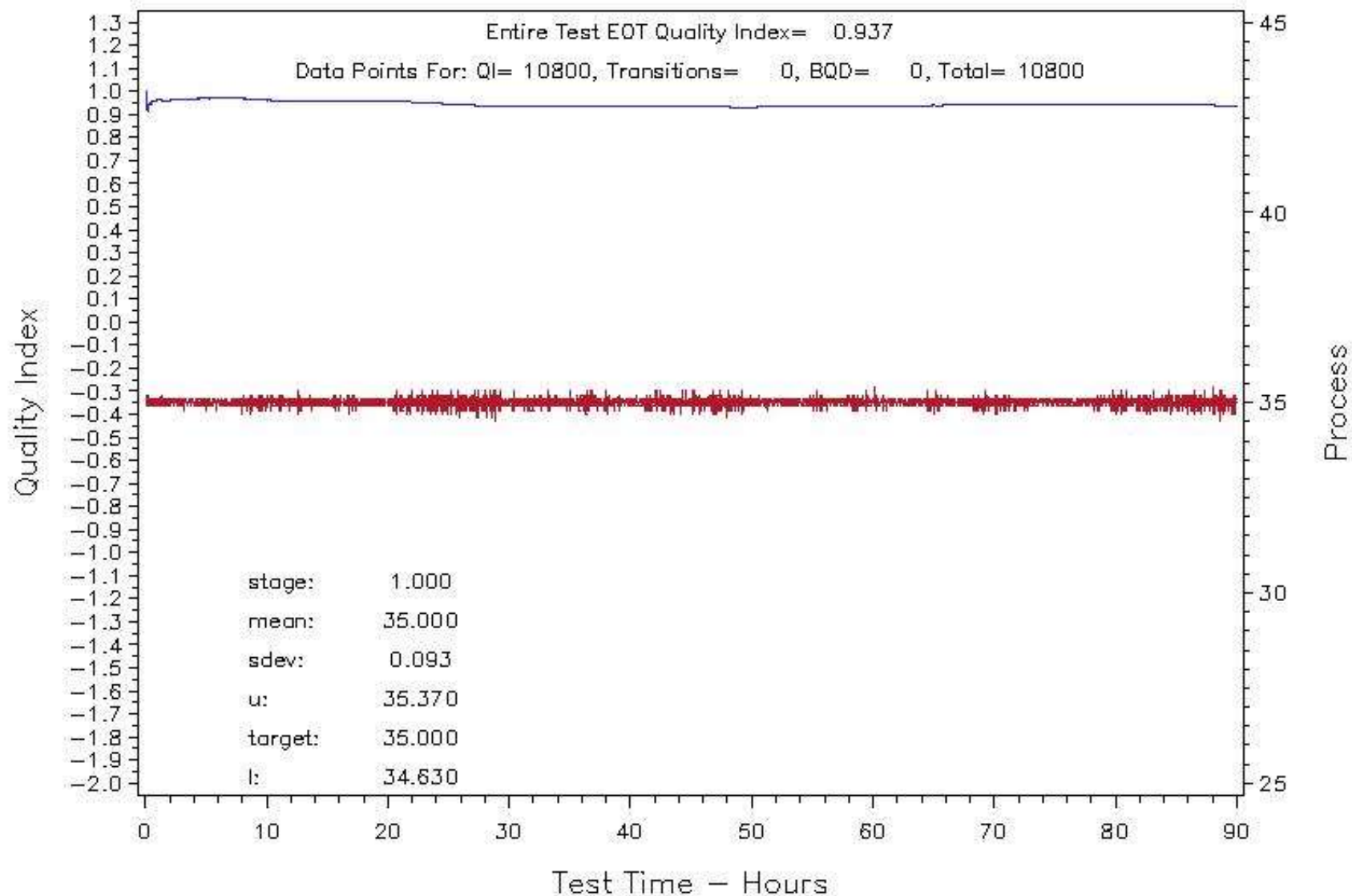
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature - Degrees C (CONTROL)
LAB= D Stand= CB106 CMR= 106793



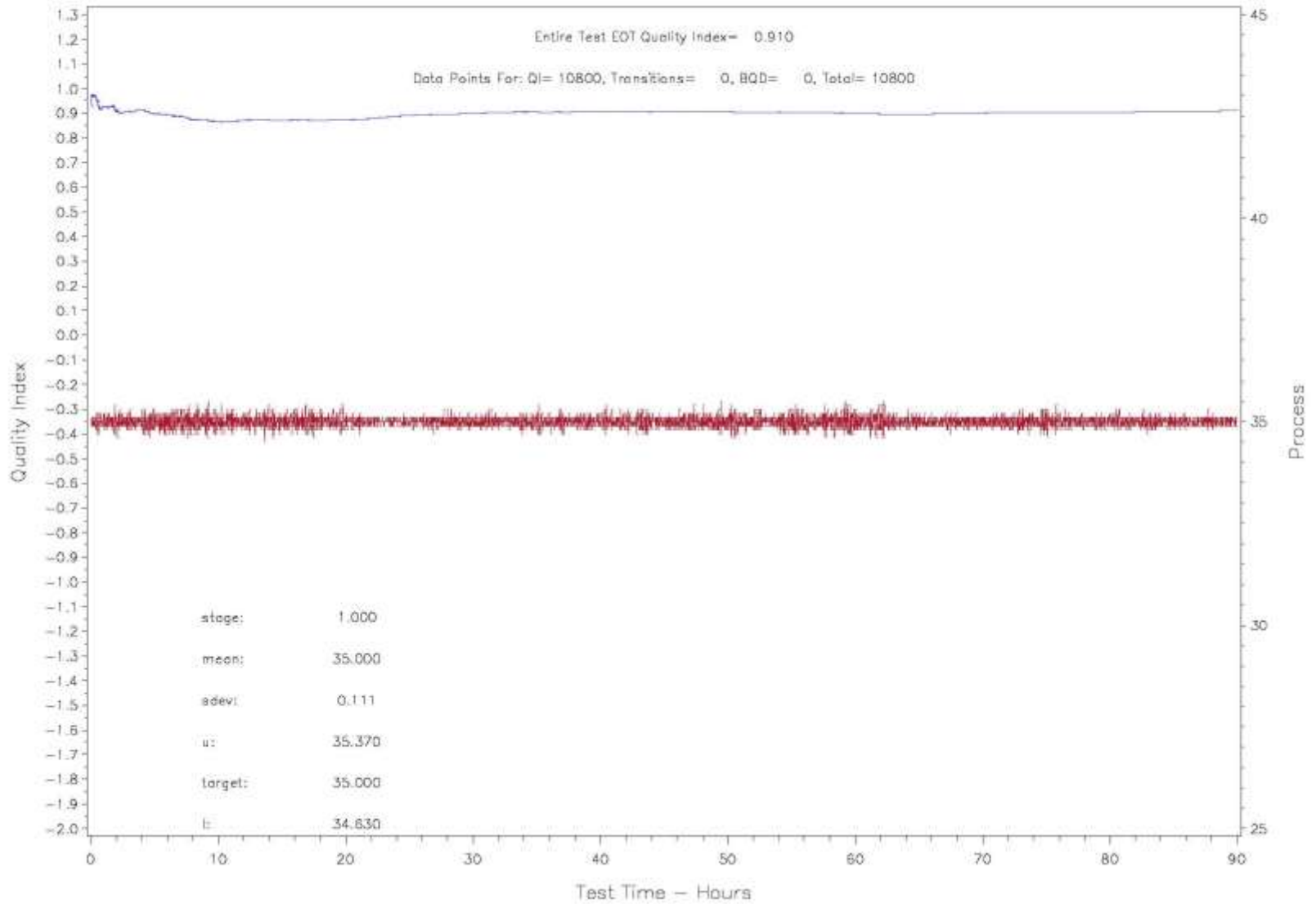
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature - Degrees C (CONTROL)
LAB= A Stand= 2 DMR= 106776



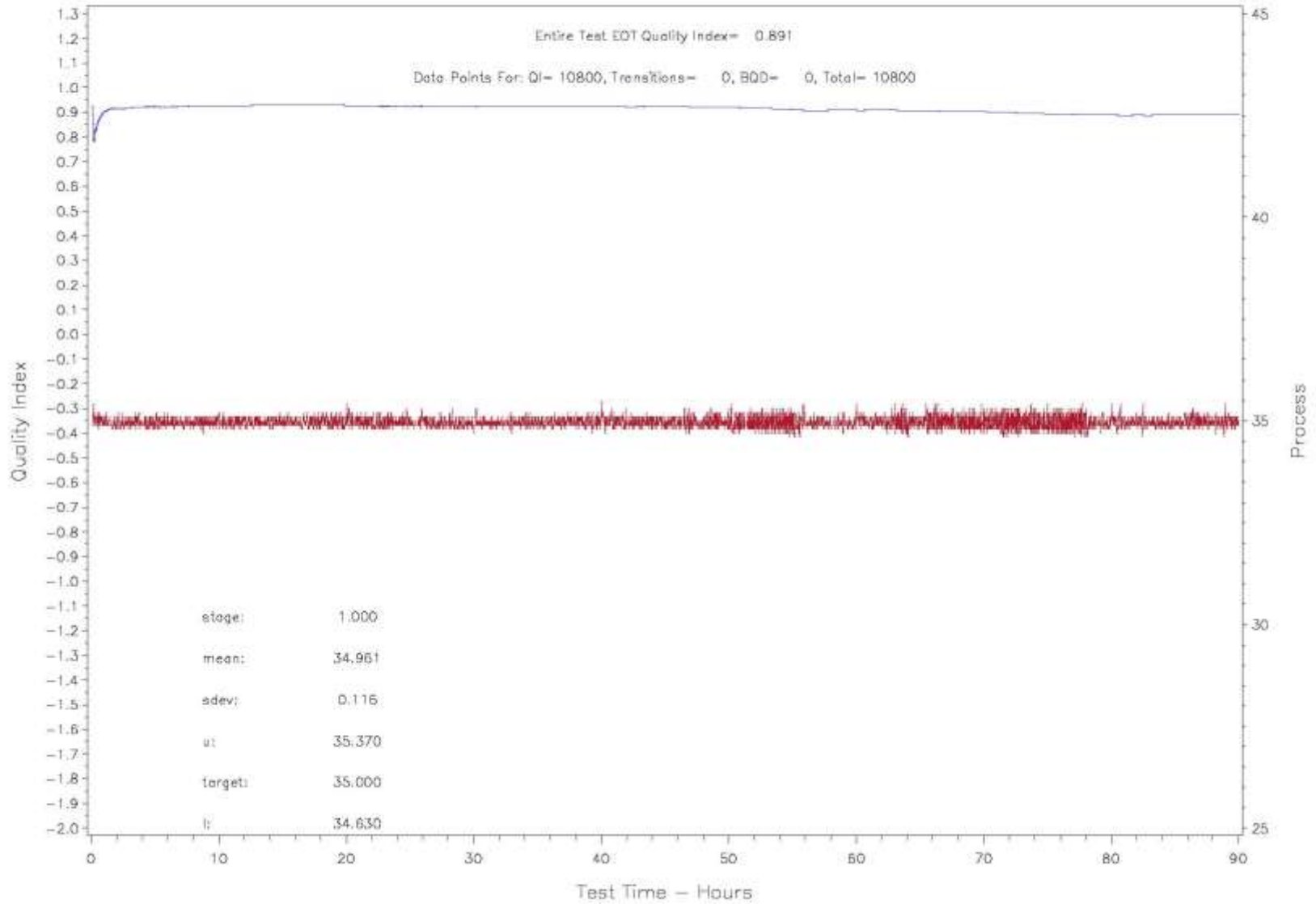
IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature – Degrees C (CONTROL)
LAB= A Stand= 1 CMIR= 106777



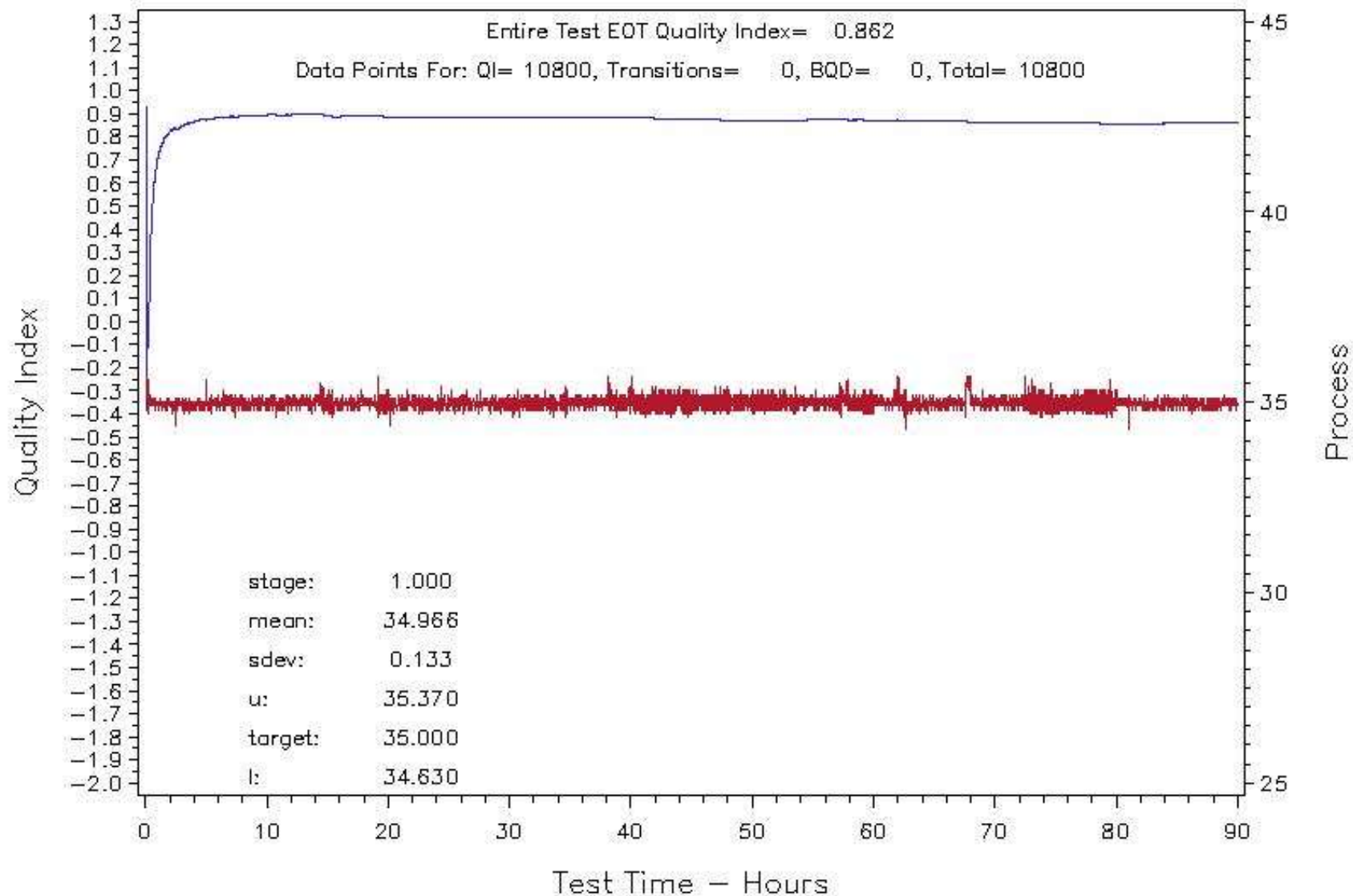
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Intake Air Temperature - Degrees C (CONTROL)
 LAB= A Stand= 1 CWIR= 106779



IIH QUALITY INDEX OPERATIONAL REVIEW
 Intake Air Temperature – Degrees C (CONTROL)
 LAB= E, Stand= 3 QMIR= 106781

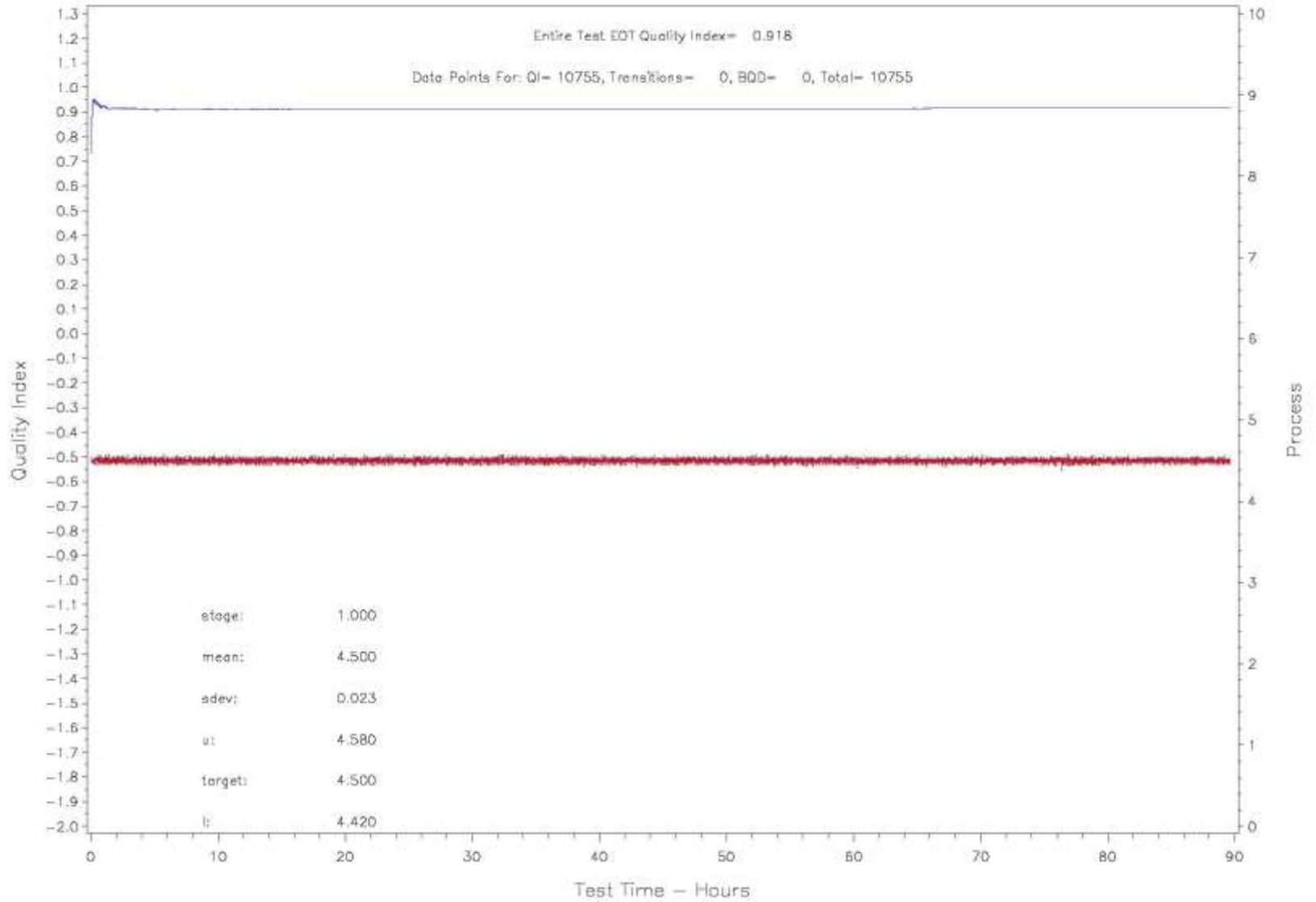


IIH QUALITY INDEX OPERATIONAL REVIEW
Intake Air Temperature – Degrees C (CONTROL)
LAB= E Stand= 3 CMIR= 106780

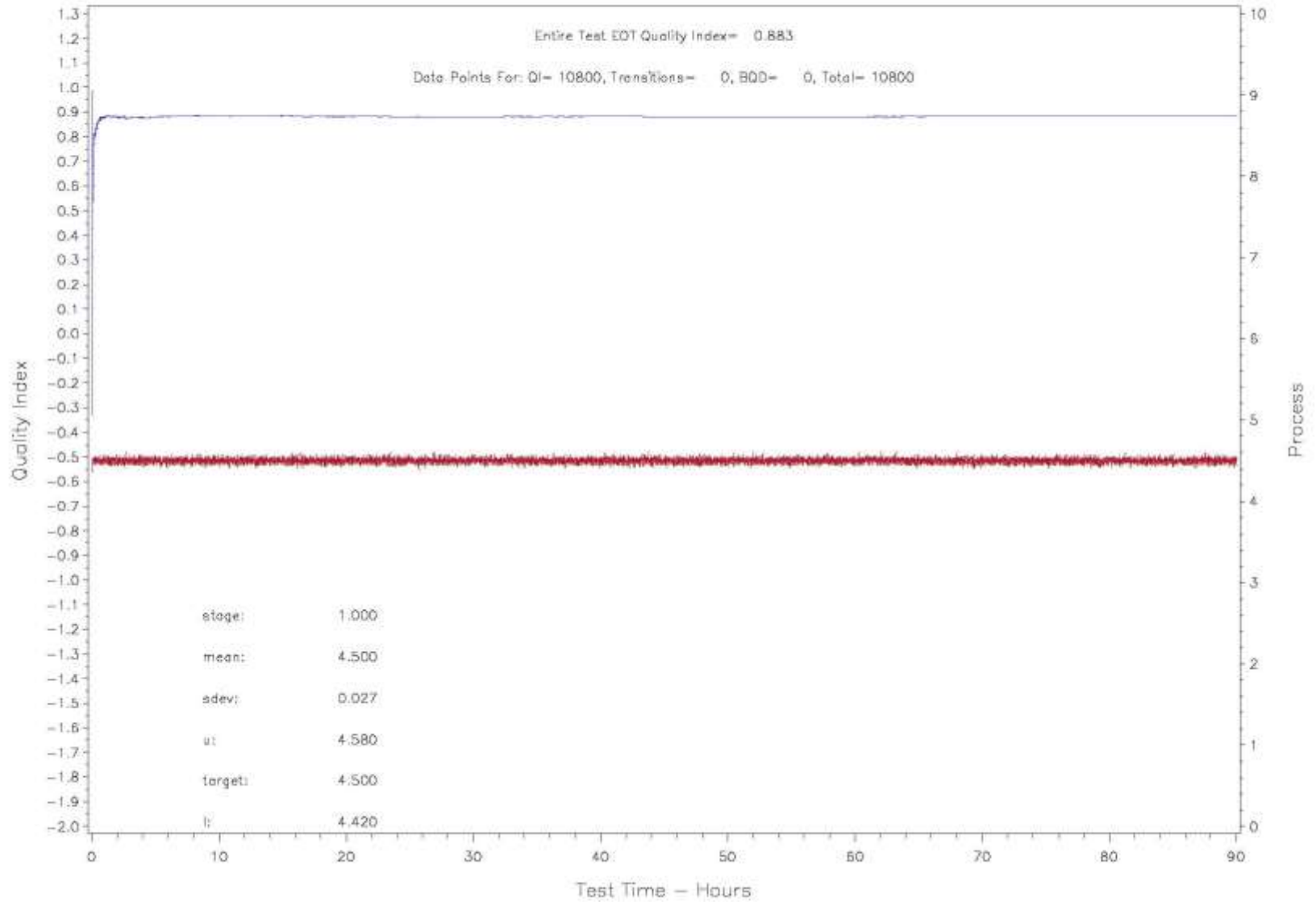


Left Exhaust Back Pressure

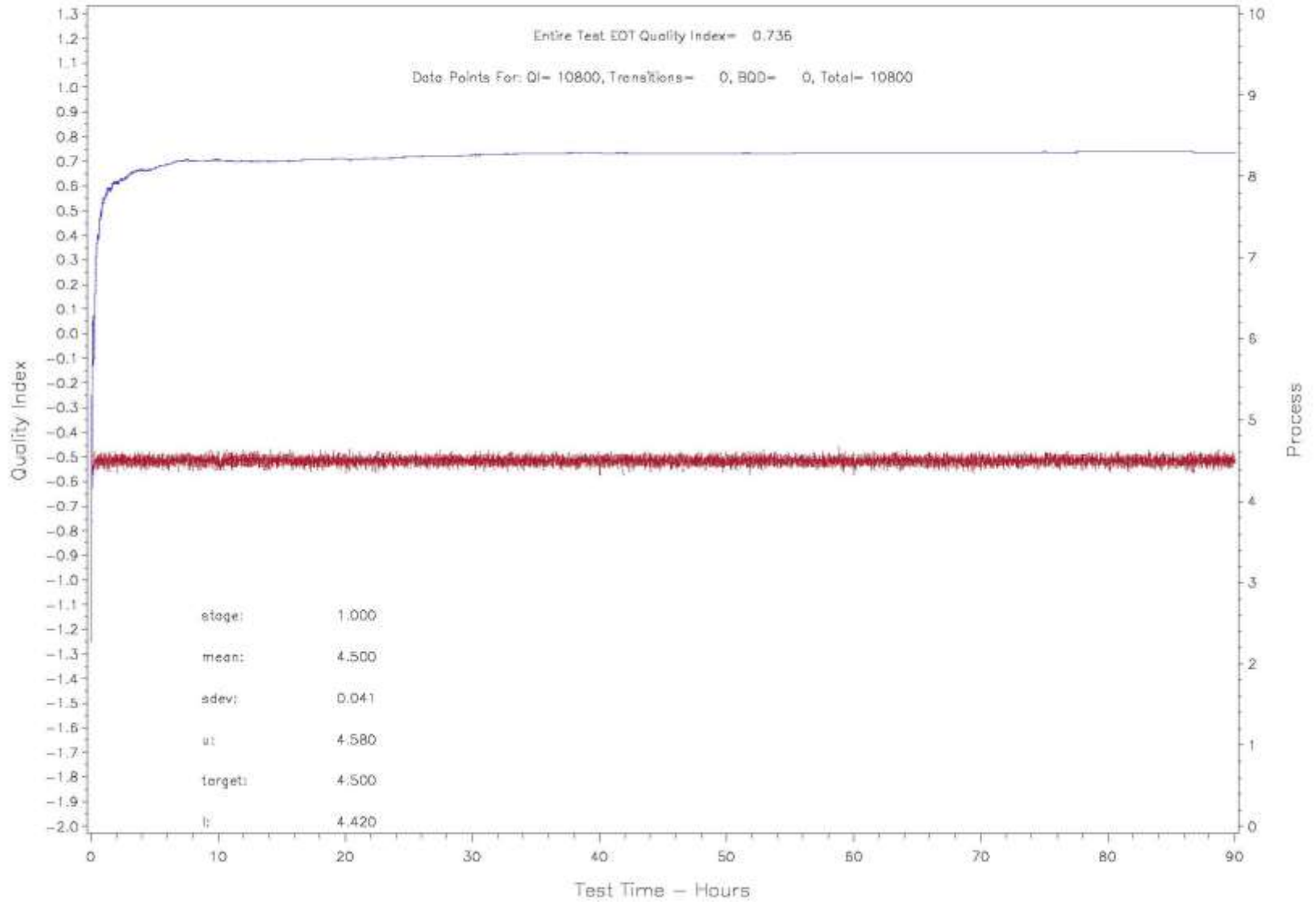
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= D Stand= CB106 CMR= 106791



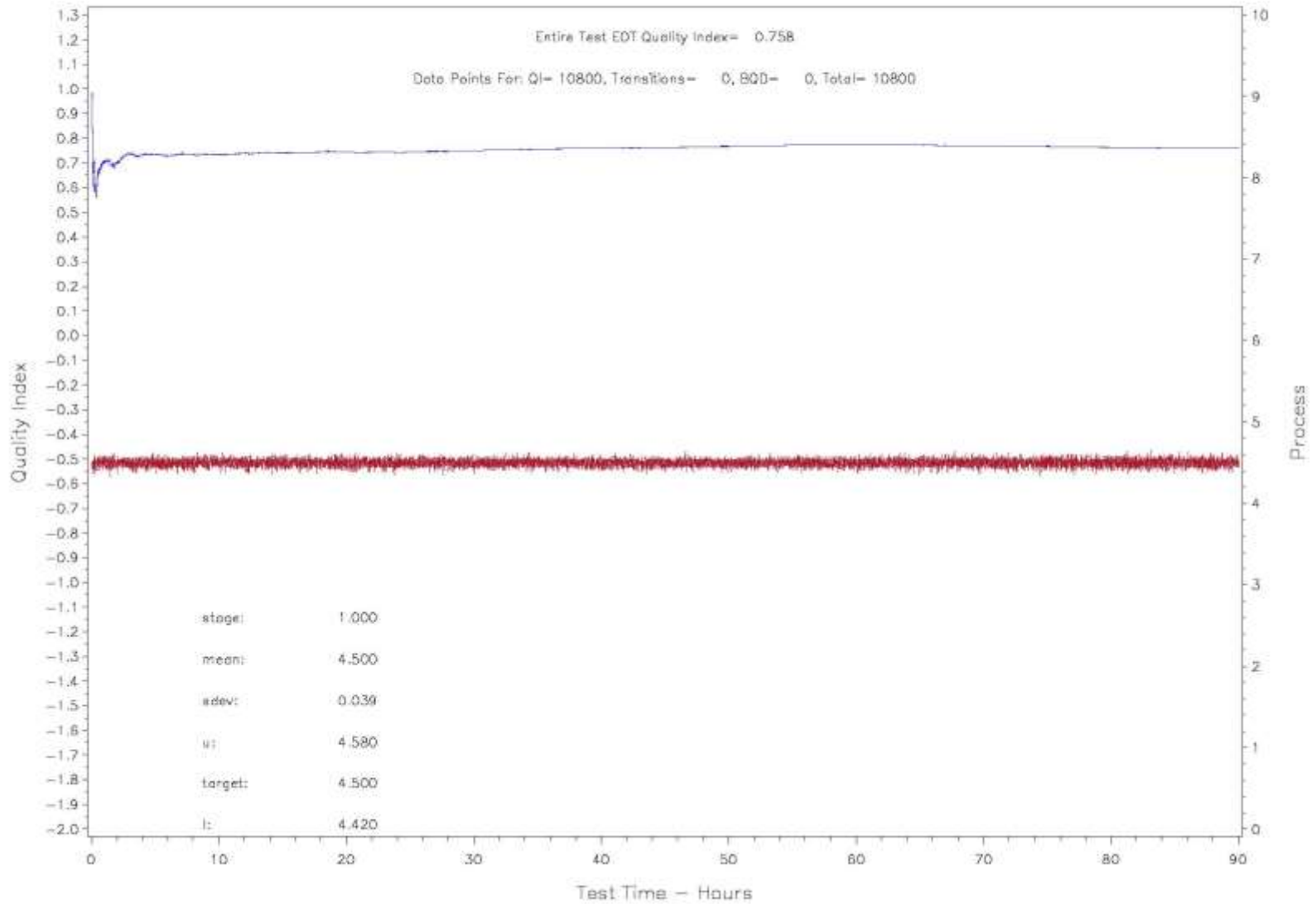
IIIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= A Stand= 2 DMR= 106776



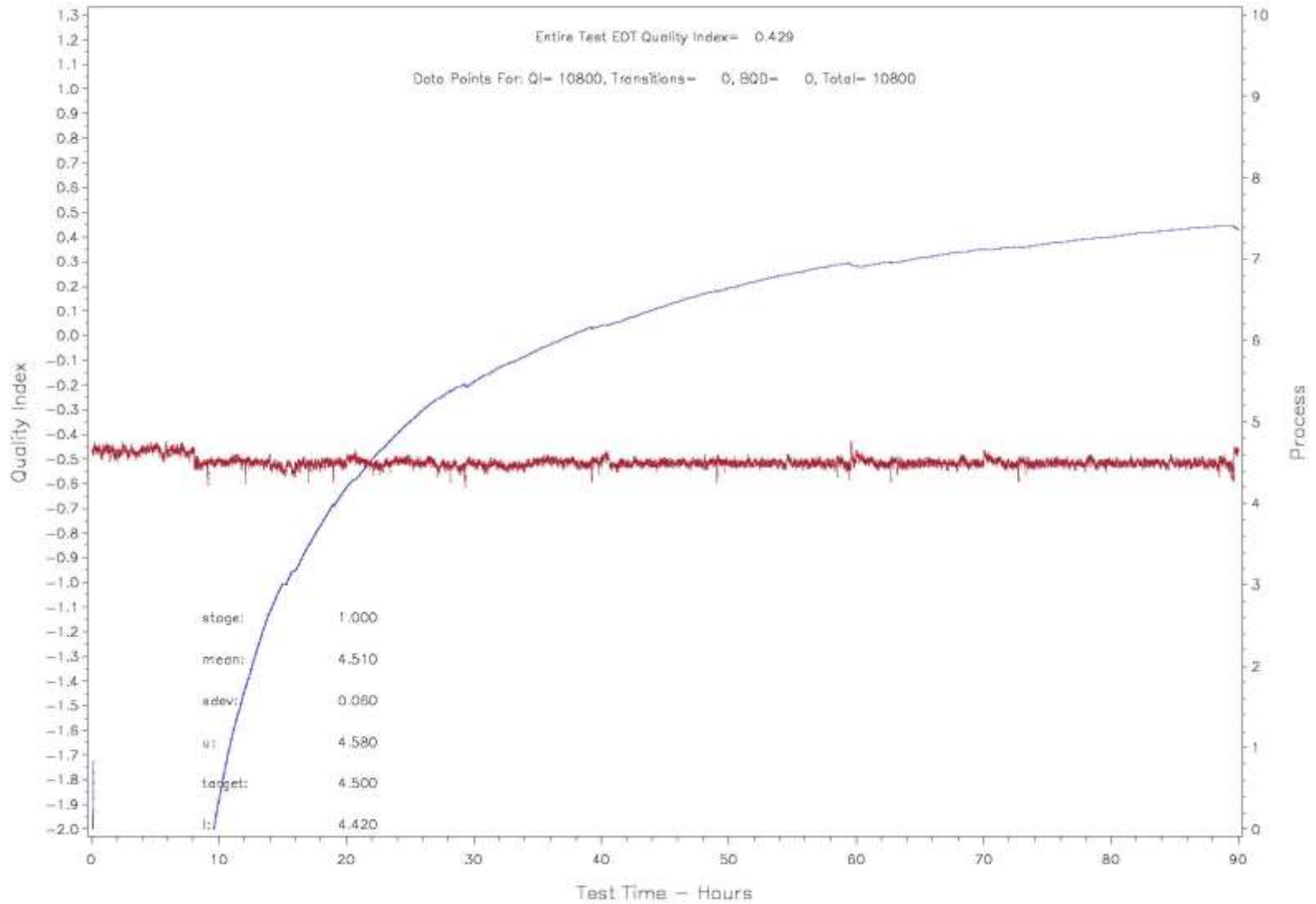
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= A Stand= 1 DM#= 106777



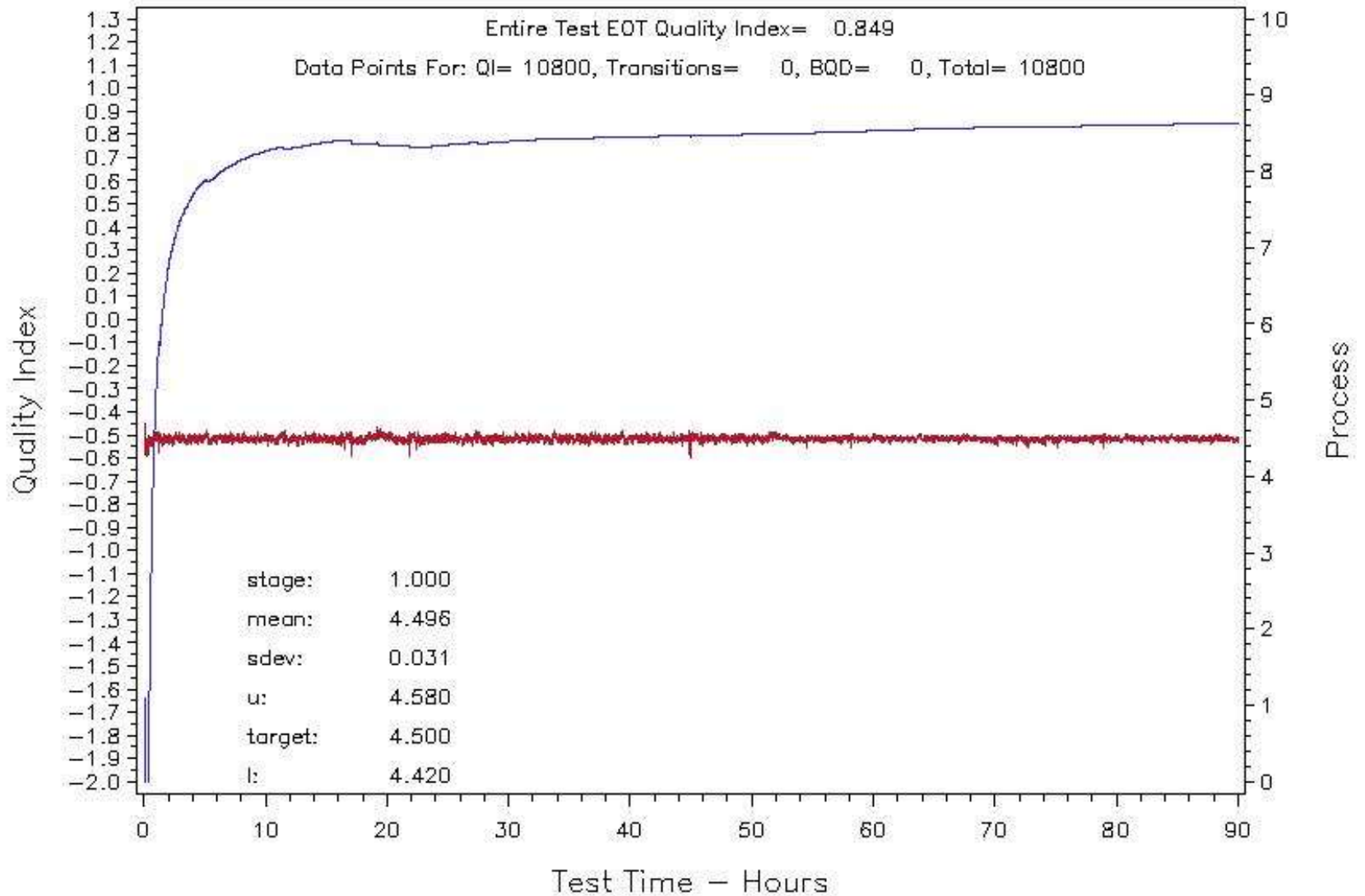
III QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left - kPa (CONTROL)
LAB= A Stand= 1 DMIR= 105778



III QUALITY INDEX OPERATIONAL REVIEW
 Exhaust Back Pressure Left - kPa (CONTROL)
 LAB= E Stand= 3 OMR= 105781

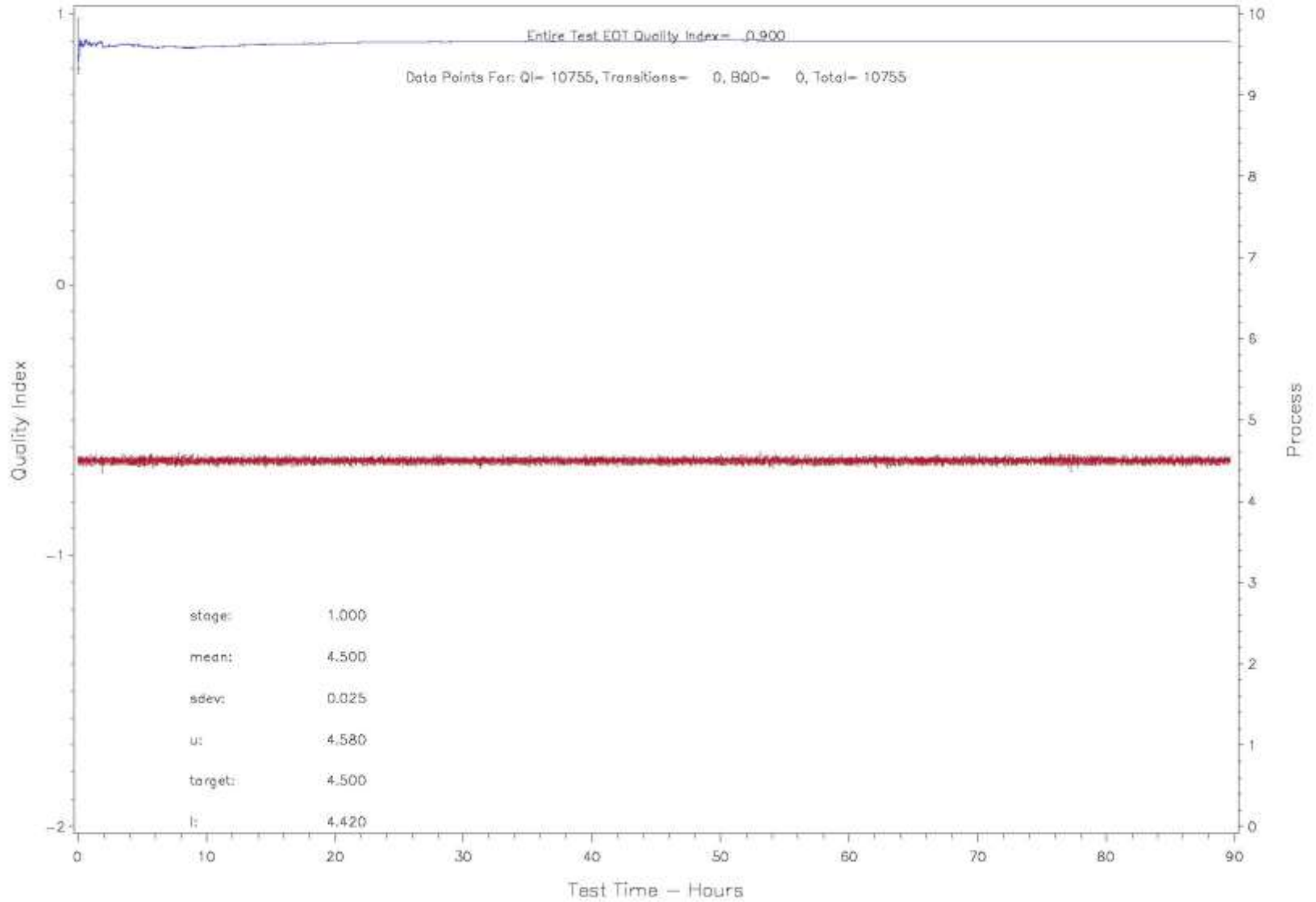


IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Left – kPa (CONTROL)
LAB= E Stand= 3 CMIR= 106780

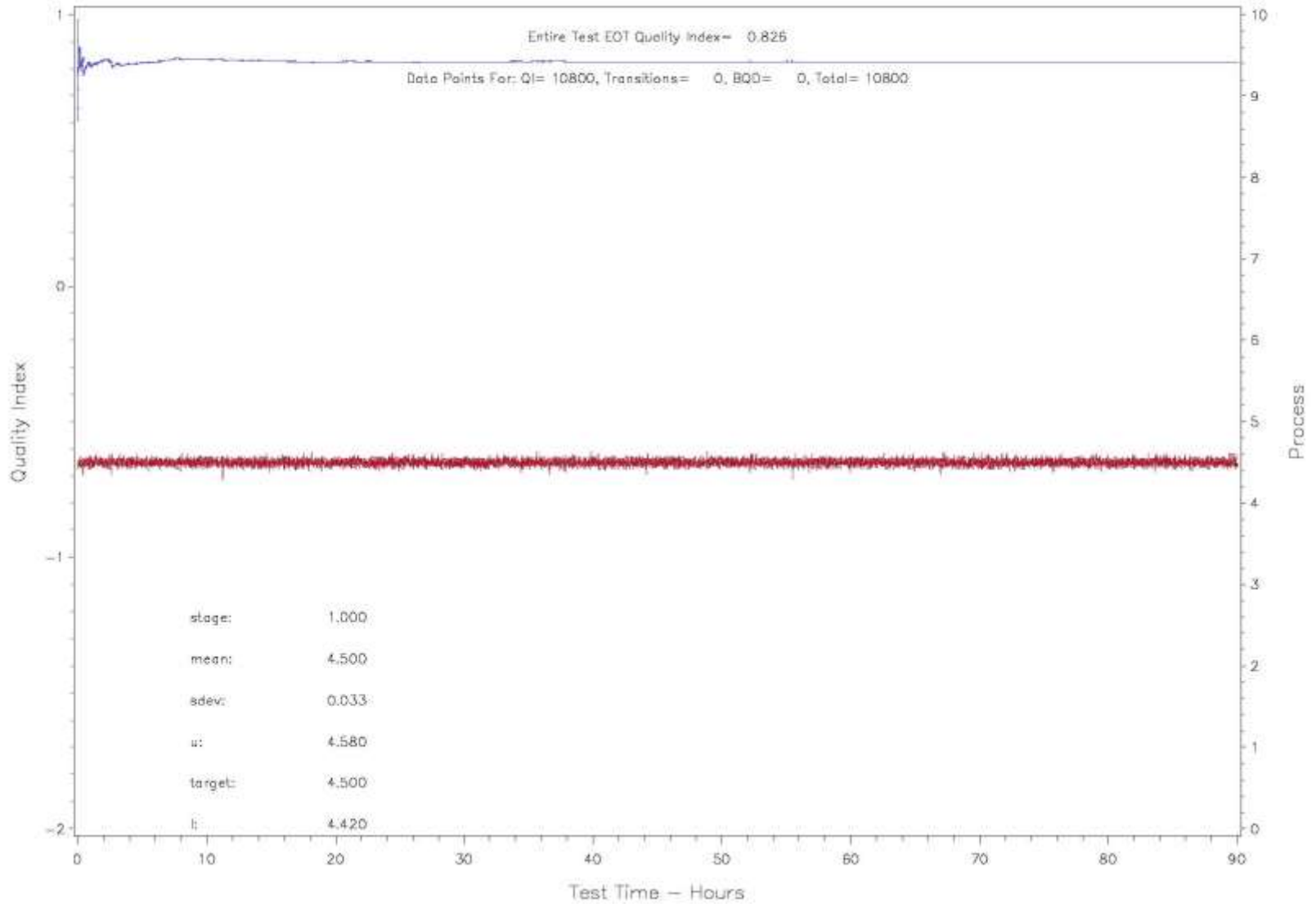


Right Exhaust Back Pressure

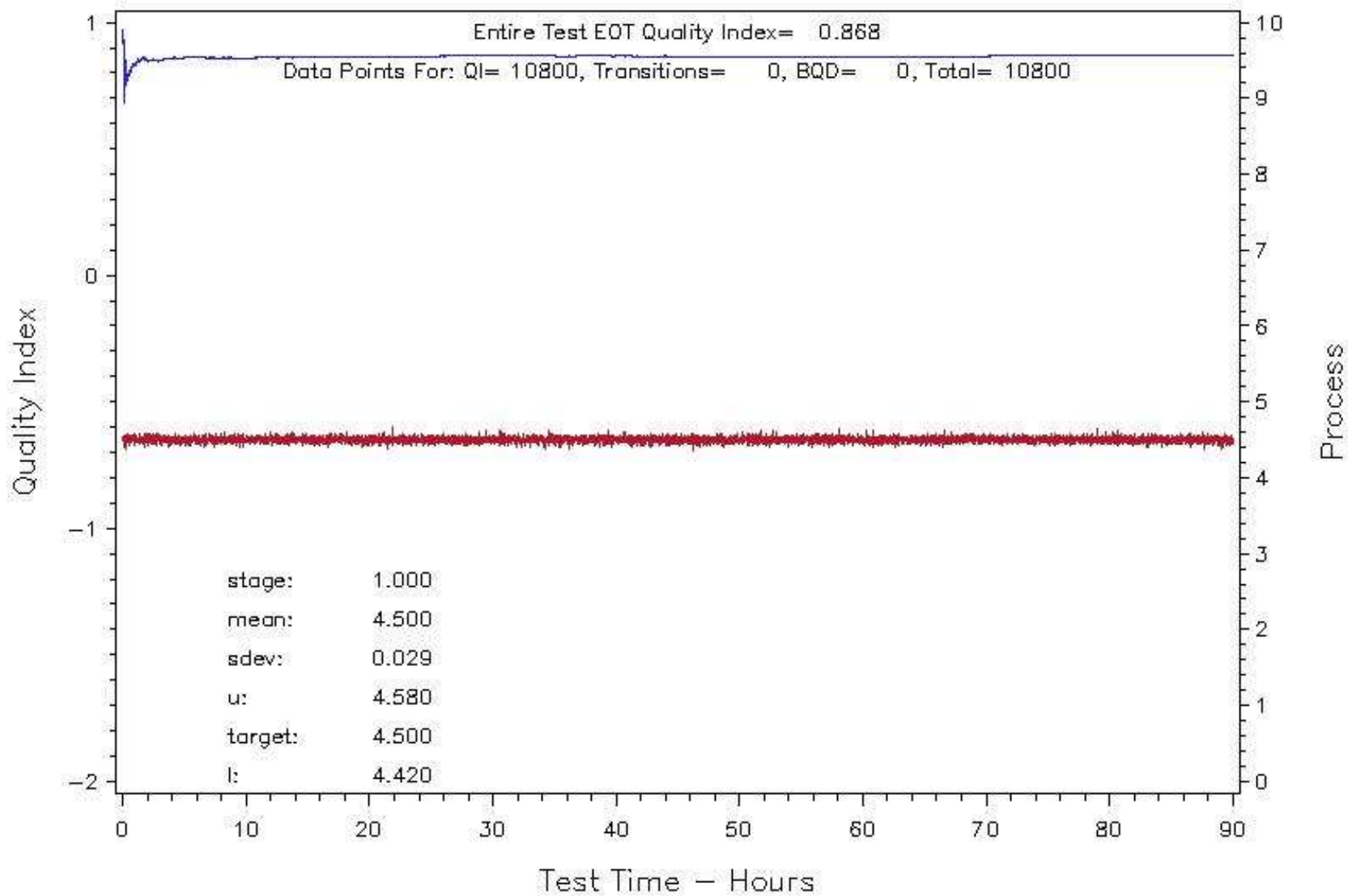
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= D Stand= CB106 CMR= 106791



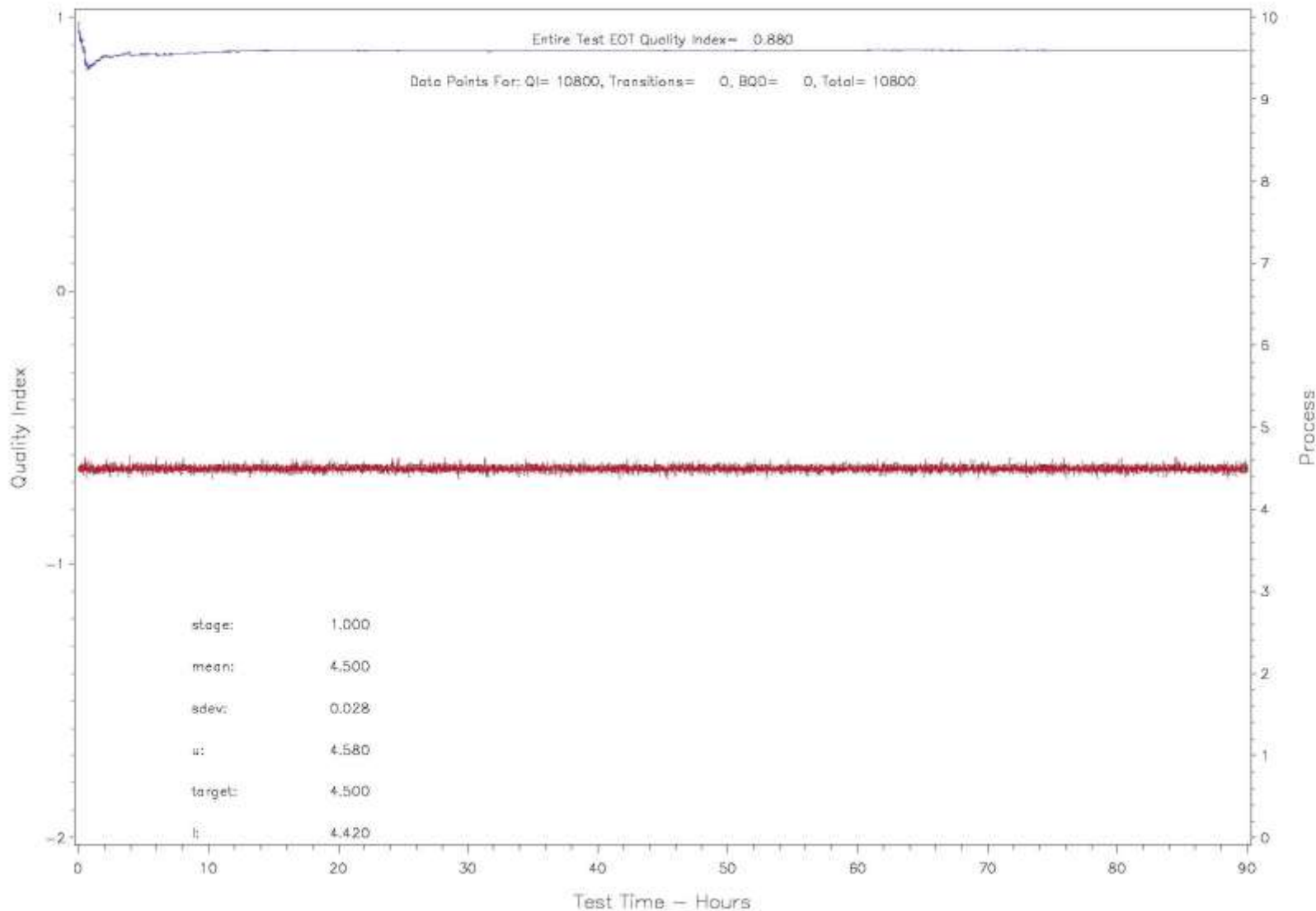
IIIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= A Stand= 2 DMIR= 106776



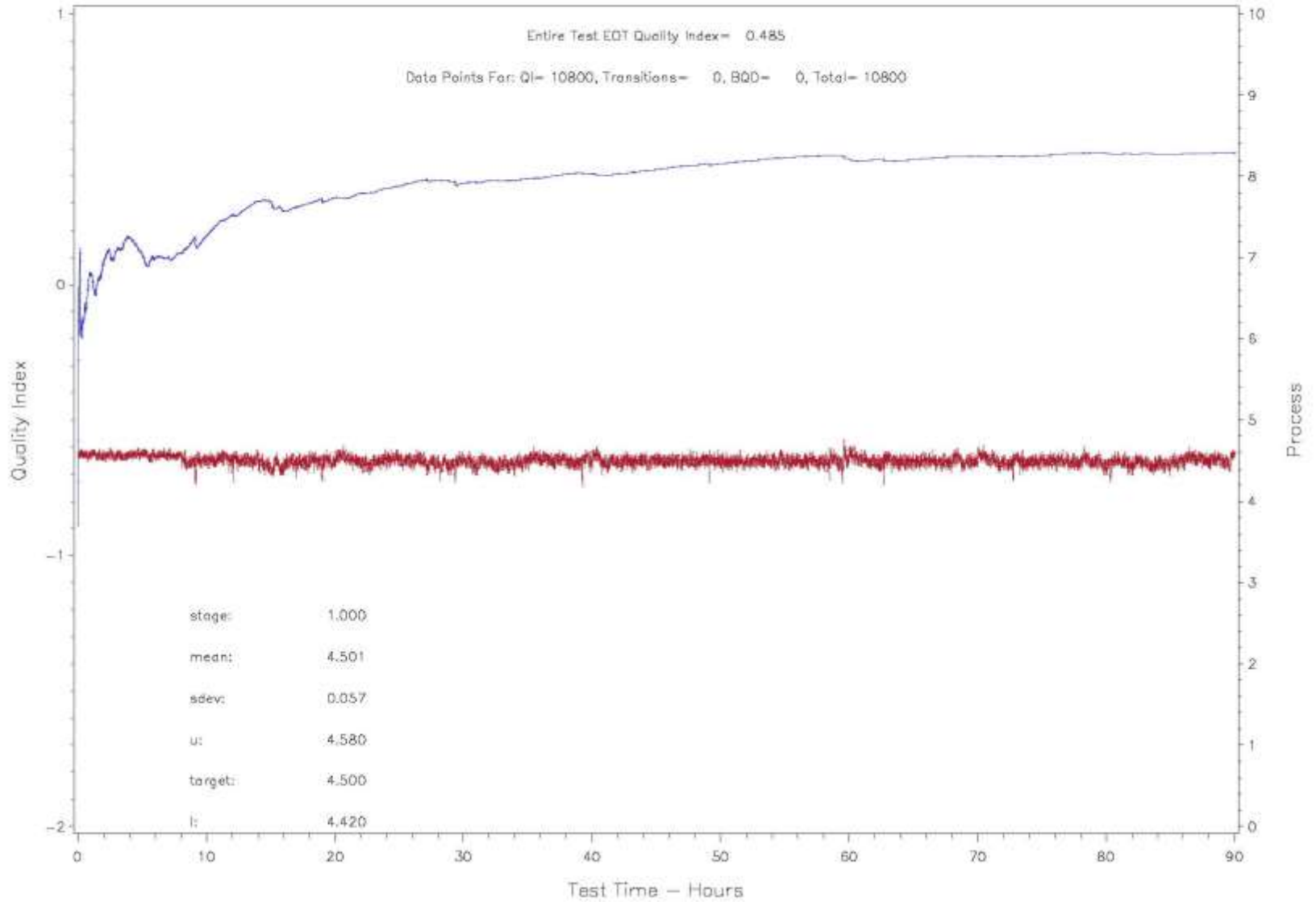
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right – kPa (CONTROL)
LAB= A Stand= 1 CMIR= 106777



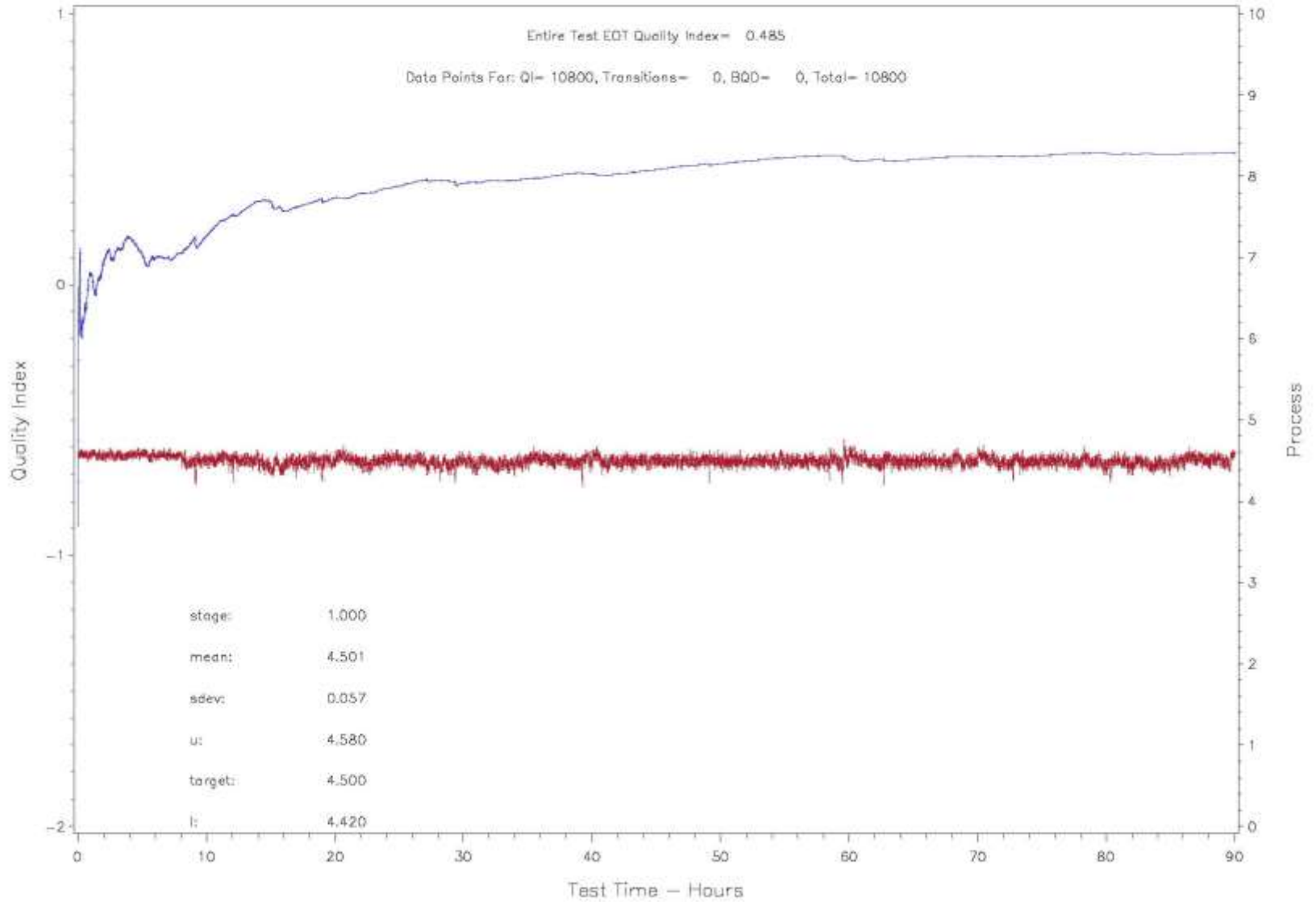
IIIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= A Stand= 1 DMIR= 106779



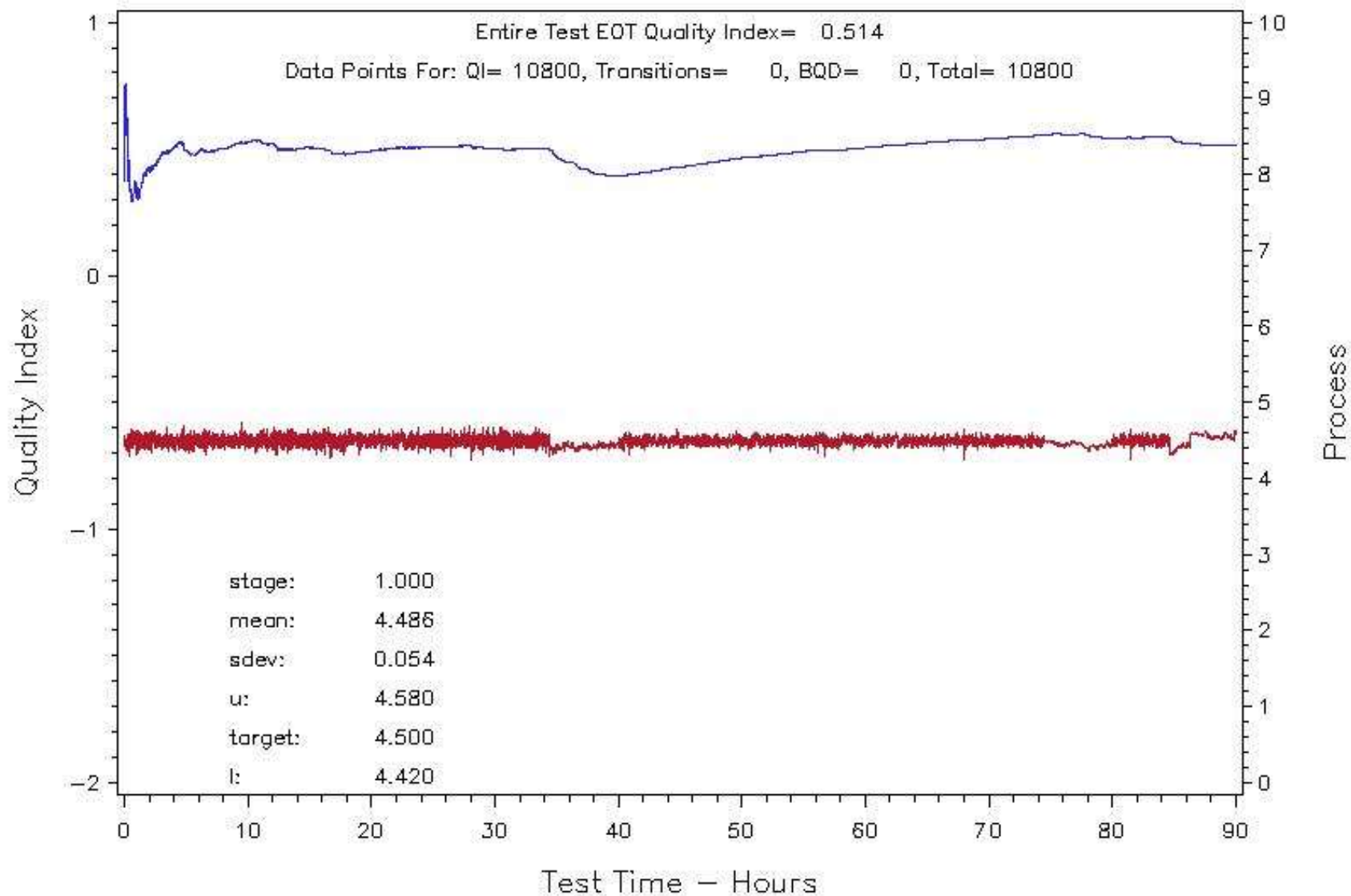
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= E Stand= 3 QWIR= 106781



IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= E Stand= 3 QMID= 106781

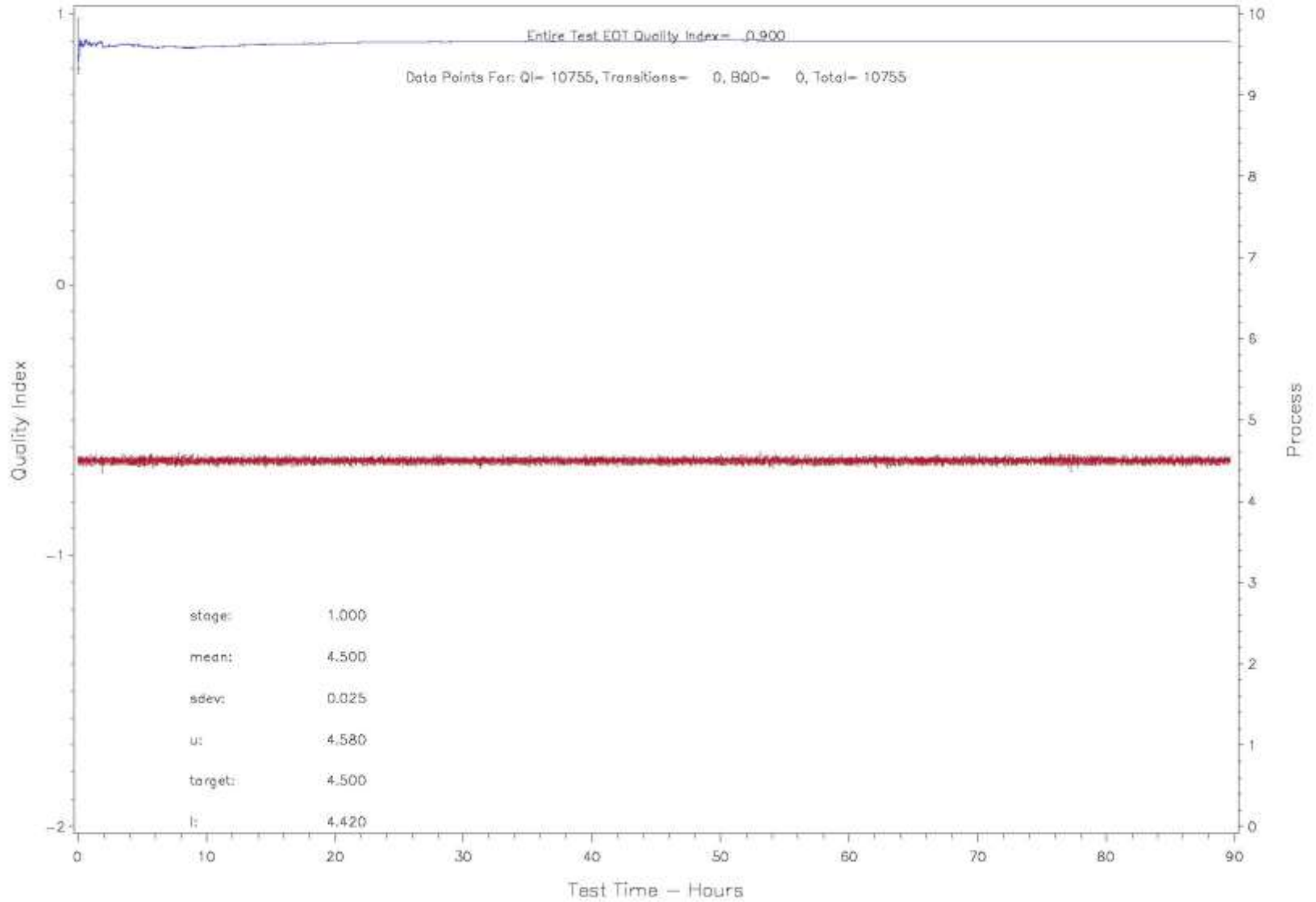


IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right – kPa (CONTROL)
LAB= E Stand= 3 CMIR= 106780

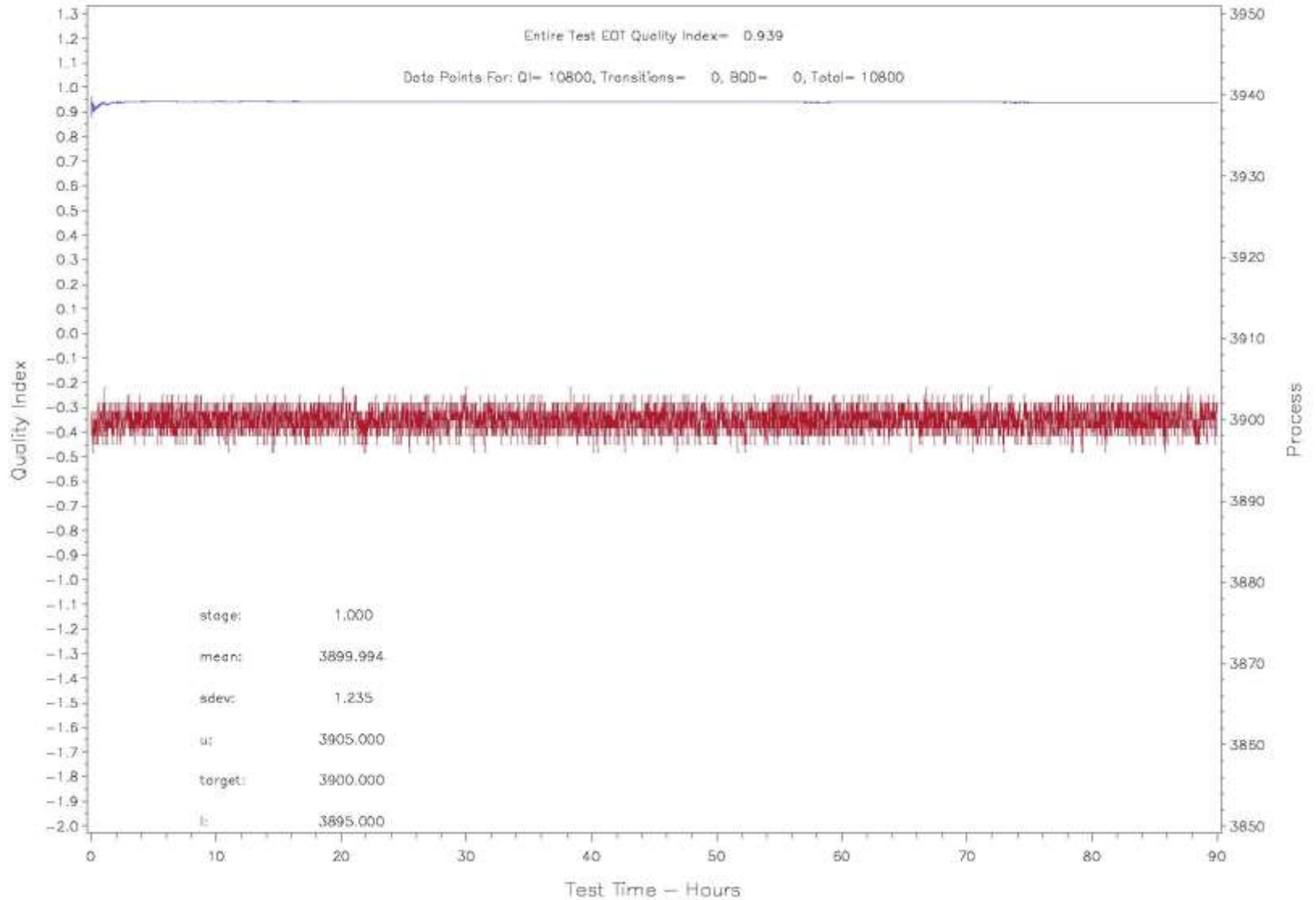


Speed

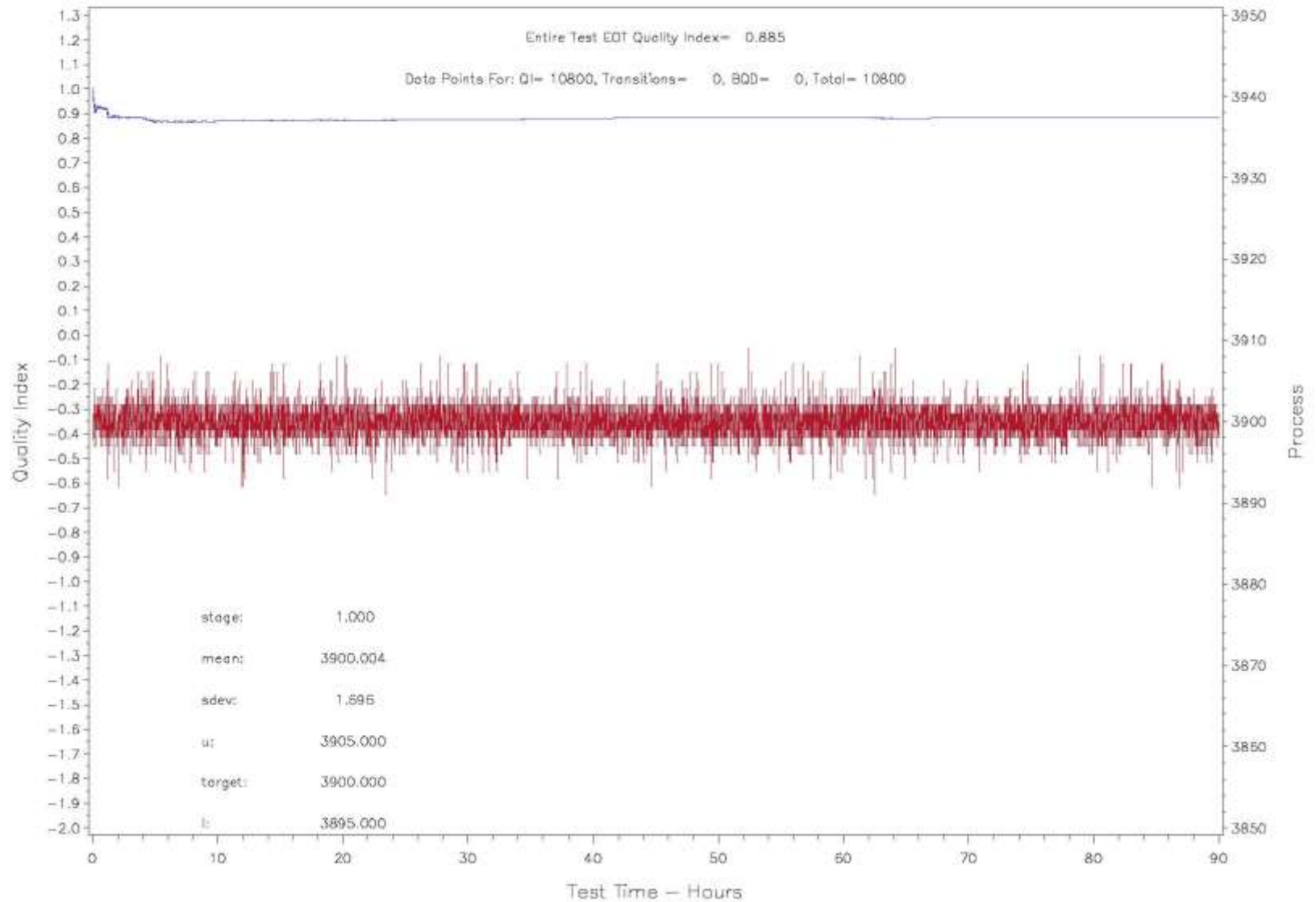
IIH QUALITY INDEX OPERATIONAL REVIEW
Exhaust Back Pressure Right - kPa (CONTROL)
LAB= D Stand= CB106 CMR= 106791



IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Speed - r/min (CONTROL)
LAB= A, Stand= 2, DM#= 106776



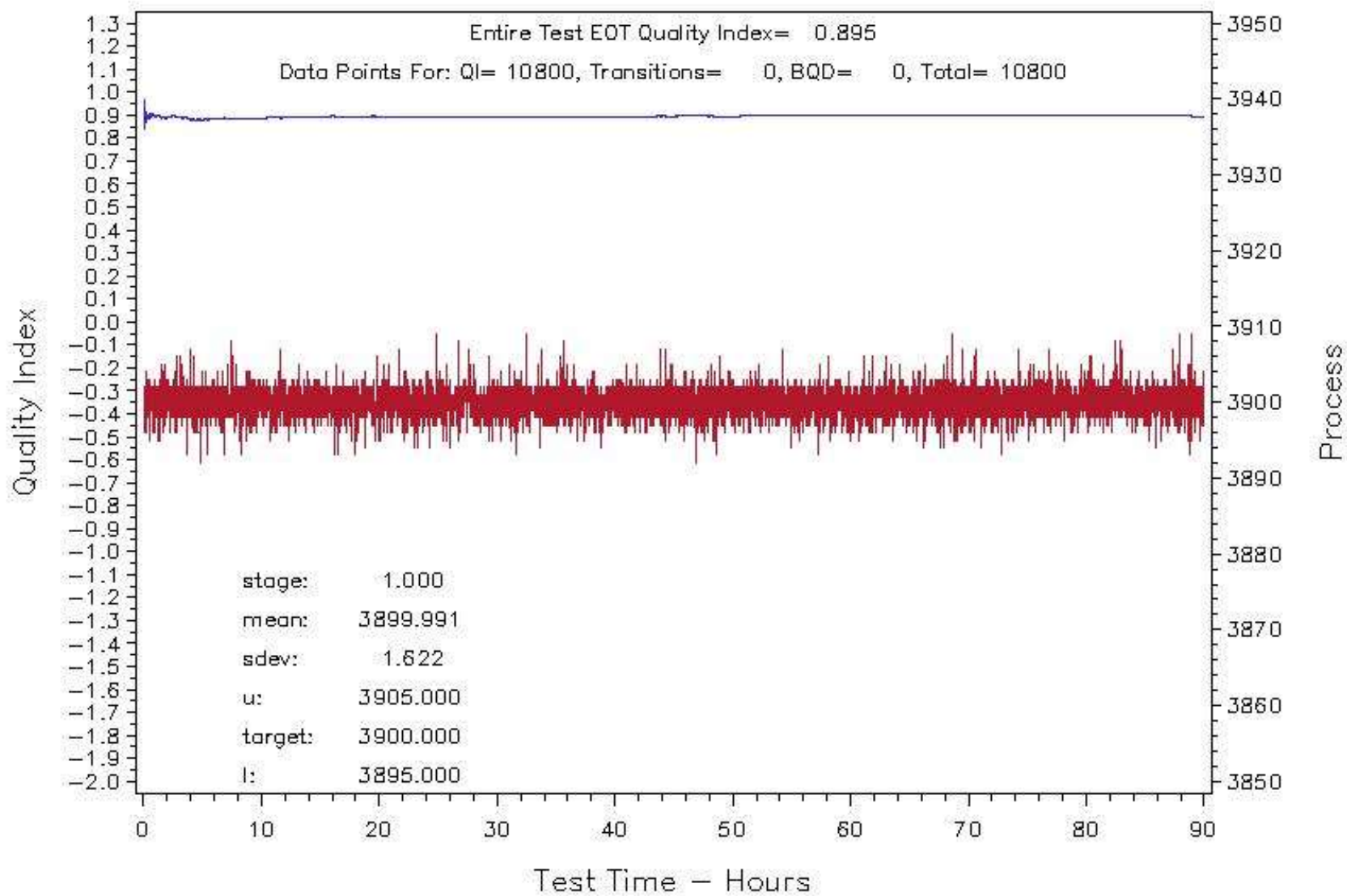
IIIH QUALITY INDEX OPERATIONAL REVIEW
 Engine Speed - r/min (CONTROL)
 LAB= A, Stand= 1, DM#= 106777



IIIH QUALITY INDEX OPERATIONAL REVIEW

Engine Speed - r/min (CONTROL)

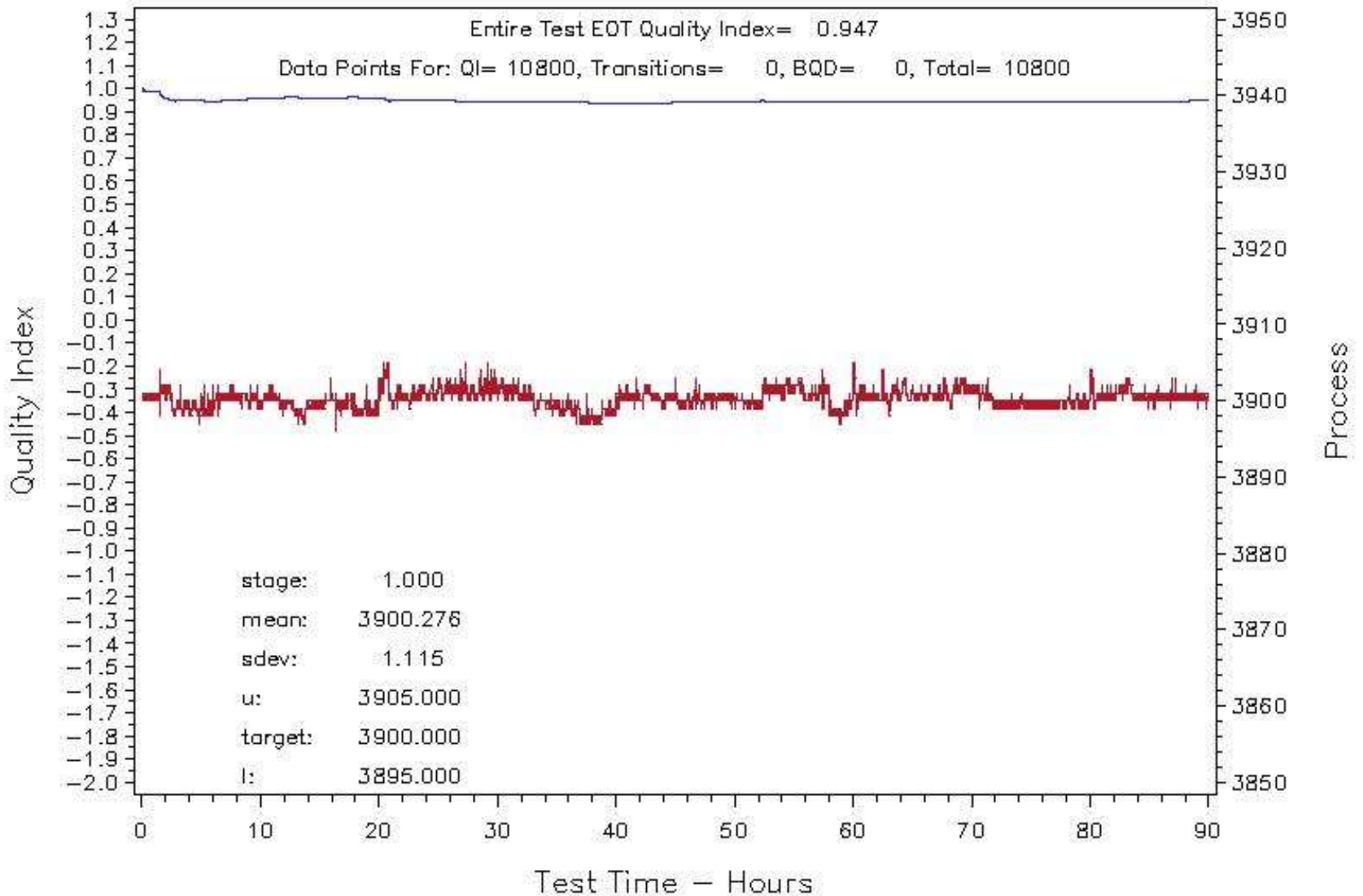
LAB= A Stand= 1 CMIR= 106779



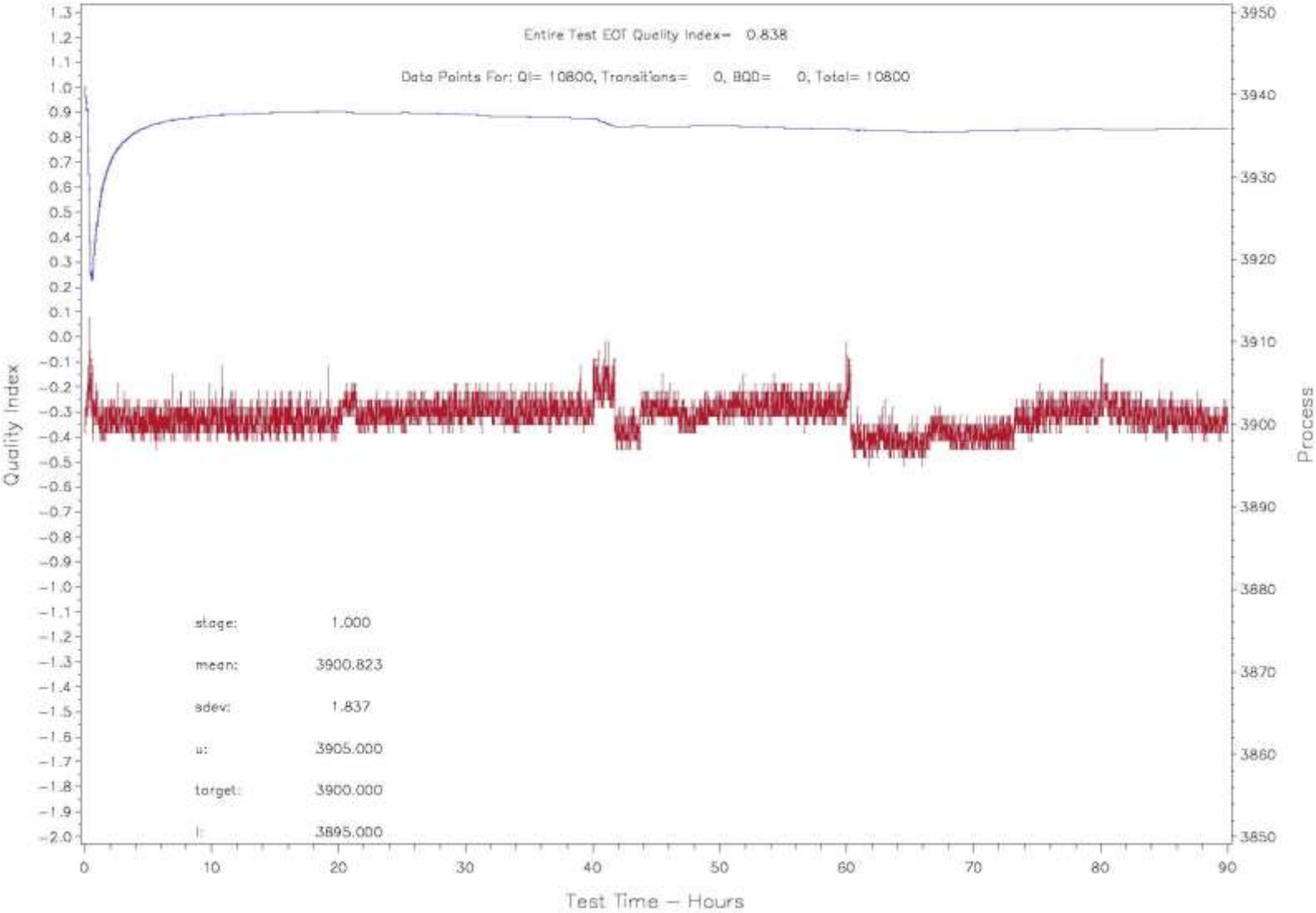
IIH QUALITY INDEX OPERATIONAL REVIEW

Engine Speed - r/min (CONTROL)

LAB= E Stand= 3 CMIR= 106780

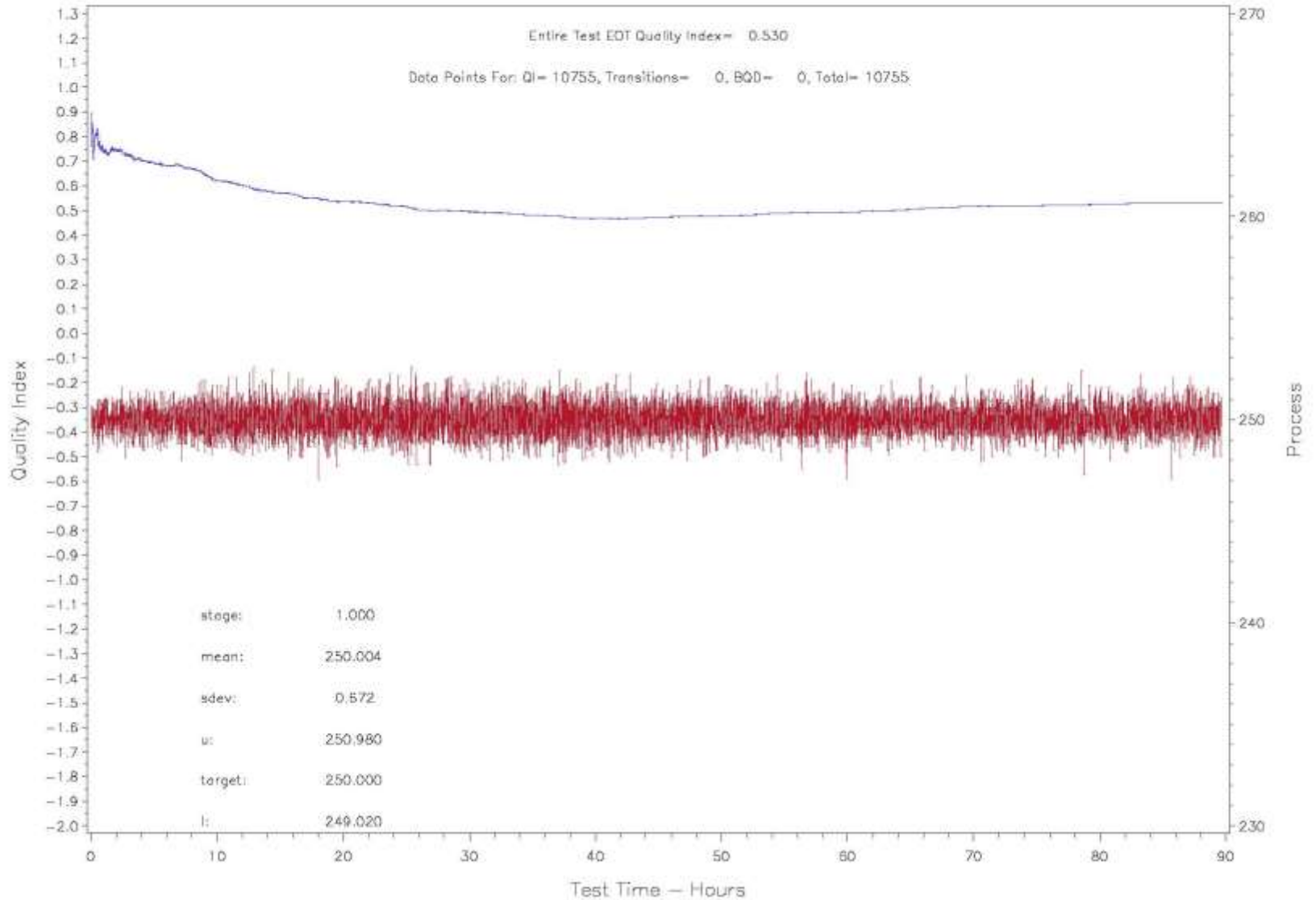


IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Speed - r/min (CONTROL)
LAB= E Stand= 3 QMR= 106781

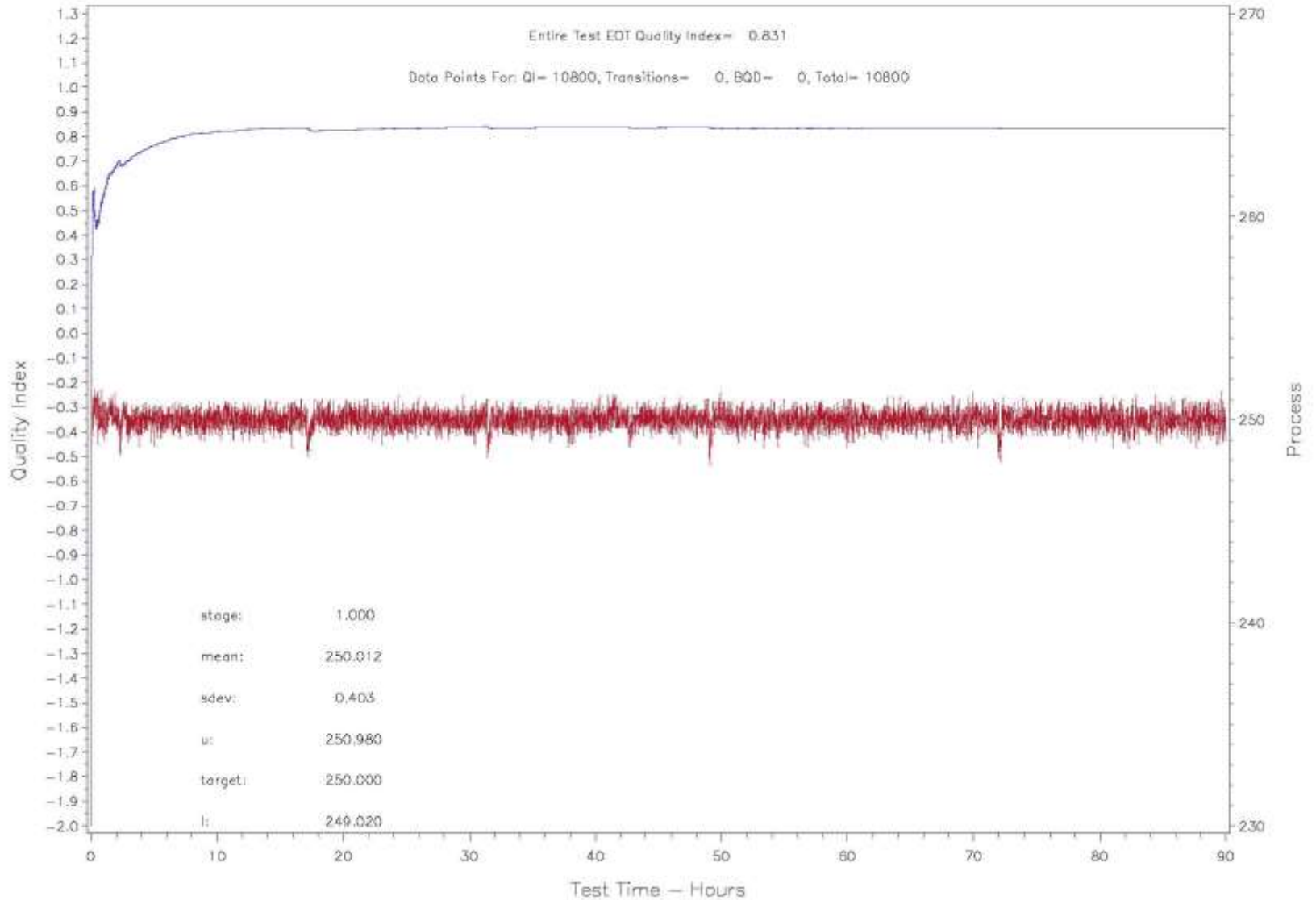


Load

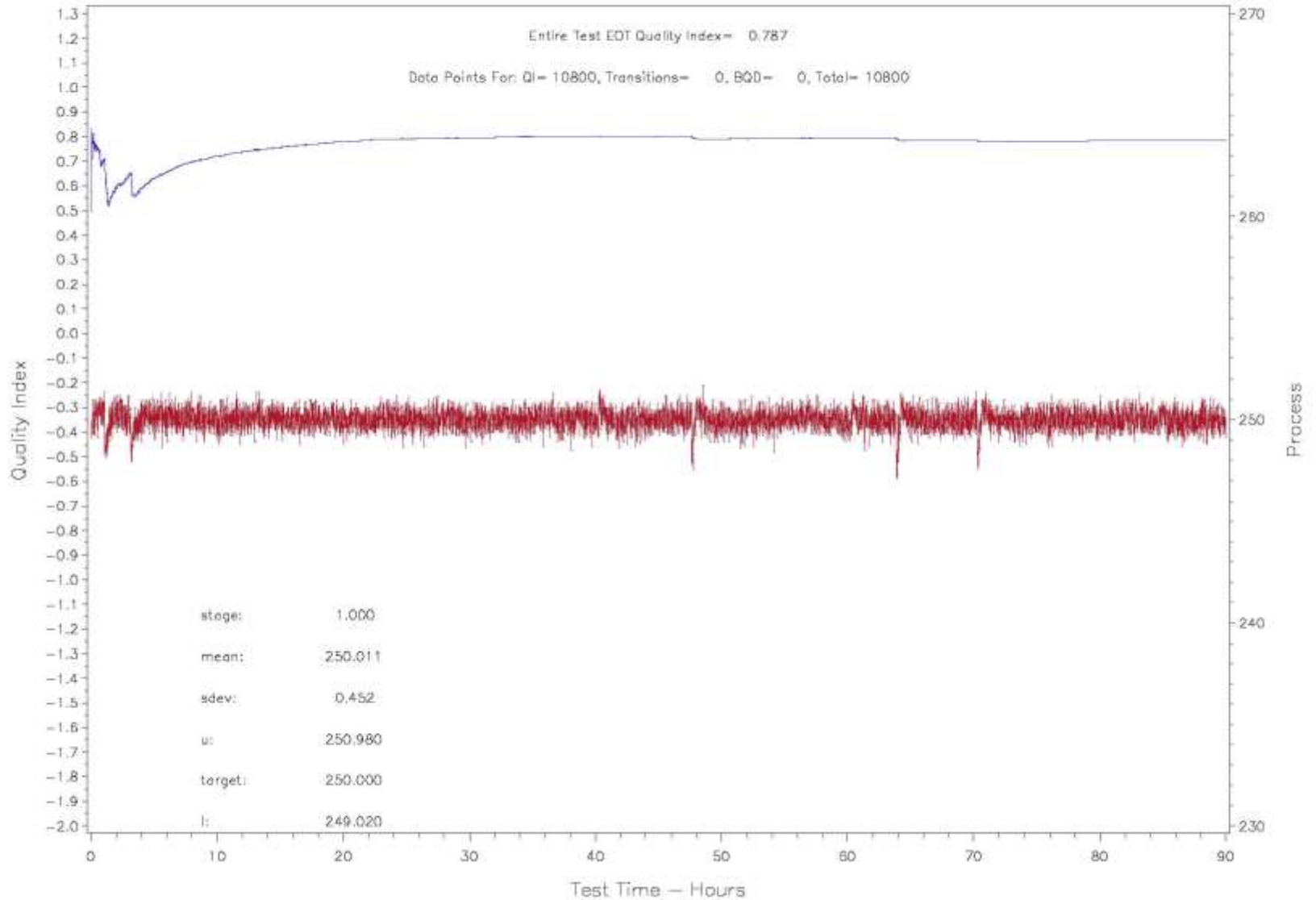
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Torque - Nm (CONTROL)
LAB= D Stand= CB106 CMR= 106791



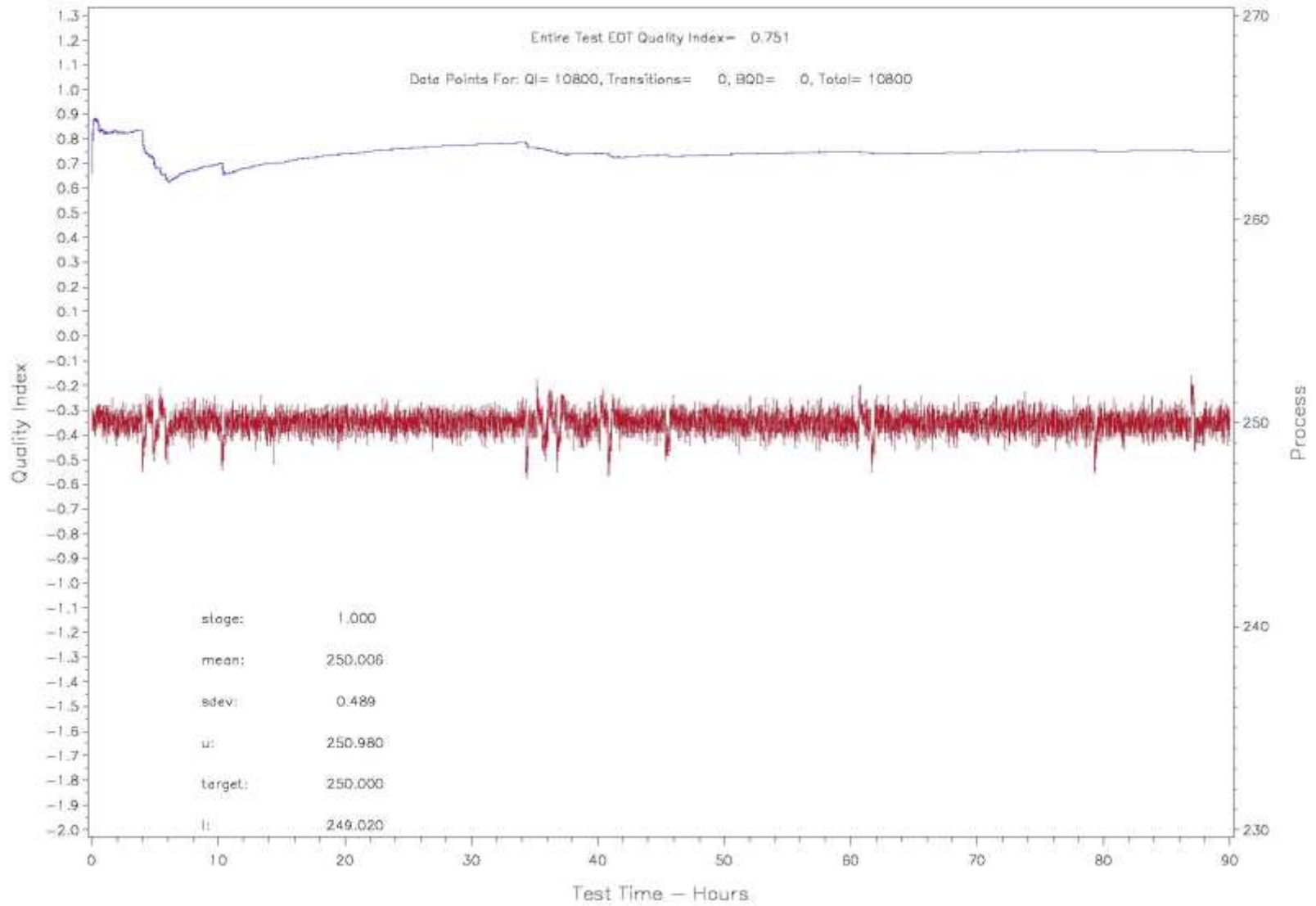
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Torque - Nm (CONTROL)
LAB= A Stand= 2 DMR= 106776



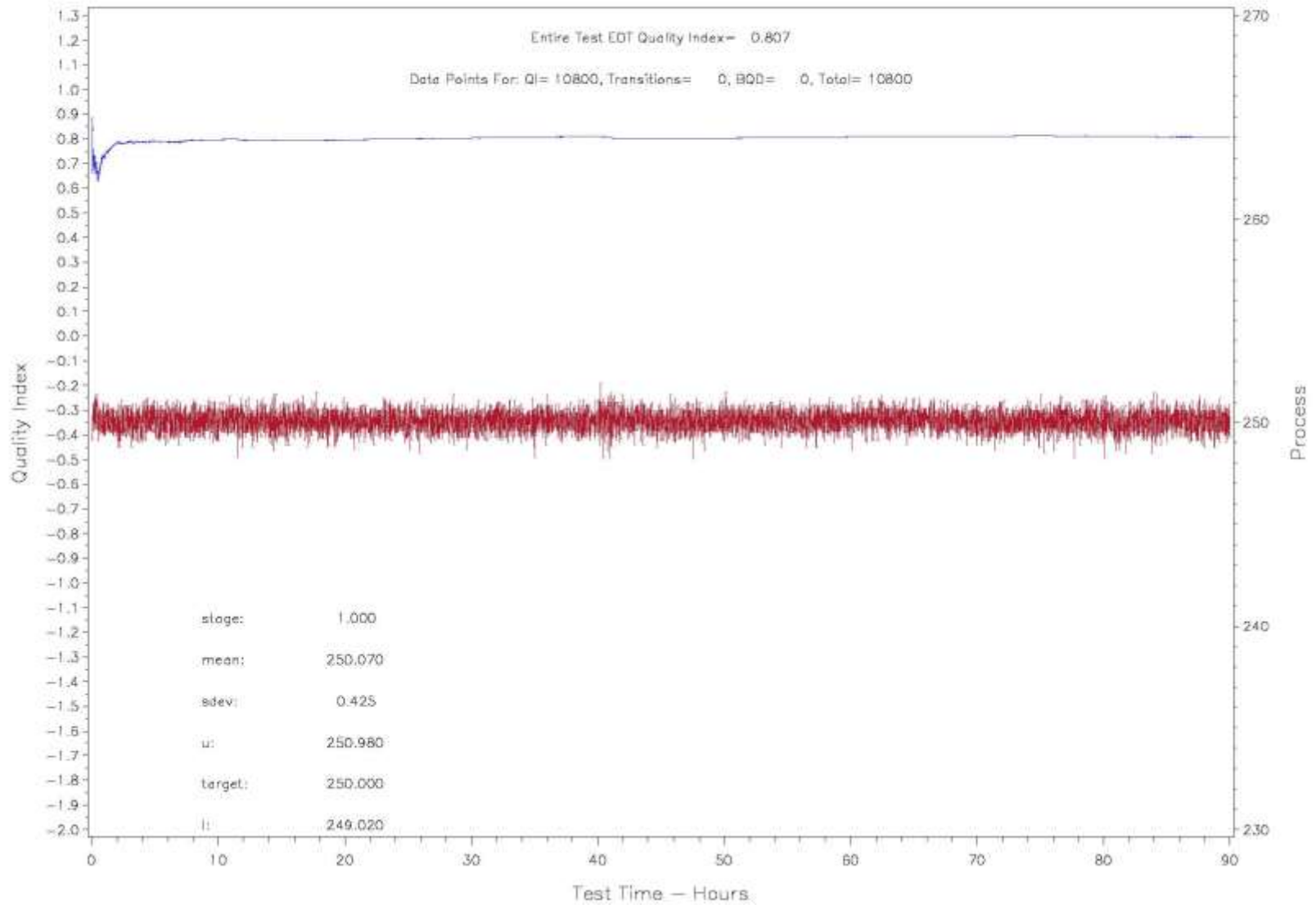
IIIH QUALITY INDEX OPERATIONAL REVIEW
Engine Torque - Nm (CONTROL)
LAB= A Stand= 1 DMR= 106777



III QUALITY INDEX OPERATIONAL REVIEW
 Engine Torque - Nm (CONTROL)
 LAB= A Stand= 1 CMR= 106779



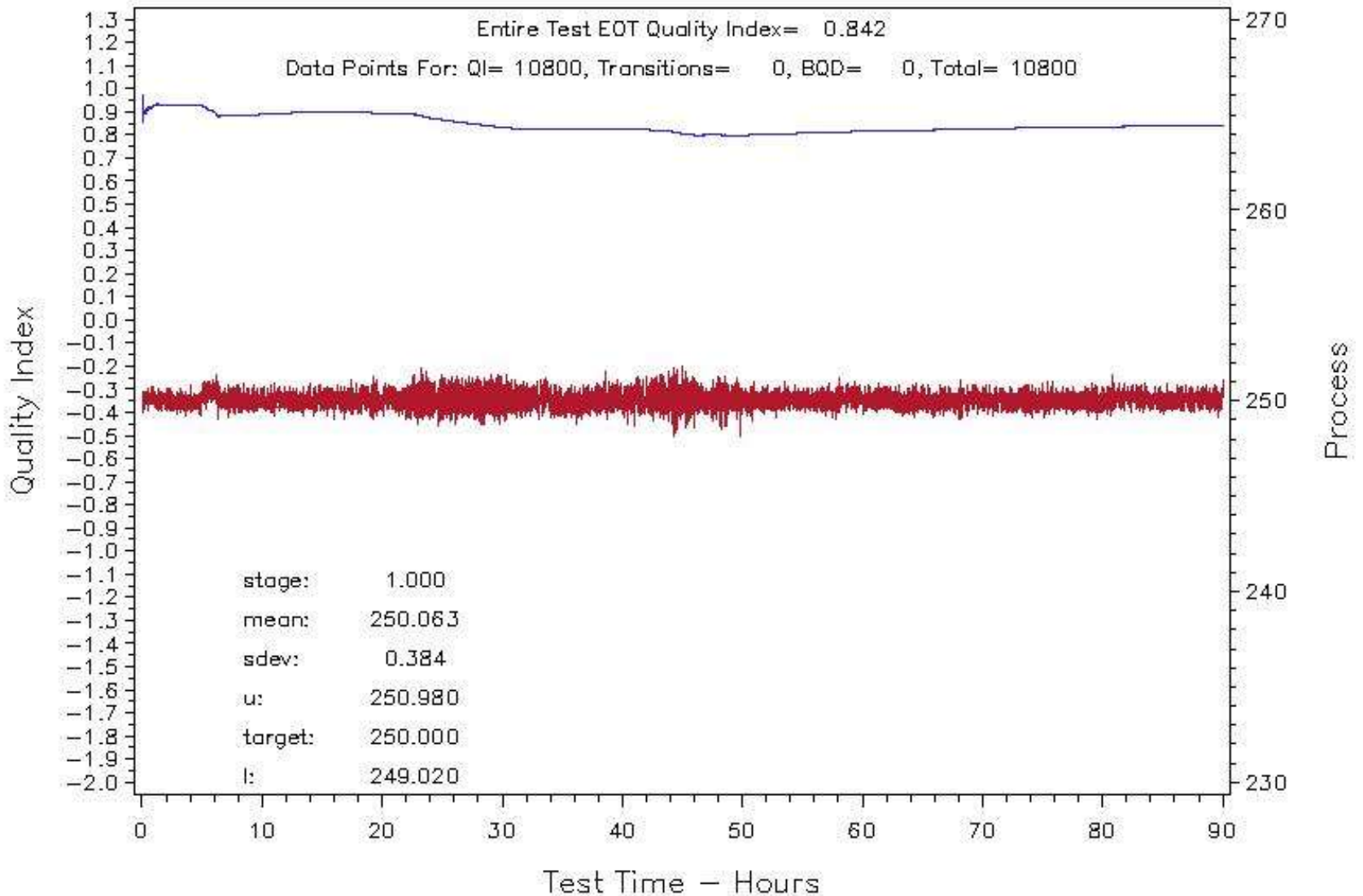
III QUALITY INDEX OPERATIONAL REVIEW
 Engine Torque - Nm (CONTROL)
 LAB= E Stand= 3 QMIR= 106781



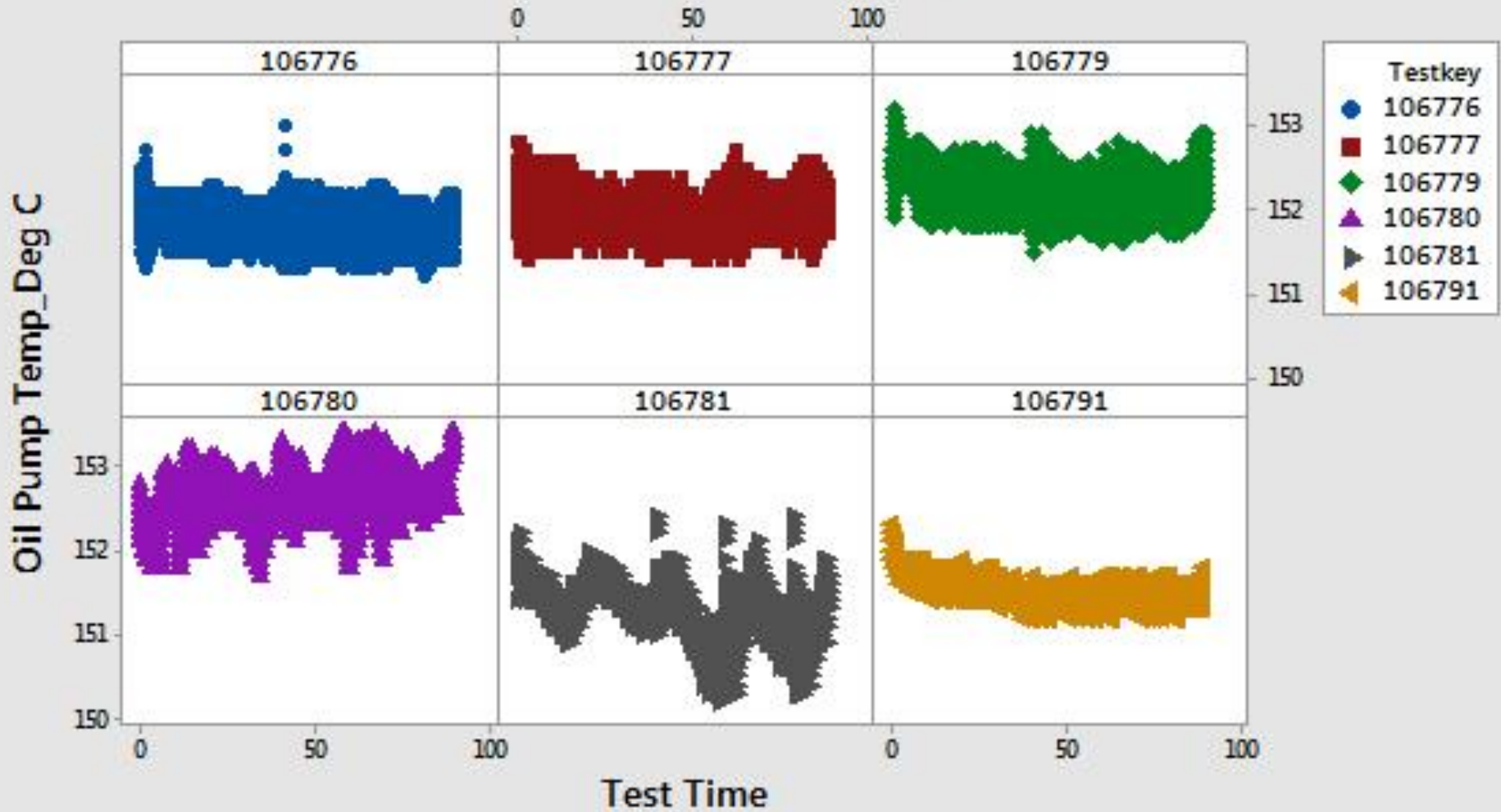
IIH QUALITY INDEX OPERATIONAL REVIEW

Engine Torque – Nm (CONTROL)

LAB= E Stand= 3 CMIR= 106780

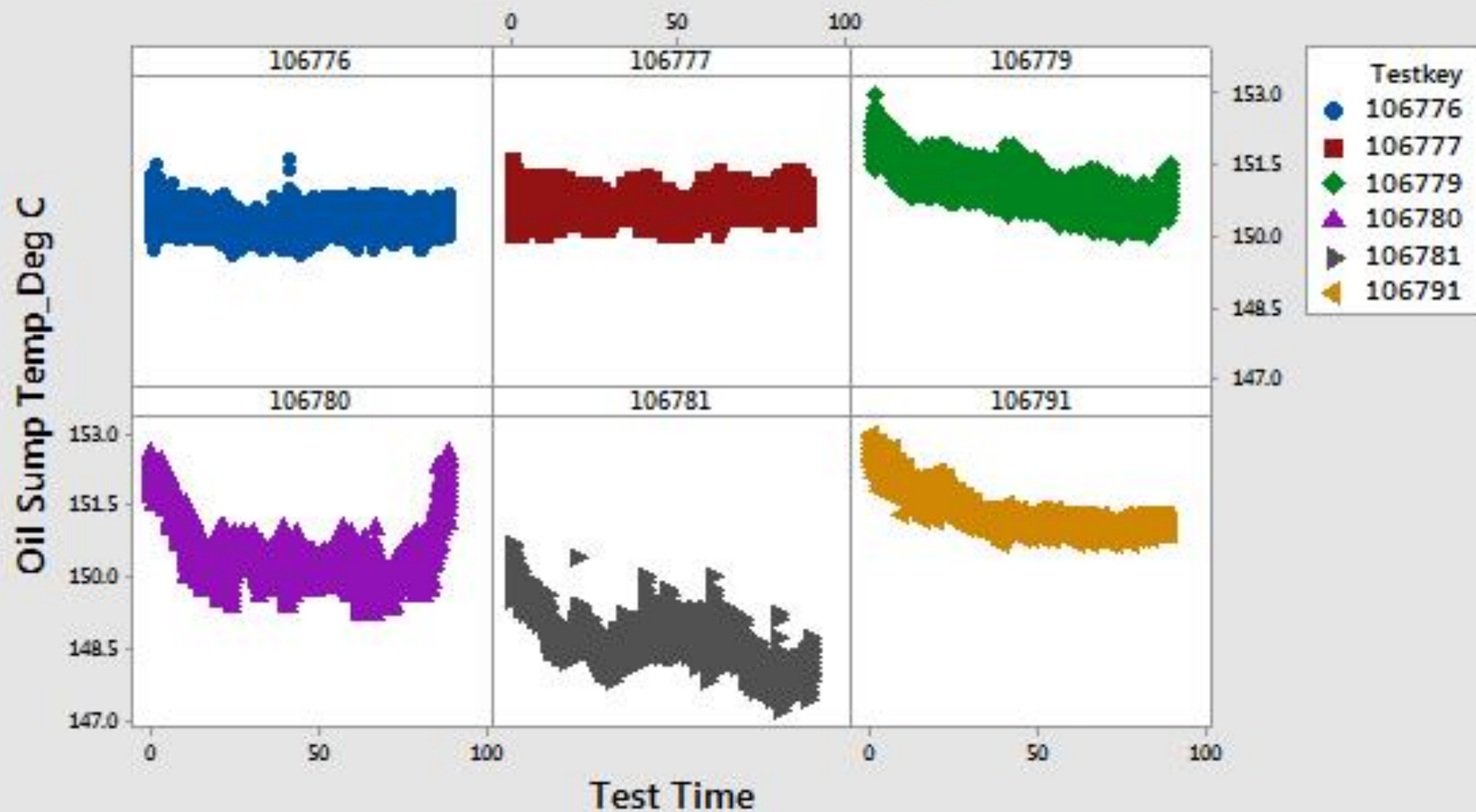


Scatterplot of Oil Pump Temp_Deg C vs Test Time



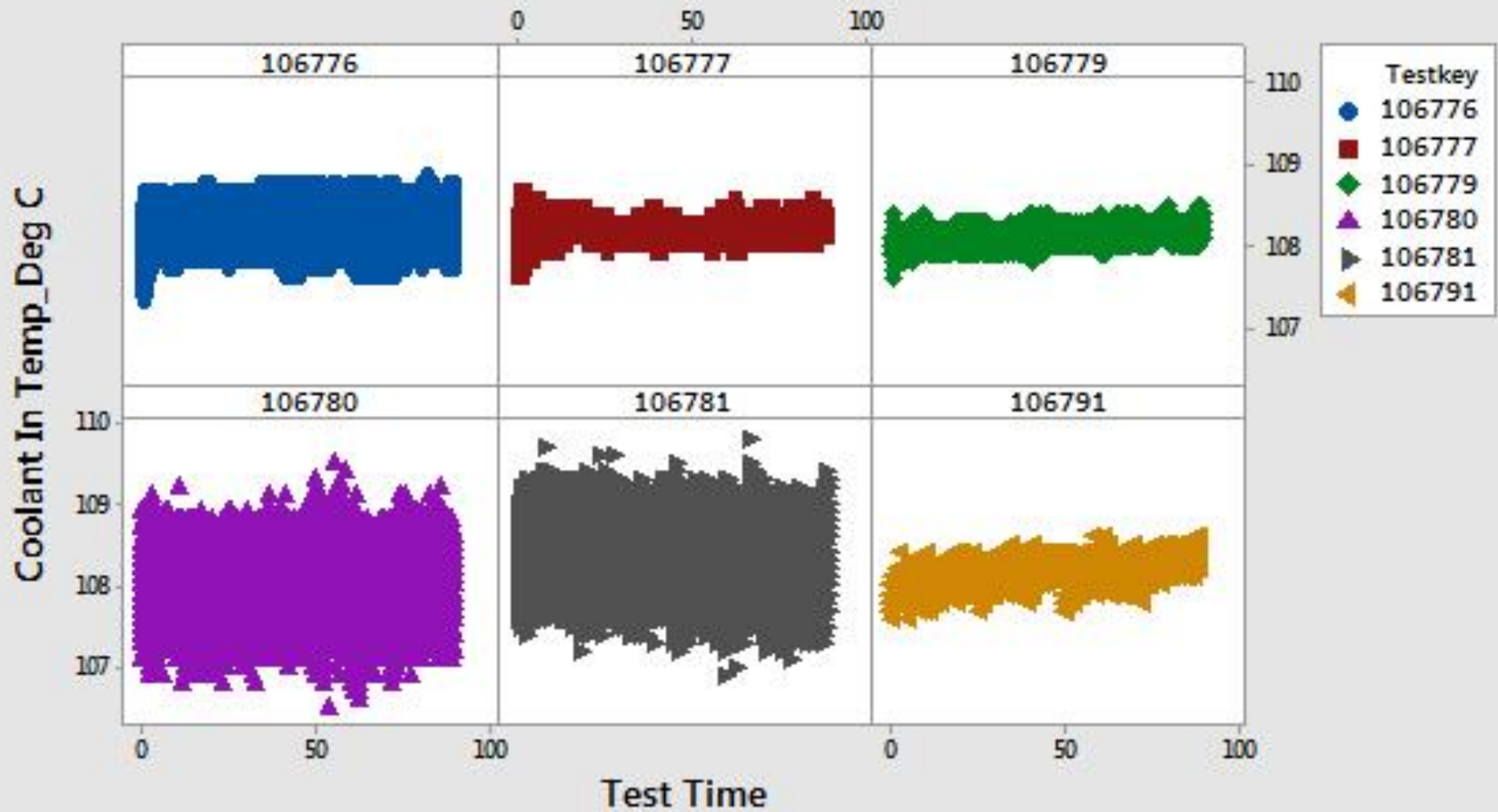
Panel variable: Testkey

Scatterplot of Oil Sump Temp_Deg C vs Test Time



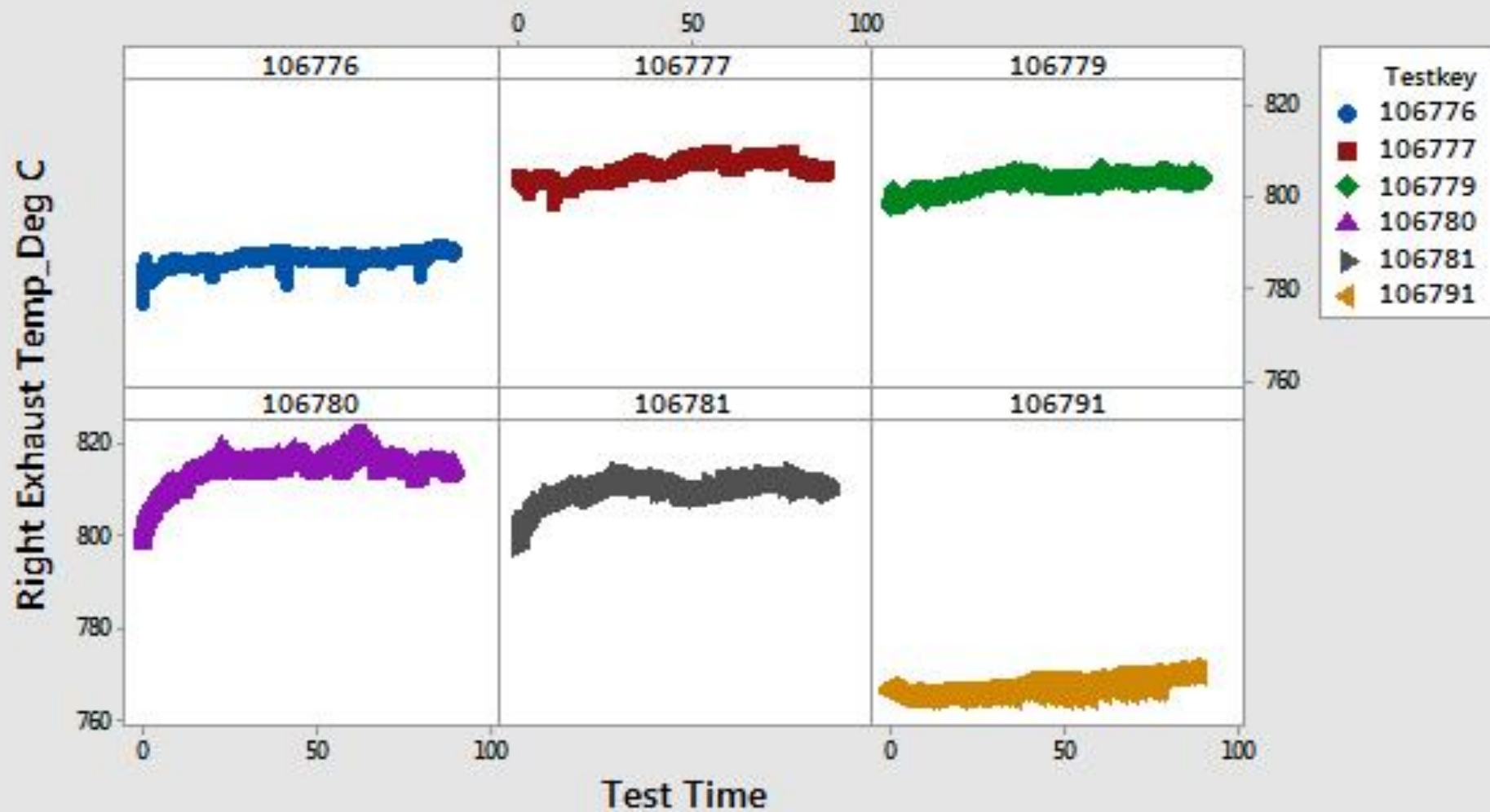
Panel variable: Testkey

Scatterplot of Coolant In Temp_Deg C vs Test Time



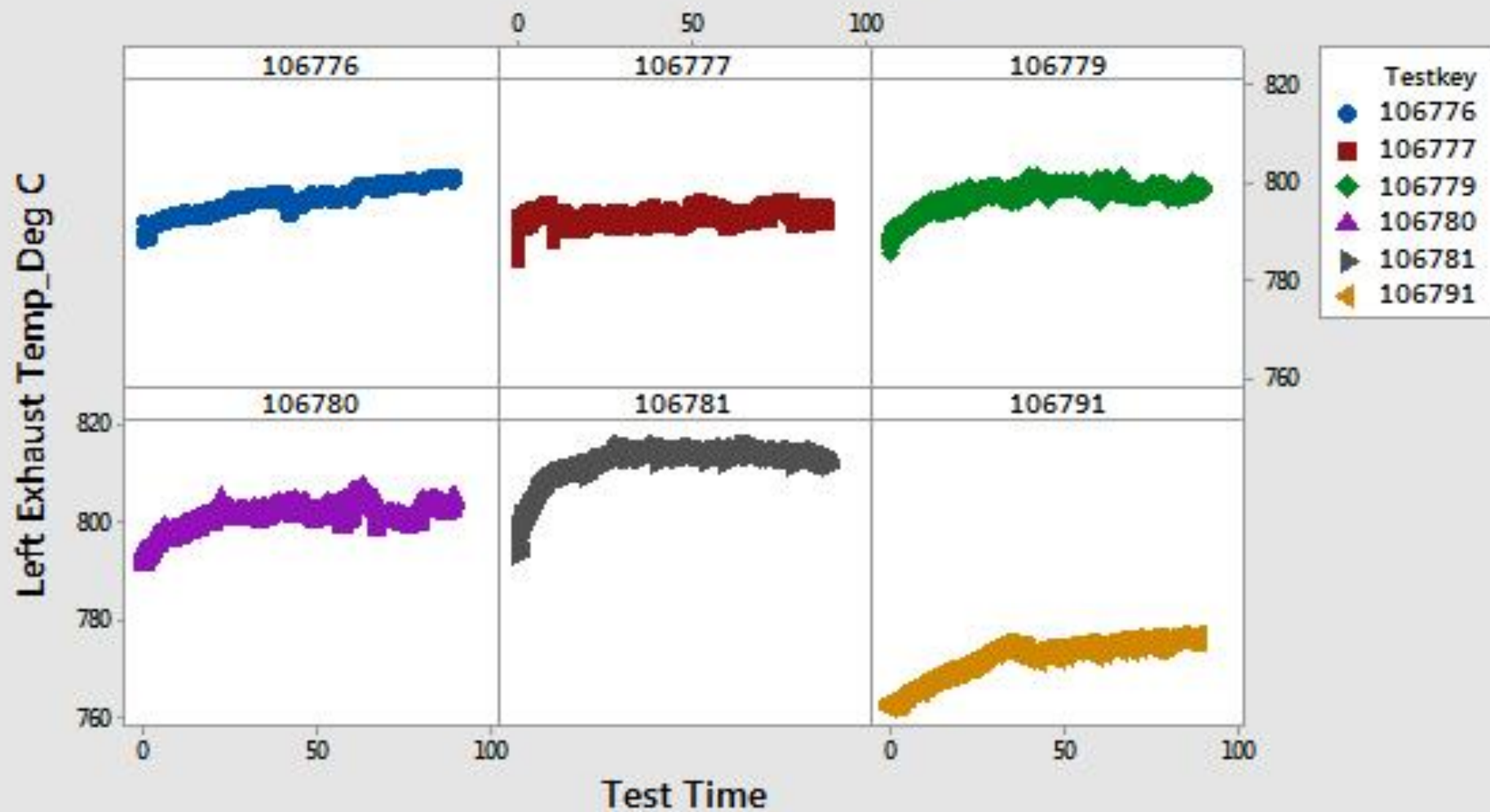
Panel variable: Testkey

Scatterplot of Right Exhaust Temp_Deg C vs Test Time



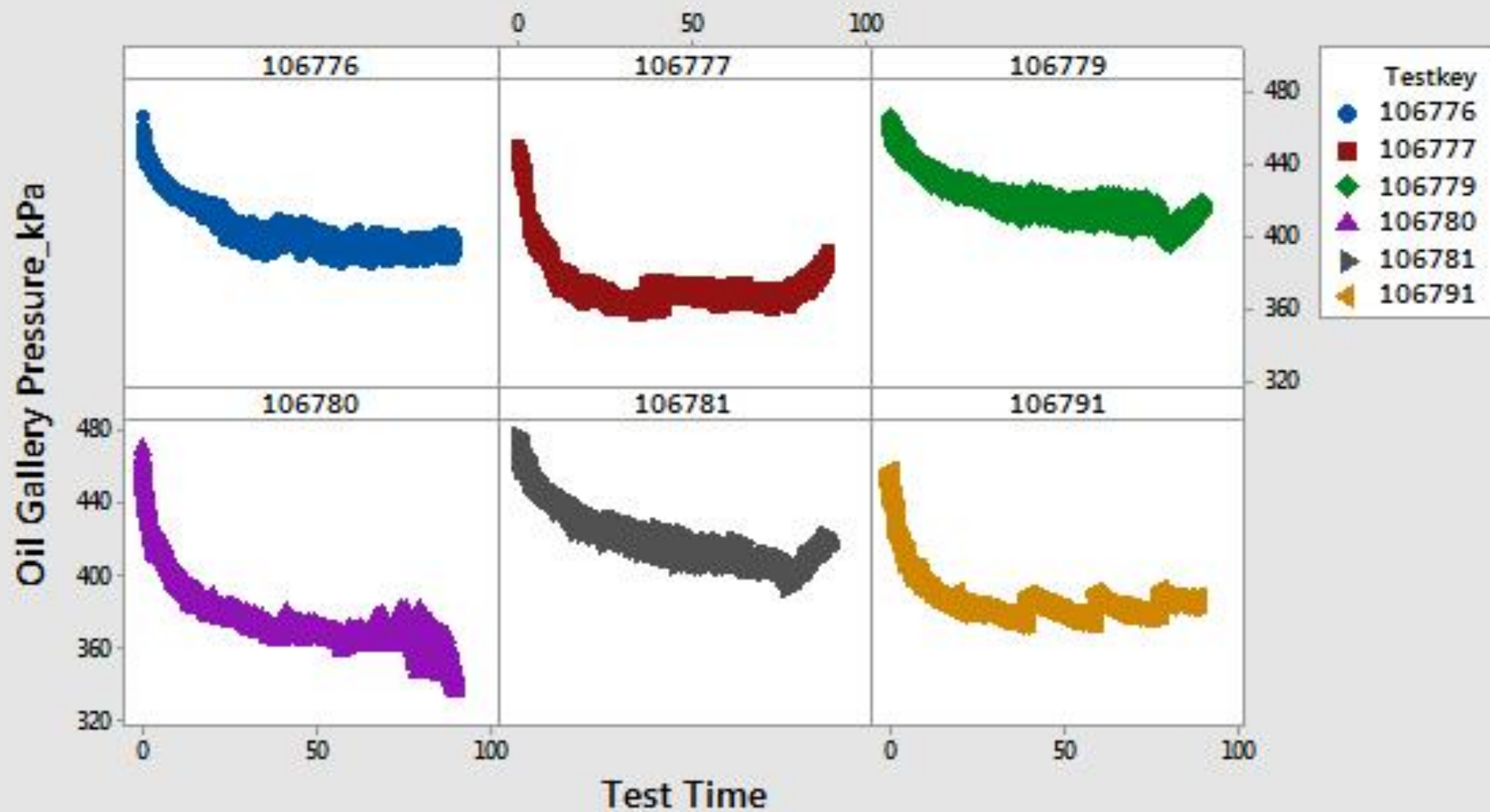
Panel variable: Testkey

Scatterplot of Left Exhaust Temp_Deg C vs Test Time



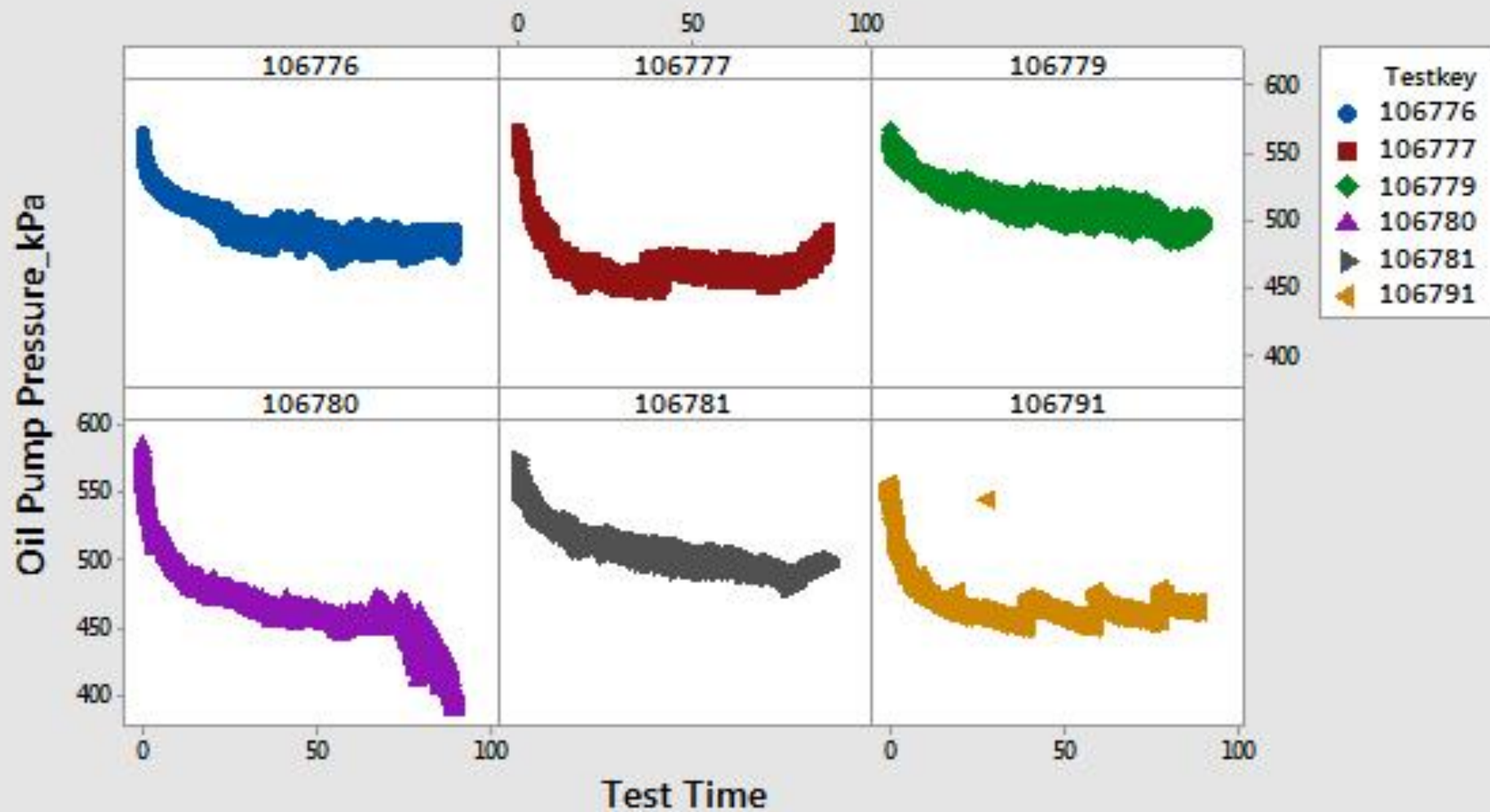
Panel variable: Testkey

Scatterplot of Oil Gallery Pressure_kPa vs Test Time

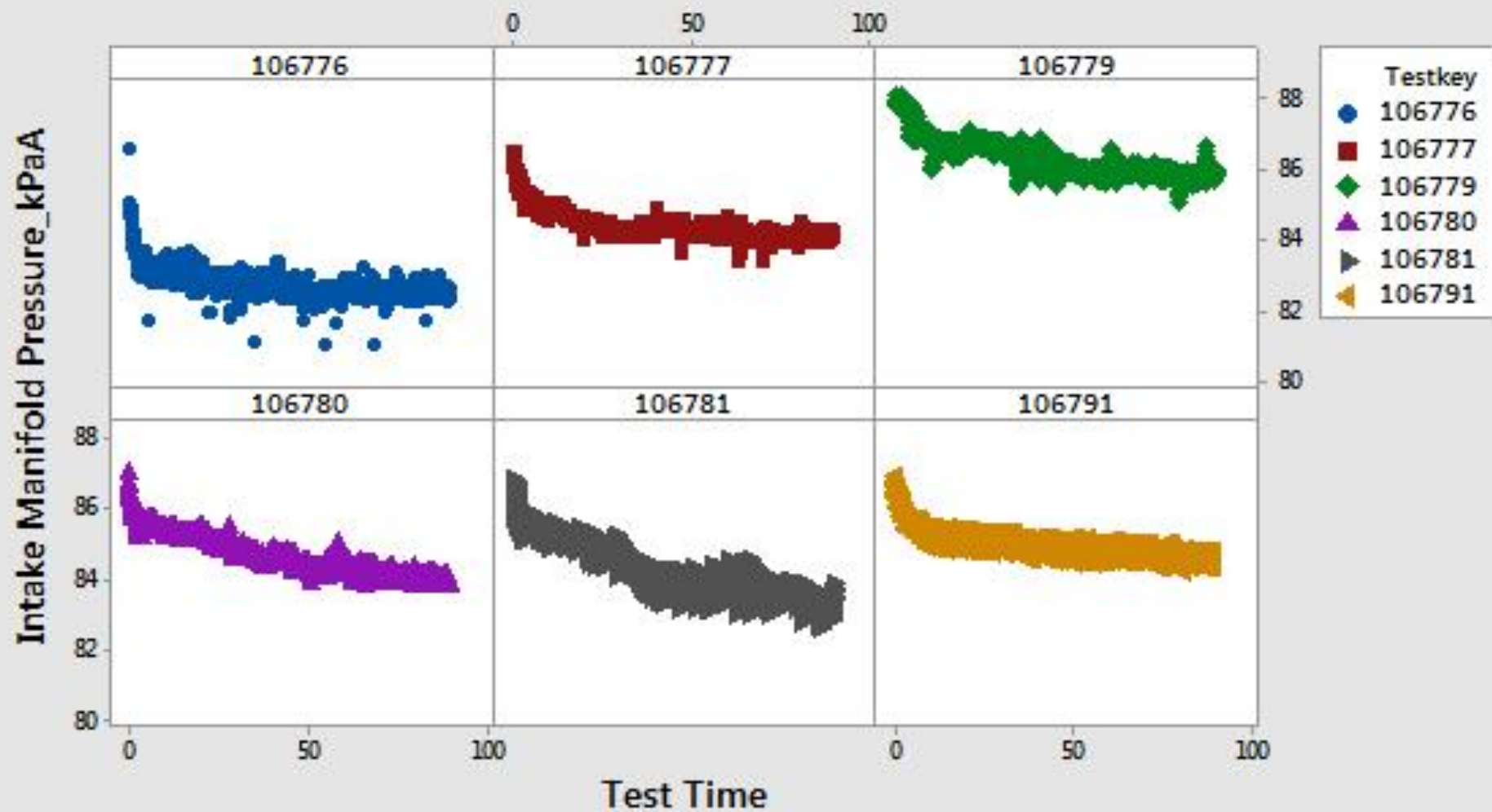


Panel variable: Testkey

Scatterplot of Oil Pump Pressure_kPa vs Test Time

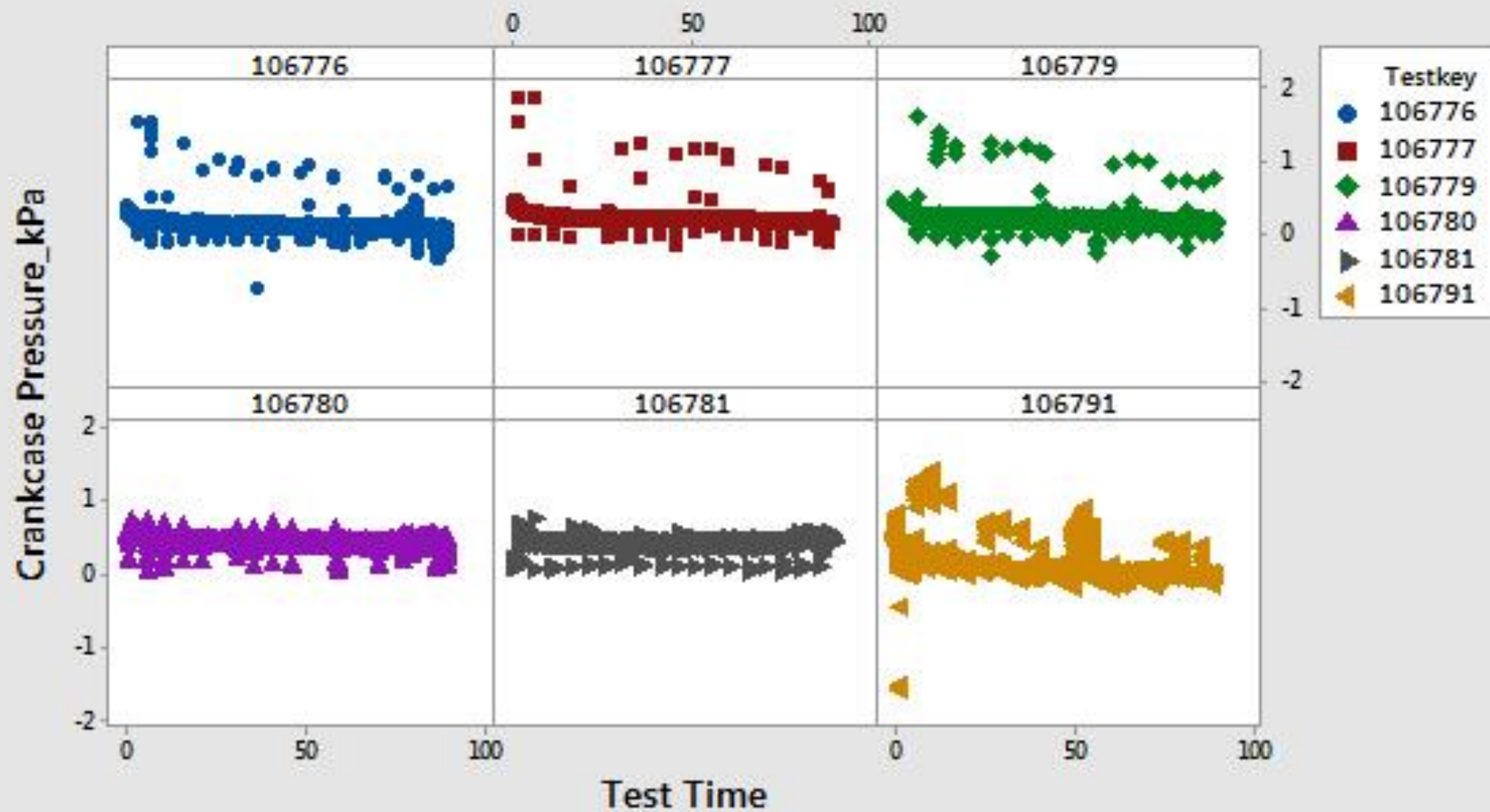


Scatterplot of Intake Manifold Pressure_kPaA vs Test Time



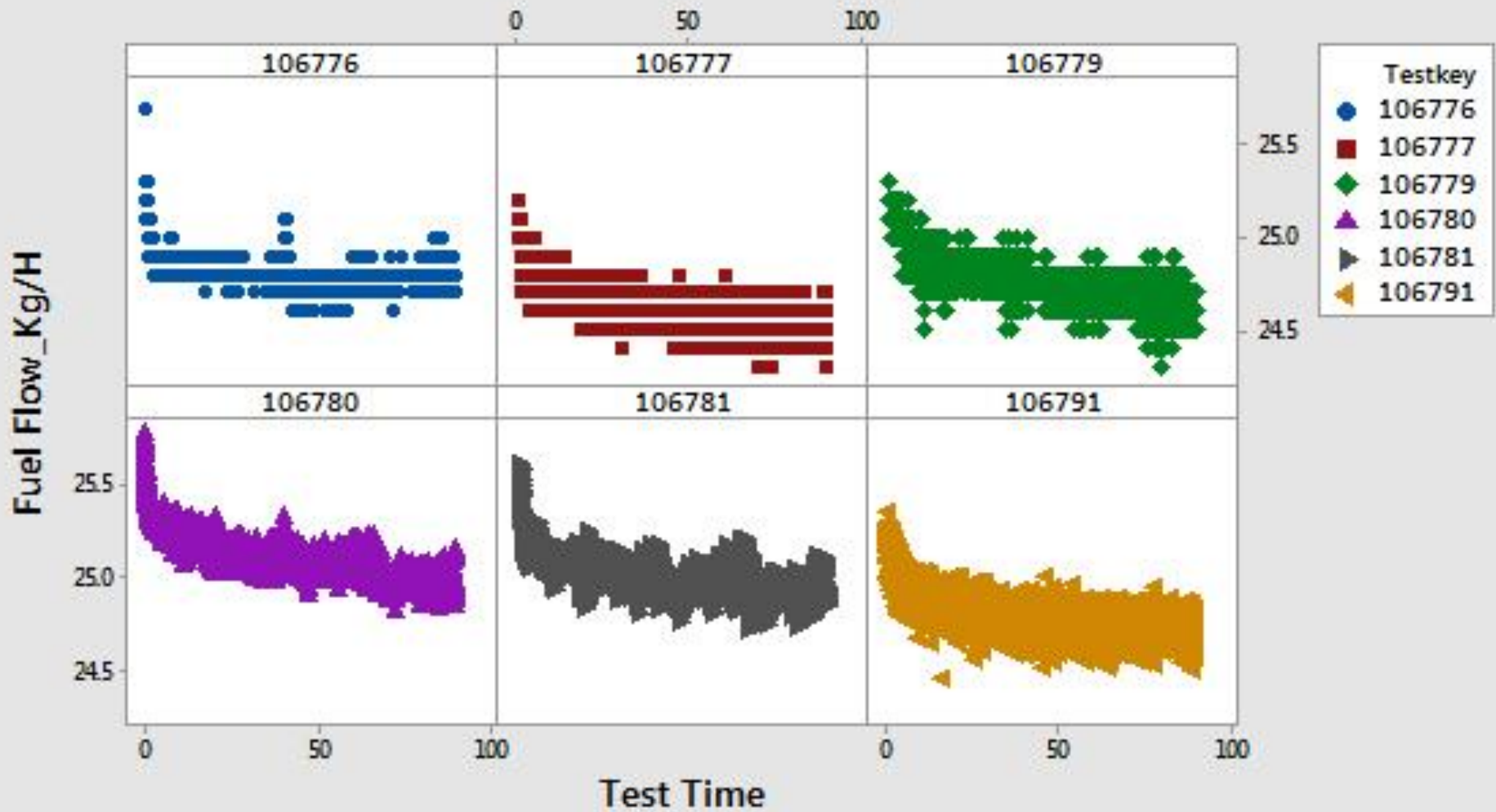
Panel variable: Testkey

Scatterplot of Crankcase Pressure_kPa vs Test Time



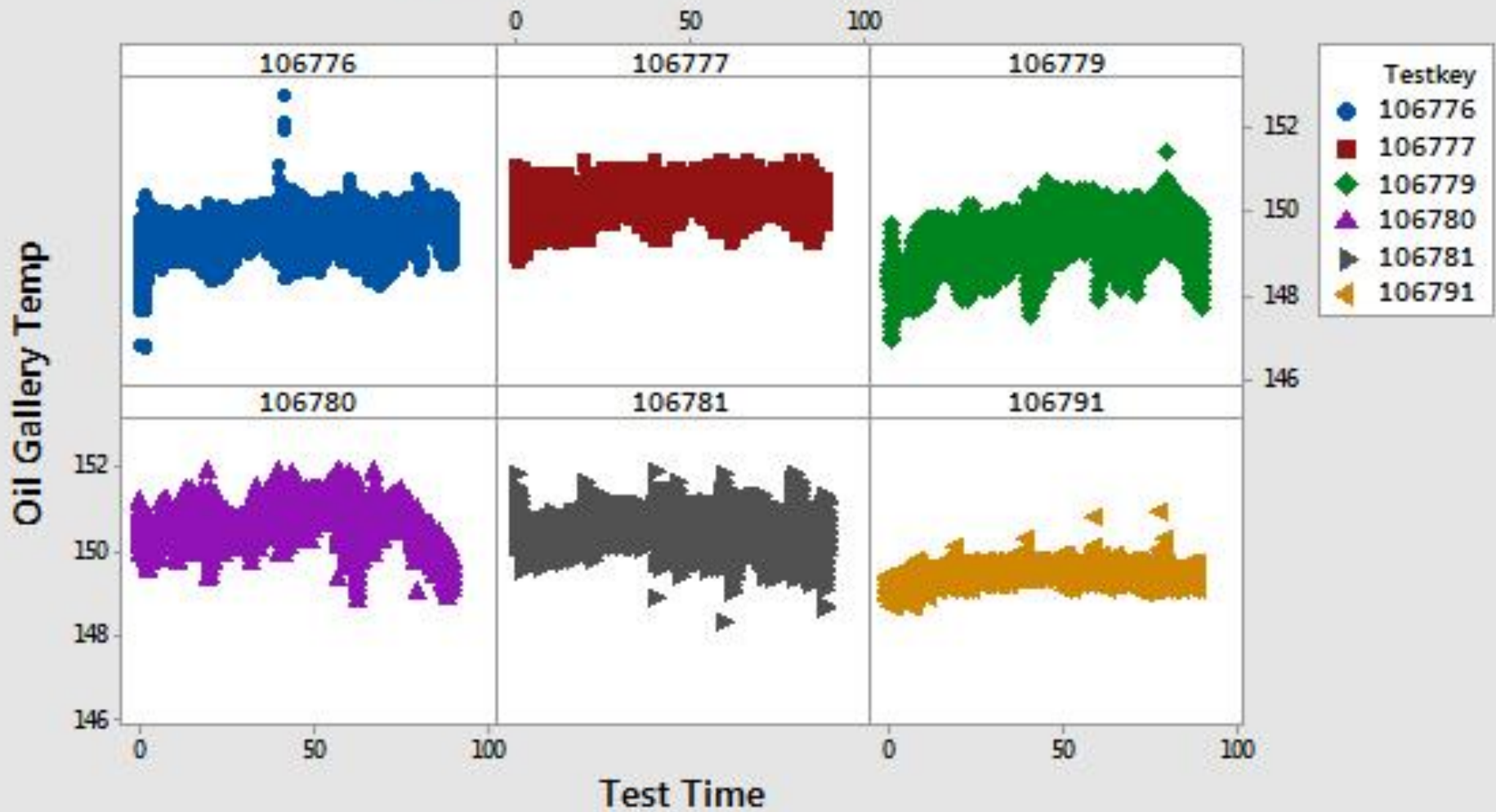
Panel variable: Testkey

Scatterplot of Fuel Flow_Kg/H vs Test Time



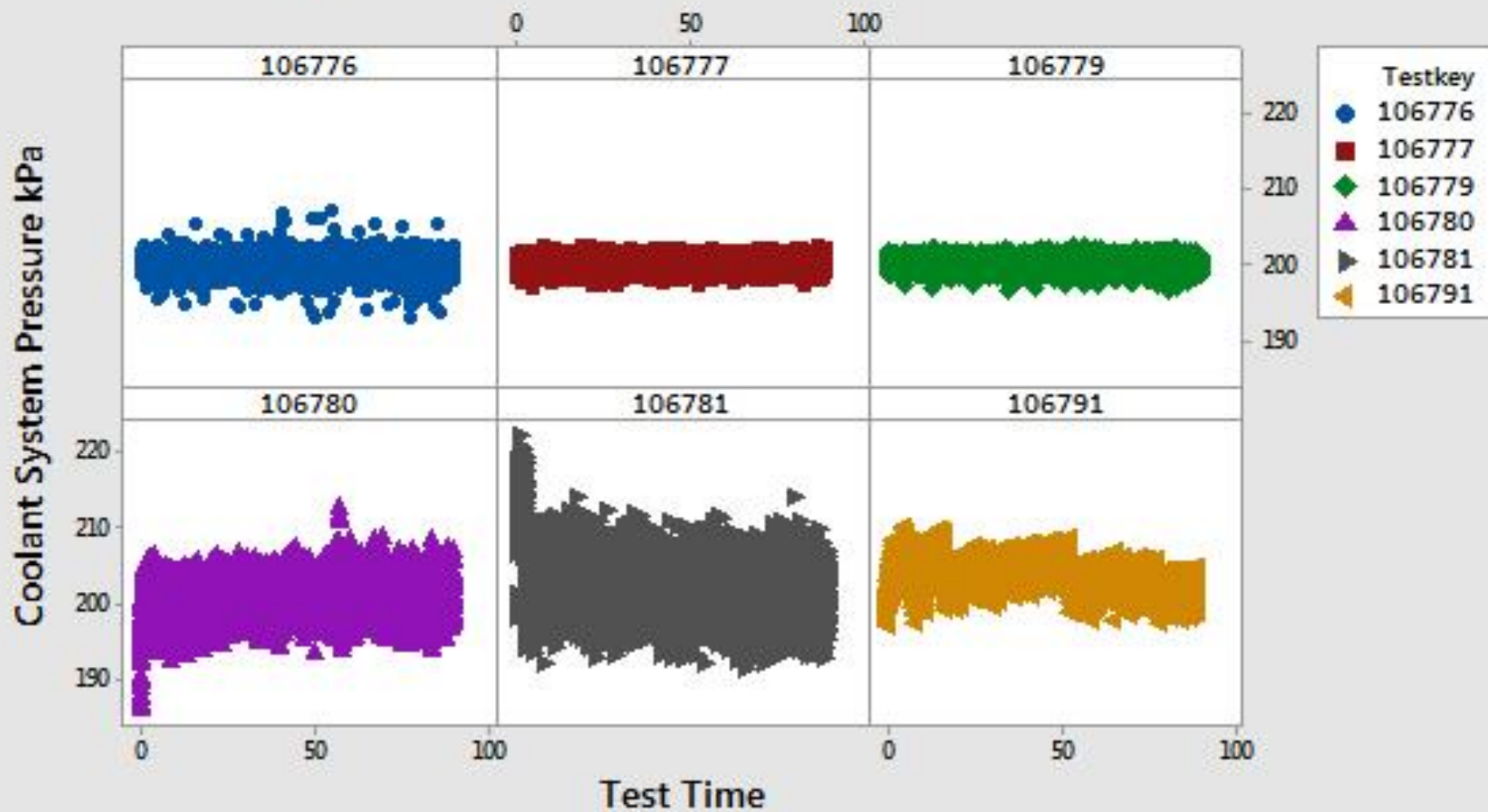
Panel variable: Testkey

Scatterplot of Oil Gallery Temp vs Test Time



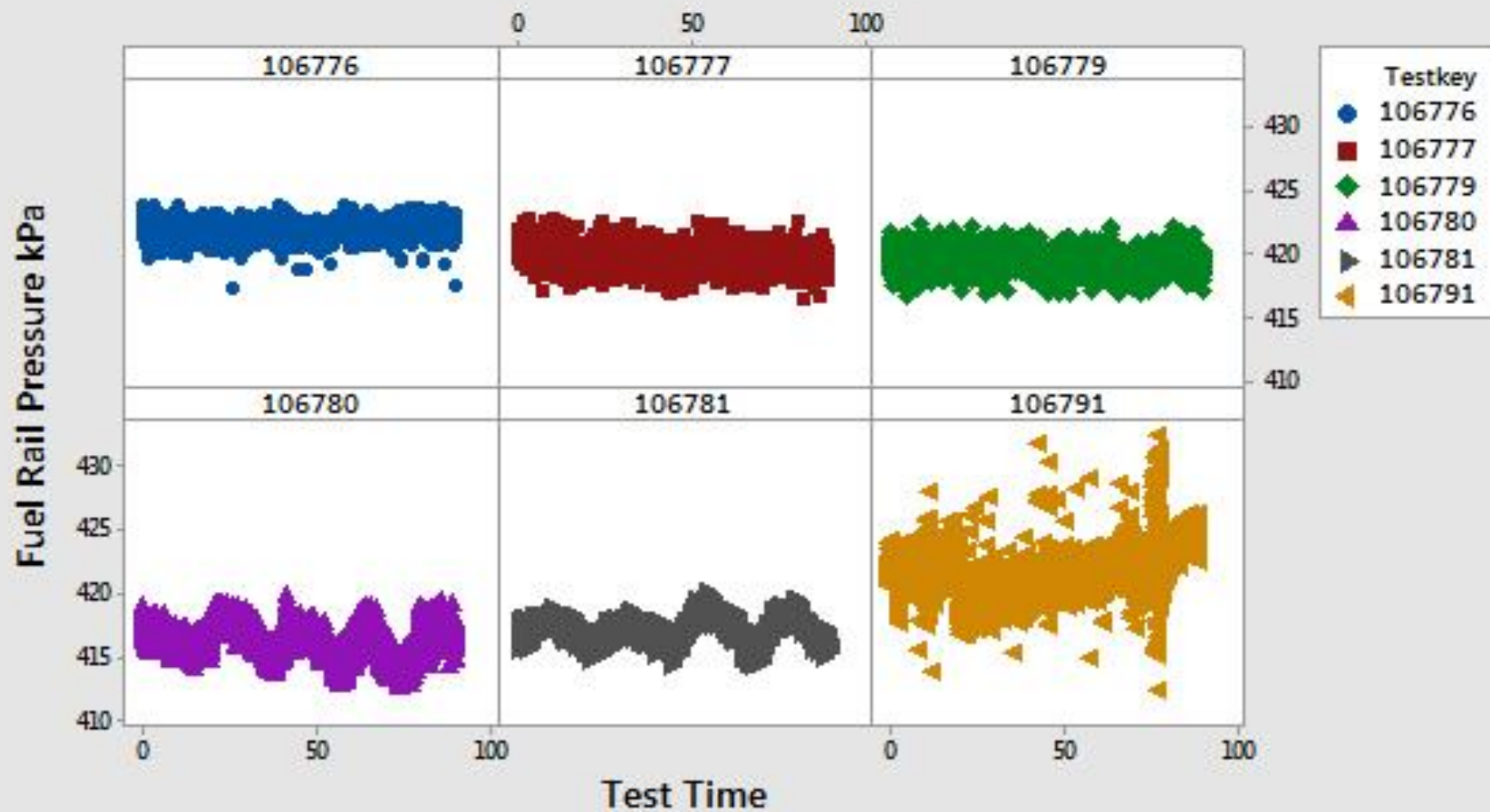
Panel variable: Testkey

Scatterplot of Coolant System Pressure kPa vs Test Time



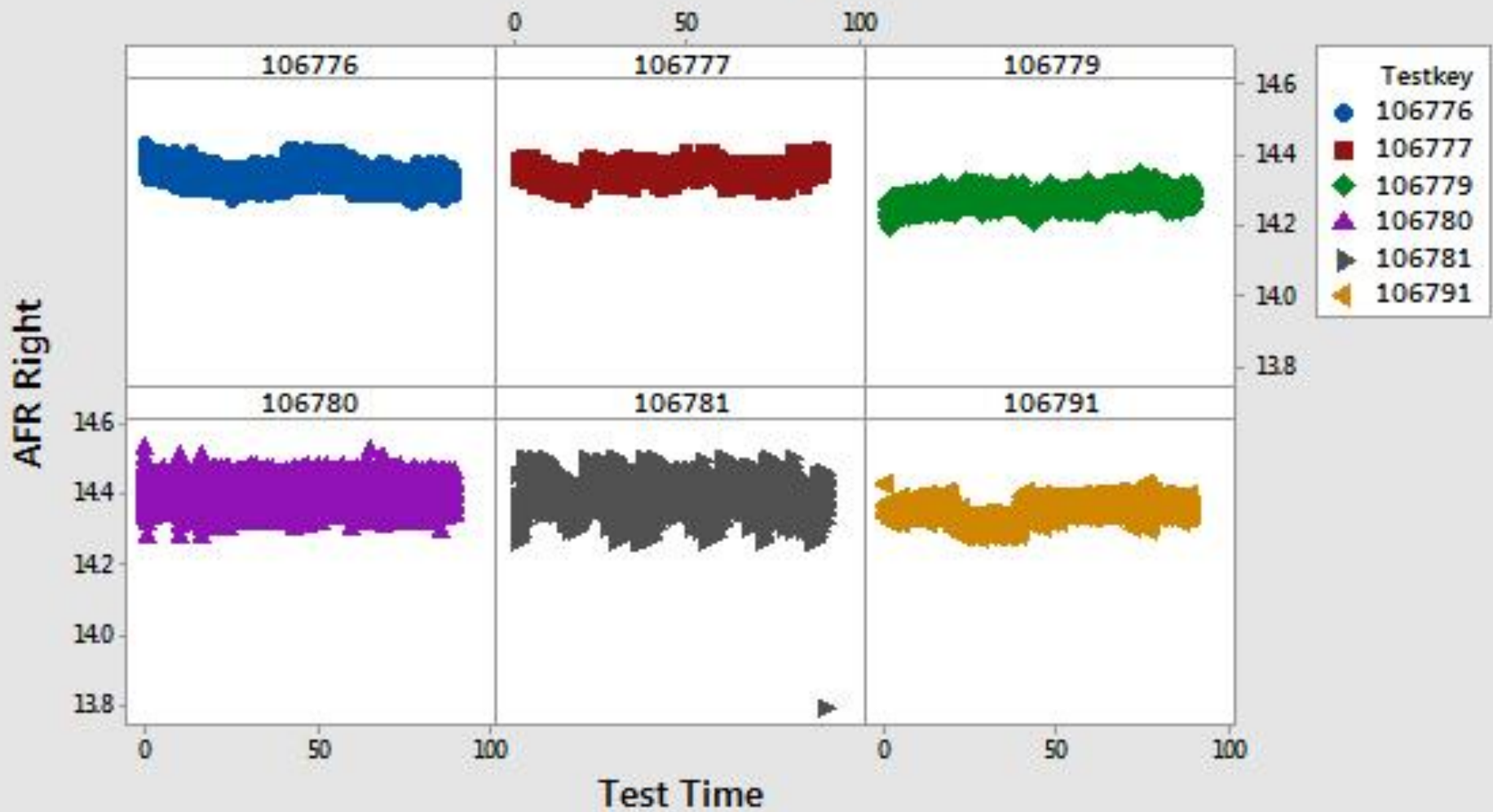
Panel variable: Testkey

Scatterplot of Fuel Rail Pressure kPa vs Test Time



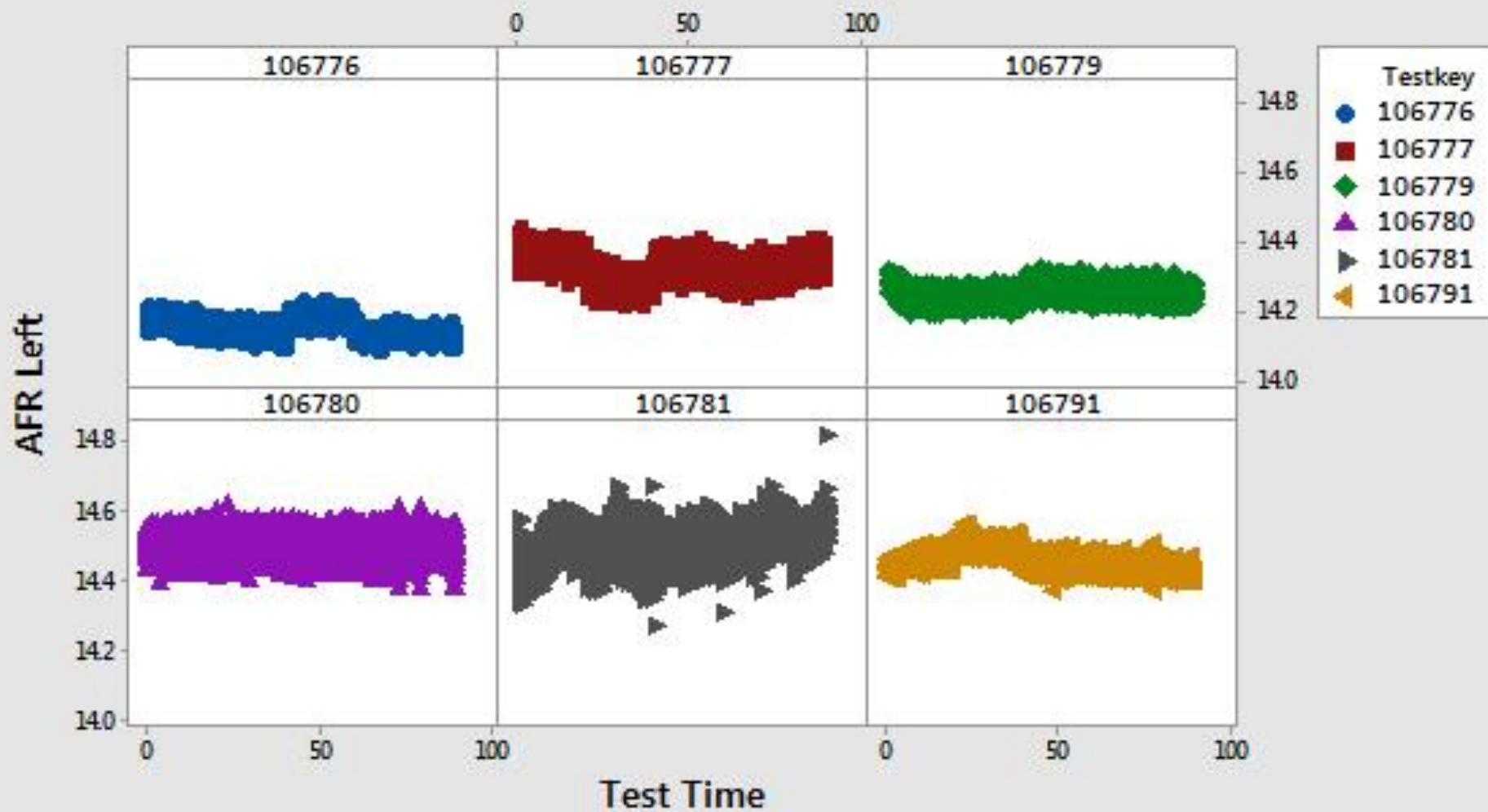
Panel variable: Testkey

Scatterplot of AFR Right vs Test Time



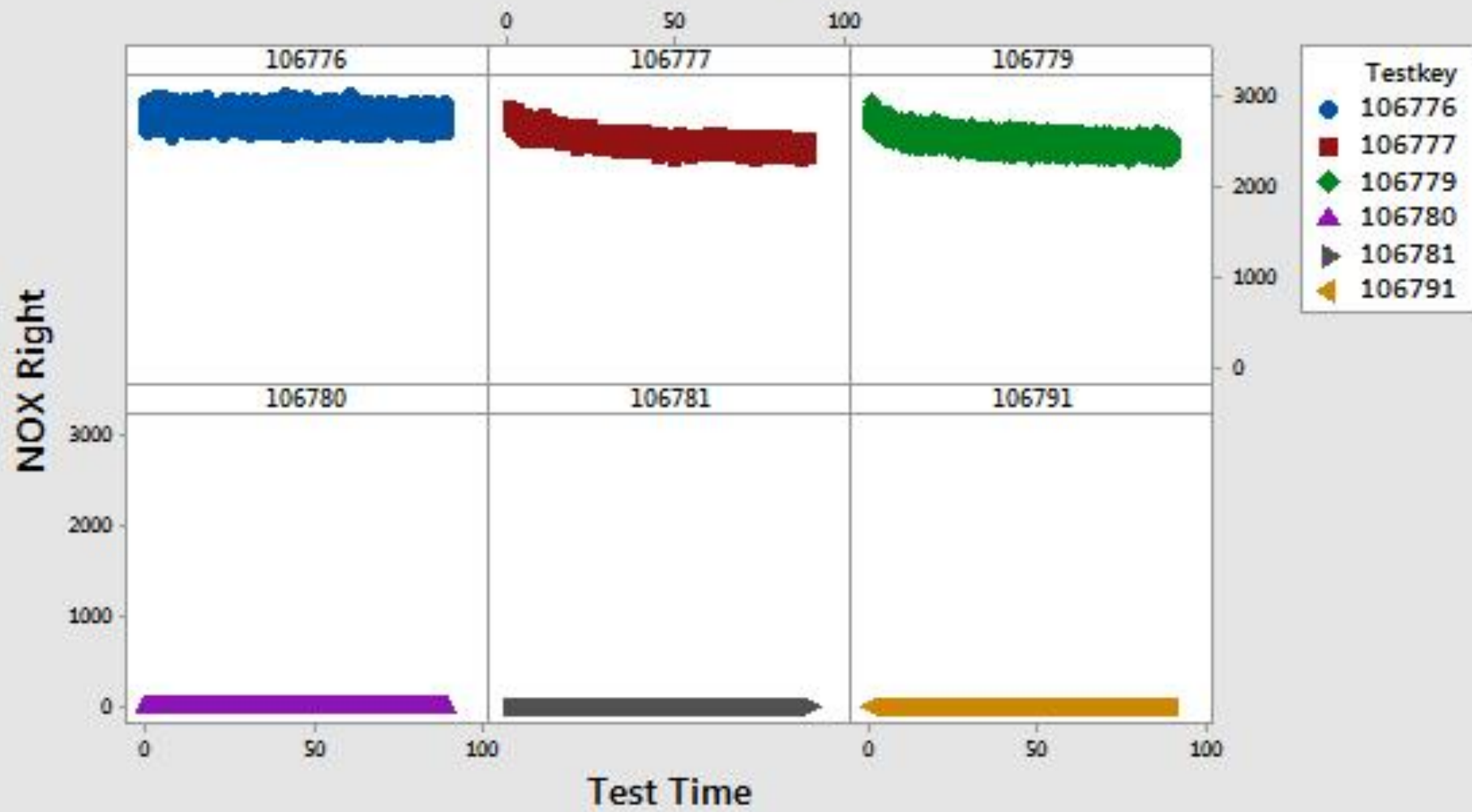
Panel variable: Testkey

Scatterplot of AFR Left vs Test Time



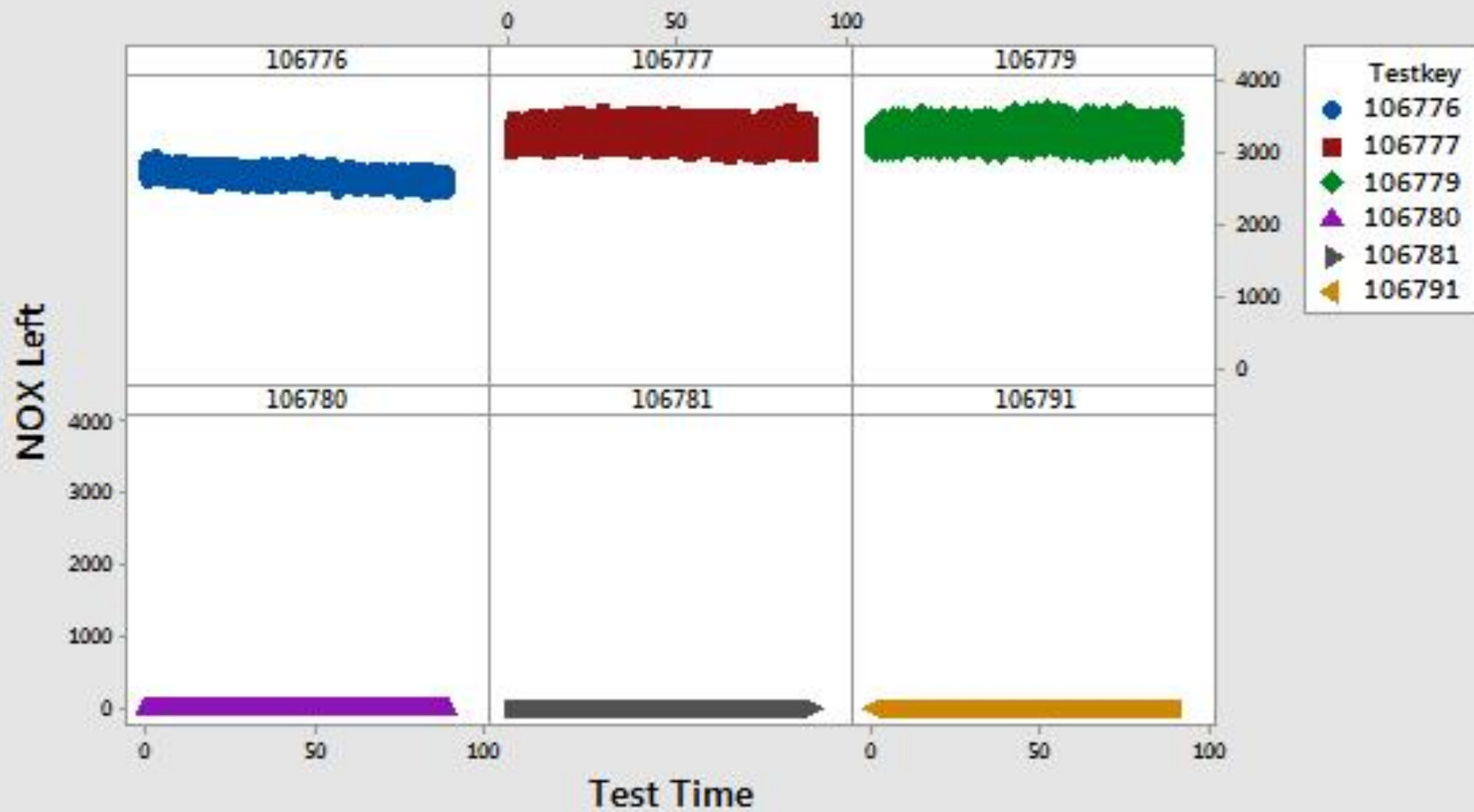
Panel variable: Testkey

Scatterplot of NOX Right vs Test Time



Panel variable: Testkey

Scatterplot of NOX Left vs Test Time



Panel variable: Testkey



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