Verification and Validation Report: Measuring Microstructure Changes During Thermal Treatment

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1 Revision History

Table 1: **Revision History**

Date	**Developer**	**Notes/Changes**
Mar 7, 2023	Abdul Nour	Updated template
Mar 8, 2023	Abdul Nour	Added Functional Requirements Evaluation & Trace to Requirements

2 Symbols, Abbreviations and Acronyms

symbol	description
T	Test

[symbols, abbreviations or acronyms – you can reference the SRS tables if needed —SS]

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3 Functional Requirements Evaluation

The following table suggests examples of system level tests that were executed in order to verify that the functional requirements of the system were met.

Table 2: Test Cases for Functional Requirements

ID	**User Action**	**Expected Result**	**Result**	**Notes**
ST1	Check "Current Source" radio button	Current Source is reset	PASS	
ST2	Type an integer (1) in the "Current Supply" textbox and click "Set" button	Current Supply is set to 1mA and displayed	PASS	
ST3	Type an integer (10) in the "Compliance" textbox and click "Set" button	Compliance voltage is set to 10V	PASS	Compliance voltage is shown on the Keithley current source display
ST4	Click "Current ON" button	Current Source is supplying current	PASS	Current Source blue LED turns on
ST4	Click "Current OFF" button	Current Source stops supplying current	PASS	Current Source blue LED turns off
ST6	Check "Nano-Voltmeter" radio button	Nano-Voltmeter is reset	PASS	

ID	User Action	Expected Result	Result	Notes
ST7	Click "Start Capture" button	Values from the voltmeter are continuously displayed on the application along with real-time calculations	PASS	
ST8	Click "Stop Capture" button	Values and calcualtions stop generating, latest batch remains visible	PASS	
ST9	Current supply is set up and capture is started	Accurate calculations of resistivity are displayed continuously	PASS	
ST10	System is capturing values, thermal treatment is taking place	Critical changes in resistivity are noted in the capture log	FAIL	Not yet implemented, needs component added to calculation module
ST11	Choose an "Integration Rate" of (1 PLC) from the drop-down menu	Voltmeter display shows faster reading than default	PASS	Obsereved on Keithley Nanovoltmeter
ST12	System is capturing values, thermal treatment is taking place	Changes in resistivity-temperature slopes are noted in caputre log and displayed	FAIL	Not yet implemented, calculation module & notification system additions needed
ST13	Current supply is set up and capture is started, "Stop Experiment" button is clicked on remote interface	Capture and current supply are turned off	FAIL	Remote interface is yet to be implemented

4 Nonfunctional Requirements Evaluation

4.1 Usability

4.2 Performance

4.3 etc.

5 Comparison to Existing Implementation

This section will not be appropriate for every project.

6 Unit Testing

7 Changes Due to Testing

[This section should highlight how feedback from the users and from the supervisor (when one exists) shaped the final product. In particular the feedback from the Rev 0 demo to the supervisor (or to potential users) should be highlighted. —SS]

8 Automated Testing

9 Trace to Requirements

Table 3: Requirements Traceability

Test	**Requirement**	**Plan**
ST1	FR1	FR-T1
ST2	FR1	FR-T1
ST3	FR1	FR-T1
ST4	FR1	FR-T1
ST5	FR1	FR-T1
ST6	FR1	FR-T2
ST7	FR1	FR-T2
ST8	FR1	FR-T2
ST9	FR1	FR-T3
ST10	FR2	FR-T4
ST11	FR3	FR-T5
ST12	FR4	FR-T6
ST13	FR5	FR-T7

10 Trace to Modules

11 Code Coverage Metrics

Appendix — Reflection

The information in this section will be used to evaluate the team members on the graduate attribute of Reflection. Please answer the following question:

1. In what ways was the Verification and Validation (VnV) Plan different from the activities that were actually conducted for VnV? If there were differences, what changes required the modification in the plan? Why did these changes occur? Would you be able to anticipate these changes in future projects? If there weren't any differences, how was your team able to clearly predict a feasible amount of effort and the right tasks needed to build the evidence that demonstrates the required quality? (It is expected that most teams will have had to deviate from their original VnV Plan.)