

**Supplementary Table S1: Detailed Site Verification Summary: September 2017-
November 2018**

Modules verified at each of thirteen sites are shown, with error codes highlighted. The initial verification panels had a high number of volume errors, which led to operating procedure changes. A score of $\leq 4/6$ was unacceptable and the module required retesting. Replaced modules were also tested before patient specimen testing commenced.

Site/Panel	Module	Expected HIV VL	Difference (log cp/mL)	Score	Outcome
Site 1	A1	Negative	0.00	6/6	Pass
		Low	0.11		
		High	0.29		
	A2	Negative	Error2097	5/6	Acceptable
		Low	-0.10		
		High	0.08		
	A3	Negative	0.00	6/6	Pass
		Low	-0.20		
		High	0.19		
	A4	Negative	0.00	6/6	Pass
		Low	-0.20		
		High	0.31		
Site 2	A1	Negative	0.00	6/6	Pass
		Low	-0.11		
		High	0.09		
	A2	Negative	0.00	6/6	Pass
		Low	-0.08		
		High	-0.04		
	A3	Negative	0.00	6/6	Pass
		Low	0.05		
		High	0.06		
	A4	Negative	0.00	6/6	Pass
		Low	-0.20		
		High	0.91		
Module Replacement	A3	Negative	0.00	5/6	Acceptable
		Low	-0.05		
		High	Invalid		
Site 3 V17V11WA1	A1	Negative	0.00	6/6	Pass
		Low	-0.07		
		High	0.27		
	A2	Negative	0.00	6/6	Pass
		Low	0.12		
		High	-0.03		
	A3	Negative	0.00	6/6	Pass
		Low	-0.21		
		High	-0.01		

	A4	Negative	Error2097	5/6	Acceptable
		Low	-0.27		
		High	0.02		
Module Replacement	B3	Negative	0.00	6/6	Pass
		Low	-0.10		
		High	-0.26		
Site 4	A1	Negative	0.00	6/6	Pass
		Low	0.33		
		High	0.25		
	A2	Negative	0.00	6/6	Pass
		Low	-0.27		
		High	0.05		
	A3	Negative	0.00	5/6	Acceptable
		Low	0.15		
		High	Error2005		
	A4	Negative	0.00	6/6	Pass
		Low	-0.16		
		High	0.14		
Site 5	A1	Negative	0.00	5/6	Acceptable
		Low	Error5017		
		High	0.19		
	A2	Negative	0.00	6/6	Pass
		Low	0.01		
		High	-0.11		
	A3	Negative	0.00	6/6	Pass
		Low	-0.22		
		High	-0.01		
	A4	Negative	0.00	6/6	Pass
		Low	-0.15		
		High	0.27		
Site 6	A1	Negative	0.00	6/6	Pass
		Low	0.01		
		High	0.20		
	A2	Negative	Error2096	5/6	Acceptable
		Low	-0.34		
		High	0.07		
	A3	Negative	Error2096	5/6	Acceptable
		Low	0.05		
		High	-0.13		
	A4	Negative	Error2096	5/6	Acceptable
		Low	-0.13		
		High	0.14		
Site 7	A1	Negative	0.00	5/6	Acceptable
		Low	Error2005		
		High	0.04		
	A2	Negative	0.00	6/6	Pass
		Low	-0.03		
		High	-0.01		

	A3	Negative	0.00	6/6	Pass
		Low	-0.03		
		High	-0.08		
	A4	Negative	0.00	5/6	Acceptable
		Low	Error5007		
		High	0.25		
Module Replacement	A4	Negative	0.00	6/6	Pass
		Low	-0.15		
		High	-0.19		
Site 8	A1	Negative	0.00	6/6	Pass
		Low	-0.20		
		High	0.01		
	A2	Negative	0.00	6/6	Pass
		Low	0.06		
		High	0.04		
	A3	Negative	0.00	6/6	Pass
		Low	0.07		
		High	0.16		
	A4	Negative	0.00	6/6	Pass
		Low	-0.07		
		High	0.17		
Site 9	A1	Negative	Error2097	5/6	Acceptable
		Low	-0.25		
		High	0.41		
	A2	Negative	Error5017	5/6	Acceptable
		Low	-0.13		
		High	0.05		
	A3	Negative	0.00	6/6	Pass
		Low	-0.06		
		High	0.07		
	A4	Negative	Invalid (5016)	5/6	Acceptable
		Low	-0.34		
		High	0.27		
Site 10	A1	Negative	0.00	6/6	Pass
		Low	-0.16		
		High	0.12		
	A2	Negative	0.00	6/6	Pass
		Low	-0.32		
		High	-0.03		
	A3	Negative	0.00	6/6	Pass
		Low	0.03		
		High	0.00		
	A4	Negative	Error2096	4/6	Unacceptable
		Low	-0.1		
		High	Error5017		

Verification Repeat	A4	Negative	0.0	6/6	Pass
		Low	0.1		
		High	0.1		
Site 11	A1	Negative	Error2096	5/6	Acceptable
		Low	-0.06		
		High	0.25		
	A2	Negative	0.00	6/6	Pass
		Low	0.13		
		High	0.03		
	A3	Negative	0.00	6/6	Pass
		Low	0.05		
		High	-0.02		
	A4	Negative	Error2096	5/6	Acceptable
		Low	0.17		
		High	0.20		
Site 12	A1	Negative	0.00	5/6	Acceptable
		Low	Invalid (5016)		
		High	0.27		
	A2	Negative	0.00	6/6	Pass
		Low	-0.36		
		High	0.06		
	A3	Negative	0.00	6/6	Pass
		Low	-0.14		
		High	-0.20		
	A4	Negative	0.00	6/6	Pass
		Low	-0.25		
		High	0.10		
Module Replacement	A4	Negative	0.00	6/6	Pass
		Low	-0.19		
		High	-0.30		
Site 13	A1	Negative	0.00	6/6	Pass
		Low	-0.34		
		High	0.16		
	A2	Negative	Error2097	5/6	Acceptable
		Low	-0.33		
		High	0.05		
	A3	Negative	0.00	6/6	Pass
		Low	0.08		
		High	-0.02		
	A4	Negative	Error2096	5/6	Acceptable
		Low	0.00		
		High	0.22		
Module Replacement	A1	Negative	0.00	6/6	Pass
		Low	-0.06		
		High	-0.23		

Supplementary Table S2: Detailed Site EQA Summary: September 2017-November 2018

EQA results from instruments tested at each of thirteen sites are shown, with error codes highlighted. A score of $\leq 7/8$ was unacceptable and it was recommended that EQA was repeated after root cause analysis and corrective actions.

Site	Score	Outcome	Comment	Log Difference (copies/ml)			
				Neg	Log 3.0	Log 3.7	Log 4.7
EQA Round 1 2018							
1	8/8	Pass		0	-0.30	0.00	0.05
2	8/8	Pass		0	-0.03	0.12	0.10
3	8/8	Pass		0	0.14	0.15	0.01
4	8/8	Pass		0	-0.04	0.04	0.16
5	8/8	Pass		0	-0.01	0.06	0.02
6	7/8	Acceptable	Load volume error	0	ERR-2097	0.07	-0.03
7	8/8	Pass		0	0.05	0.00	0.10
8	8/8	Pass		0	0.07	0.00	-0.02
9	8/8	Pass		0	-0.04	0.18	0.14
10	8/8	Pass		0	-0.02	0.06	0.03
11	8/8	Pass		0	0.08	0.17	0.12
12	8/8	Pass		0	-0.17	0.01	-0.11
13	8/8	Pass		0	0.06	0.05	0.11
Mean				0	-0.08	0.04	-0.05
Range				0, 0	-0.36, 0.08	-0.07, 0.16	-0.21, 0.06
Standard Deviation				0	0.11	0.07	0.08
1	8/8	Pass		0	-0.05	-0.02	-0.01
EQA Round 2 2018							
2	8/8	Pass		0	0.10	0.14	0.15
3	8/8	Pass		0	-0.10	-0.02	0.01
4	8/8	Pass		0	-0.07	0.06	0.05
5	7/8	Acceptable	Loading error	0	-0.10	0.02	ERR-2096
6	8/8	Pass		0	-0.07	0.02	0.04
7	8/8	Pass		0	0.16	0.04	0.01
8	8/8	Pass		0	-0.19	-0.06	0.02
9	8/8	Pass		0	-0.26	-0.01	-0.03
10	8/8	Pass		0	-0.14	0.06	0.08
11	8/8	Pass		0	-0.13	-0.07	0.04
12	8/8	Pass		0	0.06	0.07	0.10
13	8/8	Pass		0	-0.12	0.06	0.00
Mean				0	-0.07	0.03	0.03
Range				0, 0	-0.26, 0.16	-0.07, 0.17	-0.03, 0.15
Standard Deviation				0	0.12	0.07	0.05