Second Test sequence for TRC coil - Ratcheting allowed

The TRC coil will be tested by pulsing at discrete and increasing current values from 5 kA to a maximum of 31.5 kA. A number of "test shots" will be taken between major current pulses, at intervals dictated by the NSTX testing. The following table illustrates one potential test sequence, with an assumption that NSTX will be pulsing on 5 minute intervals. The coil temperature is calculated to return to ~85K before each major current pulse. The table and accompanying graph illustrate the calculated temperature and resistance vs time. The total time for this sequence, if executed as shown, is 6 hours and 10 minutes.

max total pulse length	2	seconds	test current	200	A	dR/dt=	1.9312E-05	ohms/K
assumed coolant temp	77	K	test flattop	2	second	Rcoil @77K	5.55E-04	ohms
assumed rep rate	5	min	test temp rise	1.64E-03	K			

pulse number	elapsed time since last pulse	cooldown time	cumulative time	max current	rise time	flattop time	temp rise per pulse	I^2*t	estimated max temp at end of pulse	estimated average temp at end of pulse	estimated resistance at end of pulse
	(min.)	(seconds)	(seconds)	(amps)	(seconds)	(seconds)	(K)	(Amp^2-s)	(K)	(K)	(ohm)
1	0		0	200	1.10E-03	2	1.64E-03	9.14E+04	7.70E+01	77.0	5.552E-04
2	5		300	5000	2.75E-02	1.97E+00	1.10E+00	6.05E+07	7.81E+01	78.1	5.975E-04
3	5		600	10000	5.69E-02	1.94E+00	4.44E+00	2.39E+08	8.25E+01	82.5	7.480E-04
4	5	300	900	200	1.10E-03	2	1.64E-03	9.14E+04	8.07E+01	79.1	5.948E-04
5	5		1200	15000	8.67E-02	1.91E+00	1.00E+01	5.21E+08	8.91E+01	89.1	9.827E-04
6	5	300	1500	200	1.10E-03	2	1.64E-03	9.14E+04	8.50E+01	81.5	6.417E-04
7	5		1800	20000	1.18E-01	1.88E+00	1.81E+01	8.94E+08	9.95E+01	99.5	1.339E-03
8	5	300	2100	200	1.80E+00	2	1.64E-03	9.14E+04	9.19E+01	85.4	7.166E-04
9	5	600	2400	200	1.80E+00	2	1.64E-03	9.14E+04	8.68E+01	82.0	6.512E-04
10	5		2700	25000	1.50E-01	1.85E+00	2.88E+01	1.35E+09	1.11E+02	110.8	1.764E-03
11	5	300	3000	200	7.70E+01	2	1.64E-03	9.14E+04	9.93E+01	89.5	7.969E-04
12	5	600	3300	200	7.70E+01	2	1.64E-03	9.14E+04	9.17E+01	84.5	6.991E-04
13	5		3600	30000	1.83E-01	1.82E+00	4.27E+01	1.88E+09	1.27E+02	127.2	2.348E-03
14	5	300	3900	200	7.70E+01	2	1.64E-03	9.14E+04	1.10E+02	95.6	9.142E-04
15	5	600	4200	200	7.70E+01	2	1.64E-03	9.14E+04	9.88E+01	88.1	7.689E-04
16	5	900	4500	200	7.70E+01	2	1.64E-03	9.14E+04	9.14E+01	84.2	6.942E-04
17	5		4800	31500	1.93E-01	1.81E+00	4.76E+01	2.06E+09	1.32E+02	131.8	2.533E-03
18	5	300	5100	200	7.70E+01	2	1.64E-03	9.14E+04	1.13E+02	97.3	9.474E-04
19	5	600	5400	200	7.70E+01	2	1.64E-03	9.14E+04	1.01E+02	89.1	7.887E-04
20	5	900	5700	200	7.70E+01	2	1.64E-03	9.14E+04	9.27E+01	84.9	7.070E-04
21	5		6000	31500	1.93E-01	1.81E+00	4.76E+01	2.06E+09	1.32E+02	132.5	2.545E-03
22	5	300	6300	200	7.70E+01	2	1.64E-03	9.14E+04	1.13E+02	97.6	9.522E-04
23	5	600	6600	200	7.70E+01	2	1.64E-03	9.14E+04	1.01E+02	89.2	7.915E-04

pulse number	elapsed time since last pulse	cooldown time	cumulative time	max current	rise time	flattop time	temp rise per pulse	I^2*t	estimated max temp at end of pulse	estimated average temp at end of pulse	estimated resistance at end of pulse
	(min.)	(seconds)	(seconds)	(amps)	(seconds)	(seconds)	(K)	(Amp^2-s)	(K)	(K)	(ohm)
24	5	900	6900	200	7.70E+01	2	1.64E-03	9.14E+04	9.27E+01	85.0	7.089E-04
25	5		7200	31500	1.93E-01	1.81E+00	4.76E+01	2.06E+09	1.33E+02	132.6	2.547E-03
26	5	300	7500	200	7.70E+01	2	1.64E-03	9.14E+04	1.13E+02	97.6	9.528E-04
27	5	600	7800	200	7.70E+01	2	1.64E-03	9.14E+04	1.01E+02	89.3	7.919E-04
28	5	900	8100	200	7.70E+01	2	1.64E-03	9.14E+04	9.27E+01	85.0	7.091E-04
29	5		8400	31500	1.93E-01	1.81E+00	4.76E+01	2.06E+09	1.33E+02	132.6	2.548E-03
30	5	300	8700	200	7.70E+01	2	1.64E-03	9.14E+04	1.13E+02	97.6	9.528E-04
31	5	600	9000	200	7.70E+01	2	1.64E-03	9.14E+04	1.01E+02	89.3	7.919E-04
32	5	900	9300	200	7.70E+01	2	1.64E-03	9.14E+04	9.27E+01	85.0	7.091E-04
33	5		9600	31500	1.93E-01	1.81E+00	4.76E+01	2.06E+09	1.33E+02	132.6	2.548E-03
34	5	300	9900	200	7.70E+01	2	1.64E-03	9.14E+04	1.13E+02	97.6	9.528E-04
35	5	600	10200	200	7.70E+01	2	1.64E-03	9.14E+04	1.01E+02	89.3	7.919E-04
36	5	900	10500	200	7.70E+01	2	1.64E-03	9.14E+04	9.27E+01	85.0	7.091E-04
37	5		10800	31500	1.93E-01	1.81E+00	4.76E+01	2.06E+09	1.33E+02	132.6	2.548E-03
38	5	300	11100	200	7.70E+01	2	1.64E-03	9.14E+04	1.13E+02	97.6	9.528E-04
39	5	600	11400	200	7.70E+01	2	1.64E-03	9.14E+04	1.01E+02	89.3	7.919E-04
40	5	900	11700	200	7.70E+01	2	1.64E-03	9.14E+04	9.27E+01	85.0	7.091E-04