RESULTS

EXPERIMENT B-8006

Mar 18, 1993

MEMORANDUM

DATE: March 18, 1993

TO: Brett Leslie

FROM: Becky Riddle

SUBJECT: XRF Analysis of Rock Samples for Sulfur Content
20-5704-063

Results of XRF analysis of rock samples are shown in the table below. The detection limit for this matrix is estimated to be 50 ppm. If lower limits are required, please let me know.

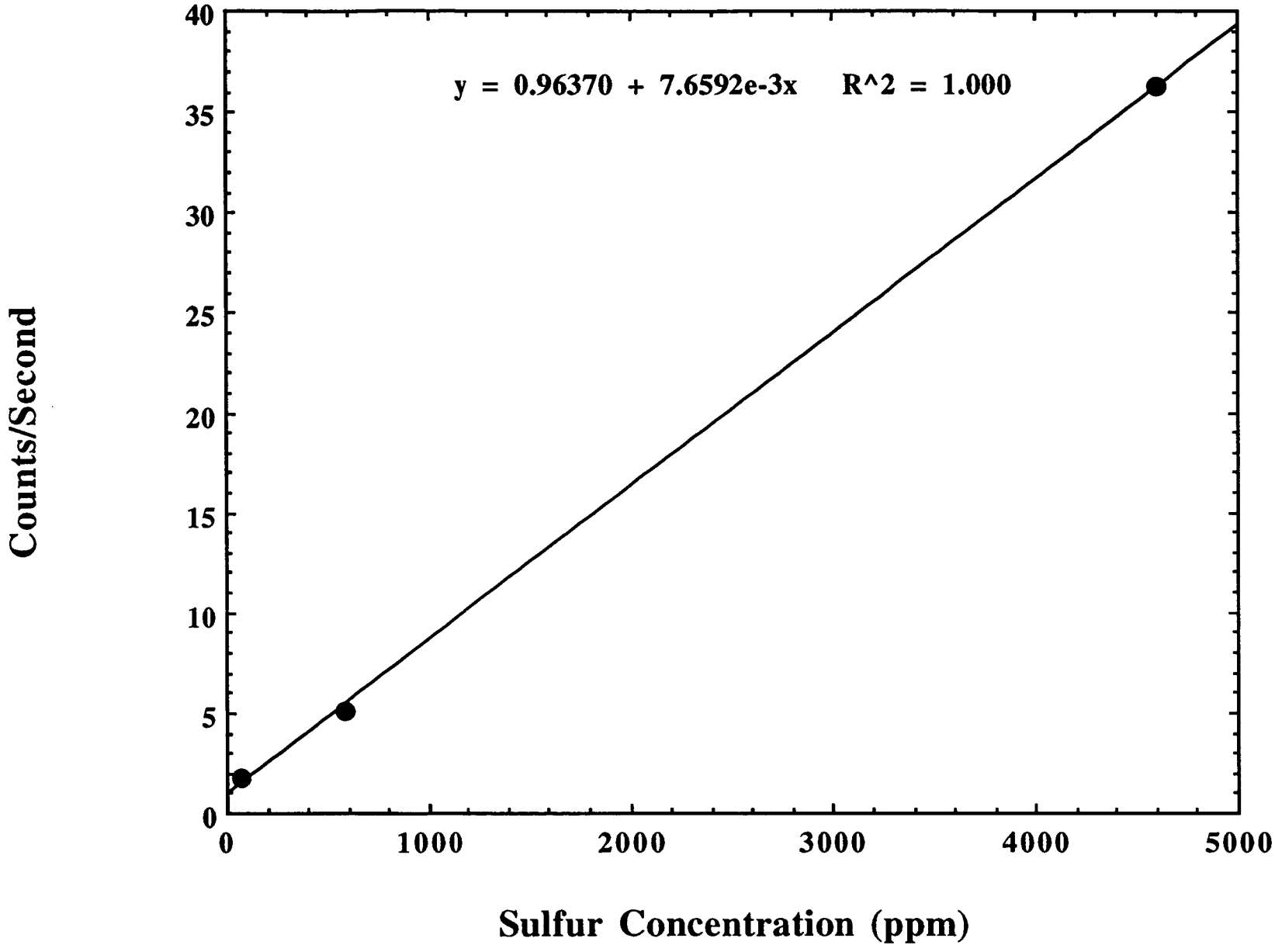
SAMPLE I.D.	COUNTS/SEC	SULFUR CONC. (PPM)
3904 stnd.(not used)	220.83	17500
3901 stnd.	36.23	4600
3909 stnd.	5.10	580
3907 stnd.	1.81	75
3902	19.79	2458
3903	0.00	not detected
3905	3.55	338
3906	8.35	964
3908	20.47	2546
3910	2.08	146

The three lower standards were used as a calibration curve.
CORR = .9999
SLOPE = 0.0077
YINT = 1.0

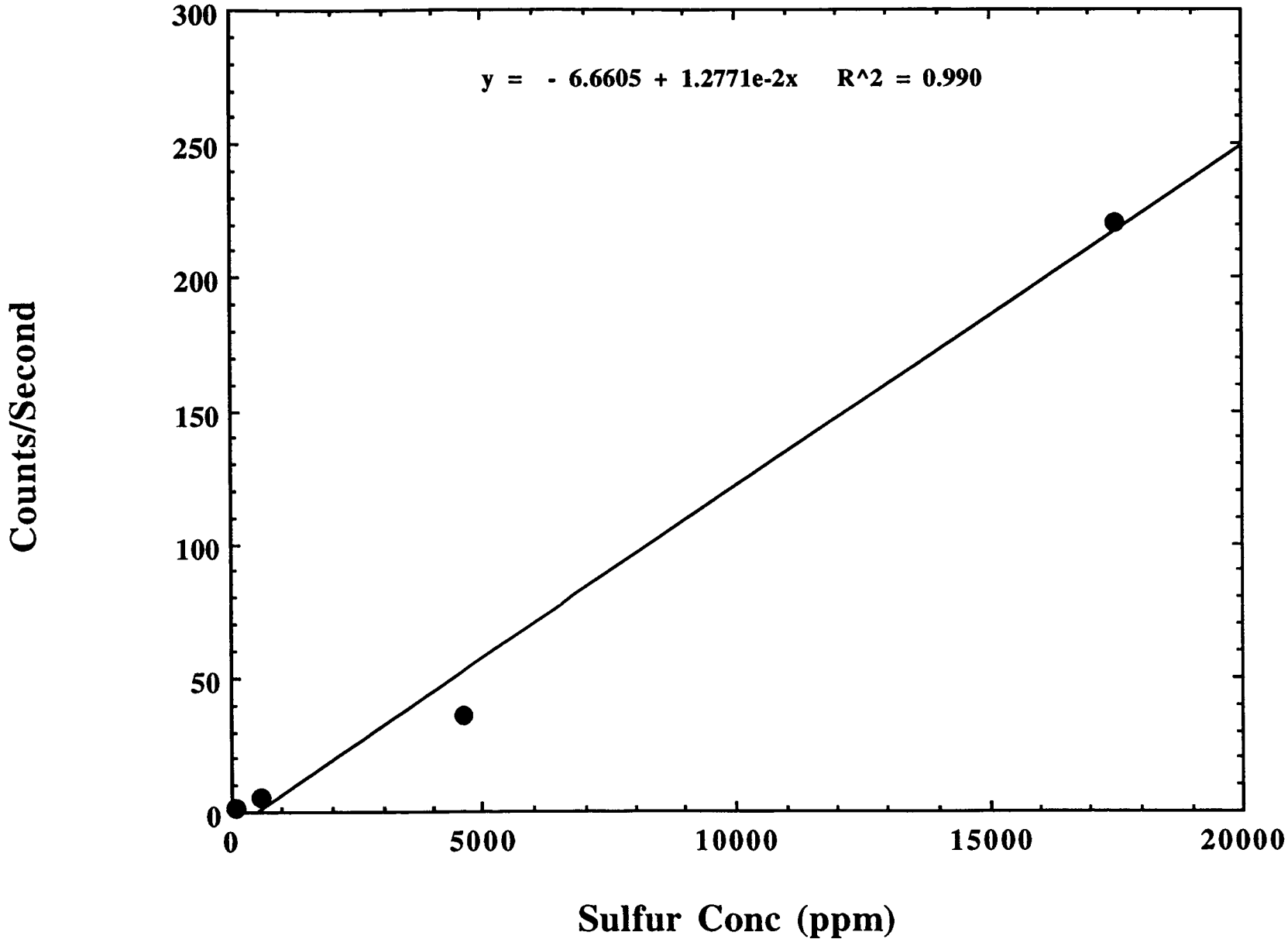
If you need any further information, please let me know. Thank you.

(leslie1)

Sulfur Standards 3/18/93 0-4600 ppm



3/18/93 All standards



full cup of sample

Quantitation via ASAP
Standardless Fundamental Parameters Program

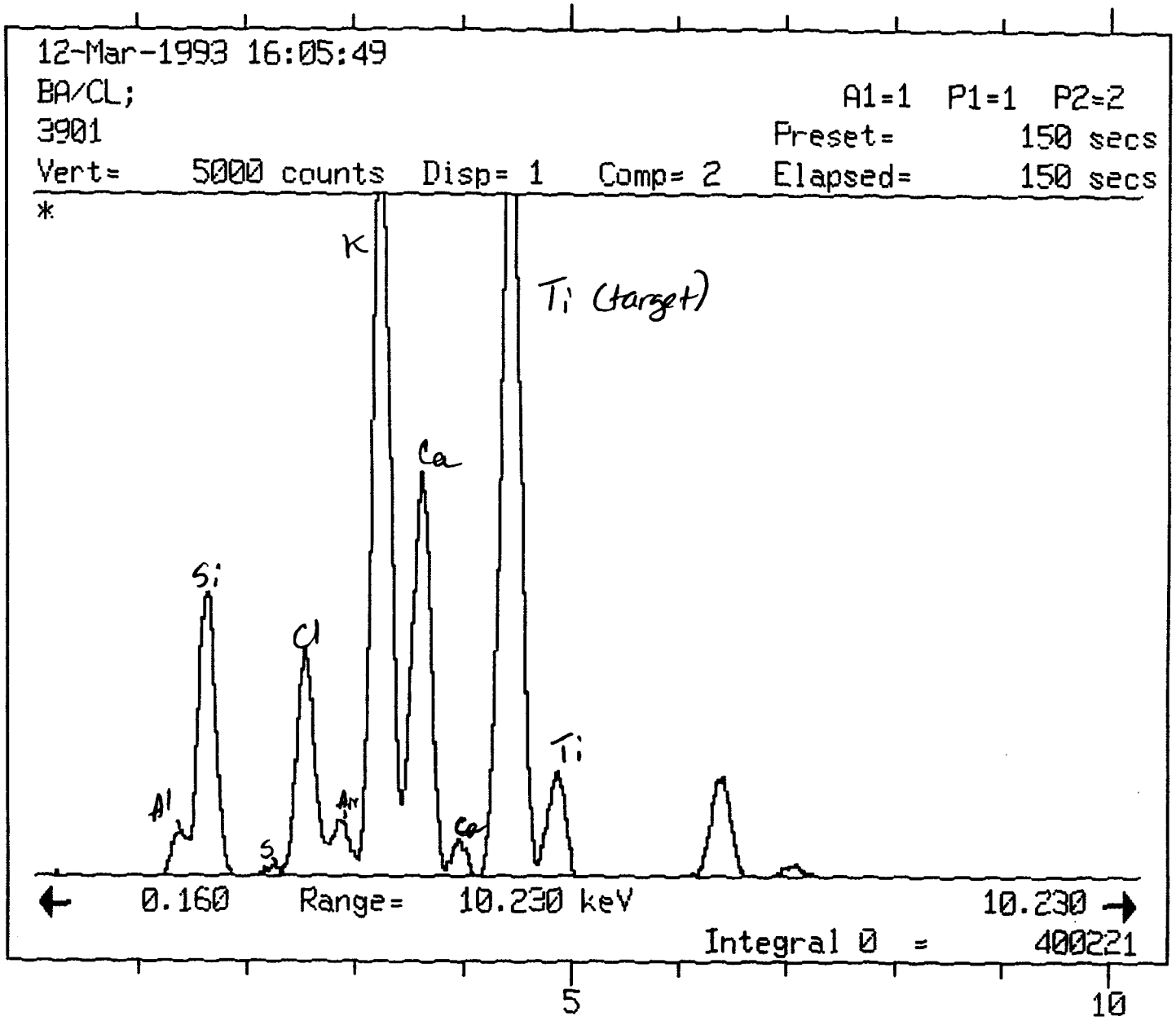
RESULTS file: 0:3901-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	90.75	20.26 Wt.%	1.00
Si KA	TI	627.82	59.42 Wt.%	0.33
S KA	TI	36.23	1.04 Wt.%	1.56
Cl KA	TI	589.36	7.40 Wt.%	0.33
K KA	TI	2011.80	8.72 Wt.%	0.18
Ca KA	TI	1030.18	3.16 Wt.%	0.25
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	*******	ppm	162.33
K	*******	ppm	155.16
CA	*******	ppm	80.48


12-Mar-1993 16:05:49
BA/CL;
3901
Vert= 5000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K
Ti (target)
Ca
Si
Cl
Ti
Al
S
Ar
Ca
0.160 Range= 10.230 keV 10.230
Integral 0 = 400221
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

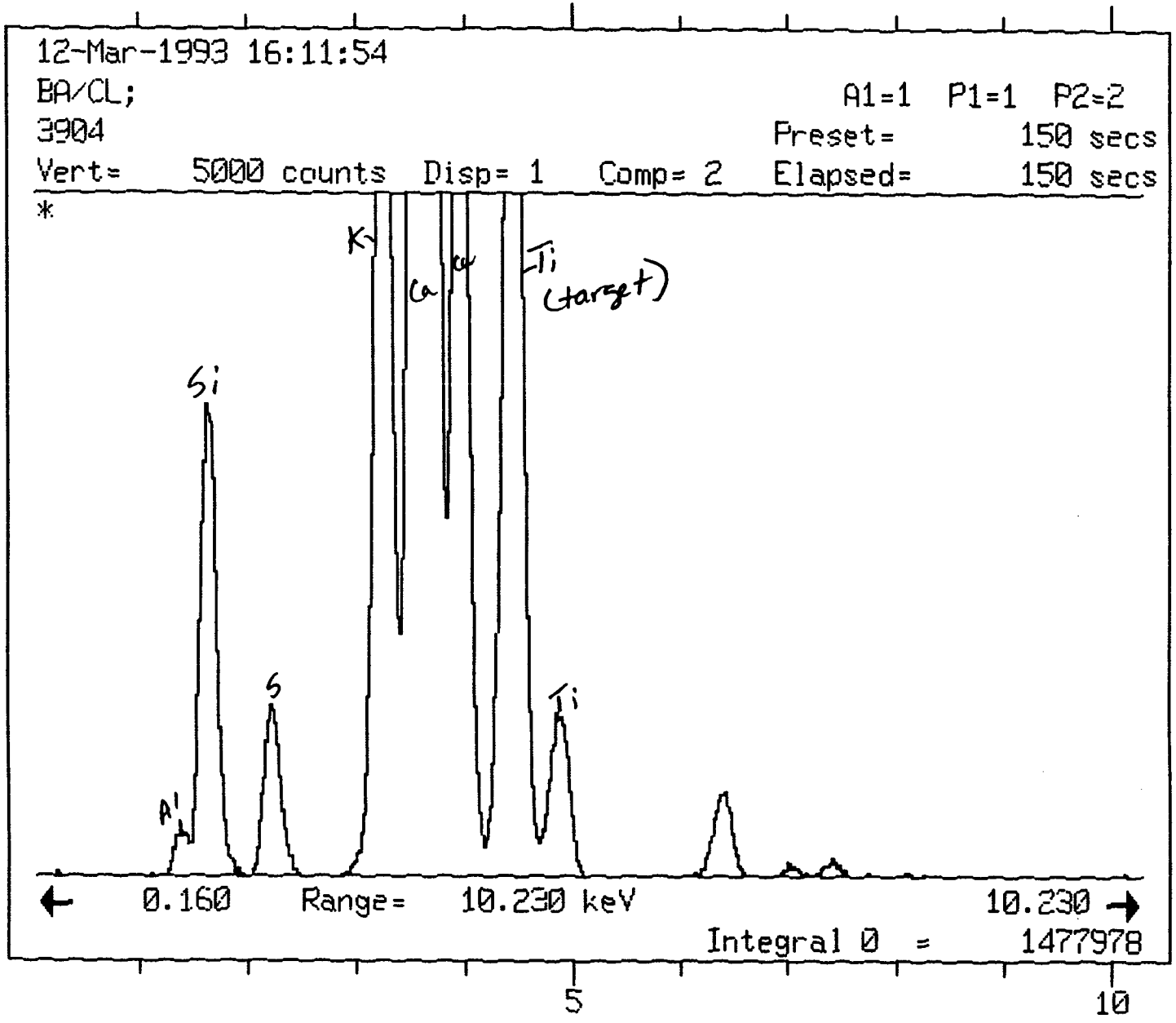
RESULTS file: 0:3904-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	48.93	13.96 Wt.%	1.03
Si KA	TI	512.35	45.50 Wt.%	0.27
S KA	TI	220.83	5.29 Wt.%	0.41
K KA	TI	1633.83	6.00 Wt.%	0.14
Ca KA	TI	10519.16	29.25 Wt.%	0.05
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	*******	ppm	217.49
K	*******	ppm	85.47
CA	*******	ppm	154.68


12-Mar-1993 16:11:54
BA/CL;
3904
Vert= 5000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K
Ca
Ca
Ti
(target)
Si
S
Ti
Al
0.160 Range= 10.230 keV 10.230
Integral 0 = 1477978
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

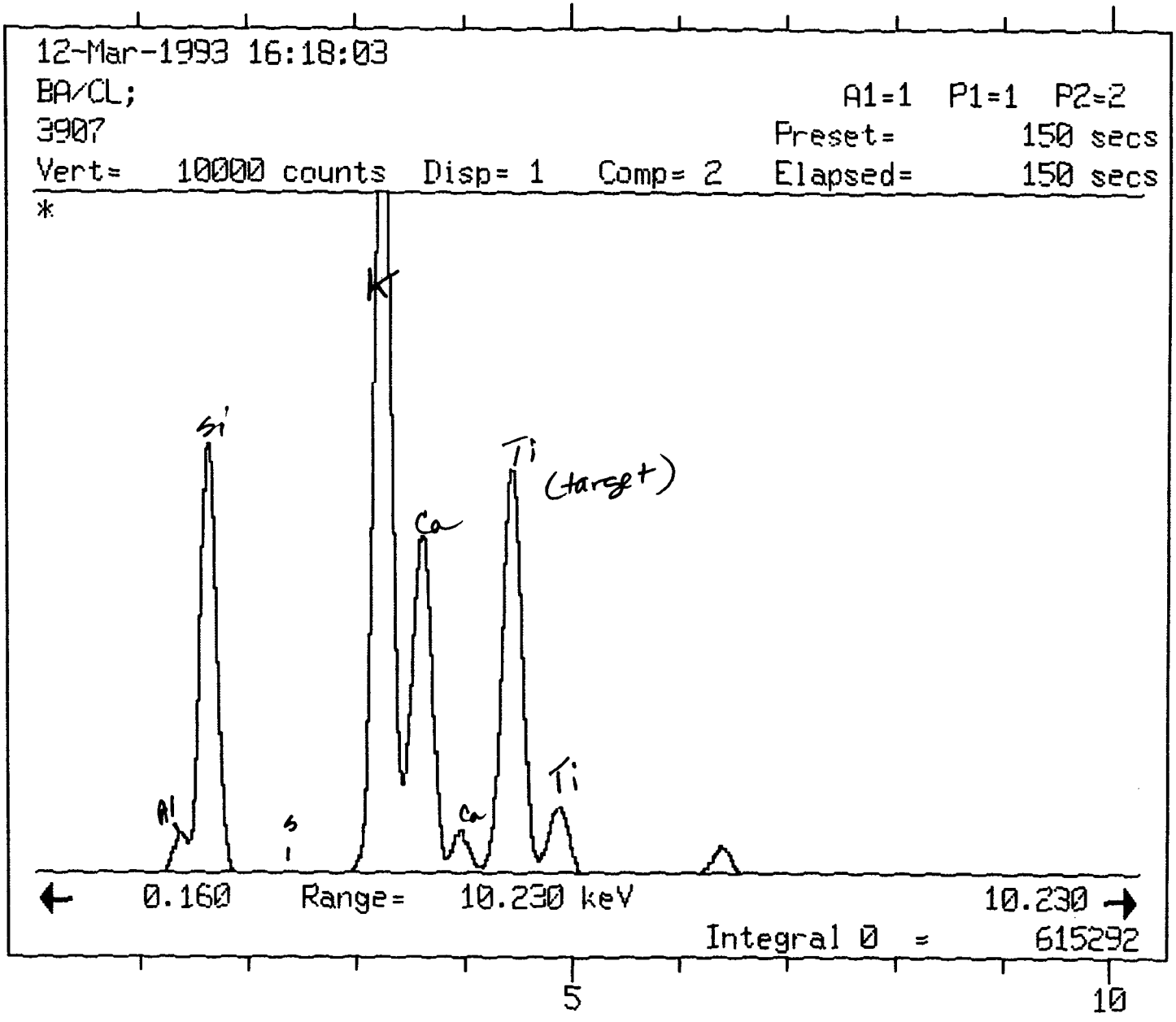
RESULTS file: 0:3907-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	111.29	16.83 Wt.%	0.87
Si KA	TI	1163.09	72.94 Wt.%	0.24
S KA	TI	1.81	417.62 ppm	12.86
K KA	TI	2579.10	8.05 Wt.%	0.16
Ca KA	TI	969.17	2.13 Wt.%	0.27
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	417.62	ppm	53.70
K	*******	ppm	126.23
CA	*******	ppm	56.88


12-Mar-1993 16:18:03
BA/CL;
3907
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
Si
K
Ca
Ti
(target)
Al
Si
Ca
Ti
0.160
Range= 10.230 keV
10.230
Integral 0 = 615292
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

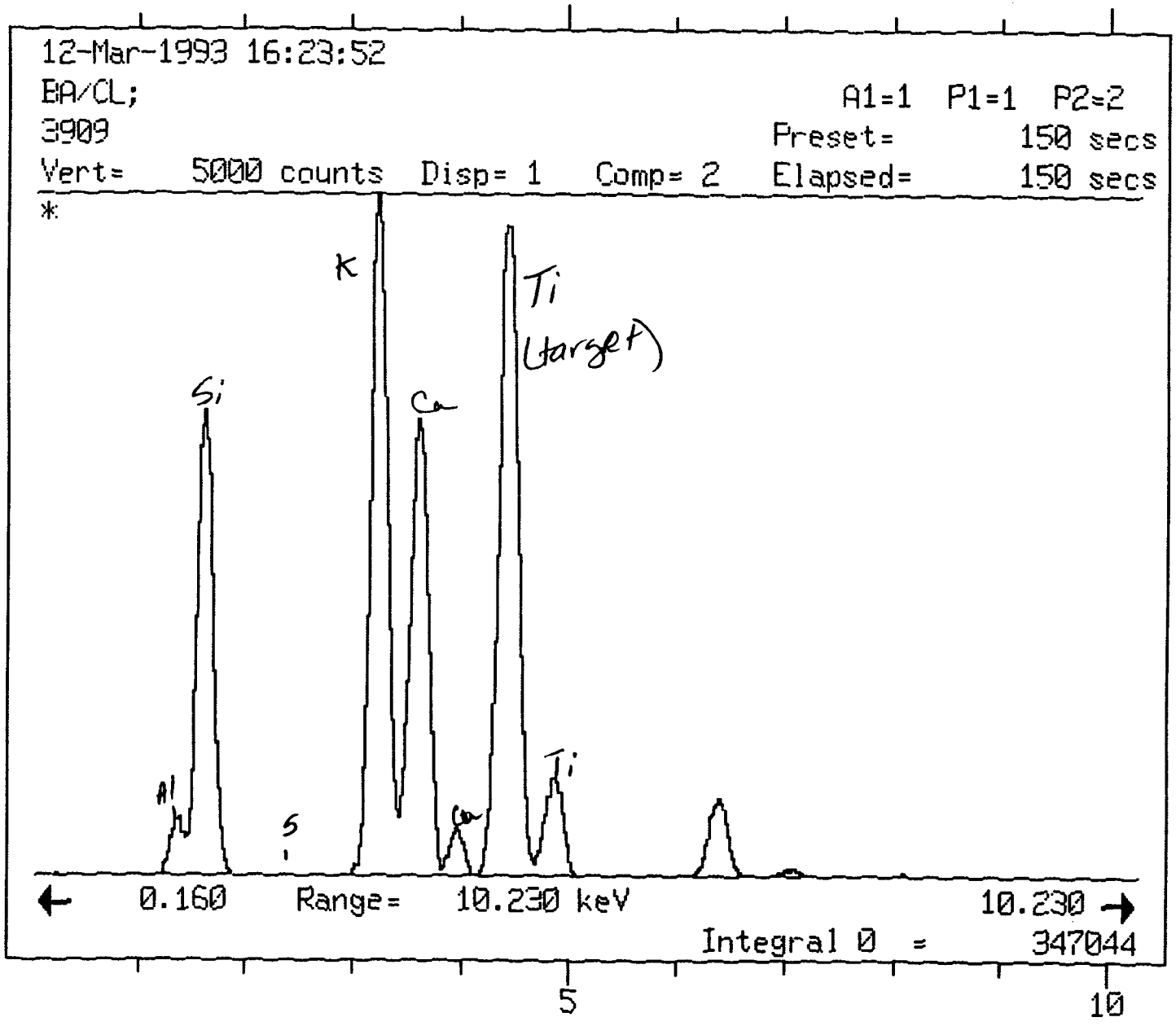
RESULTS file: 0:3909-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	124.99	18.82 Wt.%	0.81
Si KA	TI	1092.34	71.63 Wt.%	0.25
S KA	TI	5.10	0.12 Wt.%	5.97
K KA	TI	2086.94	6.49 Wt.%	0.17
Ca KA	TI	1354.84	2.94 Wt.%	0.22
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	1176.77	ppm	70.29
K	*******	ppm	113.52
CA	*******	ppm	64.28


12-Mar-1993 16:23:52
BA/CL;
3909
Vert= 5000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K
Ti
(target)
Si
Ca
Al
S
Ca
Ti
0.160 Range= 10.230 keV 10.230
Integral 0 = 347044
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

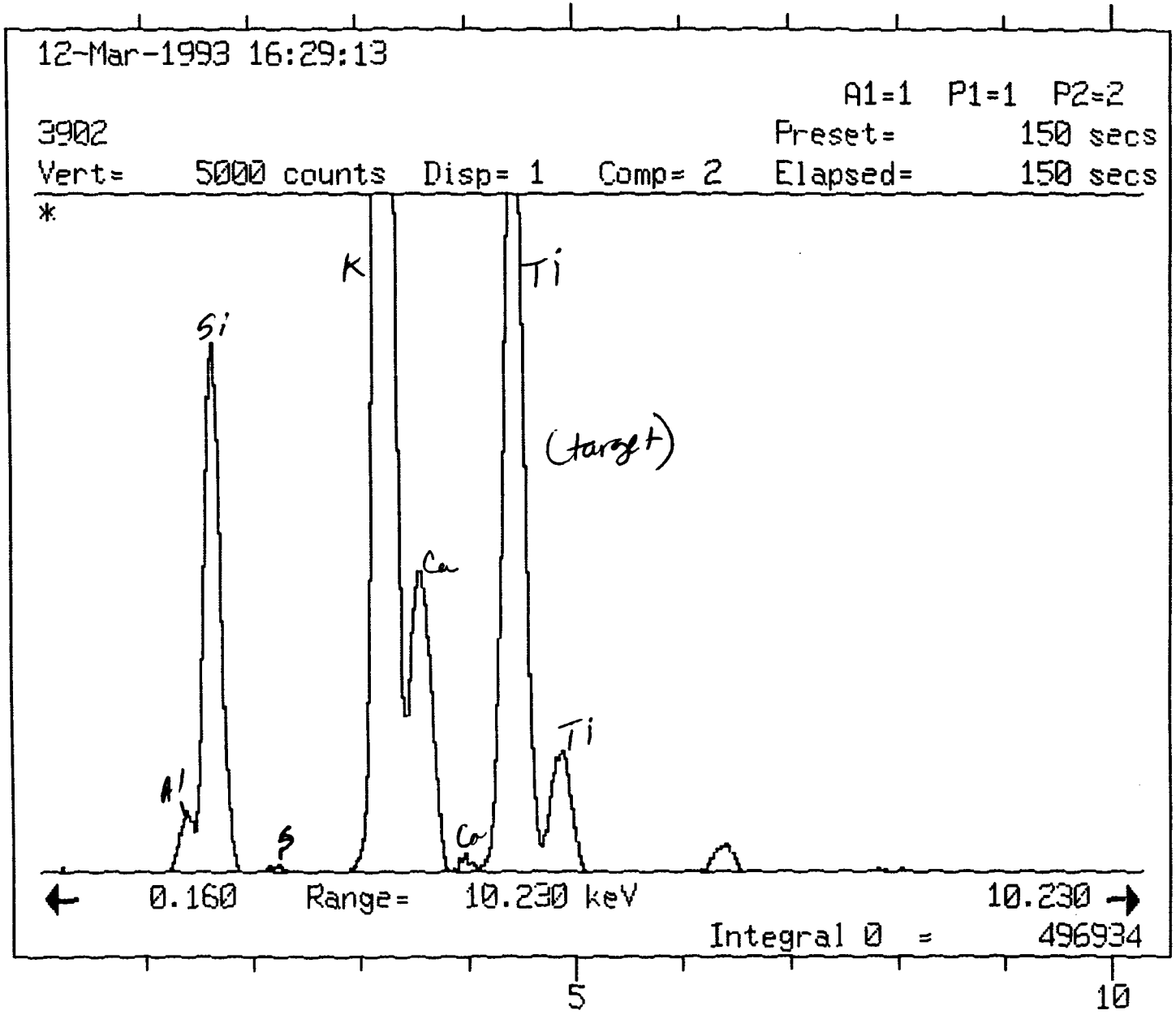
RESULTS file: 0:3902-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	120.49	17.97 Wt.%	0.86
Si KA	TI	1104.63	68.52 Wt.%	0.25
S KA	TI	19.79	0.42 Wt.%	2.27 ⇒ ± 0.449
K KA	TI	4110.68	12.12 Wt.%	0.12
Ca KA	TI	452.34	0.97 Wt.%	0.44
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	4230.70	ppm	96.11
K	*******	ppm	148.34
CA	9725.02	ppm	42.37


12-Mar-1993 16:29:13
A1=1 P1=1 P2=2
3902
Preset= 150 secs
Vert= 5000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
K
Ti
Si
(target)
Ca
Ti
Al
S
Ca
0.160
Range= 10.230 keV
10.230
Integral 0 = 496934
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

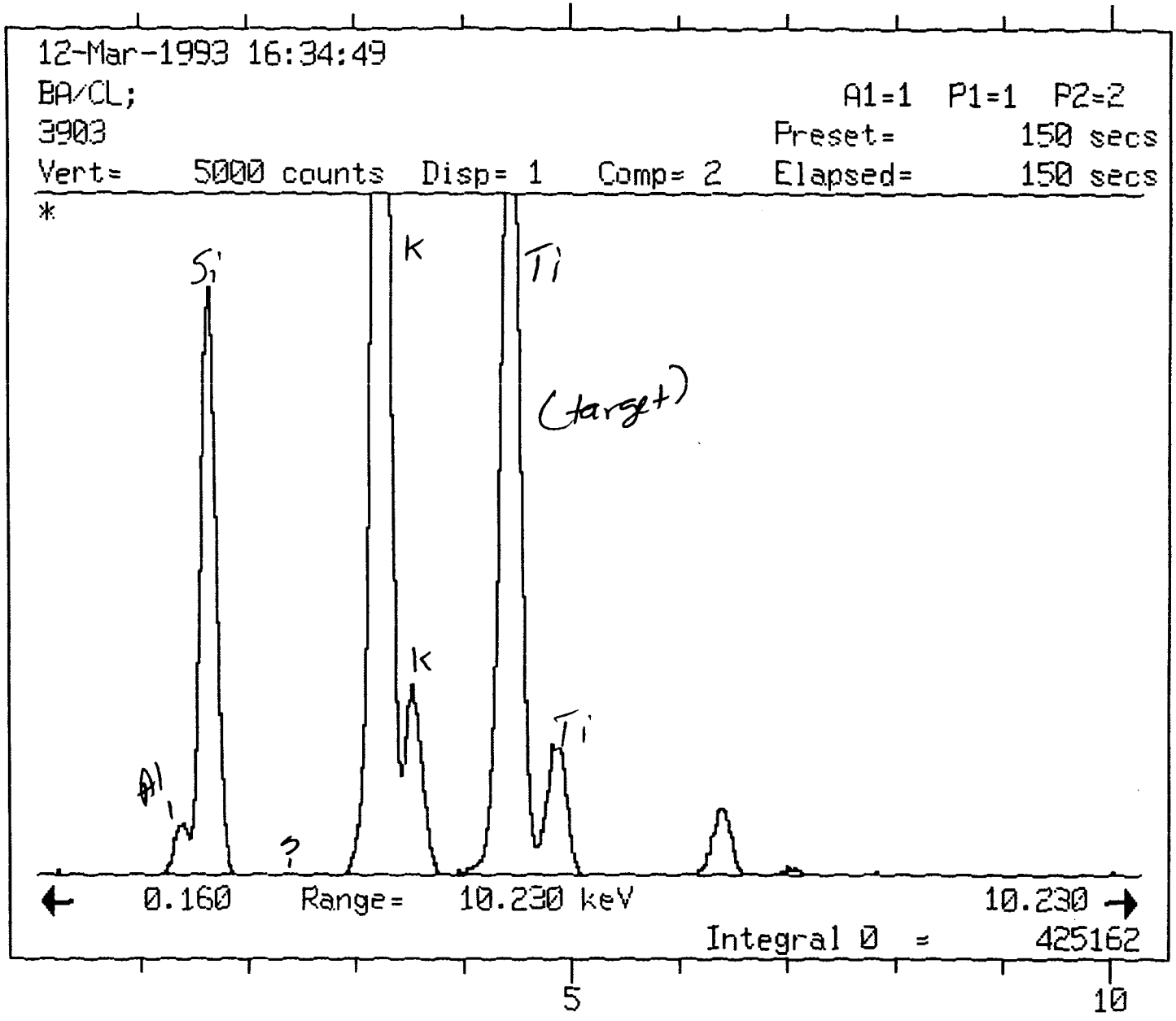
RESULTS file: 0:3903-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	106.79	16.06 Wt.%	0.91
Si KA	TI	1196.94	73.64 Wt.%	0.24
S KA	TI	0.00	0.00 ppm	0.00
K KA	TI	3273.98	10.30 Wt.%	0.13
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	0.00	ppm	0.00
K	*******	ppm	136.77


12-Mar-1993 16:34:49
BA/CL;
3903
Vert= 5000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
Si
K
Ti
(target)
K
Ti
Al
?
0.160 Range= 10.230 keV 10.230
Integral 0 = 425162
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

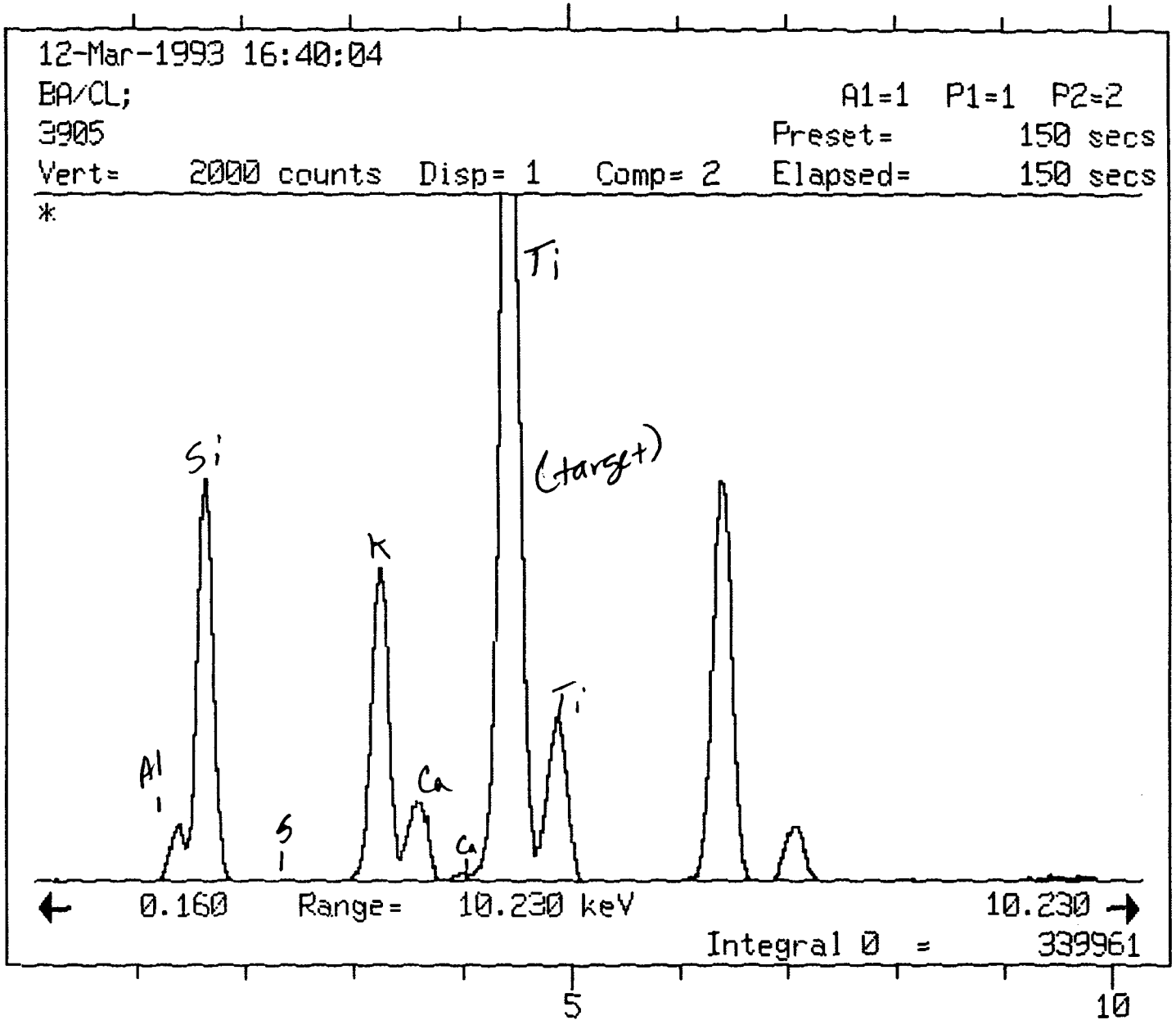
RESULTS file: 0:3905-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	89.29	19.68 Wt.%	0.93
Si KA	TI	736.67	75.97 Wt.%	0.30
S KA	TI	3.55	0.13 Wt.%	7.24
K KA	TI	744.93	3.72 Wt.%	0.29
Ca KA	TI	145.76	0.49 Wt.%	0.78
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	1340.07	ppm	97.06
K	*******	ppm	108.57
CA	4923.24	ppm	38.17


12-Mar-1993 16:40:04
BA/CL;
3905
Vert= 2000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
Ti
(target)
Si
K
Ti
Al
Ca
S
Ca
0.160 Range= 10.230 keV 10.230
Integral 0 = 339961
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

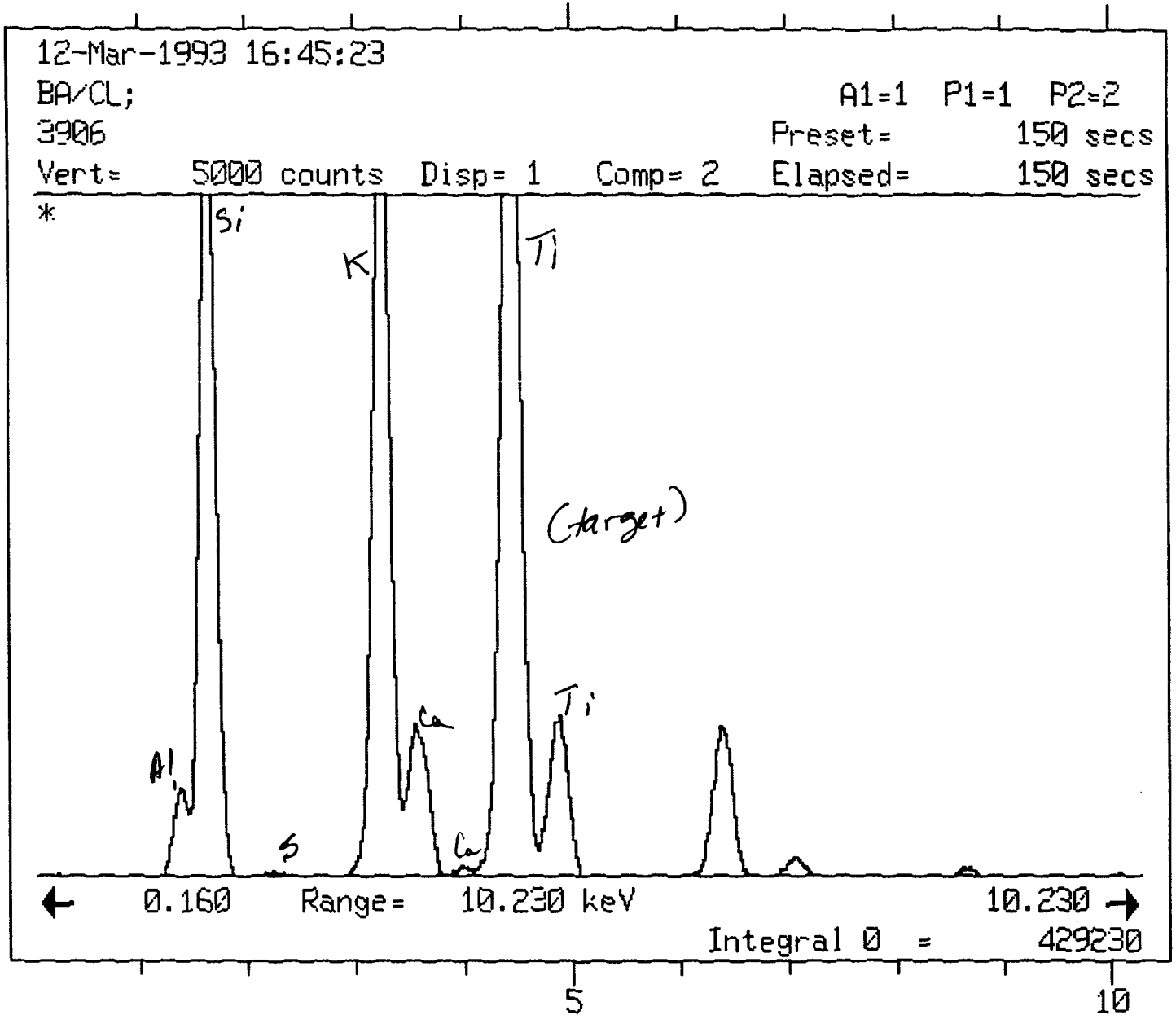
RESULTS file: 0:3906-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	115.43	18.20 Wt.%	0.82
Si KA	TI	1081.75	76.64 Wt.%	0.25
S KA	TI	8.35	0.22 Wt.%	3.86
K KA	TI	1292.80	4.59 Wt.%	0.22
Ca KA	TI	145.42	0.35 Wt.%	0.82
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	2231.92	ppm	86.09
K	*******	ppm	100.83
CA	3515.56	ppm	28.87


12-Mar-1993 16:45:23
BA/CL;
3906
Vert= 5000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
Si
K
Ti
(target)
Ca
Ti
Al
S
Ca
0.160 Range= 10.230 keV 10.230
Integral 0 = 429230
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

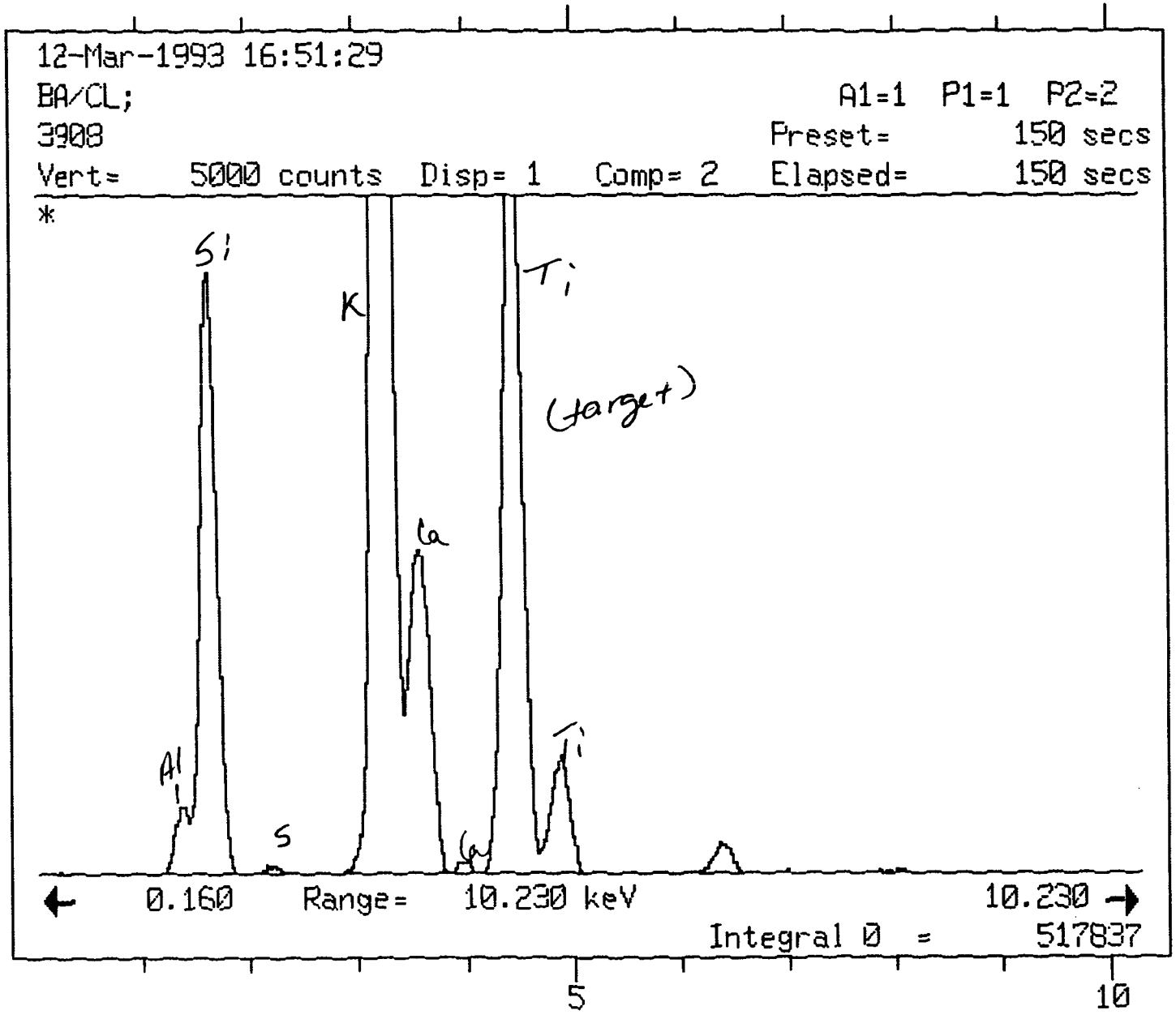
RESULTS file: 0:3908-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	121.97	18.36 Wt.%	0.85
Si KA	TI	1078.85	68.17 Wt.%	0.25
S KA	TI	20.47	0.44 Wt.%	2.21 ± 0.452
K KA	TI	4061.99	12.09 Wt.%	0.12
Ca KA	TI	435.09	0.94 Wt.%	0.45
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	4414.88	ppm	97.76
K	*******	ppm	148.58
CA	9437.37	ppm	42.11


12-Mar-1993 16:51:29
BA/CL;
3908
Vert= 5000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
Si
K
Ti
(target)
Ca
Al
S
Ca
Ti
0.160 Range= 10.230 keV 10.230
Integral 0 = 517837
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

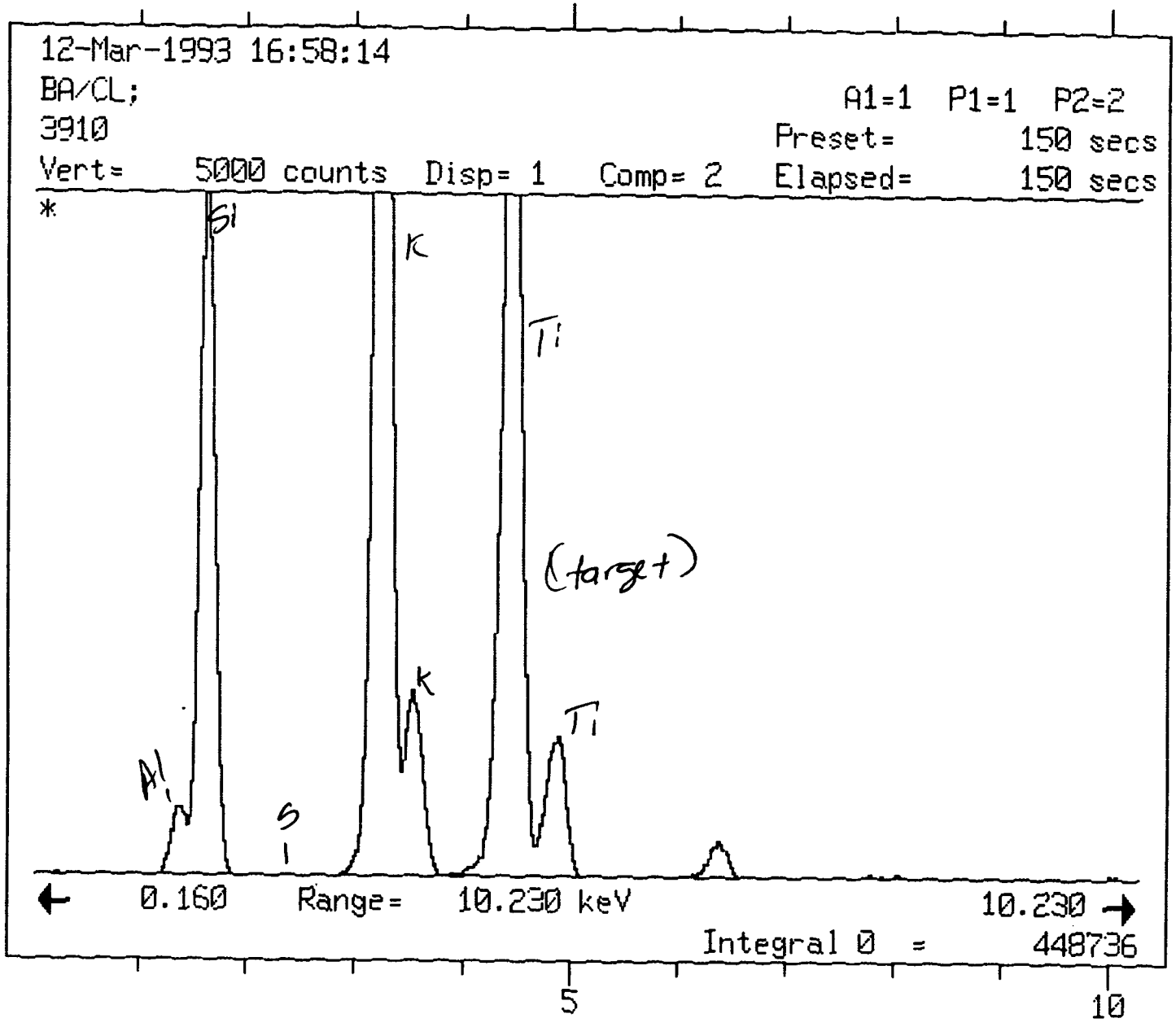
RESULTS file: 0:3910-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	118.17	16.88 Wt.%	0.84
Si KA	TI	1233.48	74.52 Wt.%	0.23
S KA	TI	2.08	472.34 ppm	11.41
K KA	TI	2796.53	8.56 Wt.%	0.14
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	472.34	ppm	53.87
K	*******	ppm	122.34


12-Mar-1993 16:58:14
BA/CL;
3910
Vert= 5000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
Si
K
Ti
(target)
K
Ti
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 448736
5
10

April 19, 1993

4/93 S Sample Results

Sample#	IDENTIFICATION	S ppm	STANDARDS	IDENTIFICATION	S ppm
4501	3902 -- NOP-ECP-1*WR	2409	STD A	3907 = RGM-1	75
4502	NOPI-ECP-11.0/9.15*WR	169	STD B	3909 = SDC-1	580
4503	NOPI-ECP-11.22/9.07*WR	223	STD C	3901 = MAG-1	4600
4504	NOPI-ECP-11.4/9.13*WR	187	STD D	3904 = SGR-1	17500
4505	NOPI-ECP-11.6/9.12*WR	<50			
4506	SDC-1	502			
4507	NOPI-ECP-11.78/9.17*WR	500			
4508	NOPI-ECP-12.0/9.09*WR	1031			
4509	NOPI-ECP-12.18/9.10*WR	4200			
4510	NOPI-ECP-12.42/9.14*WR	83			
4511	3908 -- NOP-ECP-1*WR	2226			
4512	NOPI-ECP-12.65/9.13*WR	237			
4513	NOPI-ECP-12.87/9.10*WR	<50			
4514	NOPI-ECP-13.0/9.2*WR	55			
4515	NOPI-ECP-2.55/7.65*WR	213			
4516	SDC-1	76			
4517	NOPI-ECP-9.0/7.5*WR	<50			
4518	NOPI-ECP-9.7/7.35*WR	50			
4519	NOPI-ECP-10.3/7.7*WR	<50			
4520	NOPI-ECP-10.8/7.8*WR	197			
4521	SDC-1	546			
4522	5909 -- NOP-ECP-1*WR	937			
4523	NOPI-ECP-11.55/7.8*WR	270			
4524	NOPI-ECP-11.9/7.9*WR	891			
4525	NOPI-ECP-12.5/7.75*WR	135			
4526	5909 -- NOP-ECP-1*WR	1004			
4527	SDC-1	670			
4528	NOPI-ECP-12.95/7.75*WR	167			
4529	NOPI-ECP-13.5/7.75*WR	435			
4530	NOPI-ECP-13.95/8.0*WR	422			
4531	NOPI-ECP-17.0/7.5*WR	4351			
4532	NOPI-ECP-10.3/7.7*WR	<50			
4533	NOPI-ECP-12.5/7.9*WR	109			
4534	NOPI-ECP-2.55/7.65*WR	251			
4535	NOPI-ECP-12.95/7.9*WR	229			
RERUN					
4510	NOPI-ECP-12.42/9.14*WR	126			
4516	SDC-1				

Bret Leslie 4/26/93

MEMORANDUM

DATE: April 19, 1993

TO: Brett Leslie

FROM: Becky Riddle

SUBJECT: XRF Analysis of Rock Samples for Sulfur Content
20-5704-063

Results of XRF analysis of rock samples are shown in the table below. The detection limit for this matrix is estimated to be 50 ppm.

ANALYSIS PERFORMED 4-12 93

SAMPLE I.D.	COUNTS/SEC	SULFUR CONC. (PPM)
STANDARD A	0.93	75
STANDARD B	4.50	580
STANDARD C	37.93	4600
STANDARD D	211.3	17500
4501	19.86	2409
4502	1.43	169
4503	1.87	223
4504	1.58	187
4505	0.35	<50
4506	4.17	502
4507	4.15	500
4508	8.52	1031
4509*	42.51	4200(5161)
4510	0.72	83
4511	18.36	2226

SULFUR ANALYSIS RESULTS (CON'T)

SAMPLE I.D.	COUNT/SEC	SULFUR CONC. (PPM)
4512	1.99	237
4513	0.39	<50
4514	0.49	55
4515	1.79	213
4516	0.66	76
4517	0.08	<50
4518	0.45	50
4519	0.00	<50
4520	1.66	197
4521	4.53	546
4522	7.75	937
4523	2.26	270
4524	7.37	891
4525	1.15	135
4526	8.30	1004
4527	5.55	670
4528	1.41	167
4529	3.62	435
4530	3.51	422
4531*	44.4	4351(5390)
4532	0.00	<50
4533	0.93	109
4534	2.10	251
4535	1.92	229

STANDARD A,B,C: CORR=.9999; SLOPE=0.008; YINT=0.04
*STANDARD A,B,C,D: CORR=.9969; SLOPE=0.013; YINT=-10.1
The samples marked with * were calculated using the second curve above. All other results including those in parenthesis were calculated using the first curve above.

RERUNS REQUESTED:

ANALYSIS PERFORMED 4-16-93

SAMPLE I.D.	COUNTS/SEC	SULFUR CONC.(PPM)
STANDARD A	1.14	75
STANDARD B	4.46	580
STANDARD C	38.27	4600
4510	1.16	126
4516	4.45	524

STANDARD A,B,C: CORR=.9998; SLOPE=0.008; YINT=0.11

If you have any questions or need anything further, please call me at extension 2181

Thank you.

(leslie2)

SOUTHWEST RESEARCH INSTITUTE
San Antonio, Texas 78228-0510

Page: WO#~~5137~~ 4770

Project: 20-5704-063

Rock Analysis
Bret Zelli

sample id	cps	ppm
Std A - 75	0.93	7 - corr. .9999 slp = 0.008 yint = 0.037
Std B - 540	4.50	7
Std C - 4600	37.93	- corr. .9969 slp = 0.013 yint = -10.1
Std D - 17500	211.3	★
4505	0.35	<50
4501	19.86	2409
4502	1.43	169
4503	1.87	223
4504	1.58	187
4506	4.17 ~~0.35~~	502
4507	4.15	500
4508	8.52	1031
4509 ★	42.51	4200 (5161)
★ 4510	0.72	83
N 4511	18.36	2226
4512	1.99	237
4513	0.39	<50
4514	0.49	55
4515	1.79	213
-SDC★ 4516	0.66	76
4517	0.08	<50
4518	0.45	50
4519	0.00	<50
4520	1.66	197
SDC 4521	4.53	546
N 4522	7.75	937
4523	2.26	270
4524	7.37	891
4525	1.15	135
N 4526	8.30	1004
SDC 4527	5.55	670
4528	1.41	167
4529	3.62	435
4530	3.51	422

# id	cps	ppm
4531 ★	44.40	4351 (5390
4532	0.00	<50
4533	0.93	109
4534	2.10	251
4535	1.92	229

★ samples calculated using second set of standards including highest range

Date: _____ Signature: _____

(SwRI 17) Rev 1/90

SOUTHWEST RESEARCH INSTITUTE
San Antonio, Texas 78228-0510

Page: a05137-

Project: 20-5704263

Re-Runs Rock Analysis

Sample id	cps		
A - 75 ppm	1.14		con .9998
B - 580 ppm	4.46		slope = 0.0083
C - 4600 ppm	38.27		yint 0.11
D - 17500 ppm	208.8		
		ppm	
4510	1.16	126	
4516	4.45	524	

Date: _____ Signature: _____

(SwRI 17) Rev 1 90

W.O. No. (Sponsor Code) 4770

PETROLEUM PRODUCTS RESEARCH DEPARTMENT

Date : April 6, 1993

LAB CHARGE No. 08-2621-001
Billing Charge No. 20-5704-063

Sample Code: STDA-D; 4501-4535

Sample No.

Sample Size: SMALL PLASTIC VIALS

Sample Location:

Sample Description: ROCK POWDER

Hazard Code: Health - 0 , Flammability - 0 , Reactivity - 0

Tests Requested:

XRF SCAN FOR SULFUR
RUN STDS FOR CALIBRATION CURVE
PRINT COUNTS AND SPECTRA FOR EACH SAMPLE
PLEASE NOTIFY IF INTERFERENCES ARE SEEN
DUMP ALL SAMPLE INTO CUP FOR ANALYSIS AND RETURN TO VIAL WHEN FINISHED. RETURN ALL UNUSED SAMPLE TO BECKY
RETURN ALL DATA TO BECKY FOR CALCULATIONS.

IF YOU HAVE ANY QUESTIONS, CALL BECKY!!!

Stacey - please bill $50/sample - Becky

Return Samples to Becky.

Requested By: Mary Riddle

Technicians: D. Muñoz

Ext. 2181 Client: LESLIE X5077

4-12-93

URGENCY APRIL 12 1993

Total Hrs. Chrg. 11.0

COMPLETED

APR 7 1993
RECEIVED

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

DATE: April 6, 1993

TO: Becky Riddle EXT 2181, Division 8

FROM: BWL
Bret Leslie, EXT 5077, Division 20

SUBJECT: XRF Analysis of Rock Samples for Sulfur Content 20-5704-063

Dear Becky,

I am submitting to you 35 samples of rock powders for analysis of sulfur by the XRF technique. Please provide me a realistic date for completion of these analyses. Please provide the raw results, the calibration information, and the calculated concentrations. Please return sample powders and inform me, prior to completion of the analyses, if more than 5% of the samples are below the present detection limit of 50 ppm S. The standards to be used are Standard A (75 ppm S), Standard B (580 ppm S), Standard C (4,600 ppm S), and if needed to extend the concentration range, Standard D (17,500 ppm S).

Quantitation via ASAP
Standardless Fundamental Parameters Program

Std

RESULTS file: 0:A-4770-2.1.0

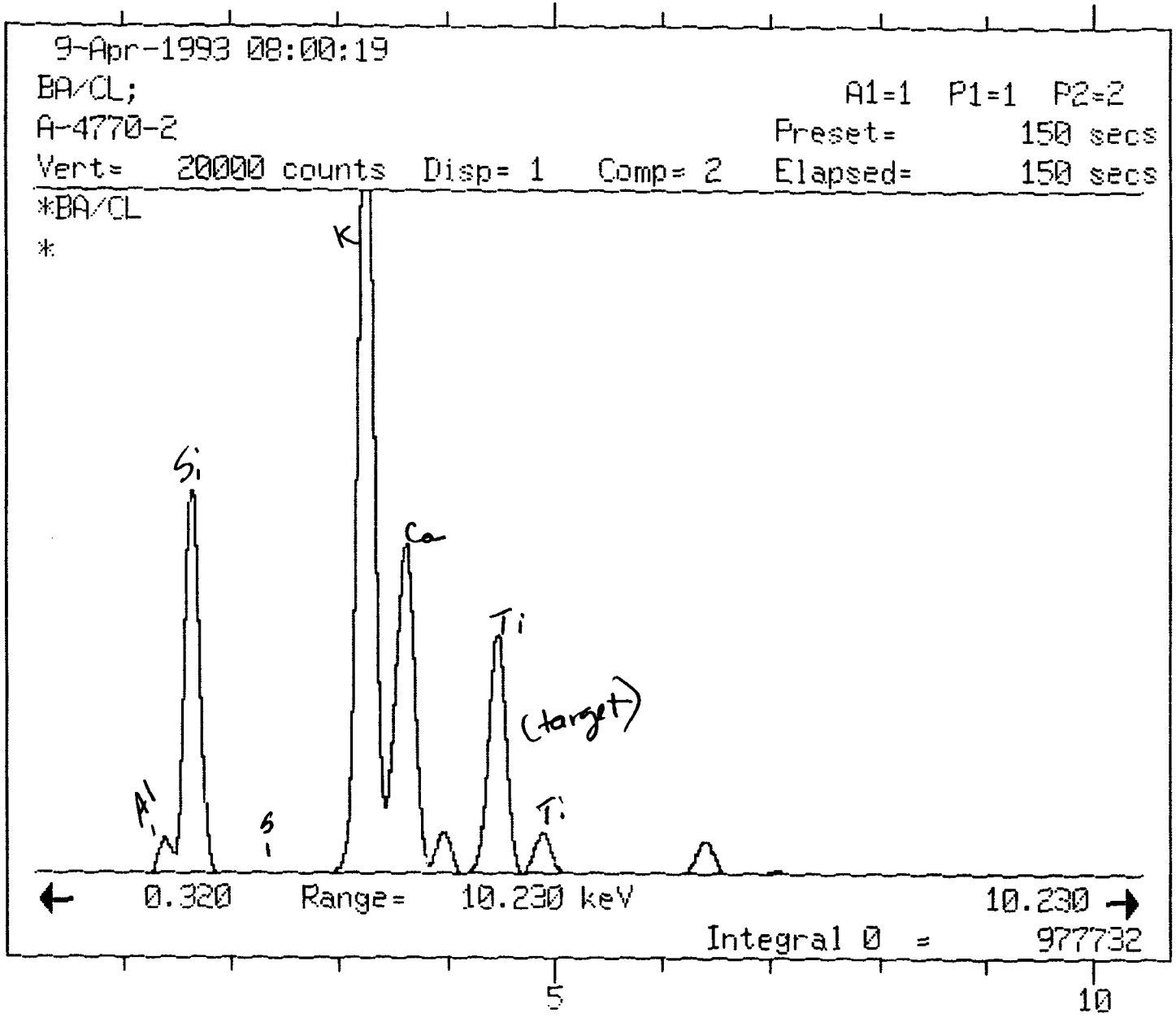
75ppm

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	105.80	16.53 Wt.%	0.89
Si KA	TI	1136.88	72.91 Wt.%	0.24
S KA	TI	0.93	220.67 ppm	25.76
K KA	TI	2596.02	8.33 Wt.%	0.16
Ca KA	TI	972.03	2.21 Wt.%	0.27
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	220.67	ppm	56.85
K	*******	ppm	130.15
CA	*******	ppm	58.89


9-Apr-1993 08:00:19
BA/CL;
A1=1 P1=1 P2=2
A-4770-2
Preset= 150 secs
Vert= 20000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
*BA/CL
*
K
Si
Ca
Ti
(target)
Al
S
Ti
0.320 Range= 10.230 keV 10.230
Integral 0 = 977732
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

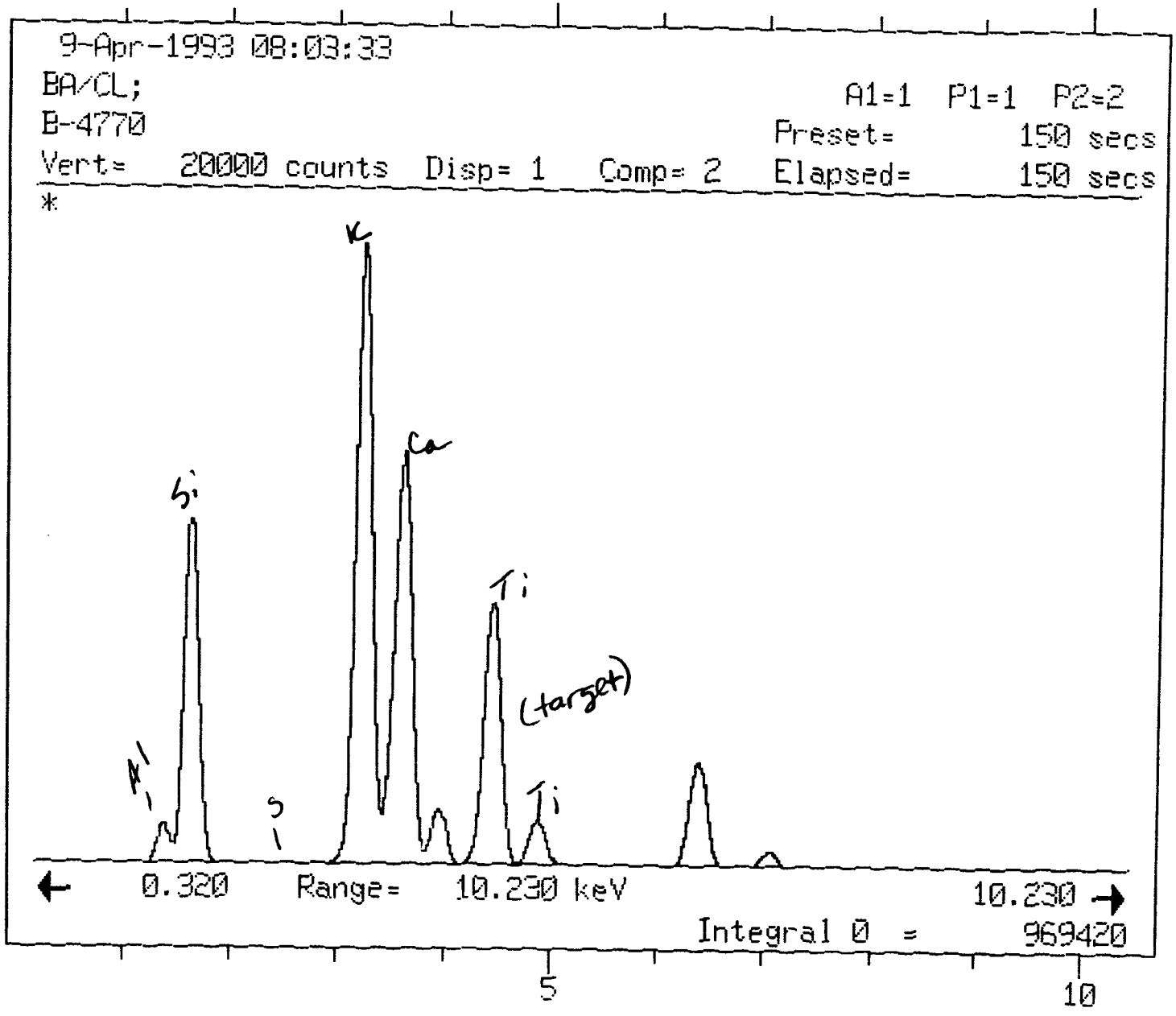
RESULTS file: 0:B-4770-2.1.0 580ppm

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	112.96	18.54 Wt.%	0.86
Si KA	TI	1010.41	71.56 Wt.%	0.26
S KA	TI	4.50	0.11 Wt.%	6.93
K KA	TI	2009.96	6.78 Wt.%	0.18
Ca KA	TI	1274.22	3.01 Wt.%	0.23
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	1123.85	ppm	77.90
K	*******	ppm	120.84
CA	*******	ppm	67.86


9-Apr-1993 08:03:33
BA/CL;
B-4770
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K
Ca
Si
Ti
(target)
Al
S
Ti
0.320
Range= 10.230 keV
10.230
Integral 0 = 969420
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

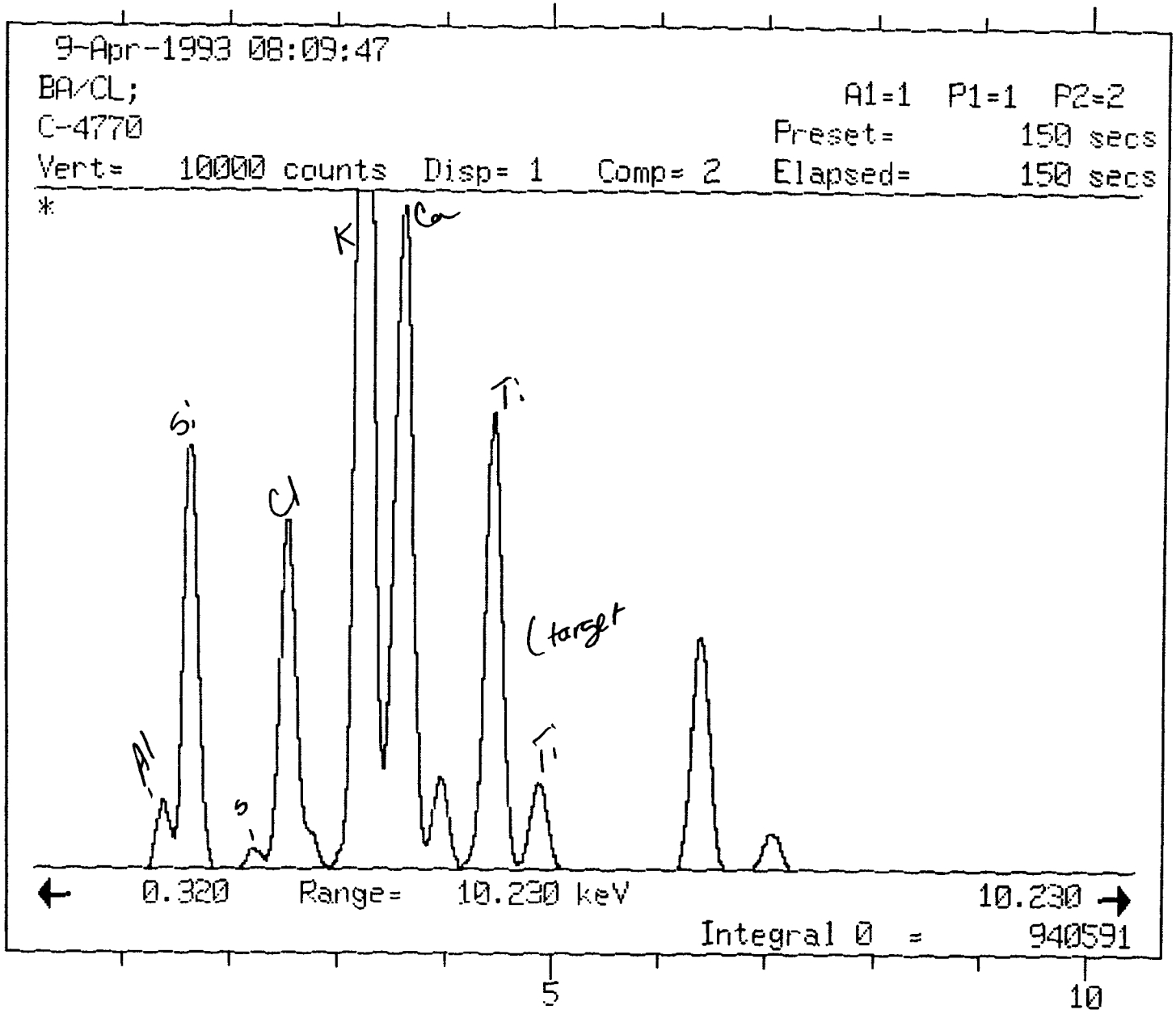
RESULTS file: 0:C-4770-2.1.0 4600ppm

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	96.25	21.18 Wt.%	0.93
Si KA	TI	620.46	59.31 Wt.%	0.33
S KA	TI	37.93	1.08 Wt.%	1.48
Cl KA	TI	548.16	6.85 Wt.%	0.34
K KA	TI	1984.56	8.51 Wt.%	0.18
Ca KA	TI	1009.70	3.06 Wt.%	0.26
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	*******	ppm	160.92
K	*******	ppm	152.40
CA	*******	ppm	78.07


9-Apr-1993 08:09:47
BA/CL;
C-4770
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K
Ca
Ti
Si
Cl
(target
Ti
Al
Si
0.320
Range= 10.230 keV
10.230
Integral 0 = 940591
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

17600 ppm

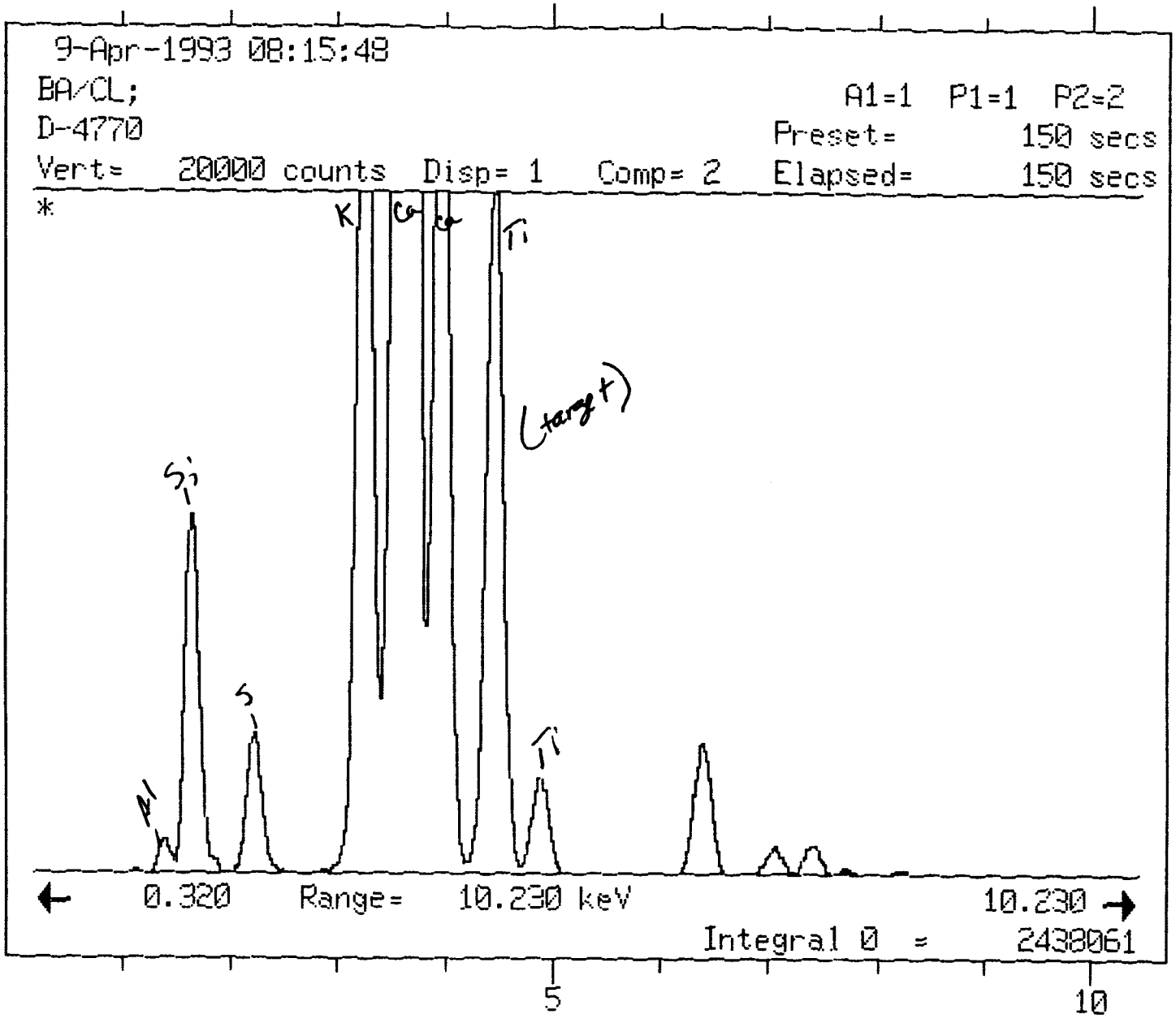
RESULTS file: 0:D-4770-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	48.75	14.09 Wt.%	1.45
Si KA	TI	505.02	45.55 Wt.%	0.38
S KA	TI	211.26	5.13 Wt.%	0.59
K KA	TI	1599.27	5.95 Wt.%	0.20
Ca KA	TI	10406.42	29.29 Wt.%	0.08
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	*******	ppm	303.47
K	*******	ppm	121.21
CA	*******	ppm	220.10


9-Apr-1993 08:15:48
BA/CL;
D-4770
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K
Cr
Cr
Ti
(target)
Si
S
Ti
Al
0.320
Range= 10.230 keV
10.230
Integral 0 = 2438061
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

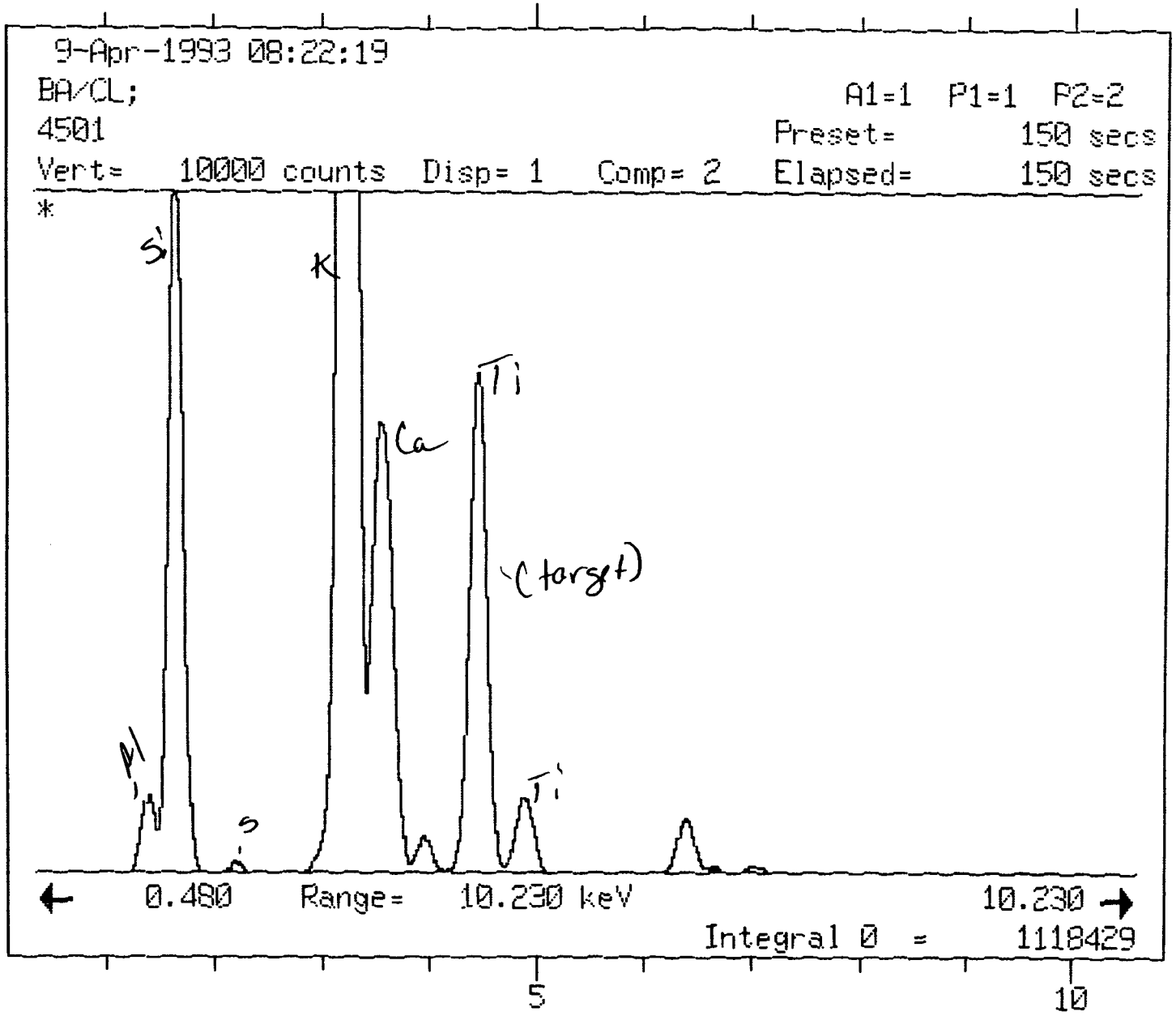
RESULTS file: 0:4501-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	112.64	18.05 Wt.%	0.89
Si KA	TI	1020.48	67.88 Wt.%	0.26
S KA	TI	19.86	0.45 Wt.%	2.26
K KA	TI	4017.32	12.63 Wt.%	0.12
Ca KA	TI	429.85	0.99 Wt.%	0.45
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	4511.90	ppm	102.04
K	*******	ppm	156.03
CA	9897.23	ppm	44.25


9-Apr-1993 08:22:19
BA/CL;
4501
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
Si
K
Ca
Ti
(target)
Ti
Si
Si
0.480
Range= 10.230 keV
10.230
Integral 0 = 1118429
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

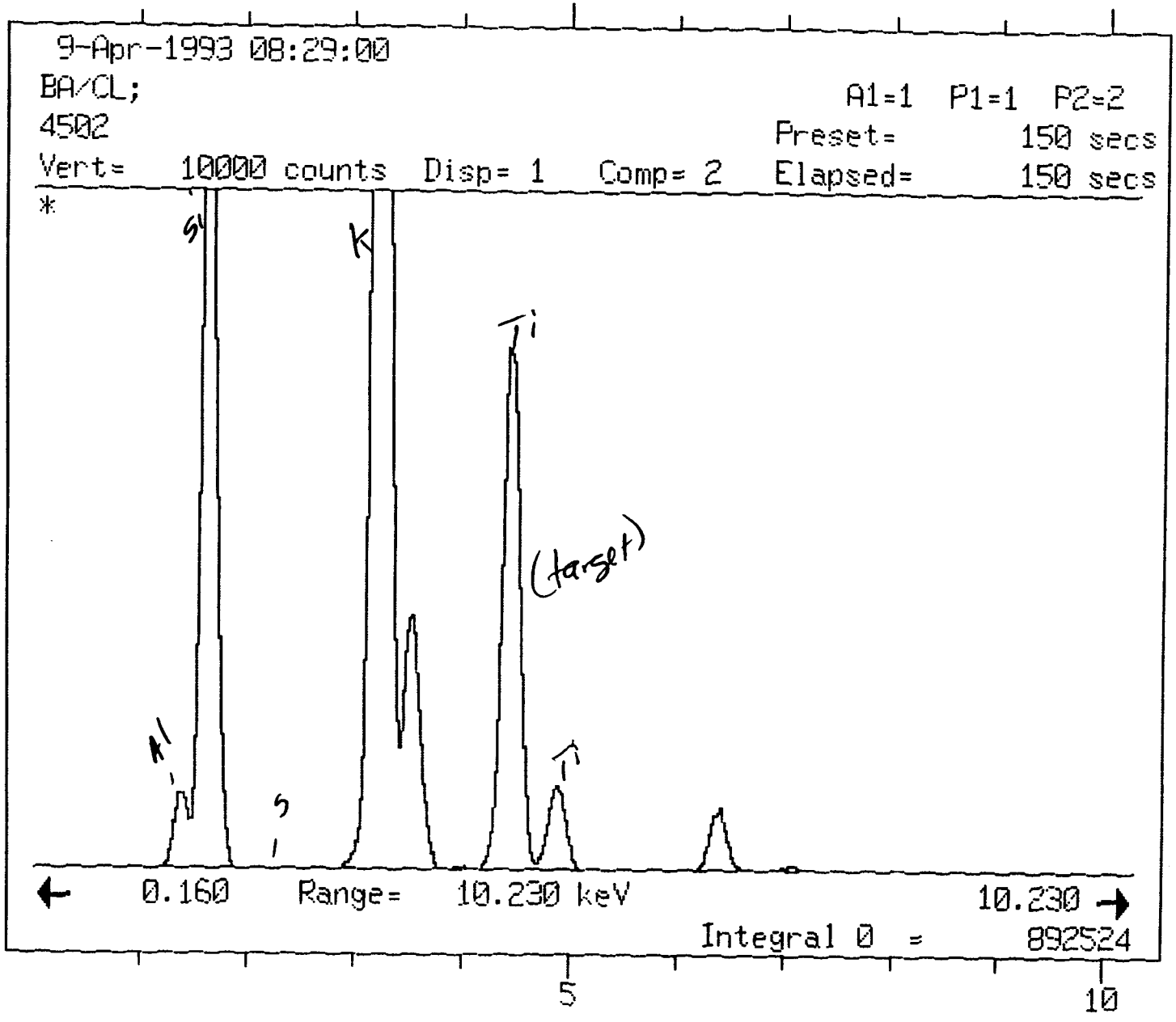
RESULTS file: 0:4502-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	118.34	17.06 Wt.%	0.84
Si KA	TI	1213.56	74.19 Wt.%	0.24
S KA	TI	1.43	325.94 ppm	16.20
K KA	TI	2832.35	8.72 Wt.%	0.14
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	325.94	ppm	52.79
K	*******	ppm	123.83


9-Apr-1993 08:29:00
BA/CL;
4502
A1=1 P1=1 P2=2
Preset= 150 secs
Vert= 10000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
*
Si
K
Ti
(target)
Al
S
Ti
0.160
Range= 10.230 keV
10.230
Integral 0 = 892524
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

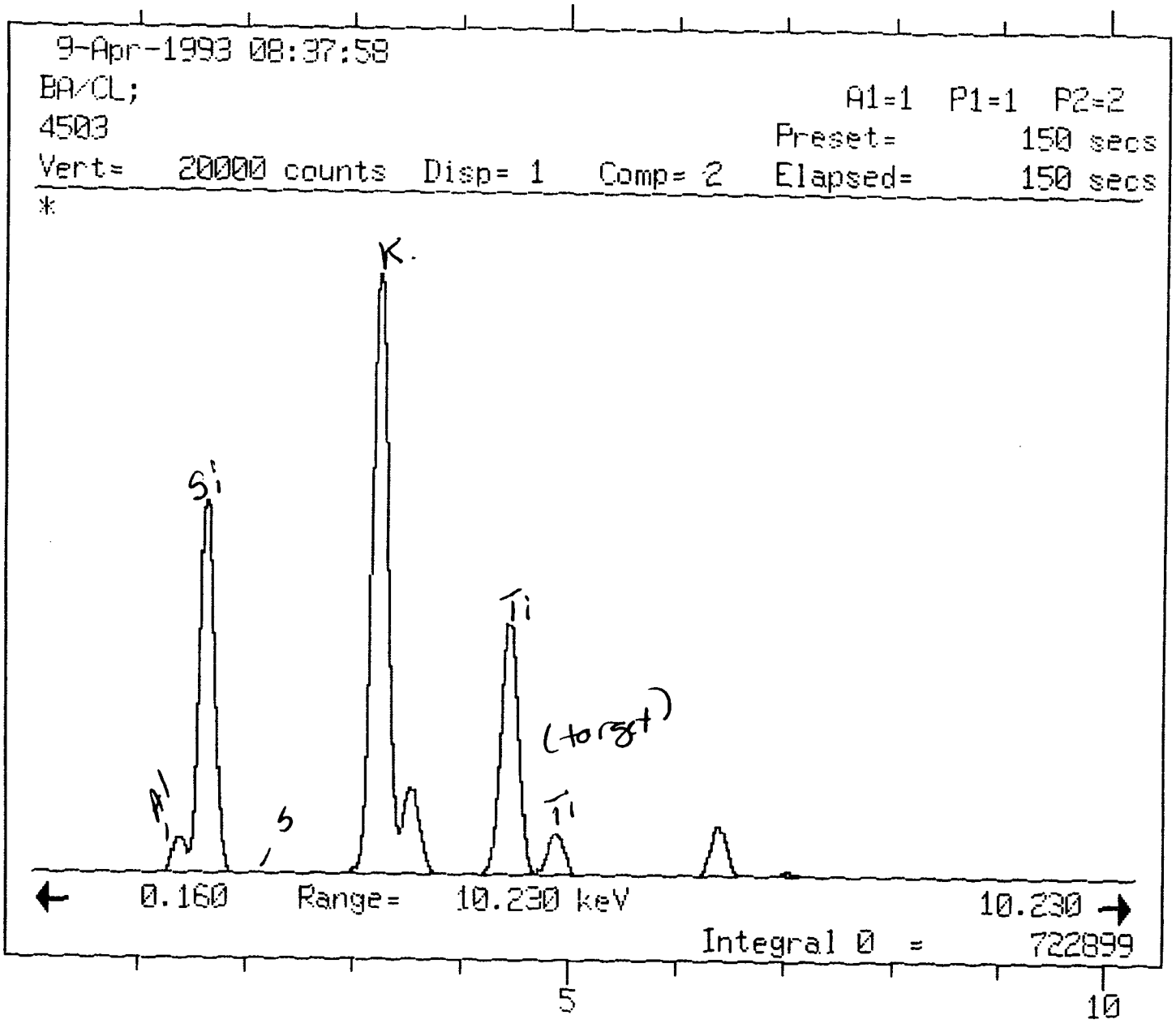
RESULTS file: 0:4503-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	115.89	18.06 Wt.%	0.83
Si KA	TI	1093.20	75.31 Wt.%	0.25
S KA	TI	1.87	480.82 ppm	12.02
K KA	TI	1916.84	6.58 Wt.%	0.17
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	480.82	ppm	57.82
K	*******	ppm	113.31


9-Apr-1993 08:37:58
BA/CL;
4503
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K.
Si
Ti
(target)
Ti
Al
S
0.160 Range= 10.230 keV
10.230
Integral 0 = 722899
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

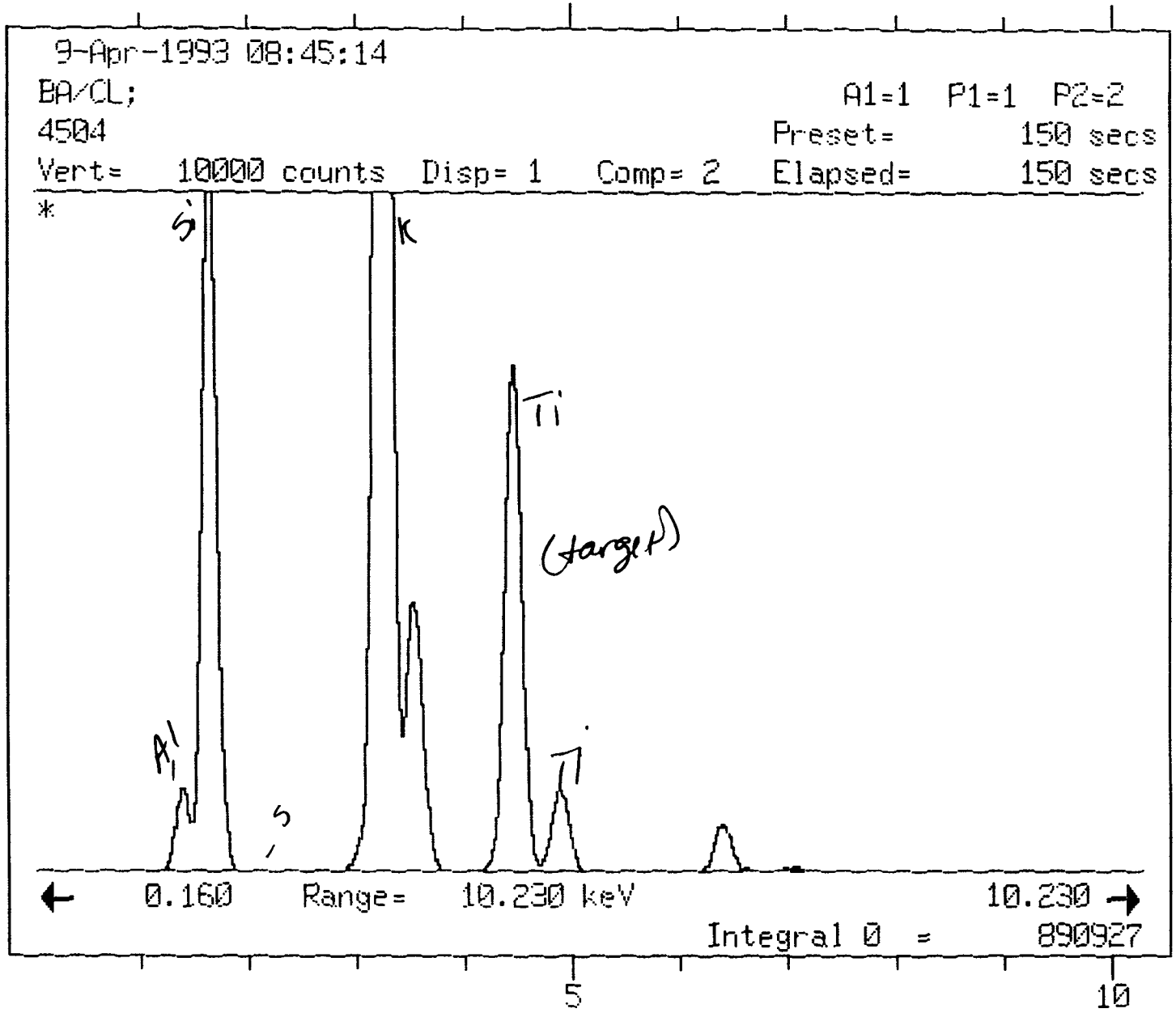
RESULTS file: 0:4504-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	123.48	18.94 Wt.%	0.82
Si KA	TI	1059.41	71.28 Wt.%	0.25
S KA	TI	1.58	372.65 ppm	14.37
K KA	TI	3041.45	9.74 Wt.%	0.14
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	372.65	ppm	53.56
K	*******	ppm	133.85


9-Apr-1993 08:45:14
BA/CL;
4504
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
S
K
Ti
(target)
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 890927
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

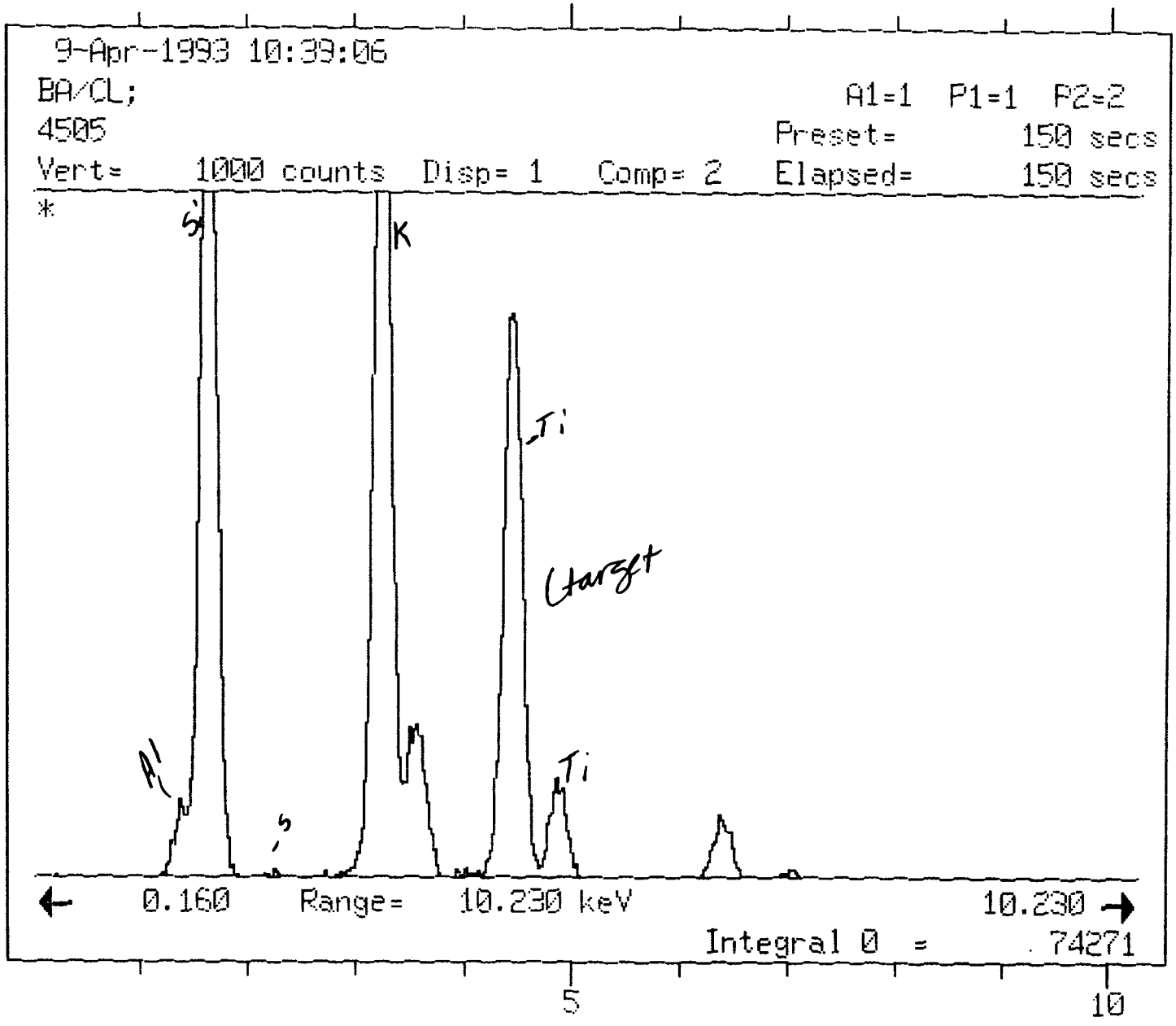
RESULTS file: 0:4505-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	10.80	14.59 Wt.%	2.86
Si KA	TI	143.98	80.27 Wt.%	0.68
S KA	TI	0.35	820.98 ppm	22.89
K KA	TI	163.68	5.06 Wt.%	0.59
Total			100.00 Wt.%	

Component	Conc.		Abs. error (1-sigma)
AL	*******	ppm	******
SI	*******	ppm	******
S	820.98	ppm	187.93
K	*******	ppm	297.62


9-Apr-1993 10:39:06
BA/CL;
4505
Vert= 1000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
Si
K
Ti
Target
Ti
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = .74271
5
10

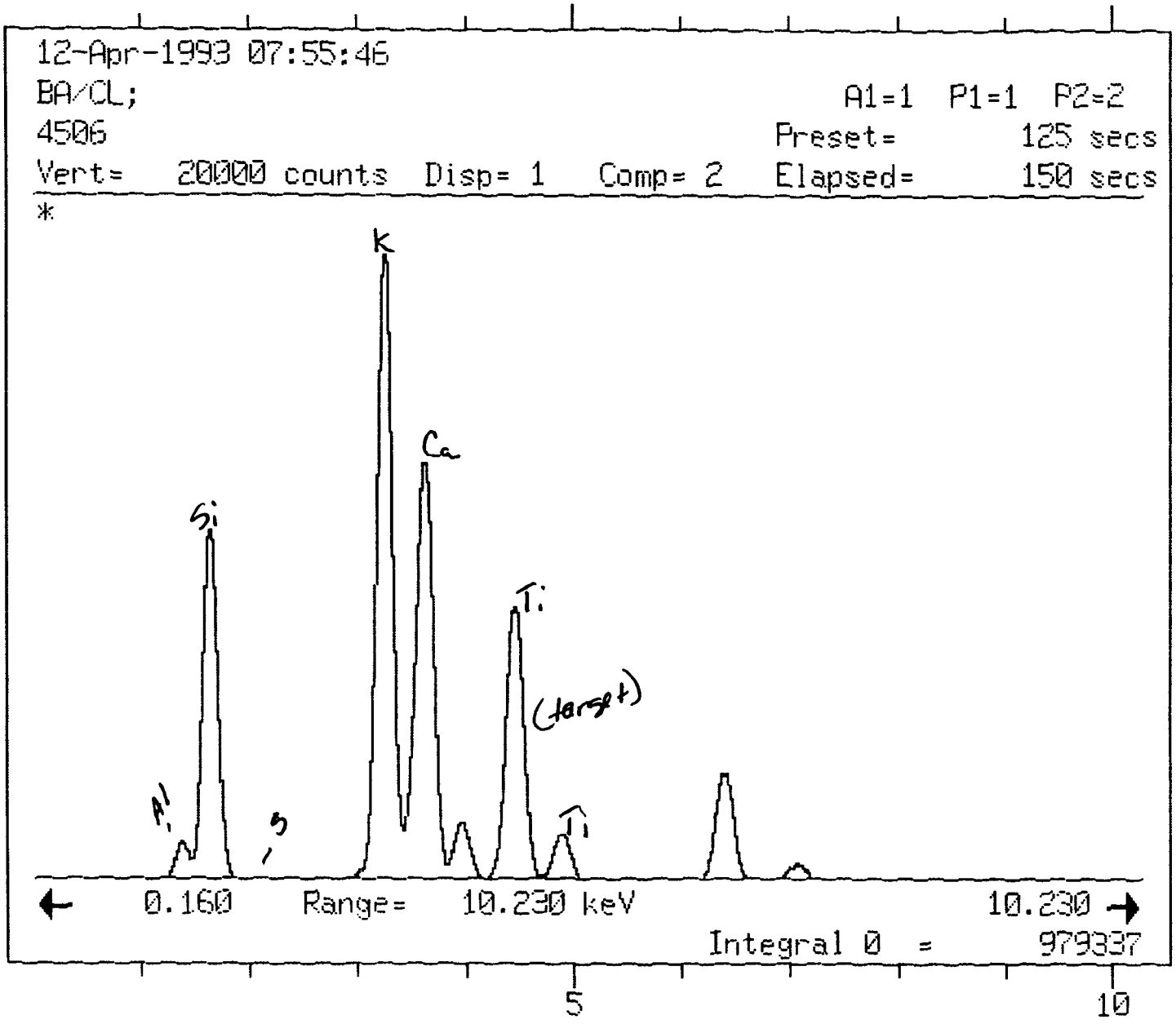
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4506-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	114.78	18.69 Wt.%	0.84
Si KA	TI	1014.02	71.53 Wt.%	0.26
S KA	TI	4.17	0.10 Wt.%	6.97
K KA	TI	1972.05	6.60 Wt.%	0.18
Ca KA	TI	1314.64	3.08 Wt.%	0.22
Total			100.00 Wt.%	


12-Apr-1993 07:55:46
BA/CL;
A1=1 P1=1 P2=2
4506
Preset= 125 secs
Vert= 20000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
*
K
Ca
Si
Ti
(target)
Al
S
Ti
0.160
Range= 10.230 keV
10.230
Integral 0 = 979337
5
10

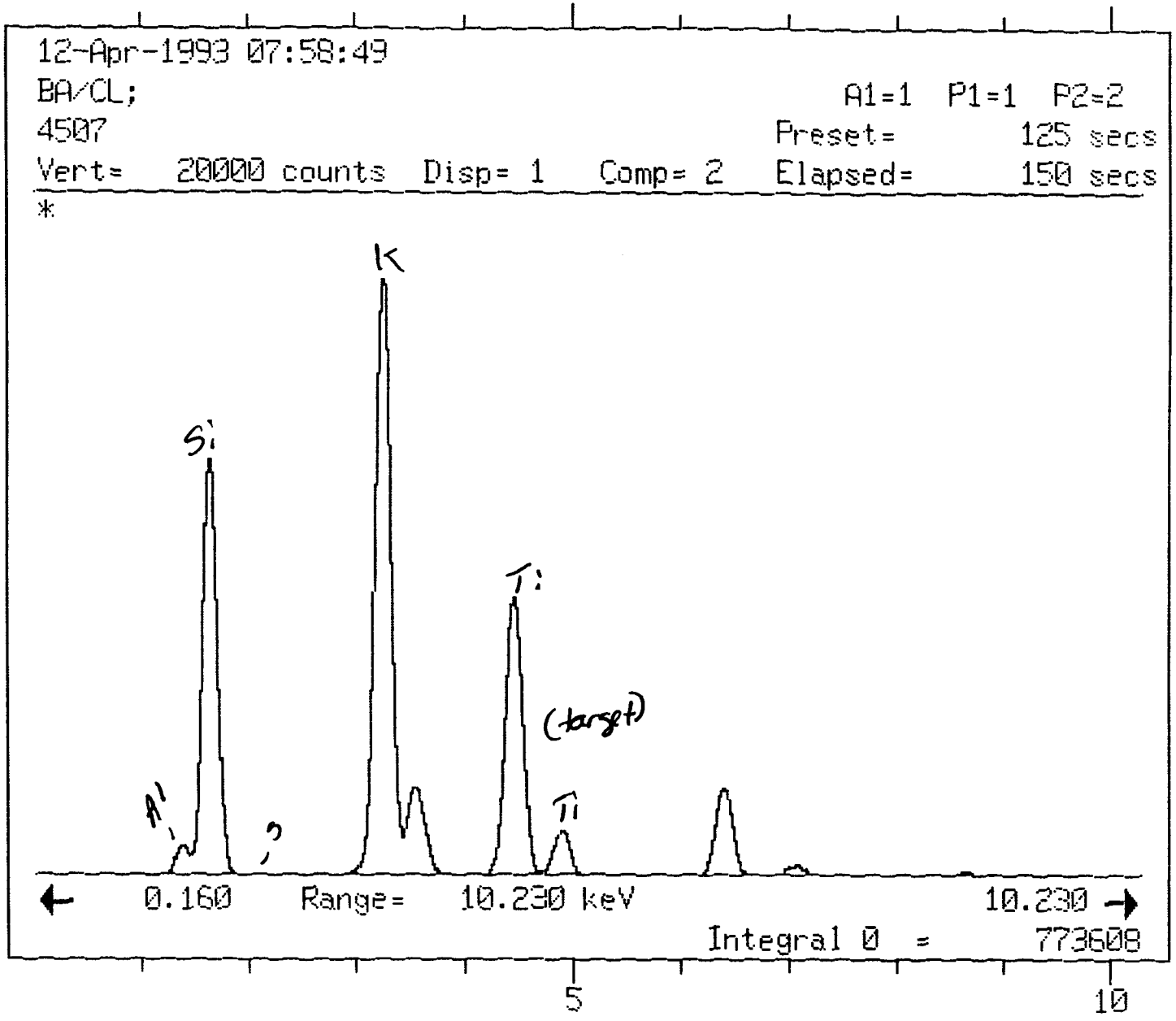
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4507-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	96.67	15.16 Wt.%	0.92
Si KA	TI	1206.96	78.15 Wt.%	0.24
S KA	TI	4.15	0.11 Wt.%	6.28
K KA	TI	1885.70	6.58 Wt.%	0.17
Total			100.00 Wt.%	


12-Apr-1993 07:58:49
BA/CL;
A1=1 P1=1 P2=2
4507
Preset= 125 secs
Vert= 20000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
?
Ti
0.160
Range= 10.230 keV
10.230
Integral 0 = 773608
5
10

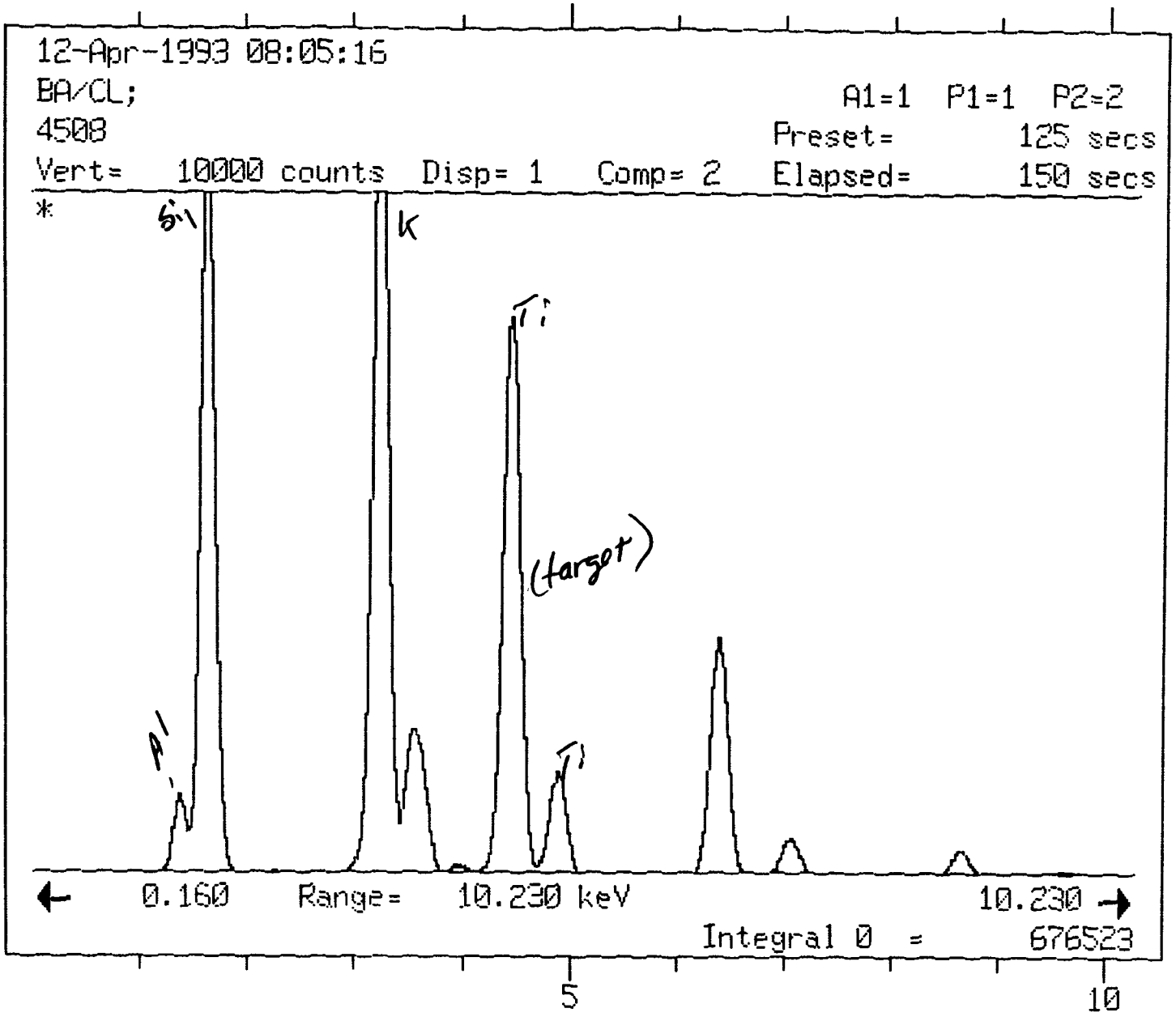
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4508-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	107.84	17.85 Wt.%	0.85
Si KA	TI	1042.26	76.98 Wt.%	0.25
S KA	TI	8.52	0.24 Wt.%	3.79
K KA	TI	1316.57	4.93 Wt.%	0.21
Total			100.00 Wt.%	


12-Apr-1993 08:05:16
BA/CL;
4508
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
Si
K
Ti
(target)
Ti
Al
0.160 Range= 10.230 keV 10.230
Integral 0 = 676523
5
10

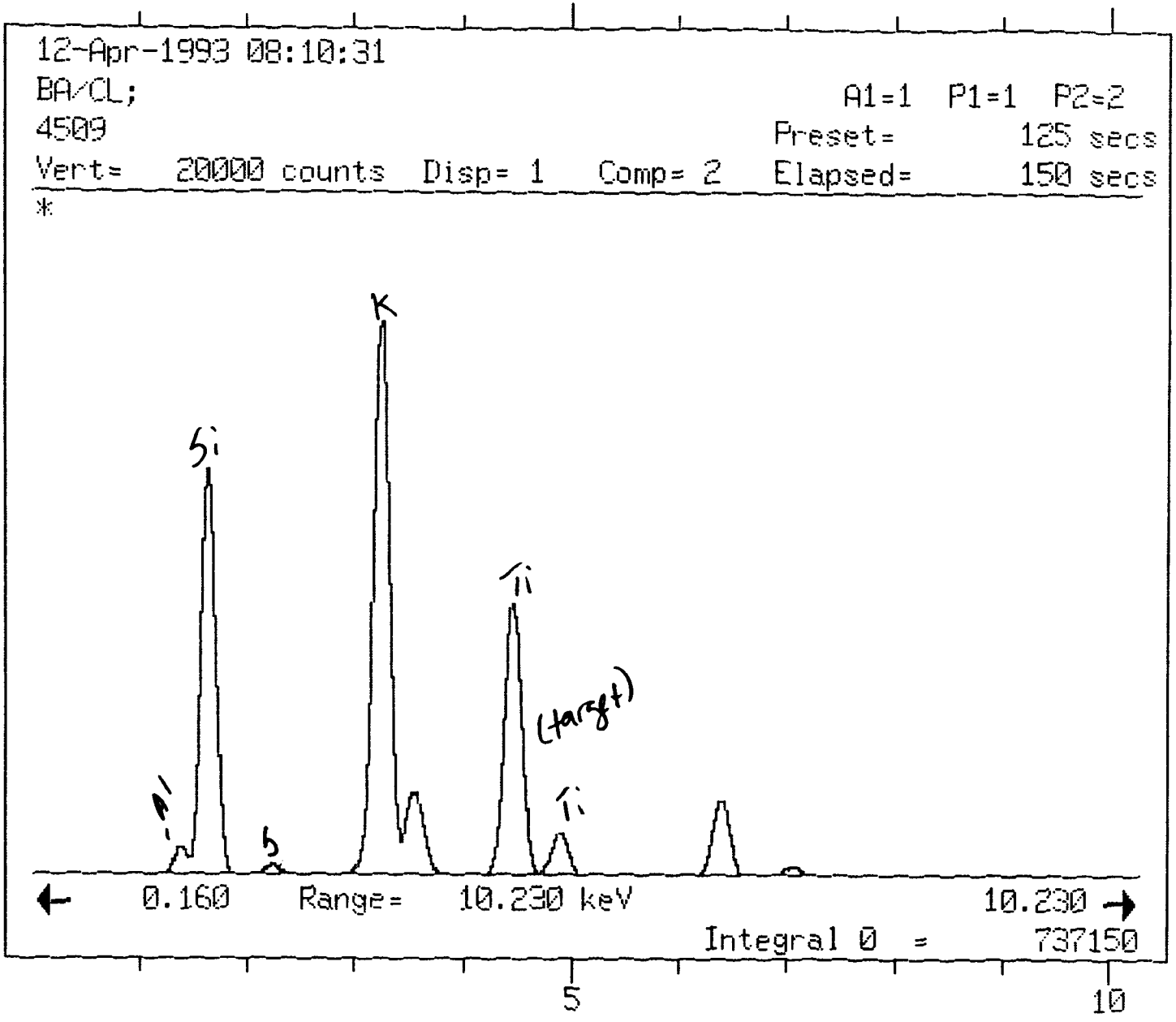
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4509-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	85.33	14.14 Wt.%	0.98
Si KA	TI	1175.55	78.15 Wt.%	0.24
S KA	TI	42.51	1.16 Wt.%	1.36
K KA	TI	1771.31	6.54 Wt.%	0.18
Total			100.00 Wt.%	


12-Apr-1993 08:10:31
BA/CL;
4509
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
Si
K
Ti
(target)
Ti
0.160 Range= 10.230 keV 10.230
Integral 0 = 737150
5
10

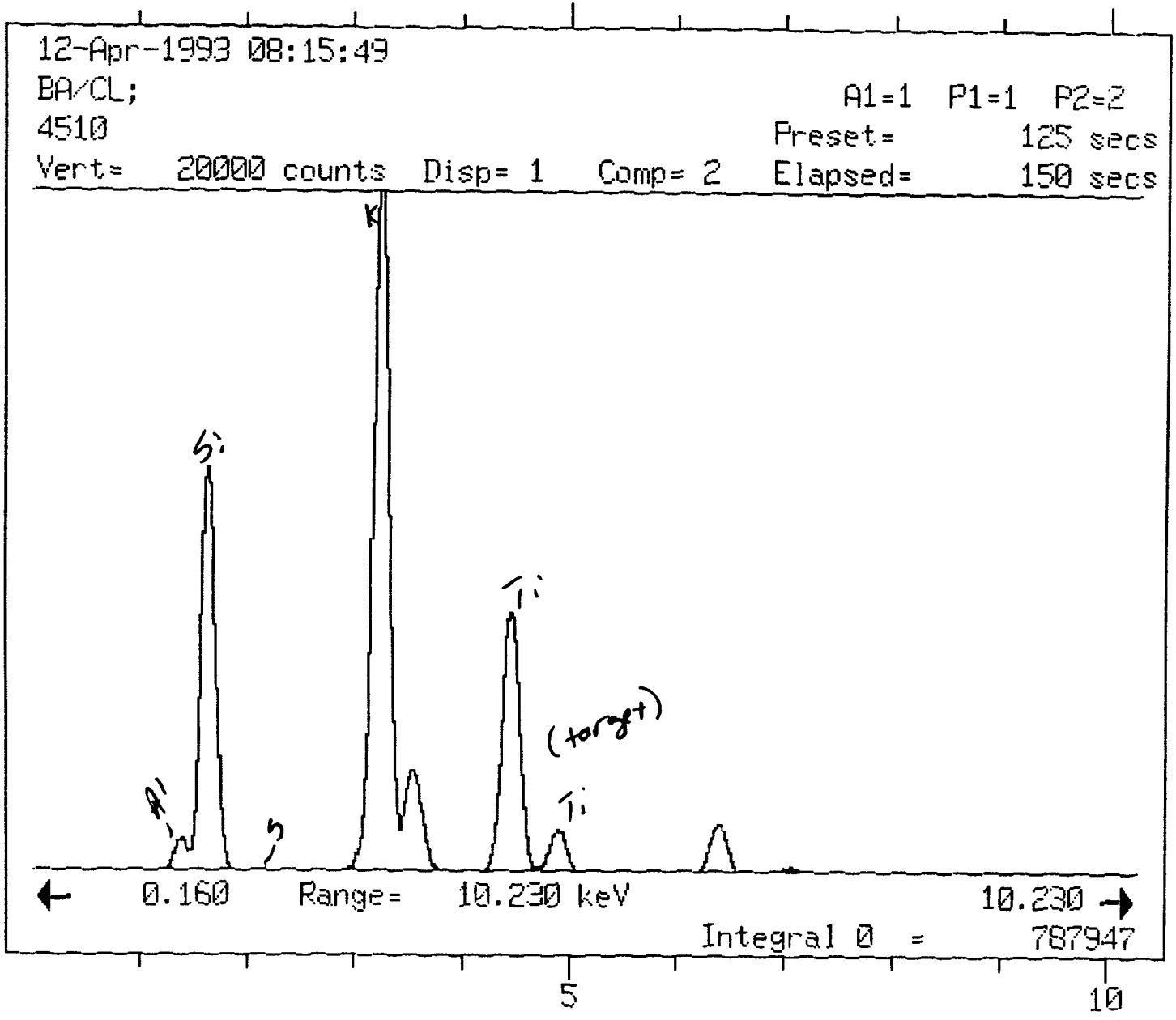
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4510-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	100.37	15.87 Wt.%	0.91
Si KA	TI	1161.26	76.46 Wt.%	0.24
S KA	TI	0.72	184.78 ppm	30.53
K KA	TI	2215.74	7.65 Wt.%	0.16
Total			100.00 Wt.%	


12-Apr-1993 08:15:49
BA/CL;
4510
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
K
Si
Ti
(target)
Ti
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 787947
5
10

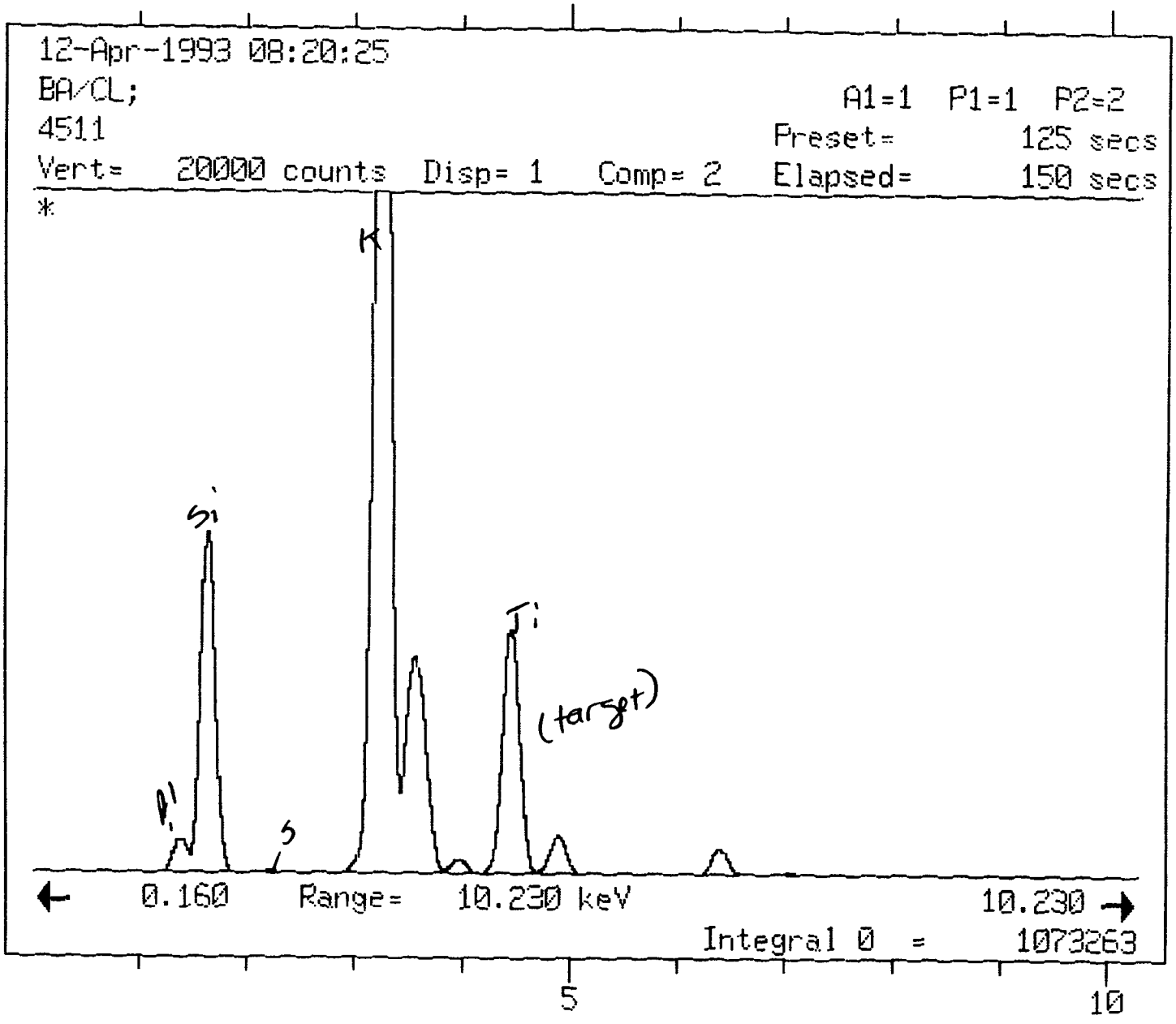
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4511-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	109.27	18.10 Wt.%	0.90
Si KA	TI	987.76	68.45 Wt.%	0.26
S KA	TI	18.36	0.44 Wt.%	2.38
K KA	TI	3949.84	13.01 Wt.%	0.12
Total			100.00 Wt.%	


12-Apr-1993 08:20:25
BA/CL;
4511
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 1073263
5
10

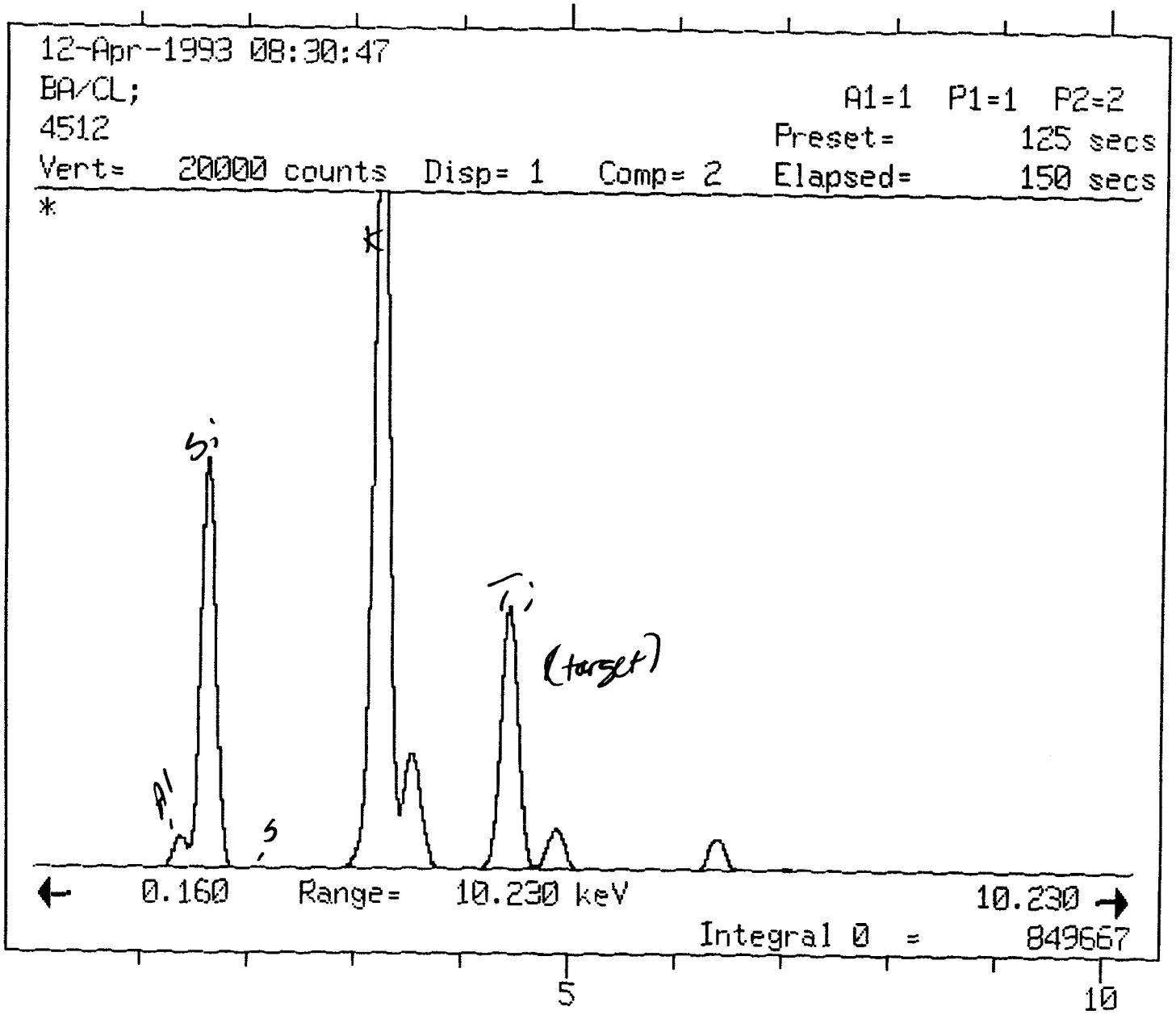
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4512-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	102.32	15.73 Wt.%	0.92
Si KA	TI	1195.46	75.67 Wt.%	0.24
S KA	TI	1.99	488.43 ppm	12.72
K KA	TI	2583.24	8.55 Wt.%	0.15
Total			100.00 Wt.%	


12-Apr-1993 08:30:47
BA/CL;
4512
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
Si
K
Ti
(target)
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 849667
5
10

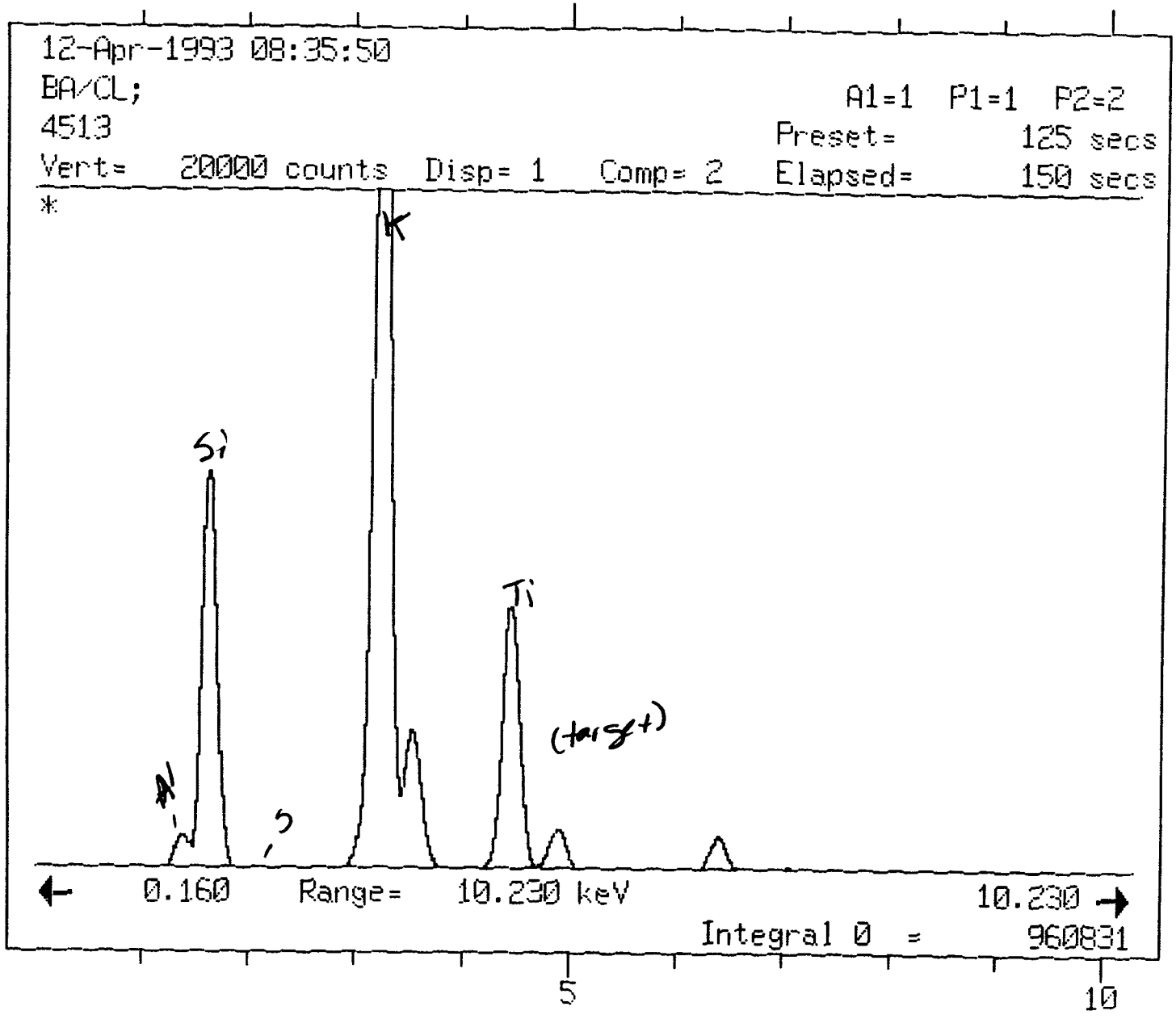
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4513-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	106.80	16.19 Wt.%	0.91
Si KA	TI	1182.27	73.52 Wt.%	0.24
S KA	TI	0.39	91.38 ppm	62.26
K KA	TI	3243.20	10.28 Wt.%	0.13
Total			100.00 Wt.%	


12-Apr-1993 08:35:50
BA/CL;
4513
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 960831
5
10

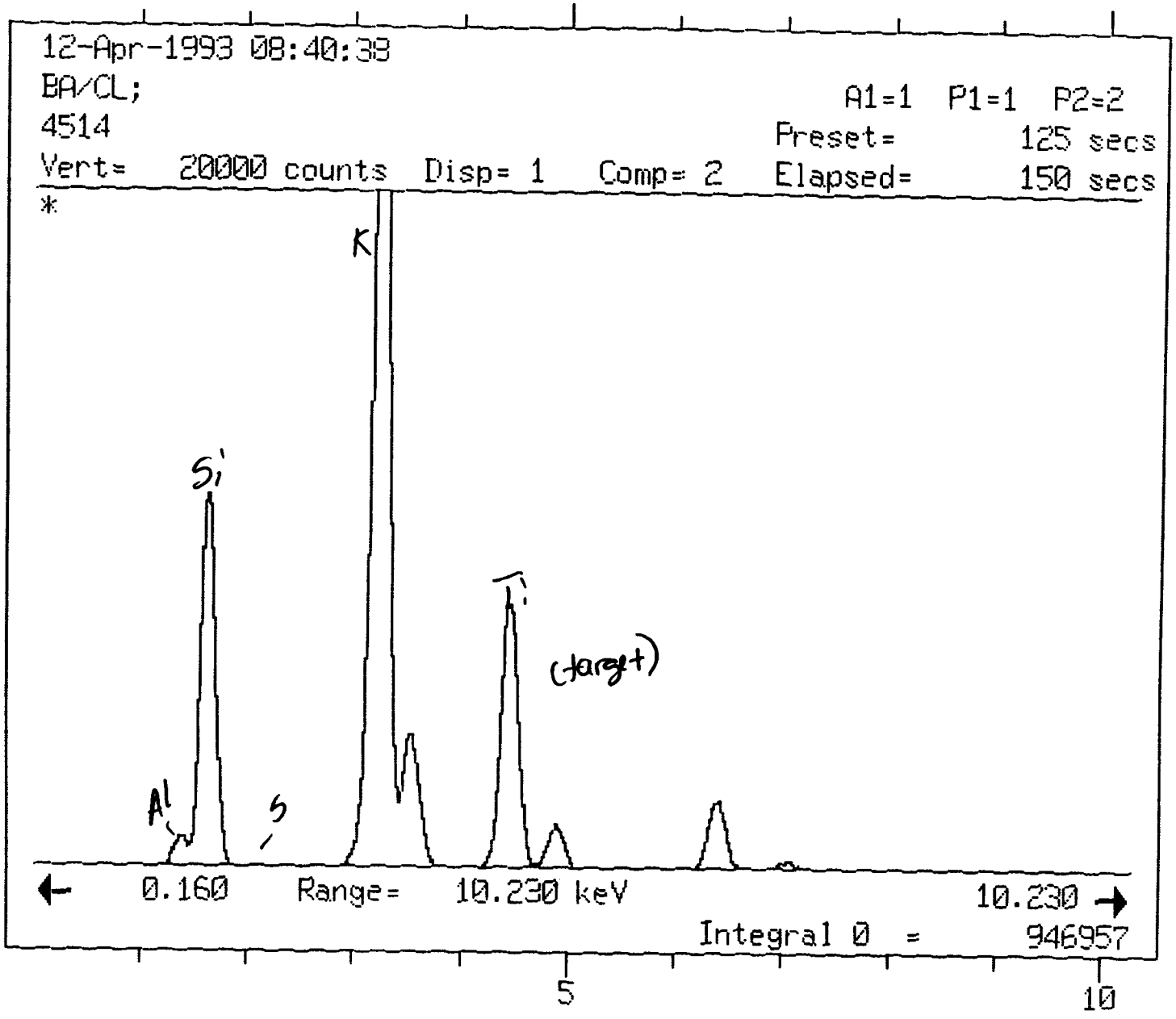
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4514-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	98.69	16.12 Wt.%	0.95
Si KA	TI	1098.94	73.37 Wt.%	0.25
S KA	TI	0.49	122.39 ppm	47.85
K KA	TI	3085.77	10.50 Wt.%	0.14
Total			100.00 Wt.%	


12-Apr-1993 08:40:39
BA/CL;
4514
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 946957
5
10

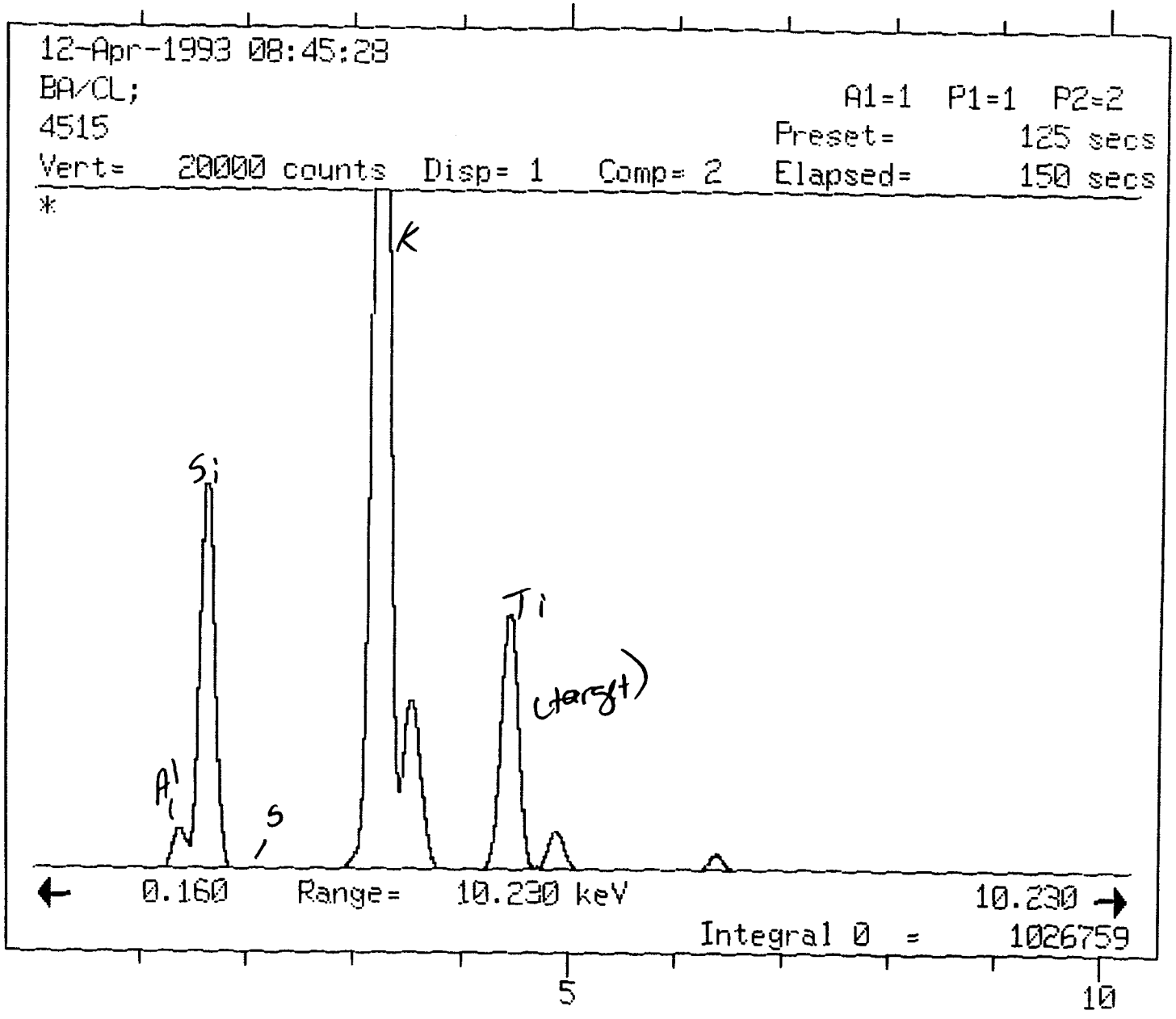
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4515-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	132.62	18.90 Wt.%	0.80
Si KA	TI	1135.07	70.26 Wt.%	0.24
S KA	TI	1.79	384.73 ppm	13.07
K KA	TI	3688.97	10.80 Wt.%	0.12
Total			100.00 Wt.%	


12-Apr-1993 08:45:28
BA/CL;
4515
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160 Range= 10.230 keV
10.230
Integral 0 = 1026759
5
10

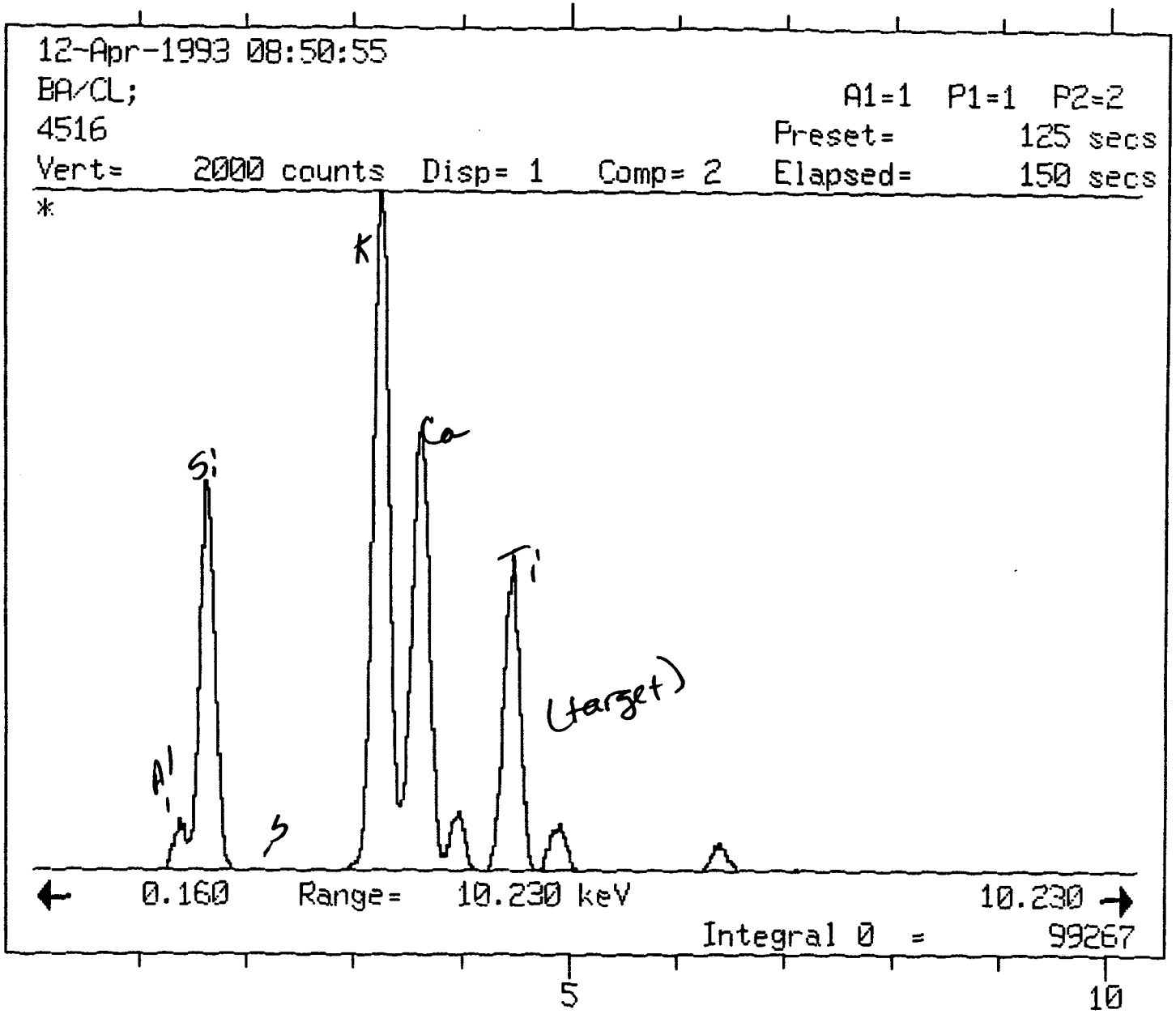
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4516-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	13.80	19.58 Wt.%	2.42
Si KA	TI	112.85	71.04 Wt.%	0.77
S KA	TI	0.66	0.14 Wt.%	13.84
K KA	TI	219.17	6.43 Wt.%	0.54
Ca KA	TI	137.43	2.81 Wt.%	0.70
Total			100.00 Wt.%	


12-Apr-1993 08:50:55
BA/CL;
4516
Vert= 2000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Ca
Si
Ti
(target)
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 99267
5
10

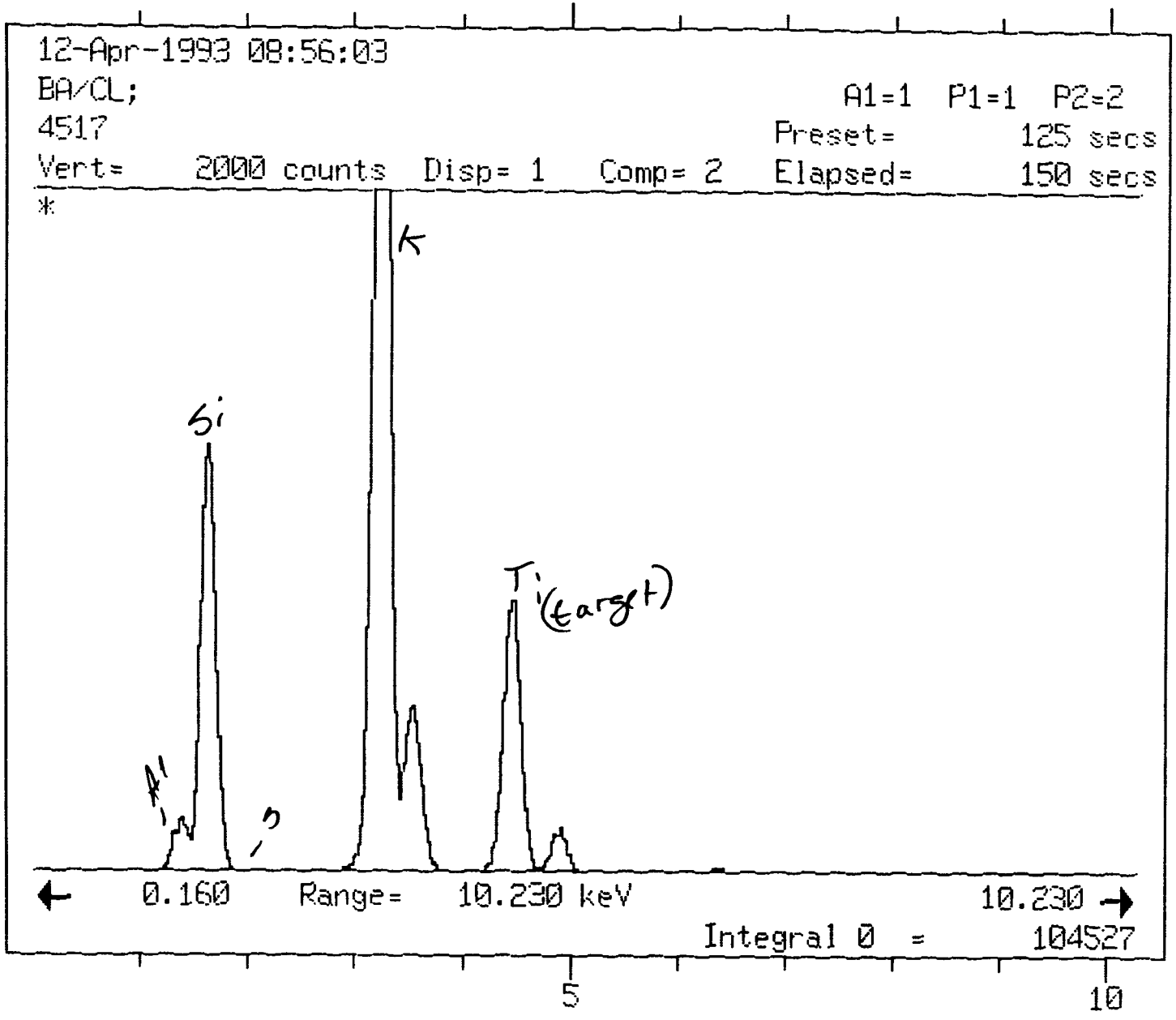
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4517-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	15.96	19.83 Wt.%	2.27
Si KA	TI	126.80	70.51 Wt.%	0.73
S KA	TI	0.08	159.86 ppm	65.57
K KA	TI	372.61	9.65 Wt.%	0.39
Total			100.00 Wt.%	


12-Apr-1993 08:56:03
BA/CL;
4517
Vert= 2000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti (target)
Al
0.160 Range= 10.230 keV 10.230
Integral 0 = 104527
5
10

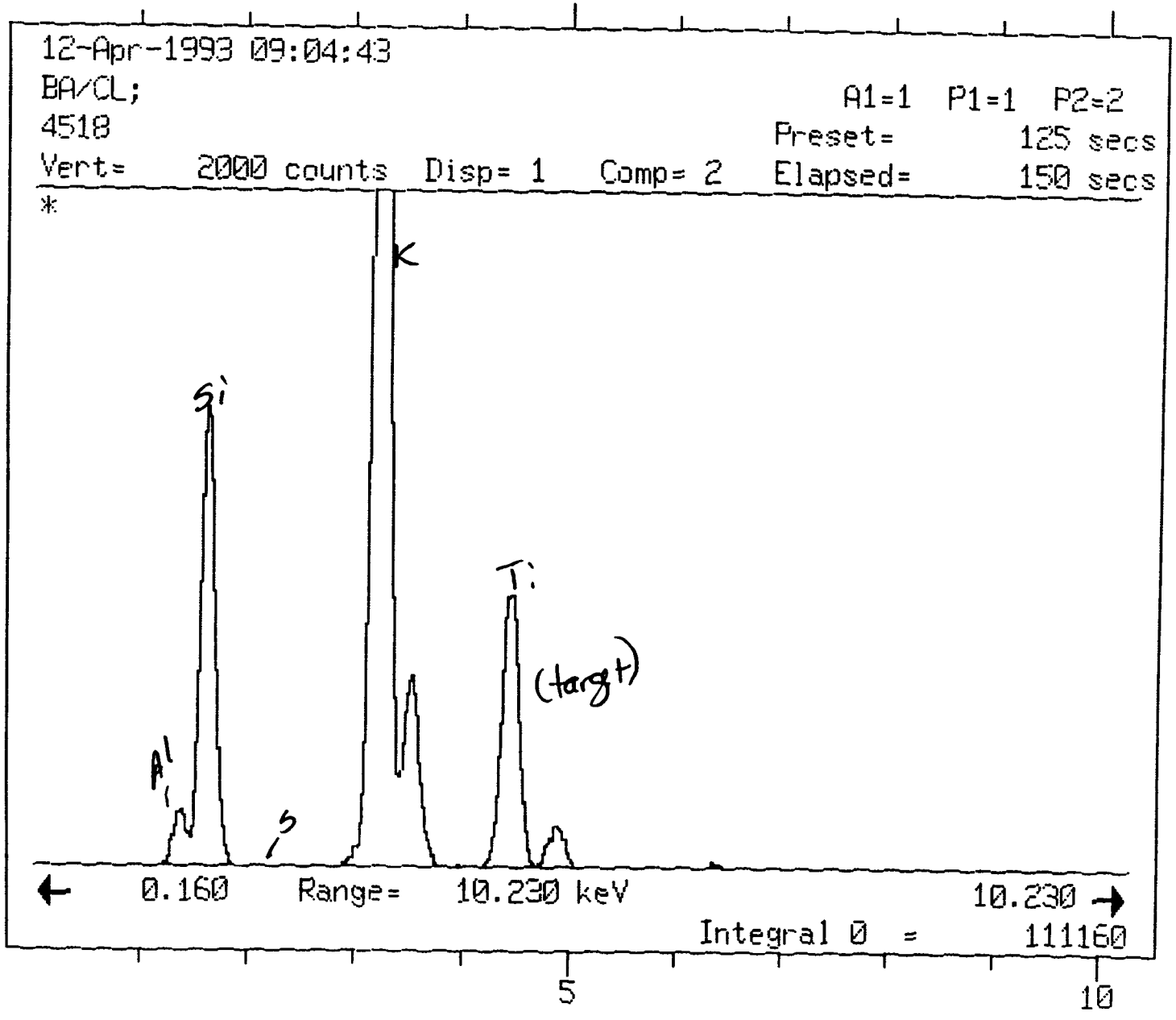
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4518-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	16.53	19.82 Wt.%	2.22
Si KA	TI	131.01	70.08 Wt.%	0.72
S KA	TI	0.45	824.23 ppm	16.48
K KA	TI	403.23	10.02 Wt.%	0.38
Total			100.00 Wt.%	


12-Apr-1993 09:04:43
BA/CL;
4518
Vert= 2000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 111160
5
10

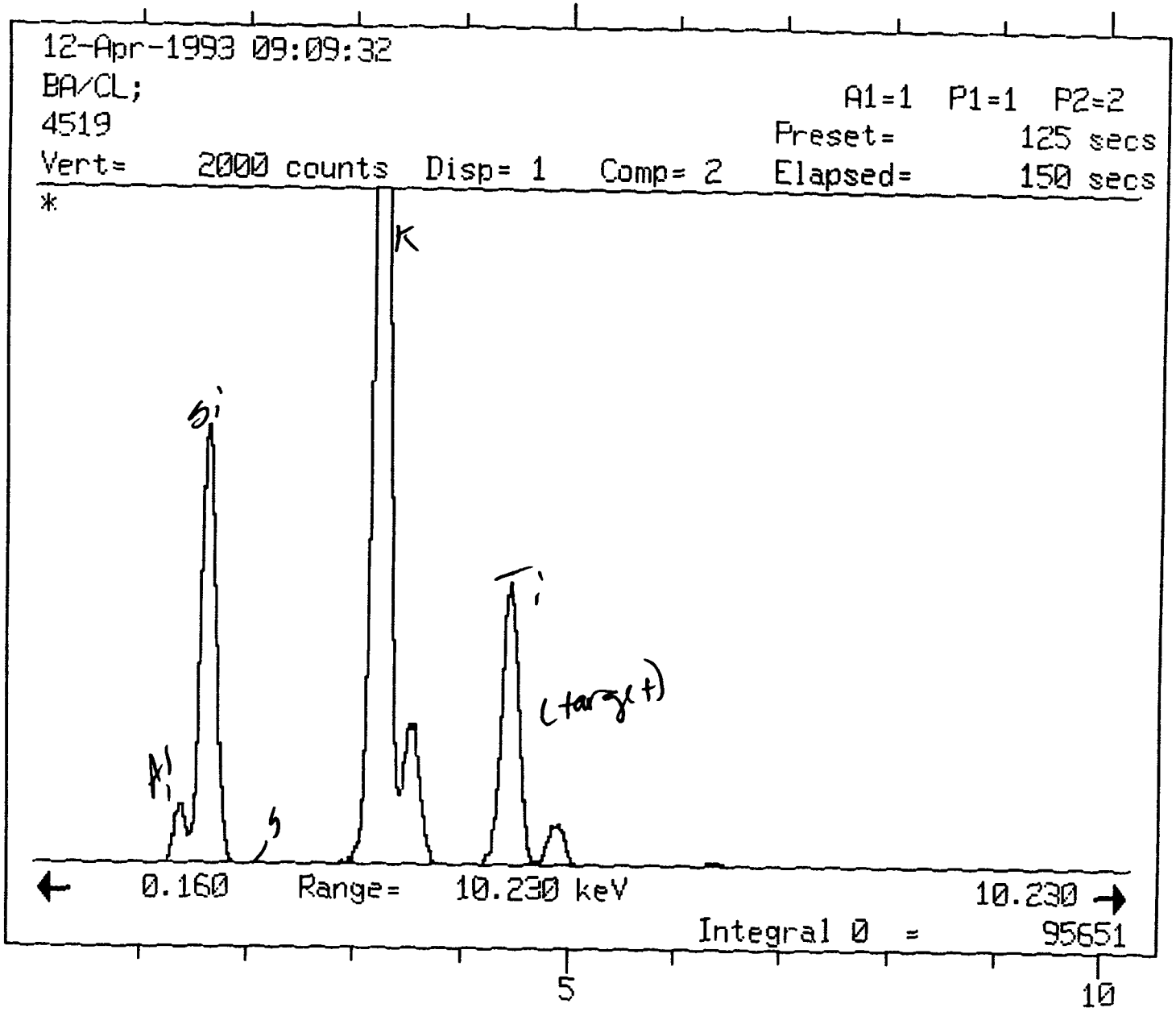
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4519-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	15.26	19.17 Wt.%	2.28
Si KA	TI	129.23	72.32 Wt.%	0.72
S KA	TI	0.00	0.00 ppm	0.00
K KA	TI	318.68	8.51 Wt.%	0.42
Total			100.00 Wt.%	


12-Apr-1993 09:09:32
BA/CL;
4519
Vert= 2000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
Si
K
Ti
(target)
Al
S
0.160 Range= 10.230 keV
10.230
Integral 0 = 95651
5
10

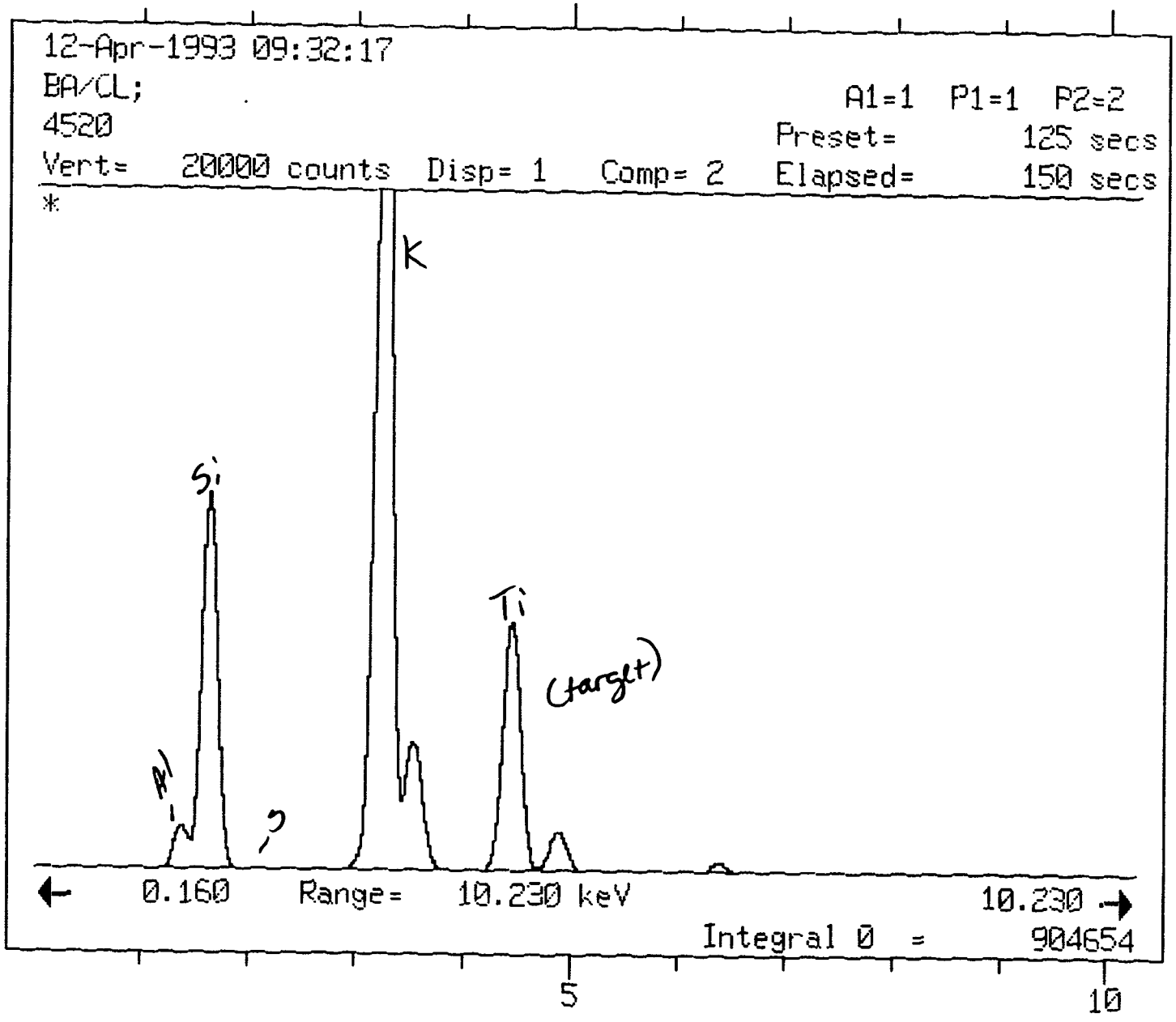
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4520-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	141.52	19.63 Wt.%	0.77
Si KA	TI	1148.40	71.44 Wt.%	0.24
S KA	TI	1.66	359.05 ppm	14.29
K KA	TI	3038.93	8.90 Wt.%	0.14
Total			100.00 Wt.%	


12-Apr-1993 09:32:17
BA/CL;
4520
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
?
0.160
Range= 10.230 keV
10.230
Integral 0 = 904654
5
10

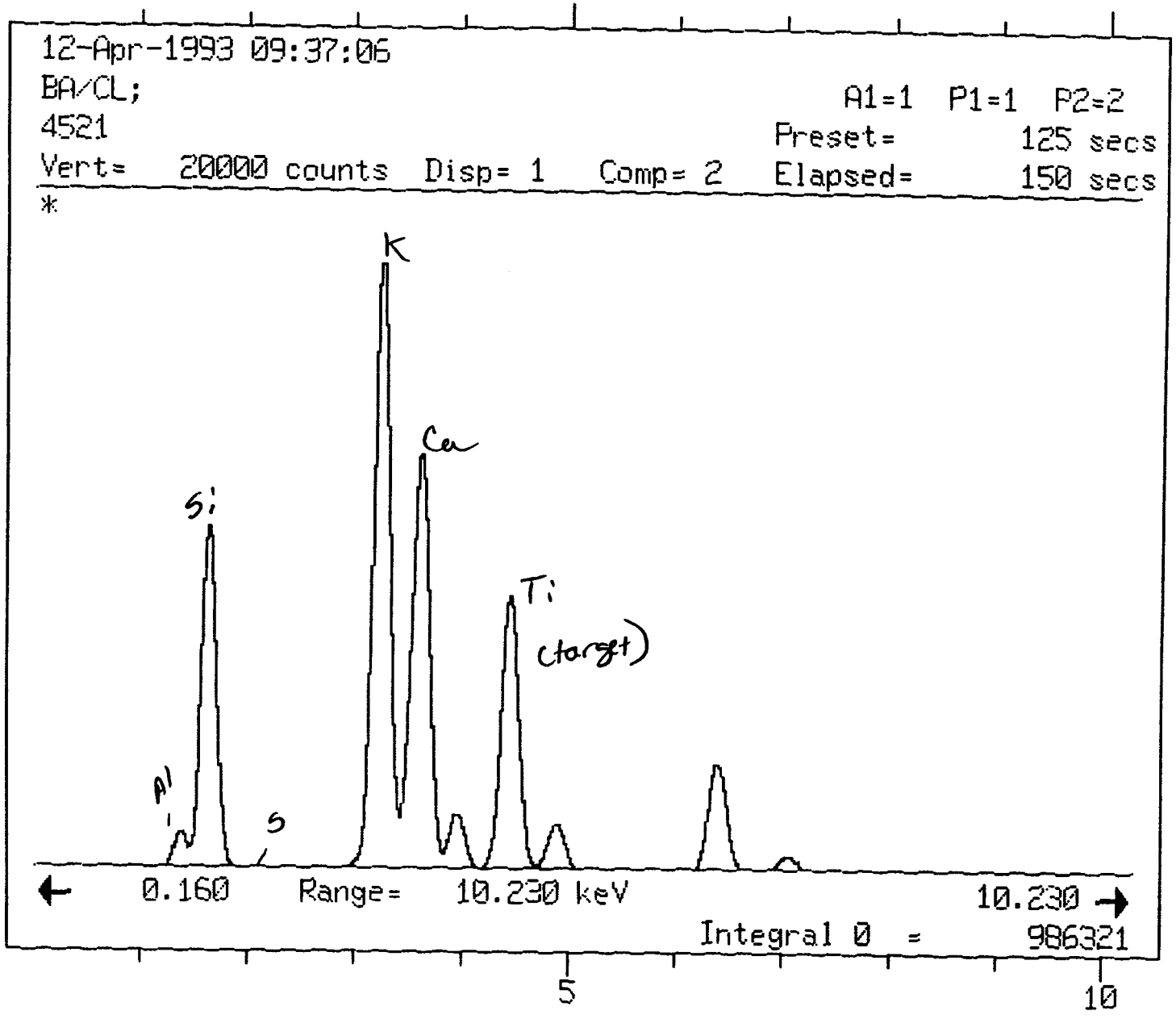
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4521-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	108.96	18.06 Wt.%	0.88
Si KA	TI	1017.38	71.86 Wt.%	0.26
S KA	TI	4.53	0.11 Wt.%	6.85
K KA	TI	2007.10	6.82 Wt.%	0.18
Ca KA	TI	1317.96	3.14 Wt.%	0.22
Total			100.00 Wt.%	


12-Apr-1993 09:37:06
BA/CL;
4521
A1=1 P1=1 P2=2
Preset= 125 secs
Vert= 20000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
*
K
Ca
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 986321
5
10

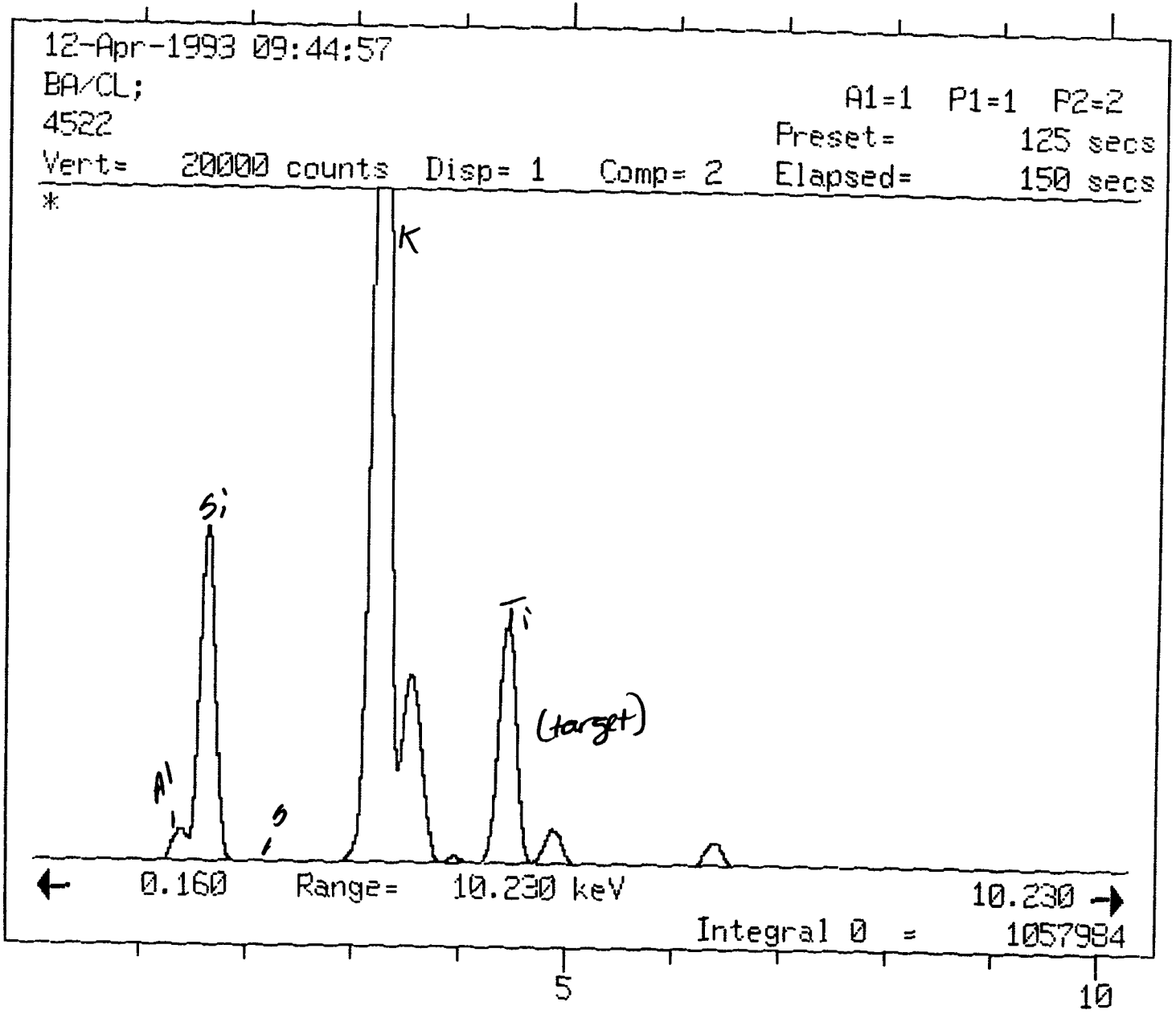
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4522-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	108.26	17.68 Wt.%	0.92
Si KA	TI	1021.74	69.39 Wt.%	0.26
S KA	TI	7.75	0.18 Wt.%	4.44
K KA	TI	3897.12	12.74 Wt.%	0.12
Total			100.00 Wt.%	


12-Apr-1993 09:44:57
BA/CL;
4522
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 1057984
5
10

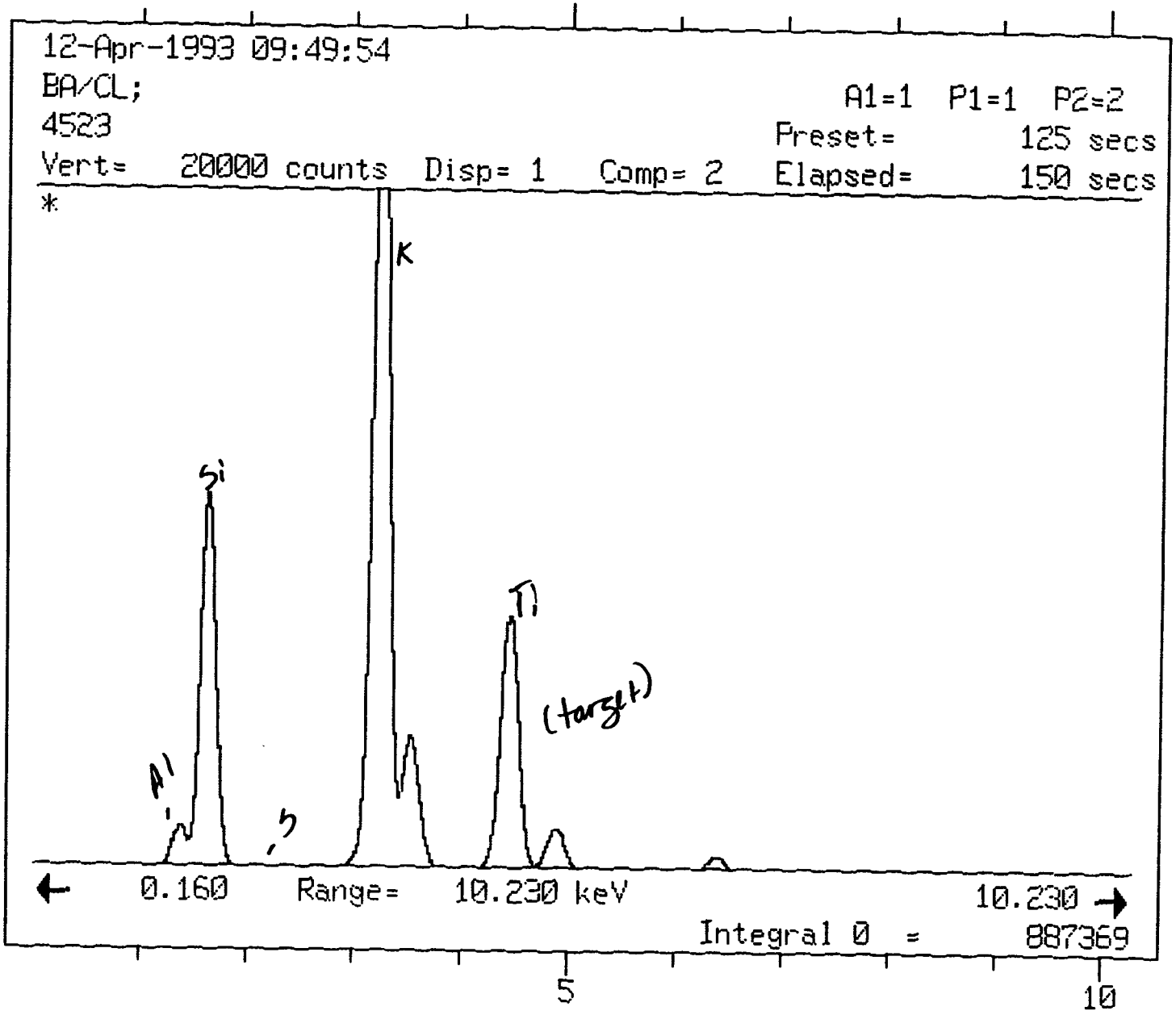
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4523-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	131.84	18.95 Wt.%	0.80
Si KA	TI	1135.22	72.09 Wt.%	0.24
S KA	TI	2.26	508.21 ppm	11.62
K KA	TI	2931.31	8.91 Wt.%	0.14
Total			100.00 Wt.%	


12-Apr-1993 09:49:54
BA/CL;
4523
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160 Range= 10.230 keV
10.230
Integral 0 = 887369
5
10

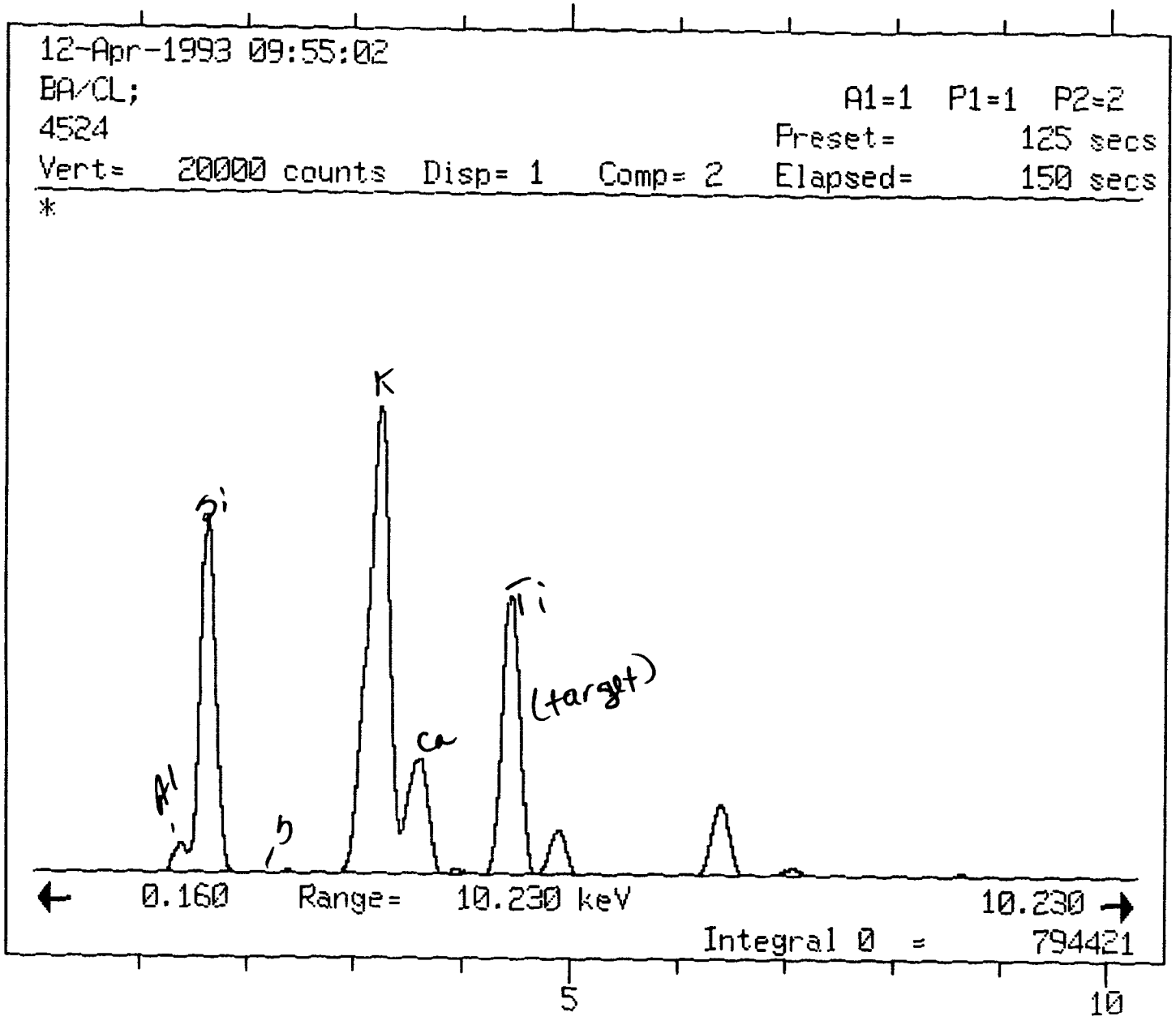
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4524-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	93.87	16.03 Wt.%	0.95
Si KA	TI	1069.13	76.15 Wt.%	0.25
S KA	TI	7.37	0.20 Wt.%	4.66
K KA	TI	1853.43	6.87 Wt.%	0.18
Ca KA	TI	285.37	0.74 Wt.%	0.57
Total			100.00 Wt.%	


12-Apr-1993 09:55:02
BA/CL;
4524
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Ca
Al
0.160 Range= 10.230 keV 10.230
Integral 0 = 794421
5
10

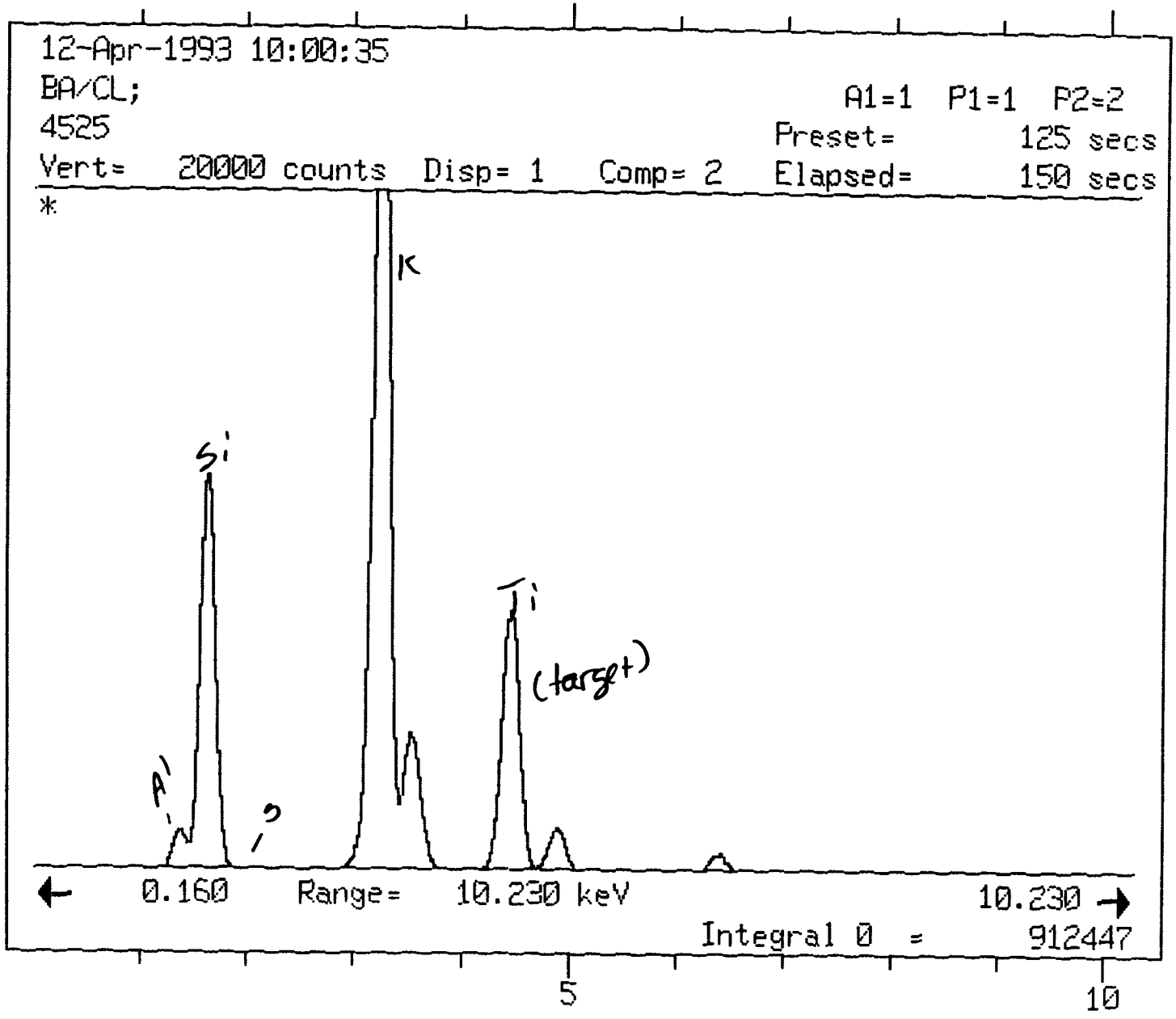
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4525-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	123.41	17.82 Wt.%	0.83
Si KA	TI	1176.33	73.00 Wt.%	0.24
S KA	TI	1.15	260.09 ppm	21.89
K KA	TI	2998.81	9.16 Wt.%	0.14
Total			100.00 Wt.%	


12-Apr-1993 10:00:35
BA/CL;
4525
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
?
0.160 Range= 10.230 keV 10.230
Integral 0 = 912447
5
10

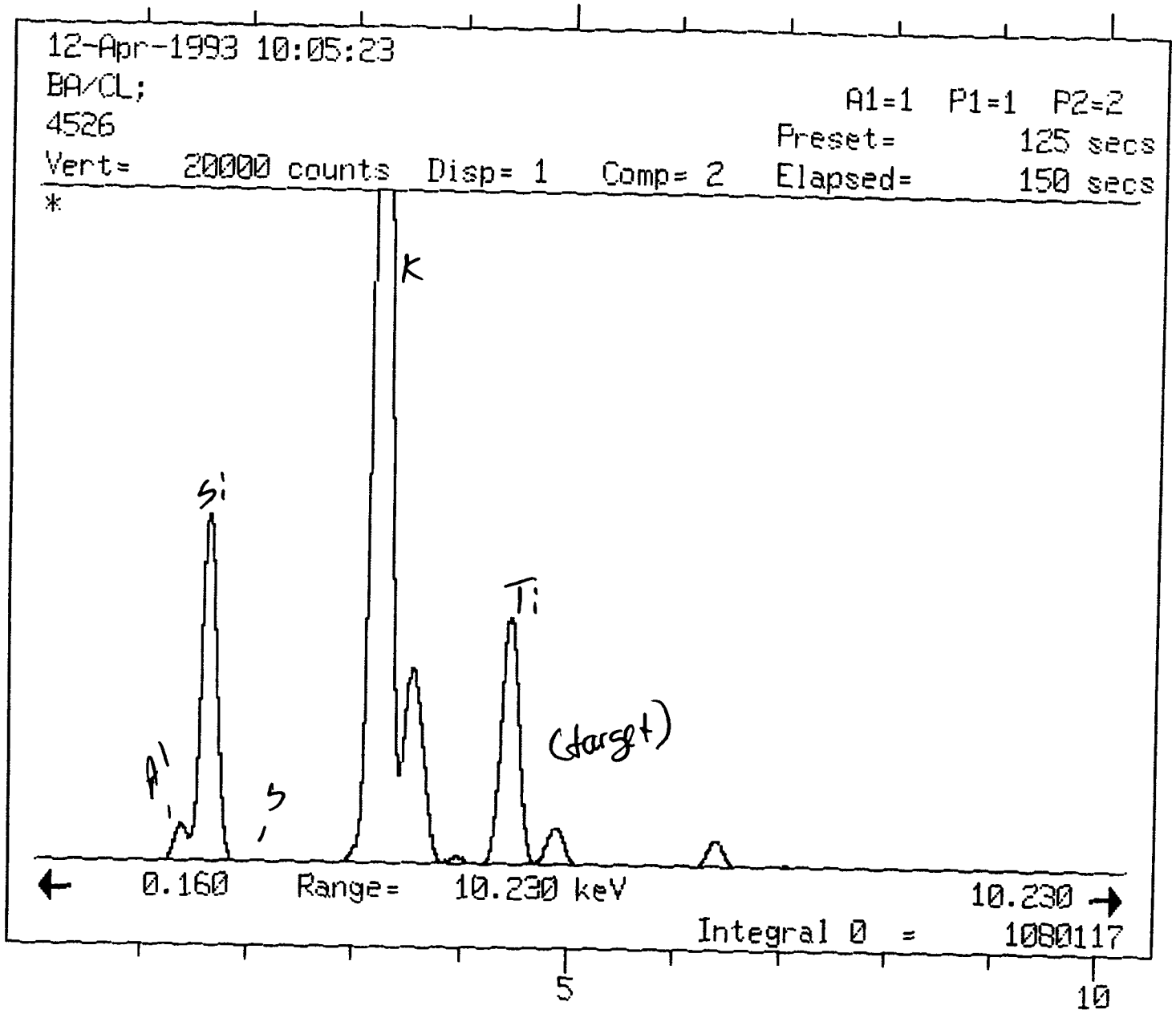
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4526-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	114.84	18.02 Wt.%	0.88
Si KA	TI	1052.79	69.37 Wt.%	0.25
S KA	TI	8.30	0.19 Wt.%	4.16
K KA	TI	3941.23	12.42 Wt.%	0.12
Total			100.00 Wt.%	


12-Apr-1993 10:05:23
BA/CL;
4526
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 1080117
5
10

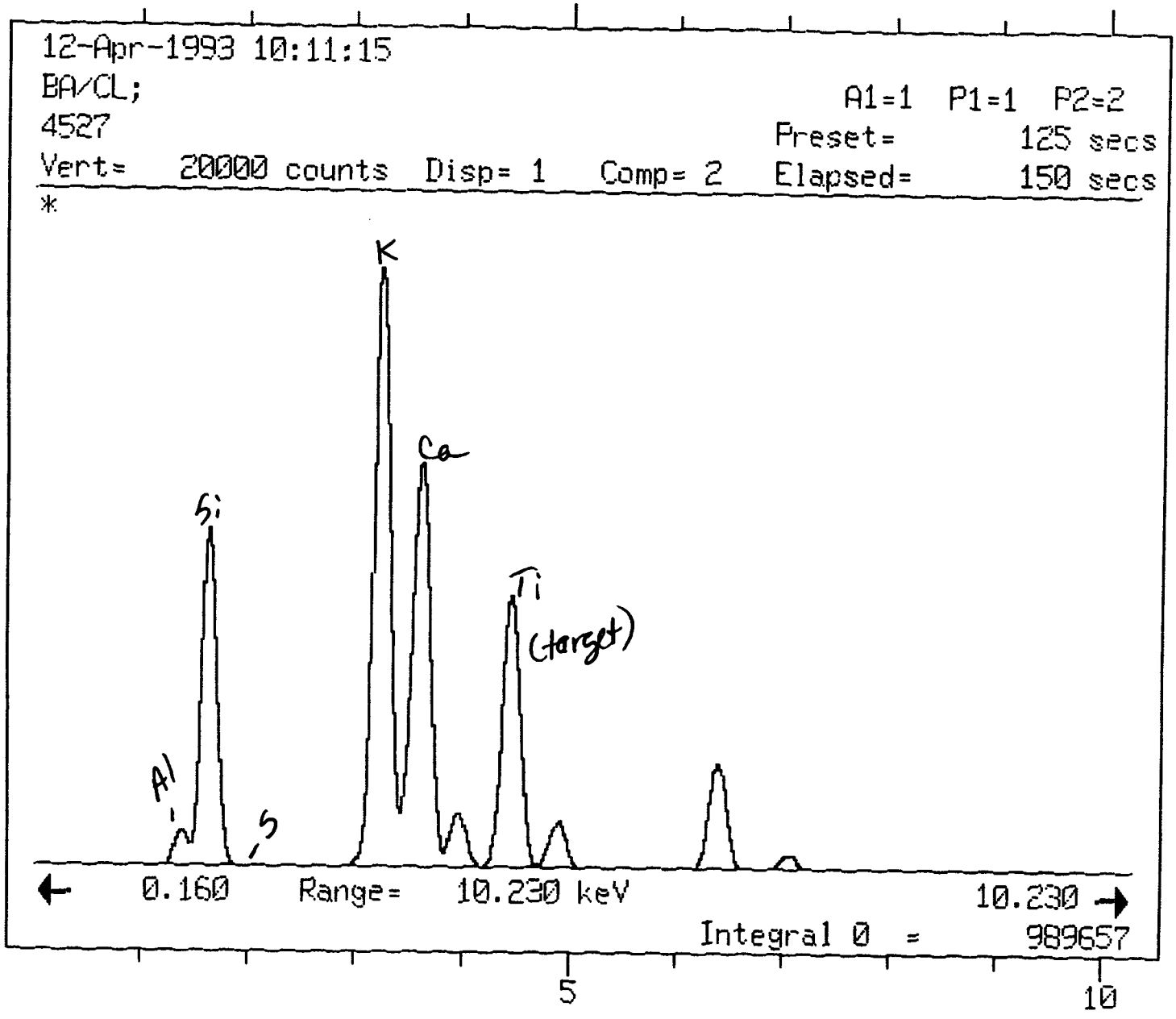
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4527-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	114.43	18.53 Wt.%	0.85
Si KA	TI	1024.94	71.61 Wt.%	0.26
S KA	TI	5.55	0.14 Wt.%	5.52
K KA	TI	2008.24	6.69 Wt.%	0.18
Ca KA	TI	1302.87	3.03 Wt.%	0.22
Total			100.00 Wt.%	


12-Apr-1993 10:11:15
BA/CL;
4527
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Ca
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 989657
5
10

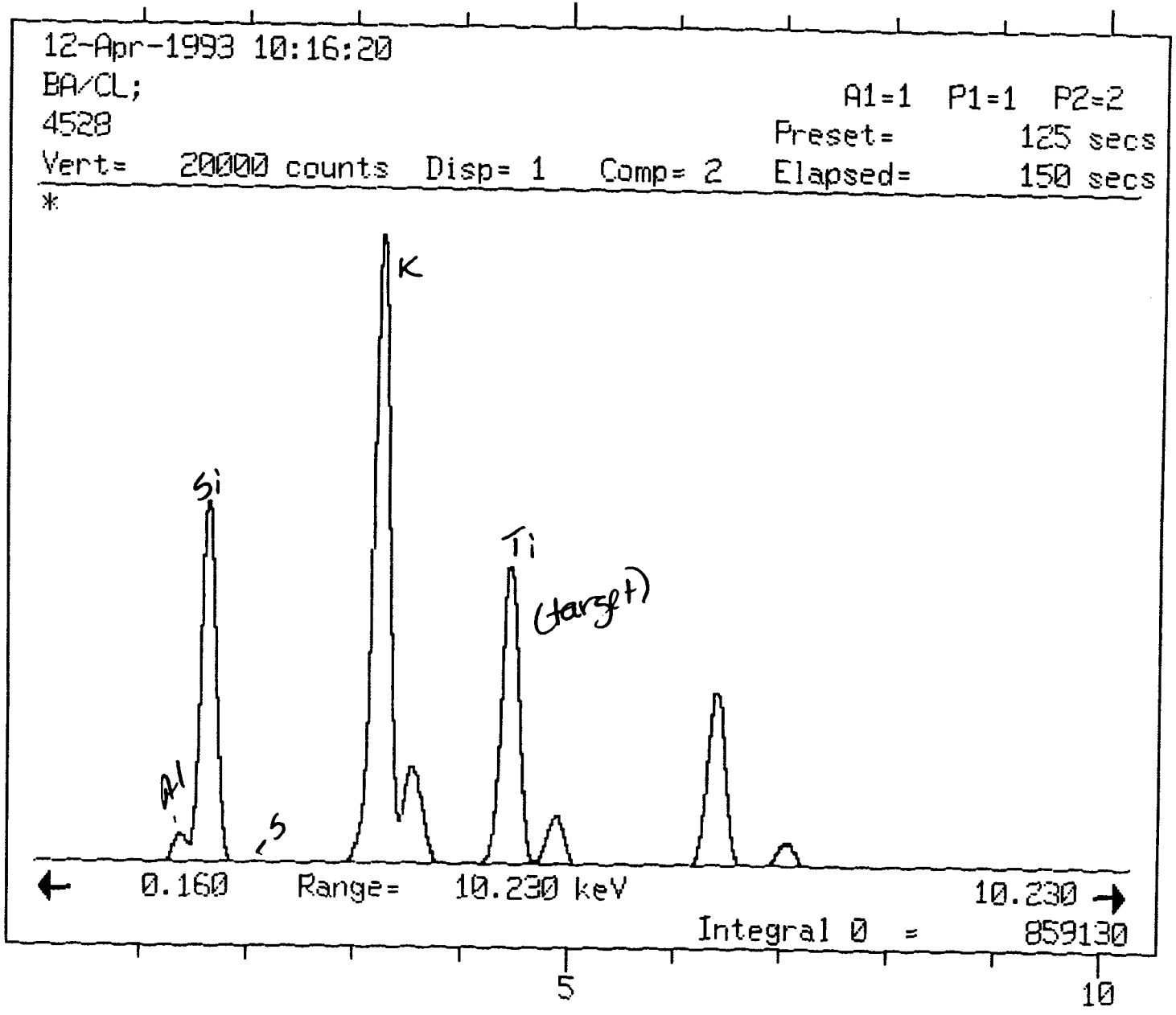
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4528-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	92.75	15.89 Wt.%	0.95
Si KA	TI	1070.58	76.31 Wt.%	0.25
S KA	TI	1.41	391.50 ppm	18.08
K KA	TI	2081.76	7.76 Wt.%	0.16
Total			100.00 Wt.%	


12-Apr-1993 10:16:20
BA/CL;
4528
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
K
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 859130
5
10

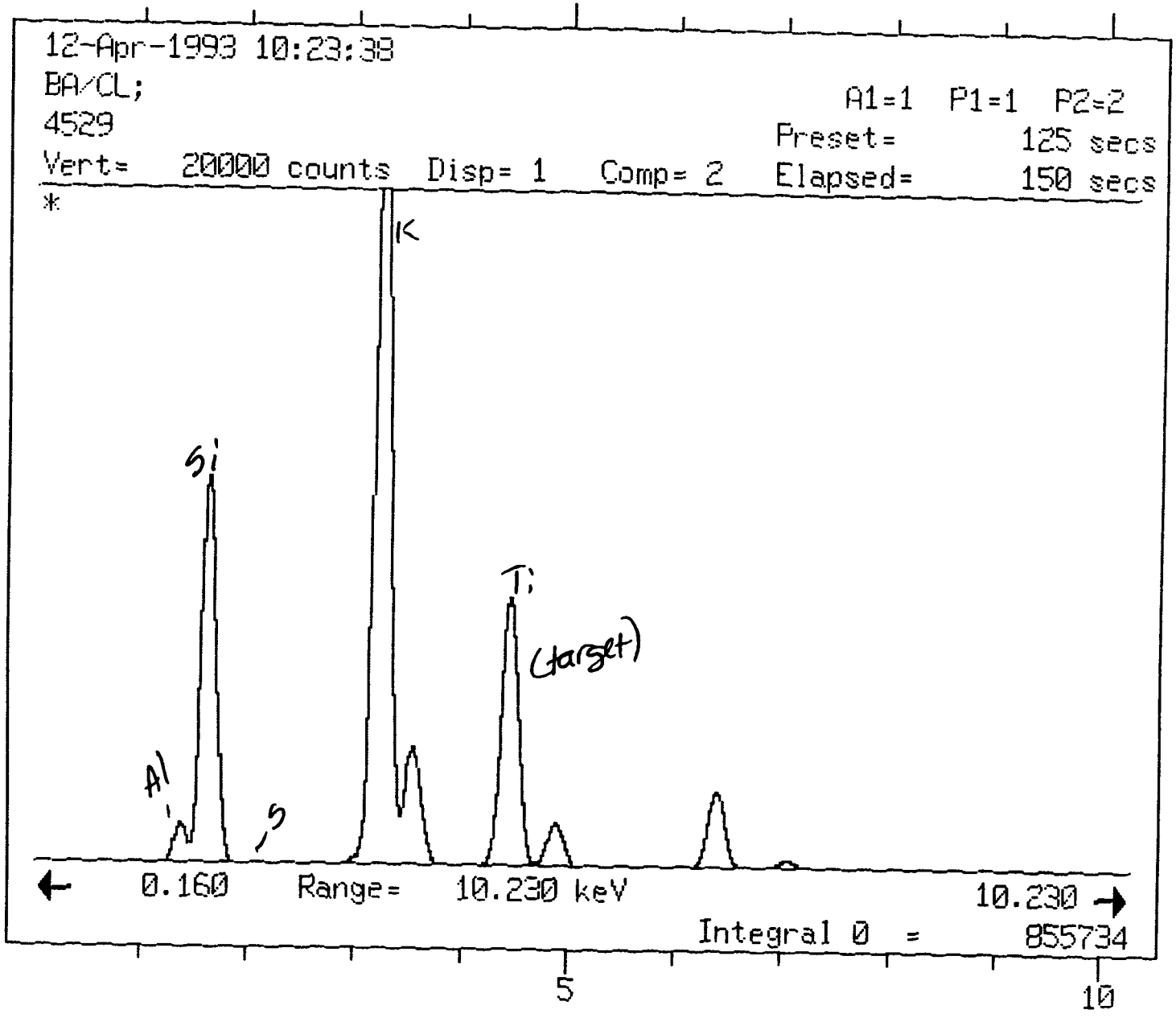
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4529-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	118.17	17.88 Wt.%	0.84
Si KA	TI	1124.83	73.91 Wt.%	0.24
S KA	TI	3.62	874.13 ppm	7.46
K KA	TI	2499.59	8.13 Wt.%	0.15
Total			100.00 Wt.%	


12-Apr-1993 10:23:38
BA/CL;
4529
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 855734
5
10

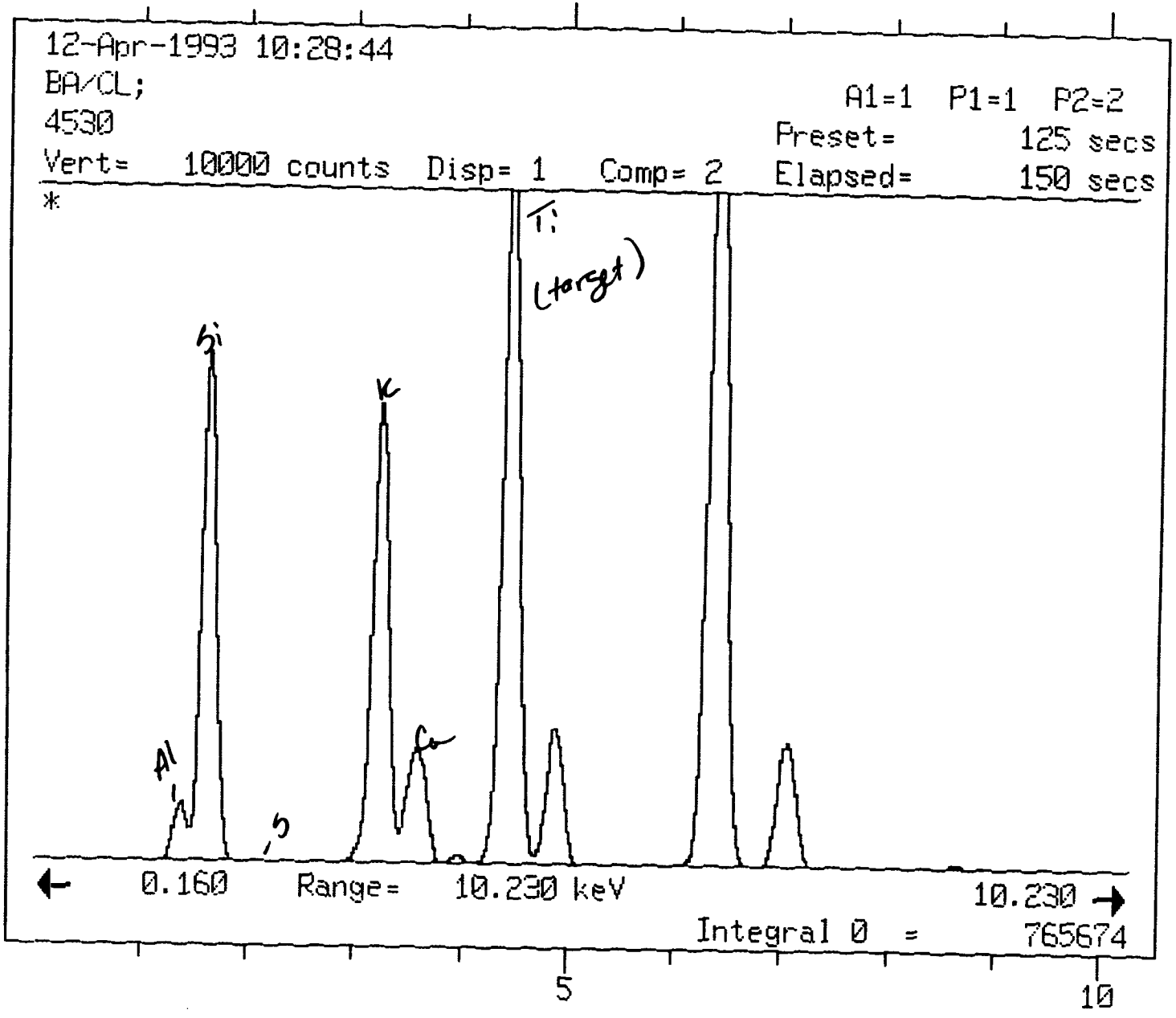
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4530-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	85.86	19.19 Wt.%	0.95
Si KA	TI	739.17	76.39 Wt.%	0.30
S KA	TI	3.51	0.13 Wt.%	6.93
K KA	TI	746.98	3.79 Wt.%	0.29
Ca KA	TI	146.26	0.50 Wt.%	0.77
Total			100.00 Wt.%	


12-Apr-1993 10:28:44
BA/CL;
4530
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
Ti
(target)
Si
K
Ca
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 765674
5
10

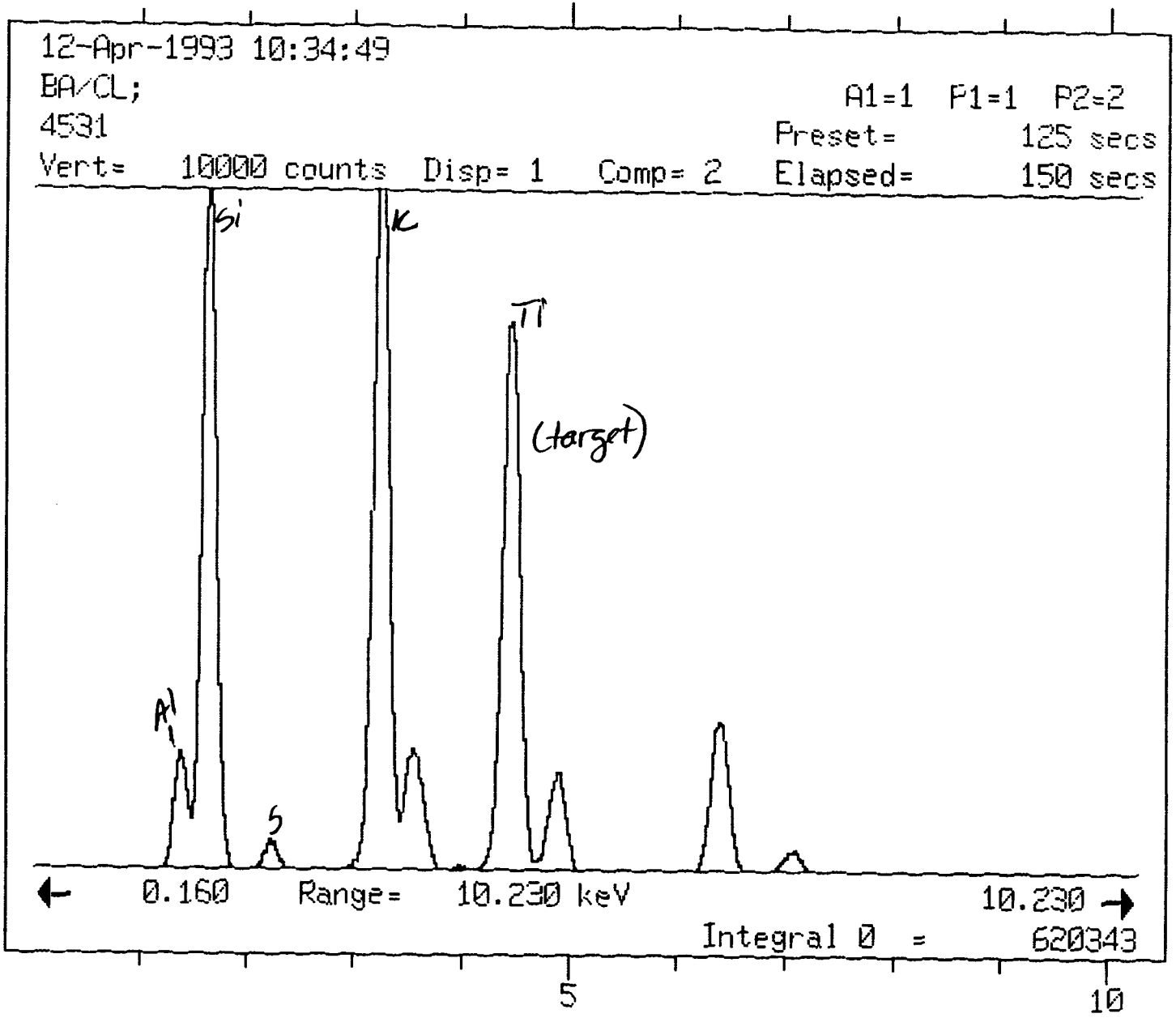
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4531-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	163.68	23.44 Wt.%	0.68
Si KA	TI	986.23	71.72 Wt.%	0.26
S KA	TI	44.40	1.07 Wt.%	1.31
K KA	TI	1167.58	3.78 Wt.%	0.22
Total			100.00 Wt.%	


12-Apr-1993 10:34:49
BA/CL;
4531
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
Si
K
Ti
(target)
Al
S
0.160 Range= 10.230 keV
10.230
Integral 0 = 620343
5
10

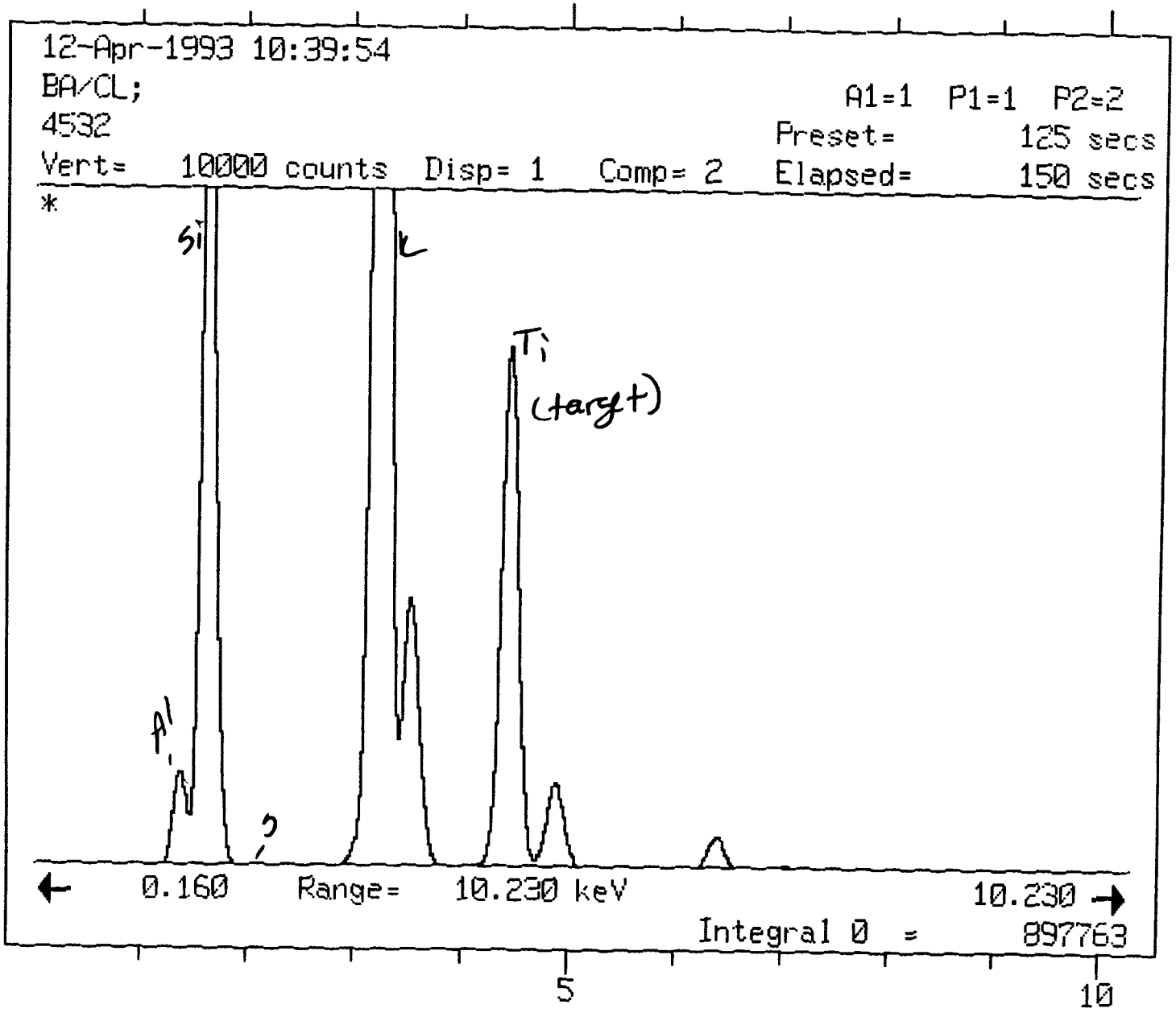
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4532-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	135.97	18.75 Wt.%	0.78
Si KA	TI	1194.18	72.60 Wt.%	0.24
S KA	TI	0.00	0.00 ppm	0.00
K KA	TI	2951.04	8.65 Wt.%	0.14
Total			100.00 Wt.%	


12-Apr-1993 10:39:54
BA/CL;
4532
Vert= 10000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
Si
K
Ti
(target)
Al
?
0.160 Range= 10.230 keV 10.230
Integral 0 = 897763
5
10

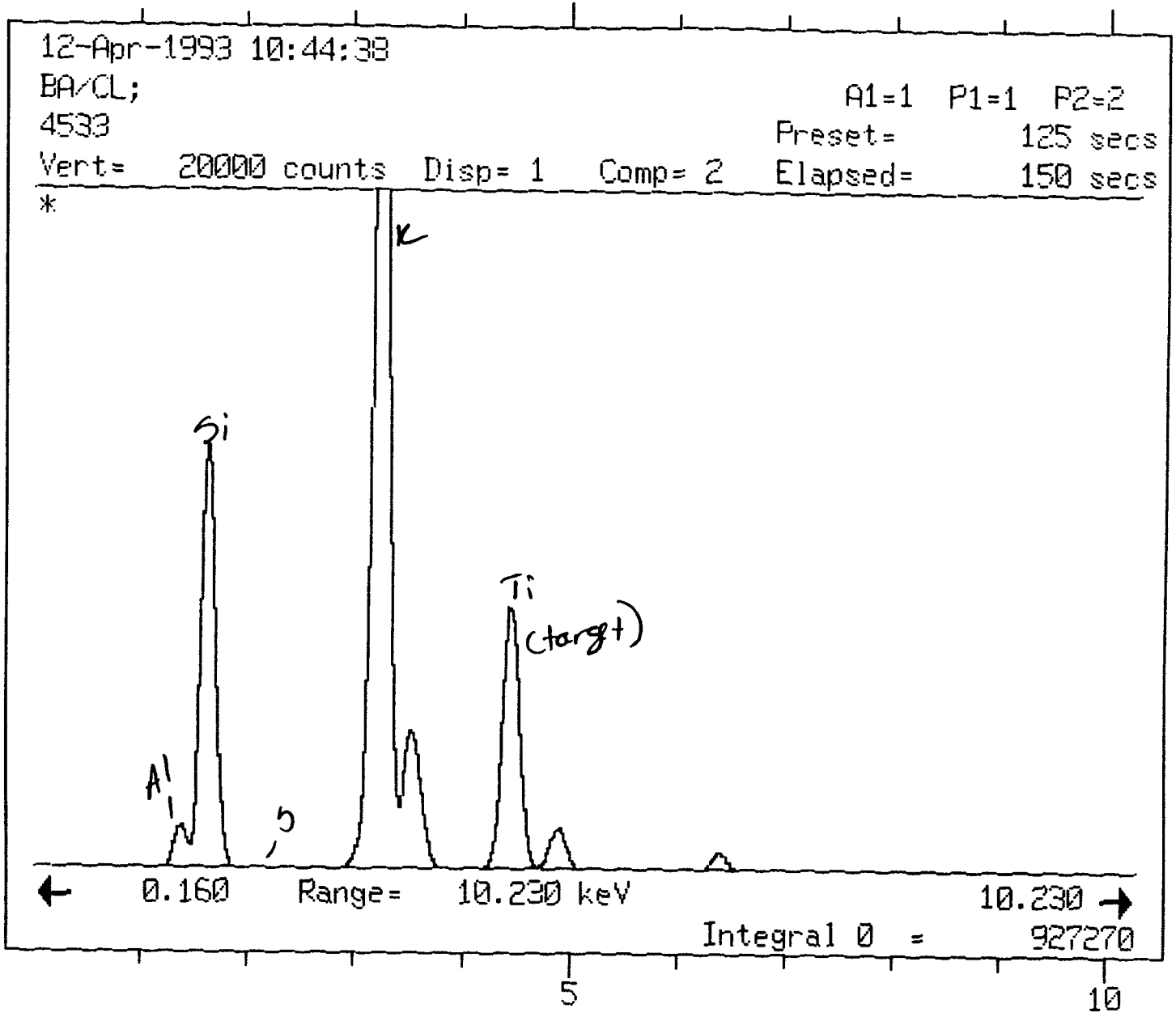
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4533-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	131.37	18.18 Wt.%	0.79
Si KA	TI	1212.49	72.85 Wt.%	0.24
S KA	TI	0.93	201.76 ppm	27.01
K KA	TI	3054.74	8.96 Wt.%	0.14
Total			100.00 Wt.%	


12-Apr-1993 10:44:38
BA/CL;
4533
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(targt)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 927270
5
10

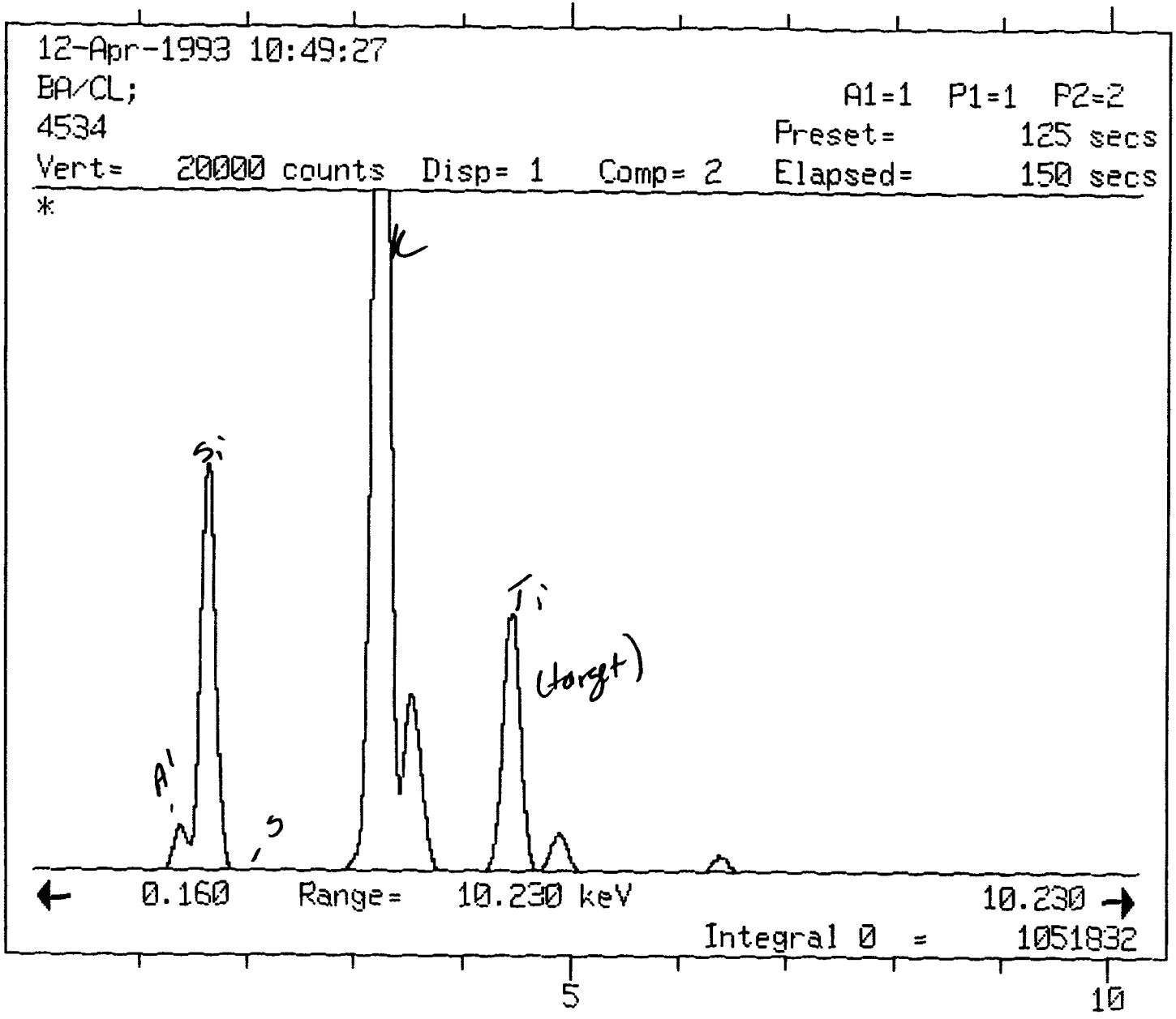
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4534-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	136.29	18.82 Wt.%	0.79
Si KA	TI	1175.21	70.38 Wt.%	0.24
S KA	TI	2.10	438.29 ppm	11.37
K KA	TI	3790.09	10.76 Wt.%	0.12
Total			100.00 Wt.%	


12-Apr-1993 10:49:27
BA/CL;
4534
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
Si
K
Ti
(target)
Al
S
0.160 Range= 10.230 keV
10.230
Integral 0 = 1051832
5
10

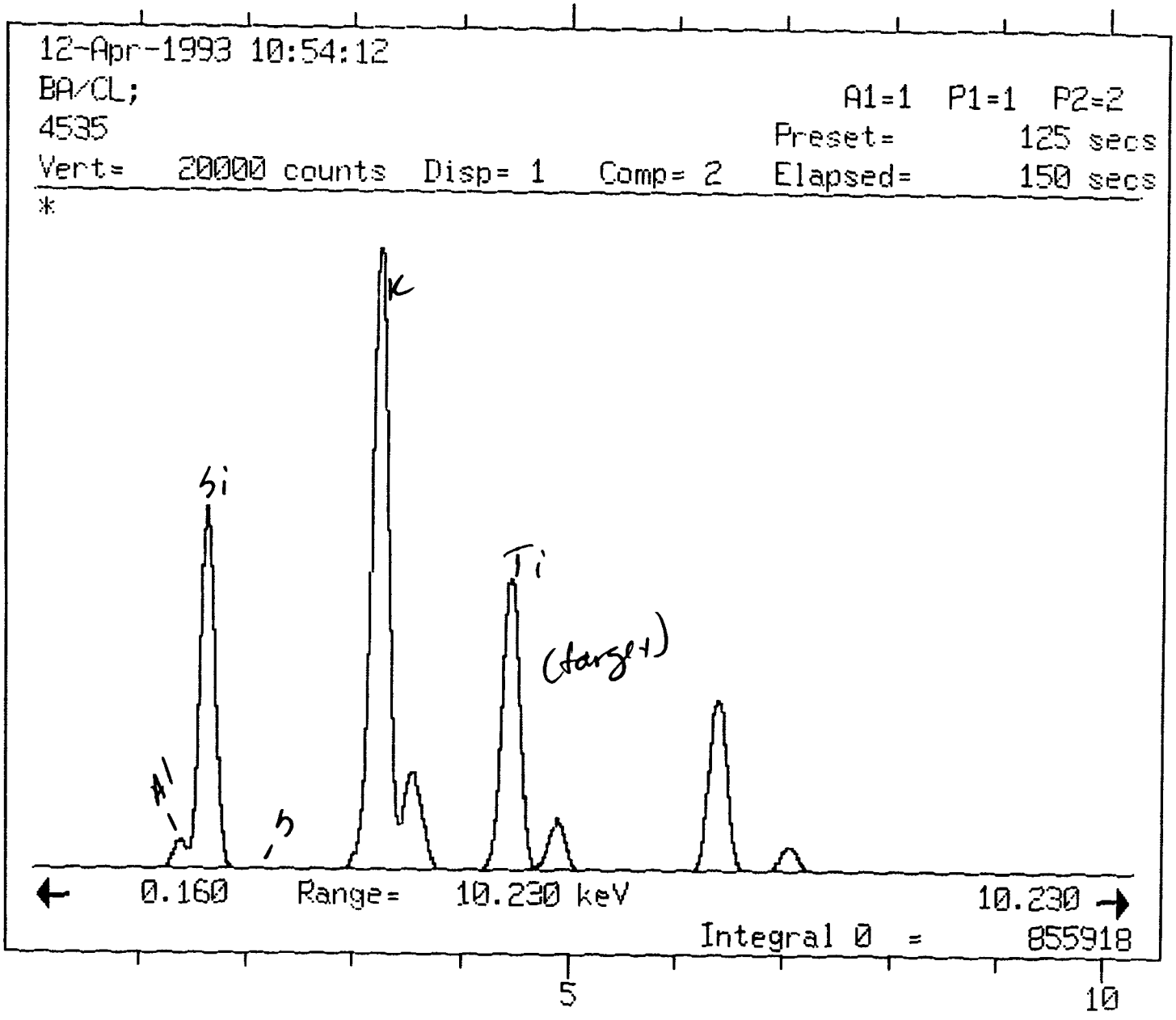
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4535-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	92.54	15.93 Wt.%	0.96
Si KA	TI	1063.43	76.25 Wt.%	0.25
S KA	TI	1.92	536.48 ppm	13.07
K KA	TI	2072.47	7.77 Wt.%	0.17
Total			100.00 Wt.%	


12-Apr-1993 10:54:12
BA/CL;
4535
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 125 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160 Range= 10.230 keV
10.230
Integral 0 = 855918
5
10

W.O. No. (Sponsor Code) 5137

PETROLEUM PRODUCTS RESEARCH DEPARTMENT

Date : April 13, 1993

LAB CHARGE No. 08-2621-001
Billing Charge No. 20-5704-063

Sample Code: STDA-C; 4510;4516

Sample No. ~~1822~~ SC 1882

Sample Size: SMALL PLASTIC VIALS

Sample Location:

Sample Description: POWDERED ROCK

Hazard Code: Health - 0 , Flammability -0 , Reactivity - 0

Tests Requested:

XRF FOR SULFUR

RUN ON CONDITION 2
PLEASE RUN STDS FOR CALIBRATION CURVE
PLEASE RUN SAMPLES AND PRINT OUT COUNTS AND SPECTRA
USE ALL OF SAMPLE IN CUP FOR ANALYSIS.
PLEASE RETURN ALL SAMPLES TO VIALS AFTER USE AND RETURN TO BECKY

Requested By: Mary Riddle Technicians: D. Muñoz

Ext. 2181 Client: BRET LESLIE X5077 4-16-93

URGENCY APRIL 14 1993 Total Hrs. Chrg. ~~20~~ DEM 1.5

APR 13 1993
RECEIVED

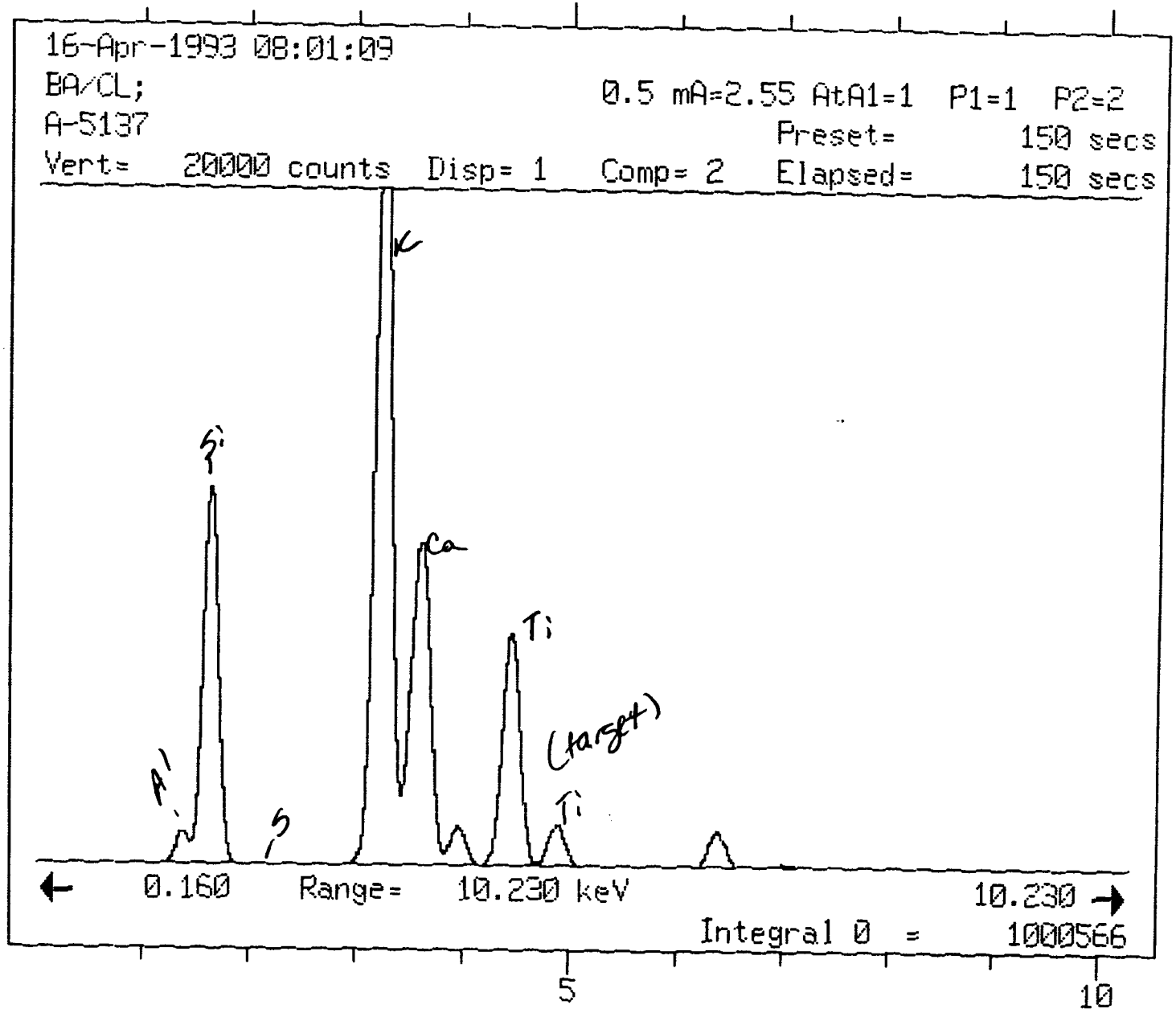
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:A-5137-2.1.0 75ppm

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	108.82	16.58 Wt.%	0.89
Si KA	TI	1163.46	72.87 Wt.%	0.24
S KA	TI	1.14	264.08 ppm	21.42
K KA	TI	2657.09	8.32 Wt.%	0.15
Ca KA	TI	998.95	2.21 Wt.%	0.26
Total			100.00 Wt.%	


16-Apr-1993 08:01:09
BA/CL;
A-5137
0.5 mA=2.55 AtA1=1 P1=1 P2=2
Preset= 150 secs
Vert= 20000 counts Disp= 1 Comp= 2 Elapsed= 150 secs
K
Si
Ca
Ti
(target)
Ti
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 1000566
5
10

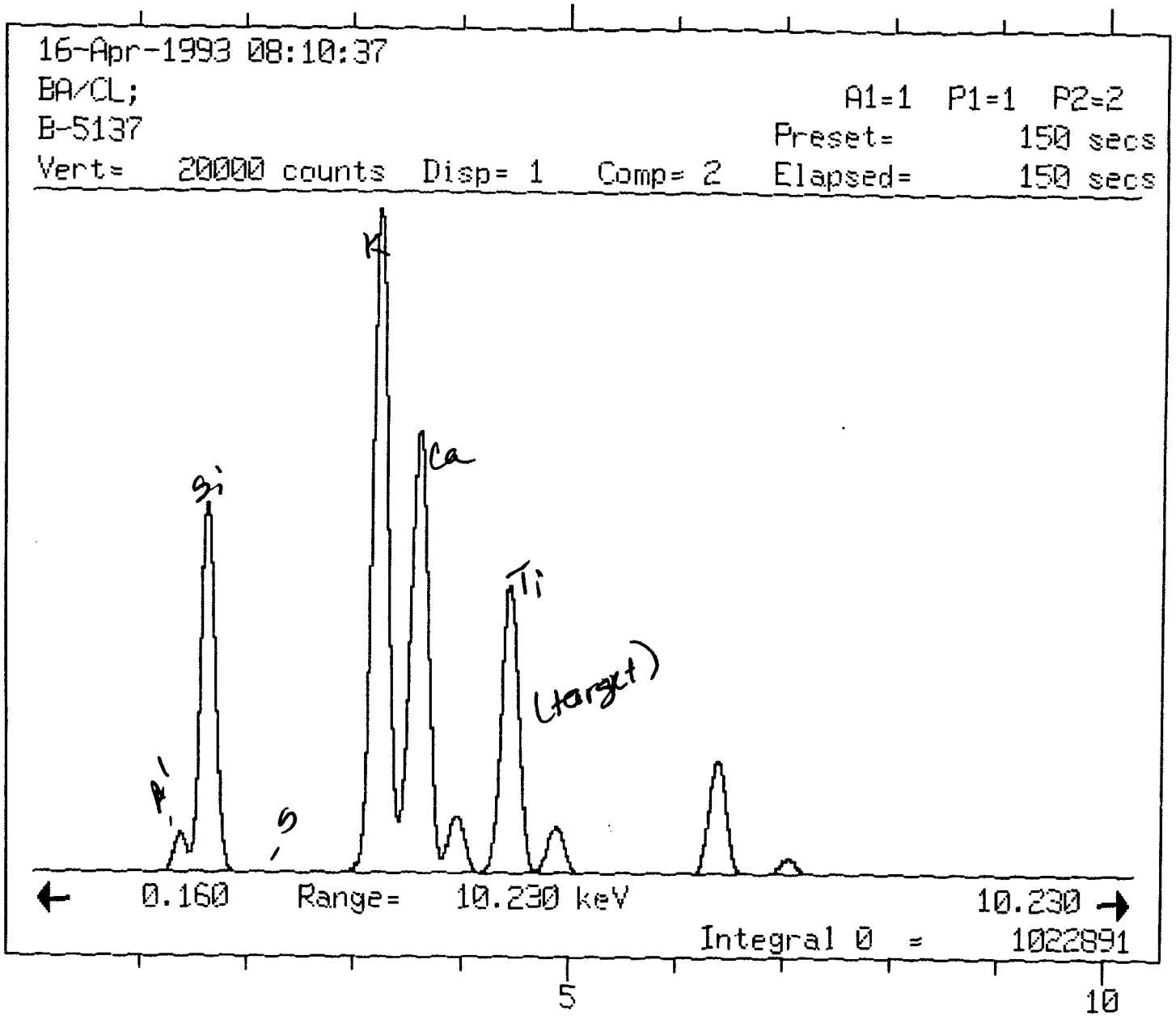
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:B-5137-2.1.0 580ppm

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	120.30	18.74 Wt.%	0.82
Si KA	TI	1056.95	71.39 Wt.%	0.25
S KA	TI	4.46	0.11 Wt.%	6.62
K KA	TI	2096.59	6.71 Wt.%	0.17
Ca KA	TI	1360.92	3.05 Wt.%	0.22
Total			100.00 Wt.%	


16-Apr-1993 08:10:37
BA/CL;
B-5137
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
Si
K
Ca
Ti
(target)
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 1022891
5
10

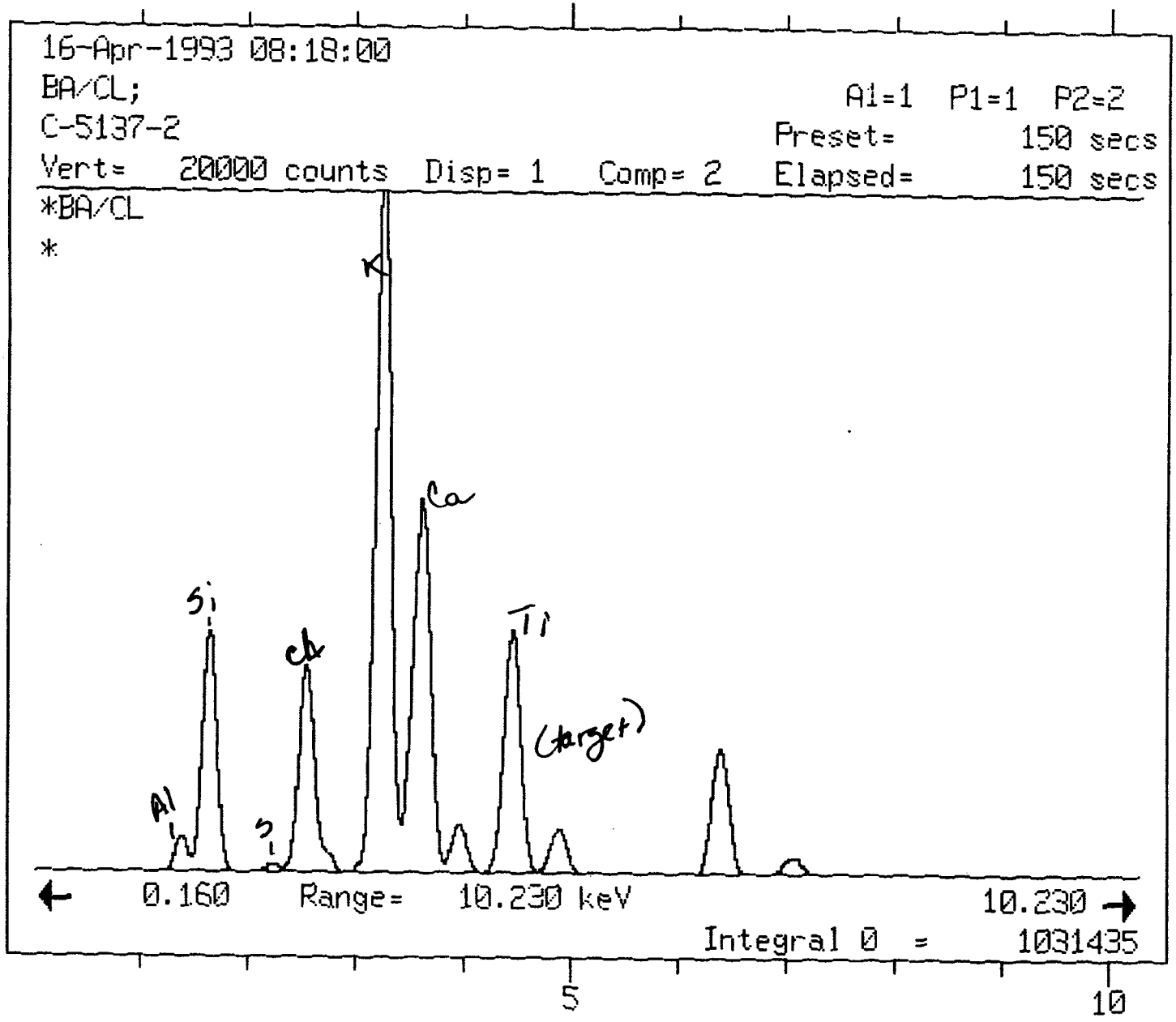
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:C-5137-2.1.0 4600ppm

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	105.99	21.03 Wt.%	0.88
Si KA	TI	690.45	59.29 Wt.%	0.31
S KA	TI	38.27	0.98 Wt.%	1.52
Cl KA	TI	638.75	7.18 Wt.%	0.31
K KA	TI	2185.49	8.46 Wt.%	0.17
Ca KA	TI	1115.78	3.05 Wt.%	0.24
Total			100.00 Wt.%	


16-Apr-1993 08:18:00
BA/CL;
C-5137-2
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*BA/CL
*
K
Ca
Si
Cl
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 1031435
5
10

Quantitation via ASAP
Standardless Fundamental Parameters Program

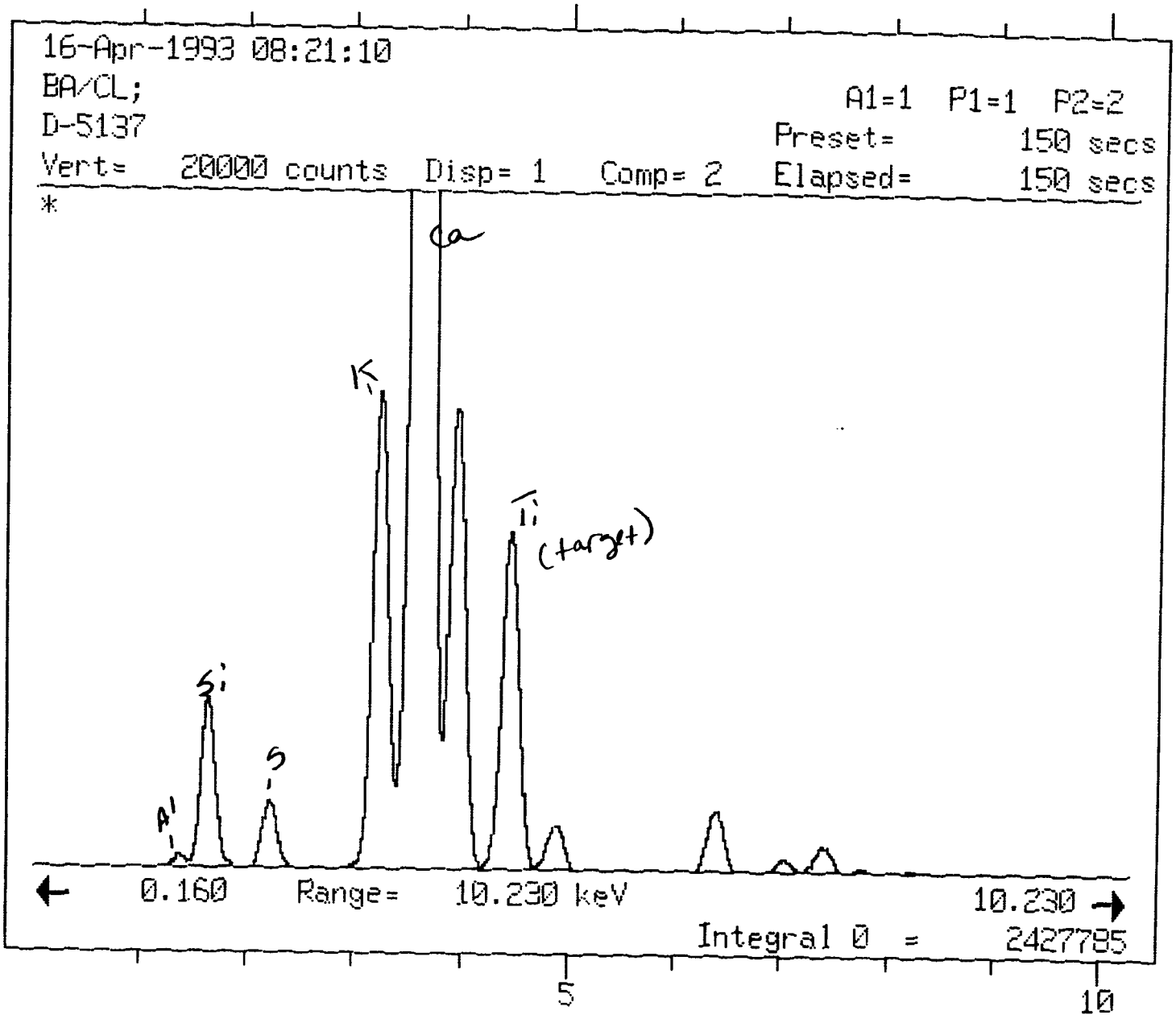
17500ppm

RESULTS file: 0:D-5137-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	46.41	13.87 Wt.%	1.49
Si KA	TI	488.20	45.14 Wt.%	0.38
S KA	TI	208.80	5.18 Wt.%	0.60
K KA	TI	1570.45	5.98 Wt.%	0.21
Ca KA	TI	10318.83	29.83 Wt.%	0.08
Total			100.00 Wt.%	


16-Apr-1993 08:21:10
BA/CL;
D-5137
A1=1 P1=1 P2=2
Preset= 150 secs
Vert= 20000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
*
Ca
K
Ti
(target)
Si
S
Al
0.160
Range= 10.230 keV
10.230
Integral 0 = 2427785
5
10

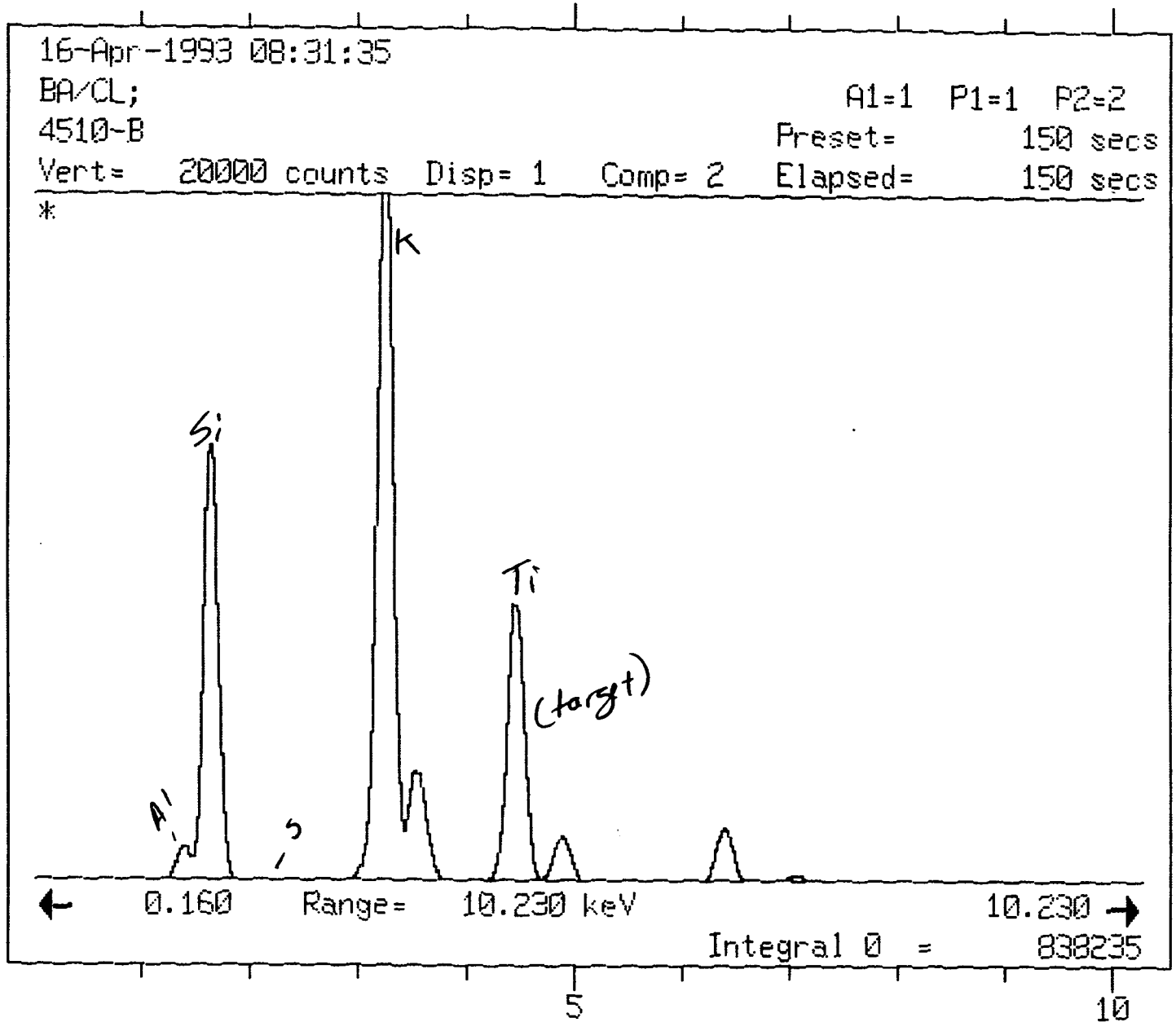
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4510-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	106.42	15.80 Wt.%	0.88
Si KA	TI	1239.60	76.48 Wt.%	0.23
S KA	TI	1.16	281.06 ppm	19.32
K KA	TI	2373.73	7.69 Wt.%	0.15
Total			100.00 Wt.%	


16-Apr-1993 08:31:35
BA/CL;
4510-B
Vert= 20000 counts Disp= 1 Comp= 2
A1=1 P1=1 P2=2
Preset= 150 secs
Elapsed= 150 secs
*
K
Si
Ti
(target)
Al
S
0.160 Range= 10.230 keV 10.230
Integral 0 = 838235
5
10

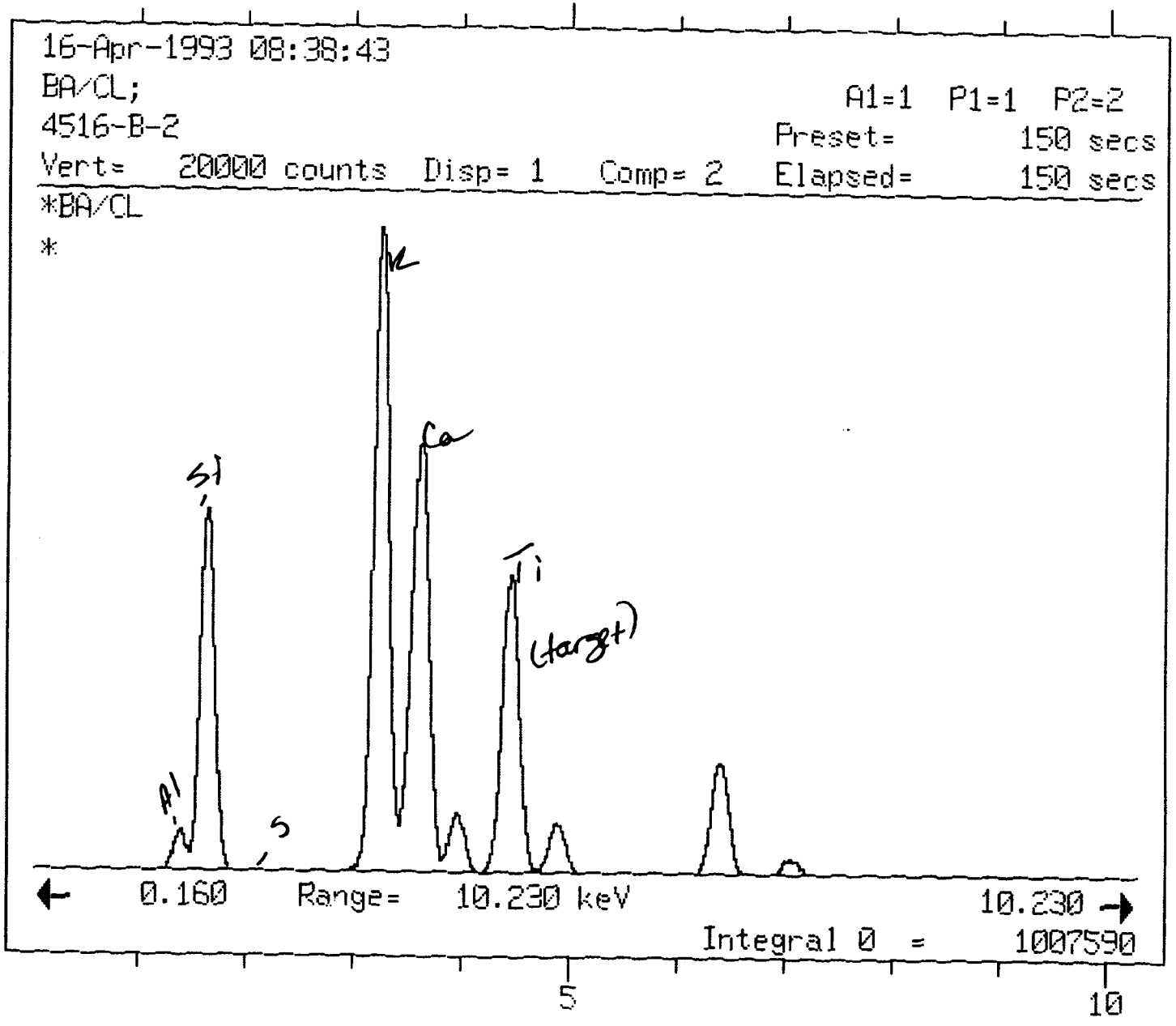
Quantitation via ASAP
Standardless Fundamental Parameters Program

RESULTS file: 0:4516-B-2.1.0

Detector Parameters:-

Detector window thickness: 12.5 microns
Gold layer thickness: 200. Angstroms
Dead layer thickness: 0.20 microns
Active thickness: 3.00 mm

	Secondary Target	Intensity (cps)	Conc.	% Rel. Error (1-sigma)
Al KA	TI	112.13	18.29 Wt.%	0.86
Si KA	TI	1025.58	71.66 Wt.%	0.26
S KA	TI	4.45	0.11 Wt.%	6.80
K KA	TI	2046.66	6.84 Wt.%	0.18
Ca KA	TI	1322.27	3.10 Wt.%	0.22
Total			100.00 Wt.%	


16-Apr-1993 08:38:43
BA/CL;
4516-B-2
A1=1 P1=1 P2=2
Preset= 150 secs
Vert= 20000 counts Disp= 1 Comp= 2
Elapsed= 150 secs
*BA/CL
*
K
Ca
Si
Ti
(target)
Al
S
0.160
Range= 10.230 keV
10.230
Integral 0 = 1007590
5
10