

beyond the technology

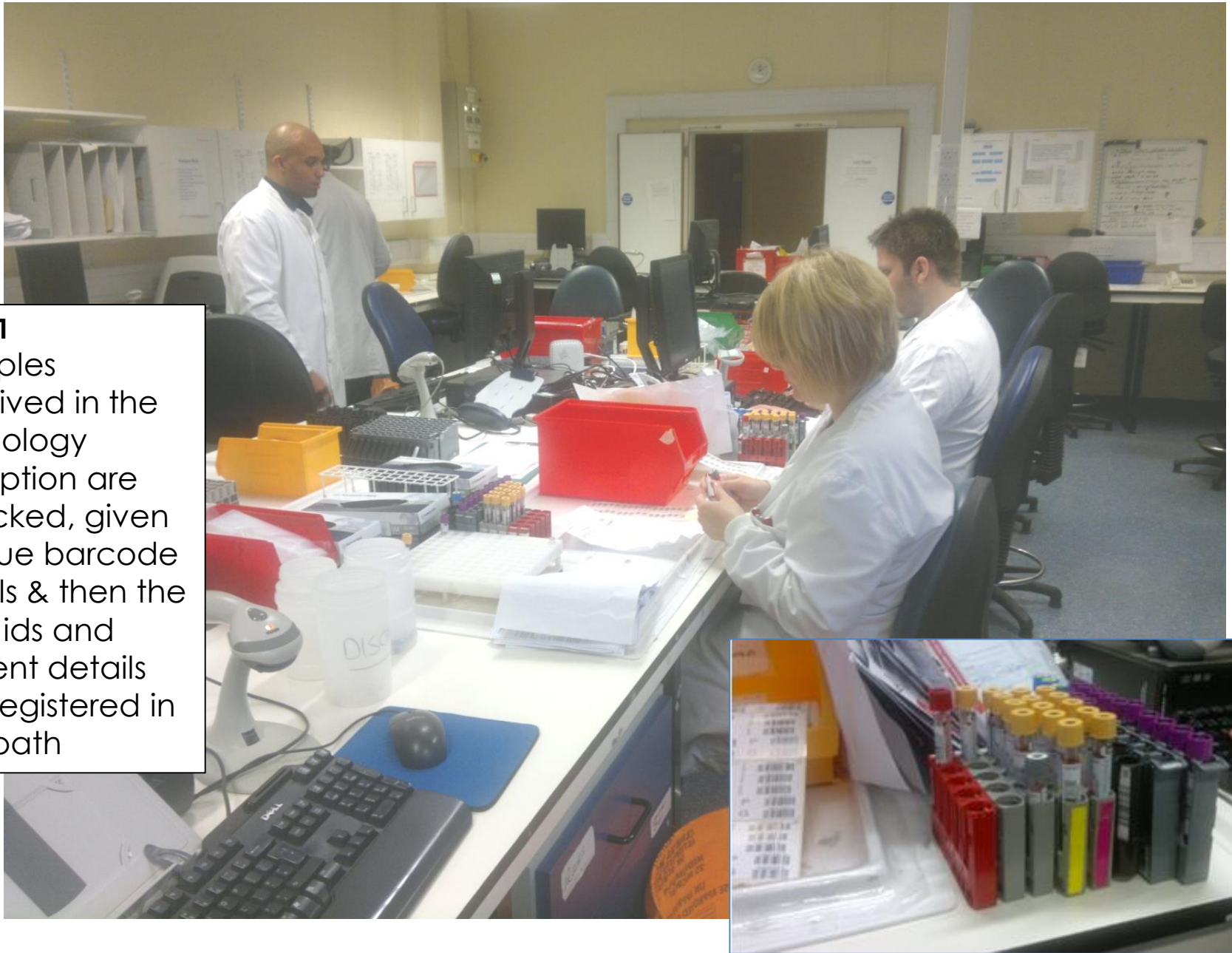


Heartlands Instrument Integration

Vitamin D Workflow

Step 1

Samples received in the pathology reception are checked, given unique barcode labels & then the new ids and patient details are registered in Telepath



Step 2

Most samples arrive in biochemistry after being processed in the clinical chemistry unit.



freedom evo

TECAN

Step 3

Samples are placed in 16 position racks on the Tecan robot for preparation e.g. Liquid-liquid Extraction for Vitamin D assay





Step 4

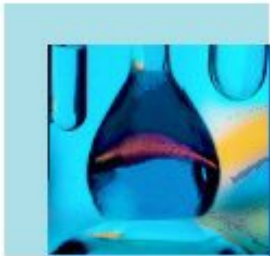
The barcode reader mounted on the Tecan reads barcodes from the samples tubes and a unique label applied to the destination 'deep well' plate, before processing the samples. On completion the Tecan software produces a file linking the sample ids and their respective position in the destination plate.




Setting up Run

 instrument setup

 CSols
laboratory systems integration



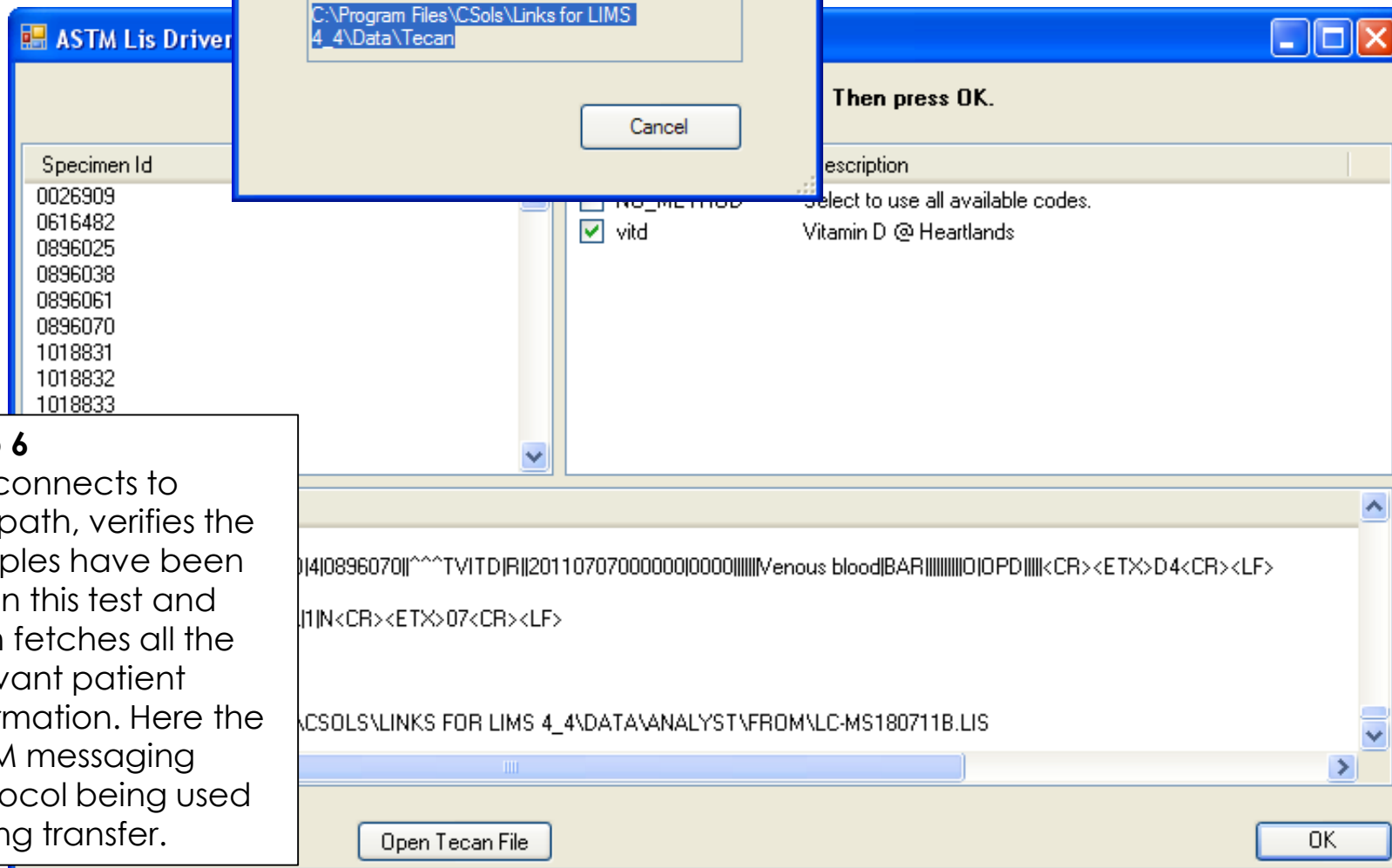
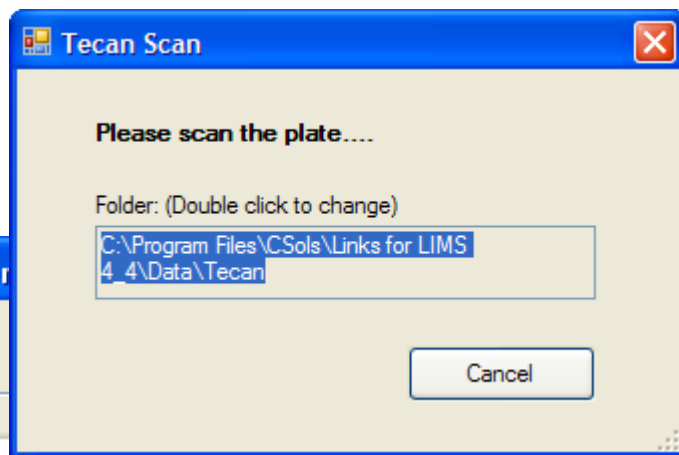
Links  LIMS

Version: 4.4 (Build 2)

Analyst Route Select LIMS Worklist to setup

Step 5

User starts the Links for LIMS (L4L) software on the instrument workstation and the software 'fetches' the LIMS/LIS information for all the samples on the plate identified from the plate barcode label



Step 6

L4L connects to Telepath, verifies the samples have been given this test and then fetches all the relevant patient information. Here the ASTM messaging protocol being used during transfer.



Step 7

The 96 well plate is placed in the AB Sciex LC-MS/MS instrument autosampler tray

Step 8

User accepts the run, checks the samples are correct and then uses L4L to set up the instrument. L4L electronically merges the new samples with a standard template file to create a run ready for use by the AB Sciex Analyst instrument software

Setup Run - LC-MS020611RUN1

File Edit Output Configuration Help

Sample Name Dil Patient Id No Patient Name Sex Specimen Type D2 Calc D3 Calc

1	112422	1	1089645	ROGER MOORE	M	Venous blood		
2	12436	1			M	Venous blood		
3	124443	1			F	Venous blood		
4	134823	1			M	Venous blood		
5	134825	1			M	Venous blood		
6	604398	1			F	Venous blood		
7	604414	1			F	Venous blood		
8	609487	1			F	Venous blood		
9	609505	1			M	Venous blood		
10	609506	1			M	Venous blood		
11	854500	1			F	Venous blood		
12	858039	1			F	Venous blood		
13	858043	1			F	Venous blood		
14	858045	1			M	Venous blood		
15	858046	1			F	Venous blood		
16	858153	1			F	Venous blood		
17	858157	1			F	Venous blood		
18	858158	1			M	Venous blood		
19	858159	1			F	Venous blood		
20	858162	1			M	Venous blood		
21	858175	1			F	Venous blood		
22	858217	1			F	Venous blood		
23	858234	1			F	Venous blood		
24	858236	1			F	Venous blood		
25	858277	1			F	Venous blood		
26	858279	1			F	Venous blood		
27	858406	1			U	Venous blood		
28	858407	1			F	Venous blood		
29	858409	1			F	Venous blood		
30	858454	1			F	Venous blood		
31	858457	1			F	Venous blood		
32	858461	1			F	Venous blood		
33	858468	1			F	Venous blood		
34	858469	1			F	Venous blood		
35	858477	1			F	Venous blood		
36	858479	1			M	Venous blood		
37	858482	1			F	Venous blood		
38	858483	1			M	Venous blood		
39	858485	1			F	Venous blood		
40	858505	1			M	Venous blood		
41	858513	1			F	Venous blood		
42	858566	1			F	Venous blood		

ge>

Method : vitd Access : EDIT View : Worksheet

Setup Instrument Run

Analyst

Setup Cancel

If you continue you will setup the Instrument with ..

Sequence LC-MS020611RUN1
Directory D:\SCIENTIFIC-DATA\MASSSPEC-DATA\ANALYST\PROJECTS\WITAMIN D\BATCH\

Step 9

User loads the L4L generated run into the Analyst software. Note position ordering in the template takes into account the differences between the autosampler and Tecan placement. L4L also provides file name and default entries so the user can start the run with no further need for data entry.

Analyst - [Batch Editor: [Vitamin D\L4L - LC-MS120711A]]

File Edit View Acquire Tools Explore Window Script Help

Acquire Mode Vitamin D\L4L - LC-MS120711A

Configure Security Configuration Hardware Configuration Report Template Editor

Sample Locations Quantitation Submit

Select Method for Sample Set

Set: SET1 Quantitation: Fast C8 Quick Quant

Add Set Remove Set Add Samples Del Samples

Acquisition Use as Template fast_vitD 0.6ml/min Method Editor Use Multiple Methods

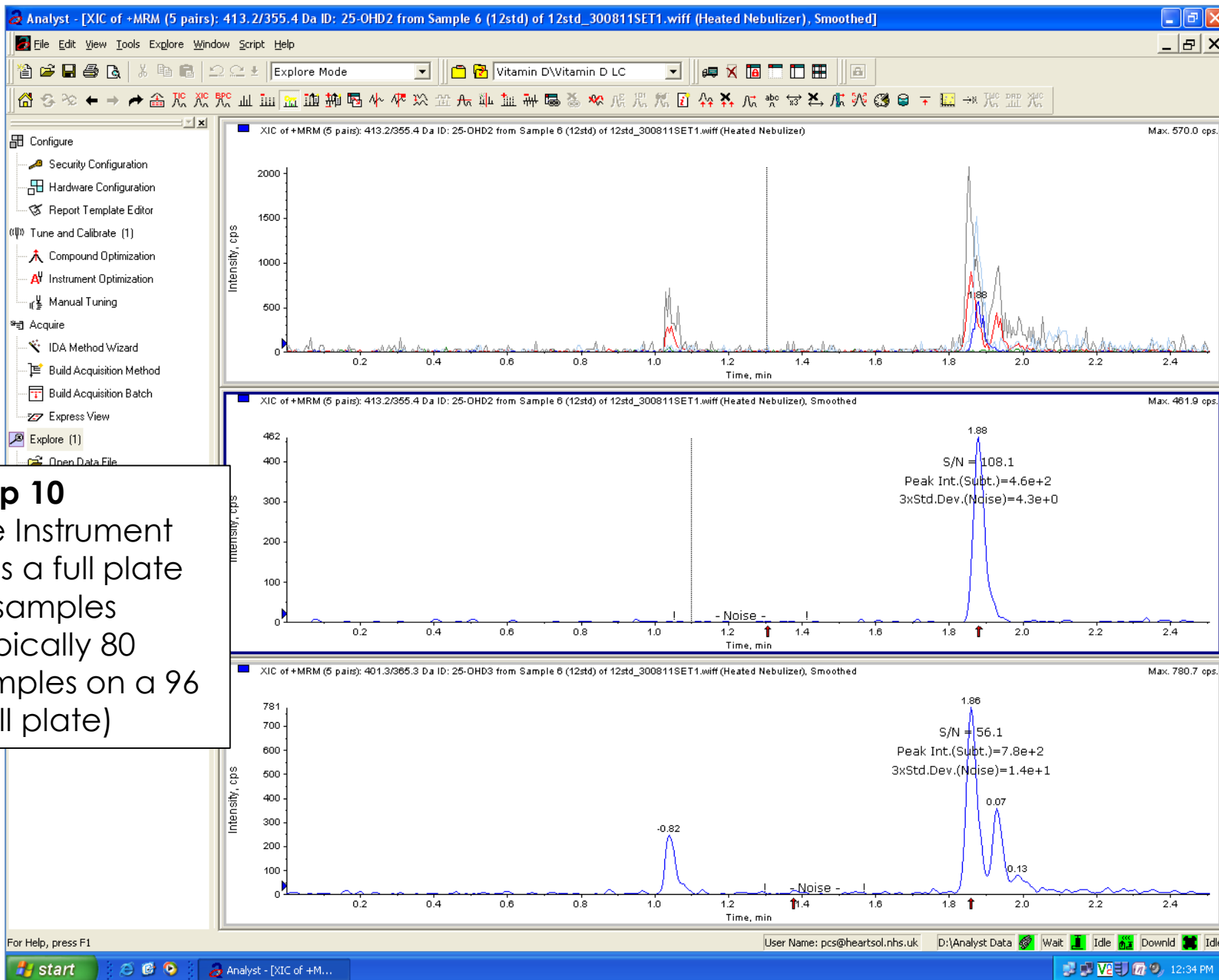
Batch Script: Select Script

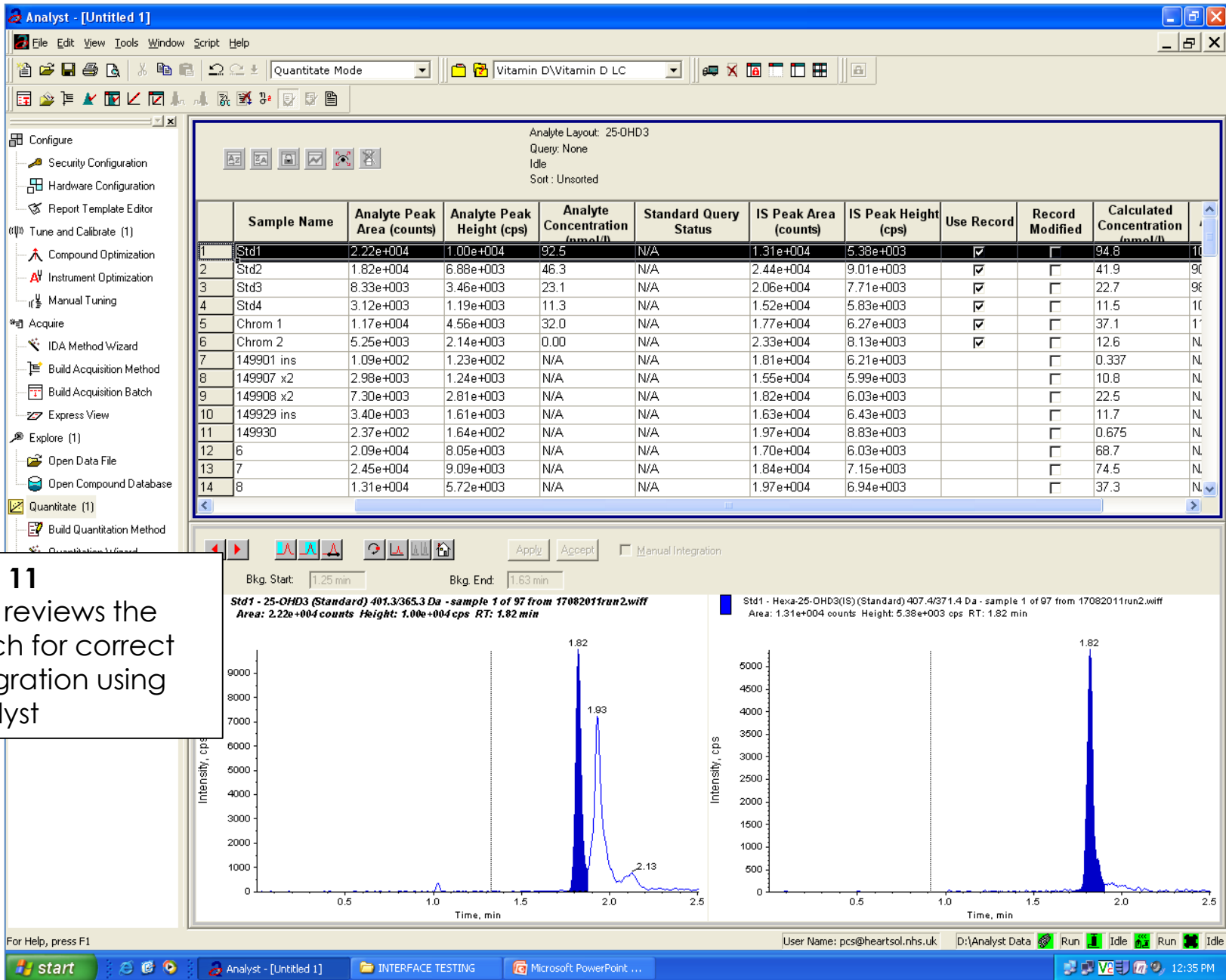
	Sample Name	Rack Code	Rack Position	Plate Code	Plate Position	Vial Position	Data File	Inj. Volume (µl)
	Std1	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	1	Jul 2011\LC-MS120711A	75.000
	Std2	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	13	Jul 2011\LC-MS120711A	75.000
	Std3	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	25	Jul 2011\LC-MS120711A	75.000
	Std4	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	37	Jul 2011\LC-MS120711A	75.000
	Chrom 1	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	49	Jul 2011\LC-MS120711A	75.000
	Chrom 2	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	61	Jul 2011\LC-MS120711A	75.000
	893068	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	73	Jul 2011\LC-MS120711A	75.000
	893086	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	85	Jul 2011\LC-MS120711A	75.000
	893094	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	2	Jul 2011\LC-MS120711A	75.000
0	893096	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	14	Jul 2011\LC-MS120711A	75.000
1	893100	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	26	Jul 2011\LC-MS120711A	75.000
2	893107	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	38	Jul 2011\LC-MS120711A	75.000
3	893109	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	50	Jul 2011\LC-MS120711A	75.000
4	893111	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	62	Jul 2011\LC-MS120711A	75.000
5	893115	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	74	Jul 2011\LC-MS120711A	75.000
6	893119	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	86	Jul 2011\LC-MS120711A	75.000
7	893120	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	3	Jul 2011\LC-MS120711A	75.000
8	893121	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	15	Jul 2011\LC-MS120711A	75.000
9	893122	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	27	Jul 2011\LC-MS120711A	75.000
0	893125	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	39	Jul 2011\LC-MS120711A	75.000
1	893127	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	51	Jul 2011\LC-MS120711A	75.000
2	893146	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	63	Jul 2011\LC-MS120711A	75.000
3	Grifols + 1	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	75	Jul 2011\LC-MS120711A	75.000
4	893147	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	87	Jul 2011\LC-MS120711A	75.000
5	893163	Deep Well MTP 96 Standard	1	Deep Well MTP 96 Standard	1	4	Jul 2011\LC-MS120711A	75.000
6	893168	Deep Well MTP 96 Standard	1					
7	893184	Deep Well MTP 96 Standard	1					
8	893188	Deep Well MTP 96 Standard	1					
9	893190	Deep Well MTP 96 Standard	1					
0	893198	Deep Well MTP 96 Standard	1					
1	893209	Deep Well MTP 96 Standard	1					
2	893213	Deep Well MTP 96 Standard	1					
3	893214	Deep Well MTP 96 Standard	1					
4	893235	Deep Well MTP 96 Standard	1					
5	893242	Deep Well MTP 96 Standard	1					

	1	2	3	4	5	6	7	8	9	10	11	12
A	Std 1	3	11	18	26	33	41	Chrom1	56	64	71	79
B	Std 2	4	12	19	27	34	42	49	57	Chrom 2	72	80
C	Std 3	5	13	20	28	35	43	50	58	65	73	Grifols 1
D	Std 4	6	14	21	29	36	44	51	59	66	74	81
E	Chrom1	7	15	22	30	37	45	52	60	67	75	82
F	Chrom2	8	16	23	31	38	46	53	61	68	76	83
G	1	9	Grifols 1	24	32	39	47	54	62	69	77	84
H	2	10	17	25	Grifols Low	40	48	55	63	70	78	Grifols Low

Step 10

The Instrument runs a full plate of samples (typically 80 samples on a 96 well plate)





Analyst - [020611run1.rdb]

File Edit View Tools Window Script Help

New Ctrl+N
Open... Ctrl+O
Open Data File... Ctrl+D
Close
Open Workspace...
Save Workspace
Save Workspace As...
Close Workspace
Save Ctrl+S
Save As...
Export...
Print & Report Setup...
Print Preview
Print
Exit
Build Acquisition Batch
Express View
Explore (1)
Open Data File
Open Compound Database
Quantitate (1)
Build Quantitation Method
Quantitation Wizard
Review Results Table

Quantitate Mode Vitamin D

Full Layout
Query: None
Idle
Sort: Unsorted

	Sample Name	Sample ID	Sample Type	File Name	Analyte Peak Area (counts)	Analyte Peak Height (cps)	Analyte Concentration (nmol/L)	Standard Query Status	IS Peak Area (counts)
1	Std1		Standard	June 2011\02062011run1.wiff	5.70e+003	3.46e+003	57.3	N/A	1.39e+004
2	Std1		Standard	June 2011\02062011run1.wiff	1.57e+004	8.67e+003	0.00	N/A	1.39e+004
3	Std1		Standard	June 2011\02062011run1.wiff	5.43e+004	2.91e+004	0.00	N/A	1.39e+004
4	Std1		Standard	June 2011\02062011run1.wiff	7.43e+003	3.46e+003	0.00	N/A	1.39e+004
5	Std1		Standard	June 2011\02062011run1.wiff	6.57e+004	3.63e+004	92.5	N/A	1.39e+004
6	Std1		Standard	June 2011\02062011run1.wiff	4.03e+004	2.22e+004	0.00	N/A	1.39e+004
7	Std2		Standard	June 2011\02062011run1.wiff	3.11e+003	1.79e+003	28.6	N/A	1.48e+004
8	Std2		Standard	June 2011\02062011run1.wiff	8.83e+003	5.06e+003	0.00	N/A	1.48e+004
9	Std2		Standard	June 2011\02062011run1.wiff	3.43e+004	1.56e+004	0.00	N/A	1.48e+004
10	Std2		Standard	June 2011\02062011run1.wiff	1.57e+002	1.21e+002	0.00	N/A	1.48e+004
11	Std2		Standard	June 2011\02062011run1.wiff	3.83e+004	2.12e+004	46.3	N/A	1.48e+004
12	Std2		Standard	June 2011\02062011run1.wiff	2.80e+002	1.63e+002	0.00	N/A	1.48e+004
13	Std3		Standard	June 2011\02062011run1.wiff	1.75e+003	9.47e+002	14.3	N/A	1.45e+004
14	Std3		Standard	June 2011\02062011run1.wiff	5.40e+003	2.61e+003	0.00	N/A	1.45e+004
15	Std3		Standard	June 2011\02062011run1.wiff	1.81e+004	9.30e+003	0.00	N/A	1.45e+004
16	Std3		Standard	June 2011\02062011run1.wiff	6.32e+001	7.46e+001	0.00	N/A	1.45e+004
17	Std3		Standard	June 2011\02062011run1.wiff	2.28e+004	1.20e+004	23.1	N/A	1.45e+004
18	Std3		Standard	June 2011\02062011run1.wiff	1.30e+004	6.45e+003	0.00	N/A	1.45e+004
19	Std4		Standard	June 2011\02062011run1.wiff	8.14e+002	4.17e+002	7.20	N/A	1.30e+004
20	Std4		Standard	June 2011\02062011run1.wiff	2.94e+003	1.32e+003	0.00	N/A	1.30e+004
21	Std4		Standard	June 2011\02062011run1.wiff	1.06e+004	3.86e+003	0.00	N/A	1.30e+004
22	Std4		Standard	June 2011\02062011run1.wiff	6.74e+001	7.86e+001	0.00	N/A	1.30e+004
23	Std4		Standard	June 2011\02062011run1.wiff	1.39e+004	6.13e+003	11.3	N/A	1.30e+004
24	Std4		Standard	June 2011\02062011run1.wiff	6.54e+003	3.07e+003	0.00	N/A	1.30e+004
25	Chrom 1		Quality Control	June 2011\02062011run1.wiff	3.72e+003	2.20e+003	39.0	N/A	1.47e+004
26	Chrom 1		Quality Control	June 2011\02062011run1.wiff	9.75e+003	4.70e+003	0.00	N/A	1.47e+004
27	Chrom 1		Quality Control	June 2011\02062011run1.wiff	3.64e+004	1.79e+004	0.00	N/A	1.47e+004
28	Chrom 1		Quality Control	June 2011\02062011run1.wiff	4.58e+003	2.09e+003	0.00	N/A	1.47e+004
29	Chrom 1		Quality Control	June 2011\02062011run1.wiff	3.53e+004	1.77e+004	32.0	N/A	1.47e+004
30	Chrom 1		Quality Control	June 2011\02062011run1.wiff	2.07e+004	1.12e+004	0.00	N/A	1.47e+004
31	Chrom 2		Quality Control	June 2011\02062011run1.wiff	1.59e+003	8.67e+002	13.6	N/A	1.36e+004
32	Chrom 2		Quality Control	June 2011\02062011run1.wiff	3.59e+003	1.74e+003	0.00	N/A	1.36e+004
33	Chrom 2		Quality Control	June 2011\02062011run1.wiff	1.51e+004	6.71e+003	0.00	N/A	1.36e+004
34	Chrom 2		Quality Control	June 2011\02062011run1.wiff	1.55e+003	7.49e+002	0.00	N/A	1.36e+004
35	Chrom 2		Quality Control	June 2011\02062011run1.wiff	1.39e+004	6.60e+003	12.6	N/A	1.36e+004

rt data to file

User Name: JONES5\kevin.jones | D:\Scientific-Data\MassSpec-data\Analyst


Step 12


The user then exports the results from Analyst.

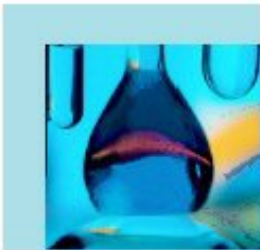
Step 13


The user then starts the L4L report result program and selects the run

Selecting Results to Report

 **report results**

 laboratory systems integration



Links  LIMS
Version: 4.4 (Build 3)

Analyst

LC-MS020611RUN1.txt

LC-MS020611RUN1.txt
12 July 2011 4:12 PM 344453 bytes.
Status : NEW
Status : NEW
Sample Sets - 1
Set Method Samples Items

Step 14

As L4L imports the results data it pre-processes the results with rounding, calculations, logic and AQC checks. It then places all the results in a matrix format for review. Greyed out results are not requested by LIMS and provided for information only

7	112422	1	1089645	ROGER MOORE	M	Venous blood	2.040	71.300	0	71.3	71.3	28.5
8	12436	1			M	Venous blood	0.000	56.200	0	56.2	56.2	22.5
9	124443	1			F	Venous blood	28.700	42.800	28.7	42.8	71.5	29
10	134823	1			M	Venous blood	0.000	31.300	0	31.3	31.3	12.5
11	134825	1			M	Venous blood	1.160	14.600	0	14.6	14.6	5.8
12	604398	1			F	Venous blood	0.626	91.800	0	91.8	91.8	36.7
13	604414	1			F	Venous blood	55.100	11.800	55.1	11.8	66.9	27
14	609487	1			F	Venous blood	0.000	36.400	0	36.4	36.4	14.6
15	609505	1			M	Venous blood	0.000	9.490	0	9.49	9.49	3.8
16	609506	1			M	Venous blood	0.000	25.900	0	25.9	25.9	10.4
17	854500	1			F	Venous blood	0.212	91.500	0	91.5	91.5	36.6
18	858039	1			F	Venous blood	0.000	12.100	0	12.1	12.1	4.8
19	858043	1			F	Venous blood	2.670	20.700	0	20.7	20.7	8.3
20	858045	1			M	Venous blood	5.100	12.800	5.10	12.8	17.9	7
21	858046	1			F	Venous blood	0.000	15.100	0	15.1	15.1	6
22	858153	1			F	Venous blood	29.200	9.580	29.2	9.58	38.8	16
23	Grifols + 1	1					81.000	77.300	81.0	77.3	158.3	63
24	858157	1			F	Venous blood	84.700	7.440	84.7	7.44	92.1	37
25	858158	1			M	Venous blood	38.600	23.900	38.6	23.9	62.5	25
26	858159	1			F	Venous blood	27.600	41.100	27.6	41.1	68.7	28
27	858162	1			M	Venous blood	0.170	1.360	0	<5	<5	<2
28	858175	1			F	Venous blood	0.000	24.200	0	24.2	24.2	9.7
29	858217	1			F	Venous blood	3.360	37.200	0	37.2	37.2	14.9
30	858234	1			F	Venous blood	0.000	15.300	0	15.3	15.3	6.1
31	858236	1			F	Venous blood	0.000	31.700	0	31.7	31.7	12.7
32	858277	1			F	Venous blood	1.450	29.800	0	29.8	29.8	11.9
33	858279	1			U	Venous blood	2.080	22.600	0	22.6	22.6	9
34	858406	1			F	Venous blood	0.000	9.670	0	9.67	9.67	3.9
35	858407	1			F	Venous blood	16.300	17.300	16.3	17.3	33.6	13
36	858409	1			F	Venous blood	0.419	47.200	0	47.2	47.2	18.9
37	858454	1			F	Venous blood	0.000	45.500	0	45.5	45.5	18.2
38	858457	1			F	Venous blood	9.430	3.660	9.43	0	9.43	3.8

System Message>

Run Status : NEW

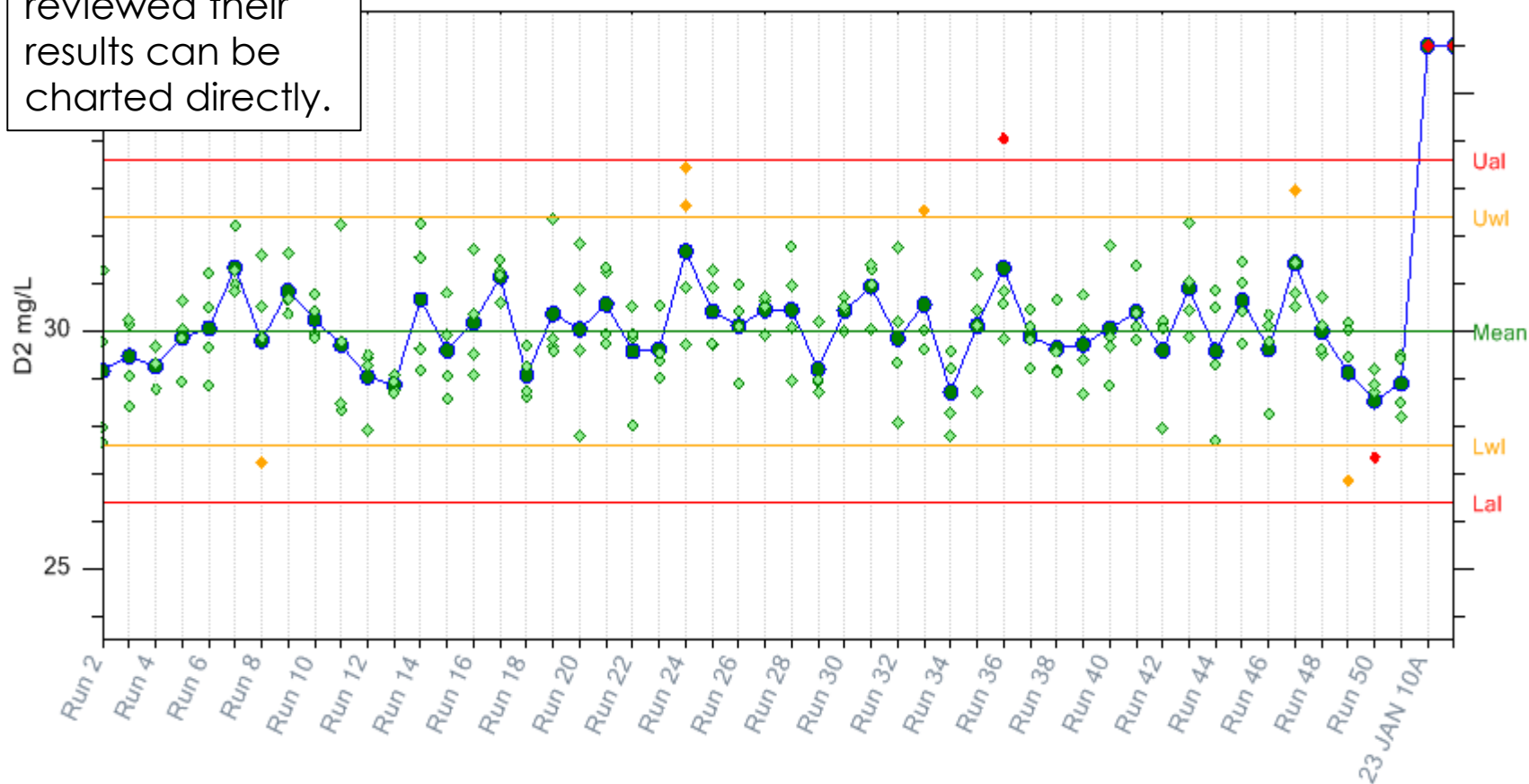
Samples : 9

Event	D2 conc. (nmol/L)	D3 conc. (nmol/L)	D2 Interpretation	D3 Interpretation	Total Vitamin D (nmol/L)
D2 Low, D3 High/Normal	<5	>5	0	D3 Result	D3 Result
D2 Low, D3 Low	<5	<5	0	<5	<5
D2 Normal/High D3 Low	>5	<5	D2 Result	0	D2 Result
D2 & D3 Normal/High	>5	>5	D2 Result	D3 Result	D2 Result + D3 Result

LIMS

Step 15

In the event that AQC's need to reviewed their results can be charted directly.

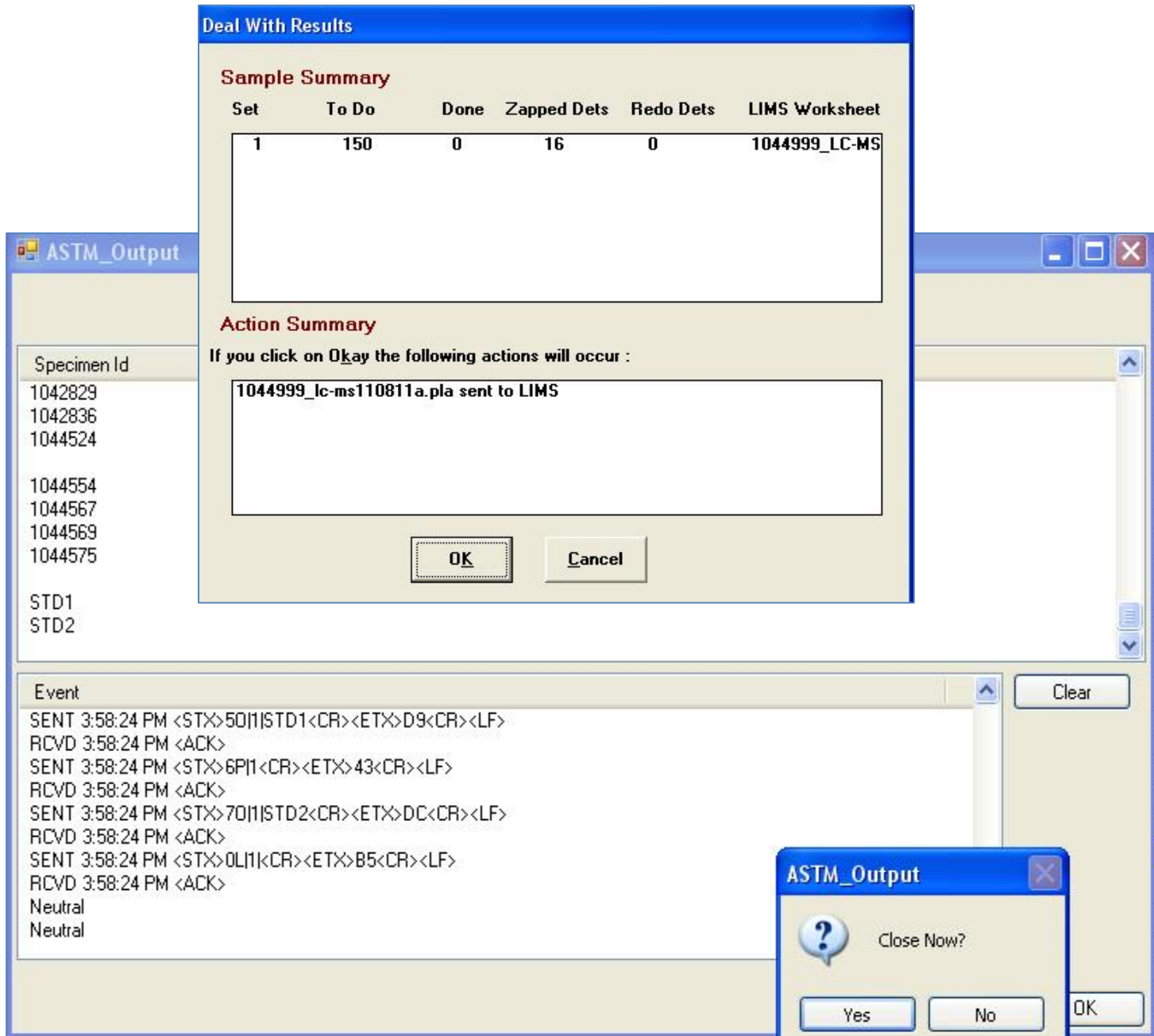
**SOP1234 : Grifols QC2
D2**

Batch Mean (plotted line) and individual aqc results

Step 16

Results in black meet AQC rules and can be sent to Telepath, while Suspect results can be 'zapped' or set aside for reanalysis in the next run.

L4L then opens a connection and Telepath and uploads all results electronically and then archives all the data files for later auditing



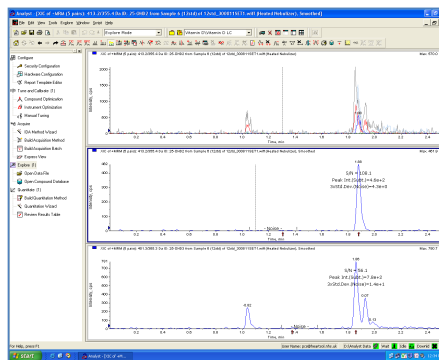
Summary



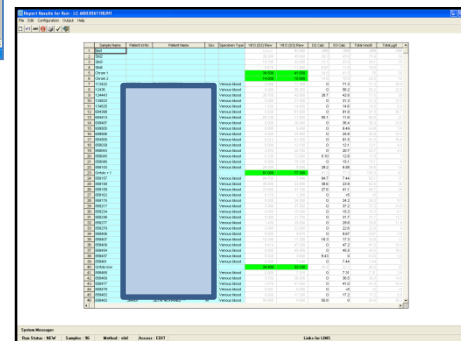
Sample Preparation
& Analyst time



Instrument set up	2 mins
Analyst time	2 mins



Instrument run
288 mins
Analyst Time
0 mins



Results review & upload 5 mins Analyst time 5 mins
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