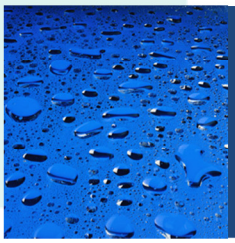


case study
Chemtest

CSols
laboratory systems integration

CSols lab integration software reduces costs, turnaround time and transcription errors at Chemtest

Figure 1: New modern laboratories

Figure 2: New modern laboratories

Chemtest is a leading supplier of high quality, fast response analytical services where customer focus and continuous investment in personnel, processes and technology are at the forefront of their business strategy. Chemtest's laboratories are housed in modern, purpose-built and secure accommodation in Newmarket. Here 65 highly qualified scientists carry out in excess of 6 million results determinations per year using a wide range of contemporary analytical instruments. CSols Ltd. has provided a number of software products and implementation services for the laboratory. These have had a significant effect upon Chemtest's activities, improving automation and hence reducing costs, average turnaround times and transcription errors. Furthermore a reduction in paper transcription and easily accessible audits of result processing using CSols software have helped Chemtest maintain their ISO/IEC 17025 and MCERTS accreditation and to successfully pass a number of audits.

Analysis at Chemtest

Figure 3: New modern laboratories

Analysis is undertaken at Chemtest for many industry sectors including Environmental, Geotechnical, Rail and Construction, Airports, Local Government as well as for Asbestos Management. Chemtest offers both fast and standard turnarounds to meet with clients' requirements and deadlines. The provision of sample containers and custody documentation, sample collection and reporting costs are included in the price of analysis. Sample collection

is provided utilising couriers and in-house transport to ensure timely and safe sample delivery to the laboratory so that samples are received in optimum condition for analysis with traceability from the sample origin. Chemtest also provides bespoke reporting formats in several different media to meet their clients' specifications.

CSols & Compliance

CSols software is helping Chemtest's laboratory workflow from sample reception and processing all the way to results delivery. In particular the following applications are used :

- **PrepLab** ensures samples are correctly labelled
- **Links for LIMS** helps analysts easily synchronise and process instrument results
- **AqcTools** is providing rapid feedback on the performance of each instrument

All the CSols software fully compliments the PerkinElmer LABWORKS LIMS and Totalchrom chromatography data handling system to help provide a complete system that allows Chemtest to easily meet its regulatory obligations for compliance for audit trailed sample and results histories for a wide range of methods. The following is a selection of methods where instruments (over 60 at the last count) use the CSols **Links for LIMS** application:

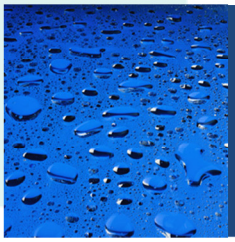
Photometric tests	(Discrete analyser)	PAH	(GC-MS)
Cyanide	(Continuous flow)	Phenols	(HPLC)
Metals	(ICP-MS)	TPH	(GC-FID)
Metals	(ICP-OES)	SVOCs	(GC-MS)
Soils - Moisture - initial weights			
Soils - Moisture - dry weights		PCBs	(GC-MS/ECD)
Sulphur	(TotalChrom)	VOCs	(GC-MS)
TOCS	(SciLabTOC)	TOC	(Carbon analyser)

Chemtest also participates in the following external proficiency schemes and CSols **AqcTools** is assisting in processing, storage and monitoring of the wide range of AQC performance data.

- CONTEST
- AQUACHECK
- LEAP
- AIMS
- RTC MCERTS

ISO 14001 Registered Company
sira CERTIFICATION SERVICE
UKAS ENVIRONMENTAL MANAGEMENT
011


sira
ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE
This is to Certify that the Environmental Management System of
CHEMTEST LTD
Depot Road
Newmarket
CB8 0AL
United Kingdom
has been assessed by Sira Certification Service and found to comply with
ISO 14001:2004
for
The provision of chemical analysis services for environmental samples (soils, waters and leachates).
Certificate No: 104029
Date of Initial Certification: 02 June 2010
Date of Issue/Reissue: 02 June 2010
Renewal Due: 12 May 2013
On behalf of SCS
Sira Certification Service
12 Acorn Industrial Park, Crayford Road, Crayford, Dartford, Kent, United Kingdom, DA1 4AL



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Sample Registration

After delivery samples are registered into Chemtest's LIMS, a confirmation of receipt is sent to the client; container specific barcoded sample labels and a folder label are produced. Technical Administration verifies that the customer order, pricing, tests / test suites are correct. The individual sample containers and folders are then labelled.

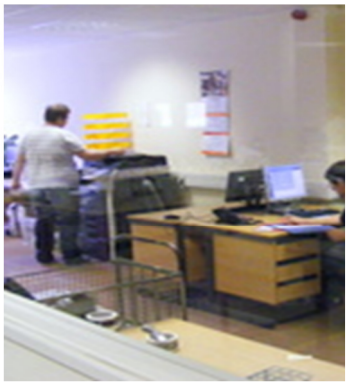


Figure 4: Sample registration

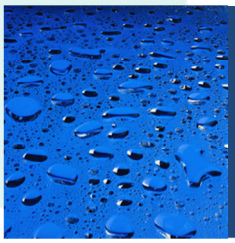
Sample preparation

Sample preparation at Chemtest utilises CSols **PrepLab** software. **PrepLab** streamlines and automates sample preparation for the analytical instrumental analysis. **PrepLab** is particularly well suited to the handling of solid samples such as soils as well as ores, metals, powders, soil, coal etc.

Figure 5: Sample preparation

Figure 6: Sample preparation area

Like all CSols software, **PrepLab** can be configured. At Chemtest users make use of barcode readers and capture weights directly from balances they are using in the preparation process. Chemtest also use **PrepLab** to produce further labels which help route prepared sub-samples to the correct analytical laboratory.



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PrepLab - Simplicity of use

Analysts typically have limited time to prepare samples and then setup each instrument so **PrepLab** operation is straightforward and easily handles the different instrument methods that are used for different sample types. **PrepLab** also allows users to record the physical layout of samples in preparation trays that are used or for worklists / sequence queues for different instruments. Unlike LIMS, in **PrepLab** the worklist run order is not forced on the analyst and so adding urgent samples, blanks, standards and QCs to the instrument's pre-sequence file is easy and straightforward and samples are both added though keyboard entry and by scanning using a barcode reader.

Automatic communication with PerkinElmer Labworks LIMS is also configured so that LIMS 'knows' that the sample is in the **PrepLab** tray. Any QC or blanks that are added are consistently named for the current method so that any subsequent results collected are easily extracted and processed by **AqcTools**. Upon completion of a sample tray two copies of the worklist are then produced by **PrepLab** – a physical and electronic copy. The first is printed and kept with the tray of samples to guide any further sample workup and the physical placement in the appropriate instrument autosampler. The second copy automatically updates LIMS to create an instrument worklist/sequence file that is used in the next phase of analysis.

Instrument setup

Instrument integration with the CSols **Links for LIMS** software is extensively used at Chemtest. For over 60 instruments of different types Links for LIMS provides a powerful user friendly interface for analysts to carry out their routine work.

Setting up an instrument is made easy as LIMS already has an instrument setup file. Analyst's simply use the Links for LIMS Setup program to select a worklist file that is matched to the sample tray. **Links for LIMS** then displays the samples and QCs in a layout suited for that specific instrument. If this matches the paper worklist attached to the tray, the run is accepted and an instrument compatible run file is created containing all the sample details and if required further biographical data, weights and dilution factors as required by the Standard Operating Procedure (SOP).

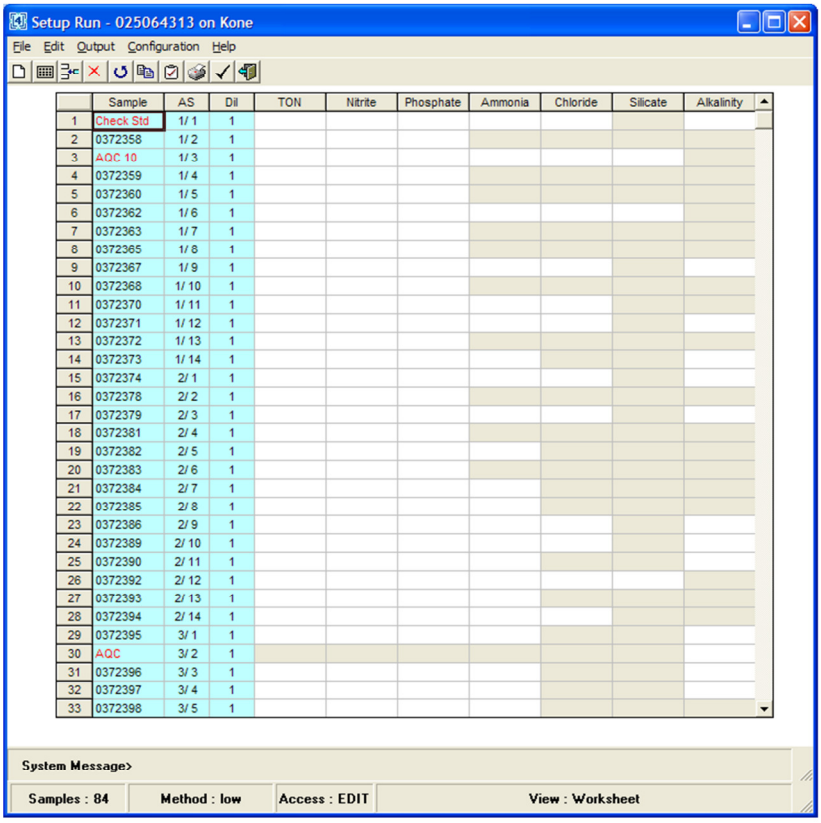
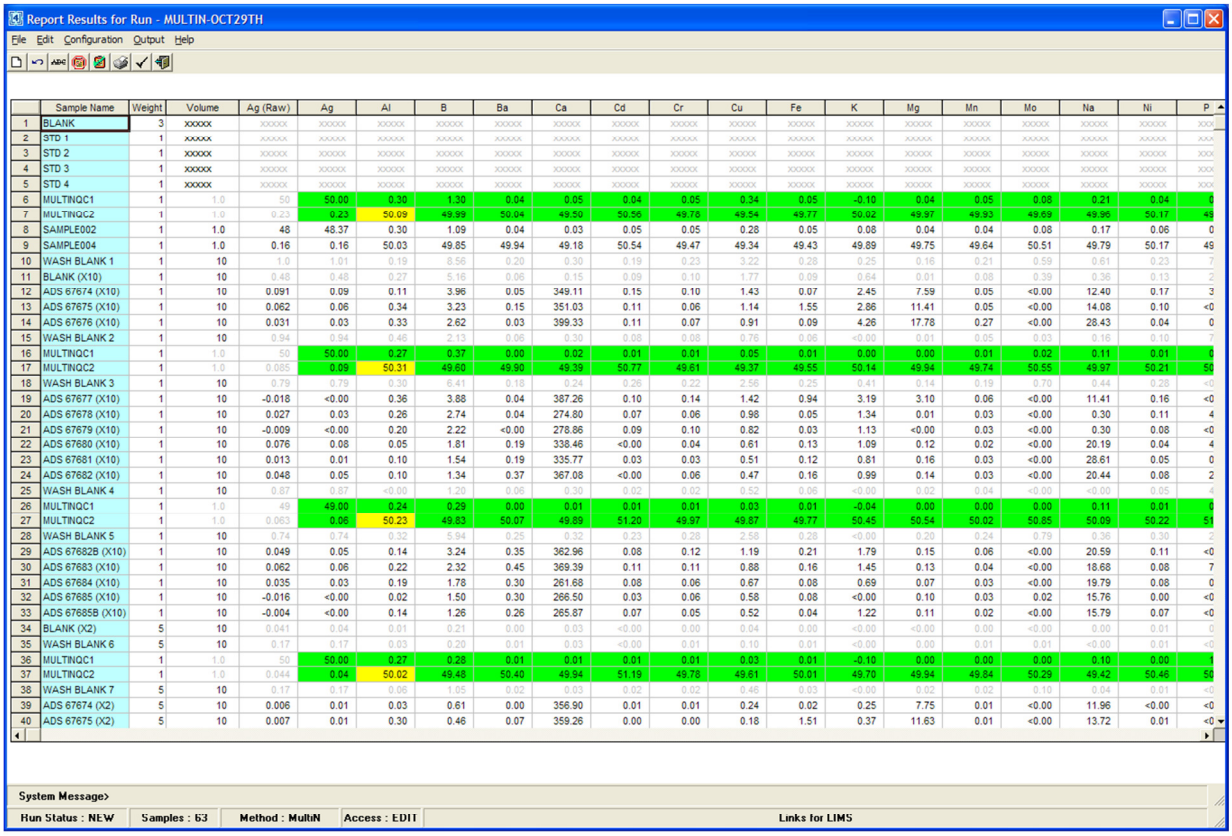


Figure 7: Setting up a run for a Thermo/Kone Aquakem analyser showing the run list, autosampler position, dilution factor and range of results expected.

Depending upon the instrument system used, this run file can be opened up directly by the instrument software and used to run the instrument without further transcription.

Instrument results processing

Once an instrument has run, Chemtest's analysts use the **Links for LIMS** Result Review program to check their results before sending them to LIMS for final reporting. This gives them the chance to approve all of the data. The Result Reporting program is configured then to not only read the instrument data file but also to apply Chemtest's SOP settings for result treatment. This includes rules for rounding, treatment of blanks and AQCs, as well any calculations and handling of duplicates. AQC rules are applied with traffic light colour coding to highlight any problems which can be addressed easily by re-assigning samples for reanalysis in the next run or by discarding results (zapping) so that they are not sent to LIMS. Finally all acceptable results are transferred to LIMS by clicking a single function key in the software.



	Sample Name	Weight	Volume	Ag (Raw)	Ag	Al	B	Ba	Ca	Cd	Cr	Cu	Fe	K	Mg	Mn	Mo	Na	Ni	P
1	BLANK	3	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxx
2	STD 1	1	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxx
3	STD 2	1	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxx
4	STD 3	1	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxx
5	STD 4	1	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxxxx	xxx
6	MULTINQC1	1	1.0	50	50.00	0.30	1.30	0.04	0.05	0.04	0.05	0.34	0.05	-0.10	0.04	0.05	0.08	0.21	0.04	0
7	MULTINQC2	1	1.0	0.23	0.23	50.09	49.99	50.04	49.50	50.56	49.76	49.54	49.77	50.02	49.97	49.93	49.69	49.96	50.17	49
8	SAMPLE002	1	1.0	48	48.37	0.30	1.09	0.04	0.03	0.05	0.05	0.28	0.05	0.08	0.04	0.04	0.08	0.17	0.06	0
9	SAMPLE004	1	1.0	0.16	0.16	50.03	49.85	49.94	49.18	50.54	49.47	49.34	49.43	49.89	49.75	49.64	50.51	49.79	50.17	49
10	WASH BLANK 1	1	10	1.0	1.01	0.19	8.56	0.20	0.30	0.19	0.23	3.22	0.28	0.25	0.16	0.21	0.59	0.61	0.23	7
11	BLANK (X10)	1	10	0.48	0.48	0.27	5.16	0.06	0.15	0.09	0.10	1.77	0.09	0.64	0.01	0.08	0.39	0.36	0.13	3
12	ADS 67674 (X10)	1	10	0.091	0.09	0.11	3.96	0.05	349.11	0.15	0.10	1.43	0.07	2.45	7.59	0.05	<0.00	12.40	0.17	3
13	ADS 67675 (X10)	1	10	0.062	0.06	0.34	3.23	0.15	351.03	0.11	0.06	1.14	1.55	2.86	11.41	0.05	<0.00	14.08	0.10	<0
14	ADS 67676 (X10)	1	10	0.031	0.03	0.33	2.62	0.03	399.33	0.11	0.07	0.91	0.09	4.26	17.78	0.27	<0.00	28.43	0.04	0
15	WASH BLANK 2	1	10	0.94	0.94	0.46	2.13	0.06	0.30	0.08	0.08	0.76	0.06	<0.00	0.01	0.05	0.03	0.16	0.10	7
16	MULTINQC1	1	1.0	50	50.00	0.27	0.37	0.00	0.02	0.01	0.01	0.05	0.01	0.00	0.00	0.01	0.02	0.11	0.01	0
17	MULTINQC2	1	1.0	0.085	0.09	50.31	49.60	49.90	49.39	50.77	49.61	49.37	49.55	50.14	49.94	49.74	50.55	49.97	50.21	50
18	WASH BLANK 3	1	10	0.79	0.79	0.30	6.41	0.18	0.24	0.26	0.22	2.56	0.25	0.41	0.14	0.19	0.70	0.44	0.28	<0
19	ADS 67677 (X10)	1	10	-0.018	<0.00	0.36	3.88	0.04	387.26	0.10	0.14	1.42	0.94	3.19	3.10	0.06	<0.00	11.41	0.16	<0
20	ADS 67678 (X10)	1	10	0.027	0.03	0.26	2.74	0.04	274.80	0.07	0.06	0.98	0.05	1.34	0.01	0.03	<0.00	0.30	0.11	4
21	ADS 67679 (X10)	1	10	-0.009	<0.00	0.20	2.22	<0.00	278.86	0.09	0.10	0.82	0.03	1.13	<0.00	0.03	<0.00	0.30	0.08	<0
22	ADS 67680 (X10)	1	10	0.076	0.08	0.05	1.81	0.19	338.46	<0.00	0.04	0.61	0.13	1.09	0.12	0.02	<0.00	20.19	0.04	4
23	ADS 67681 (X10)	1	10	0.013	0.01	0.10	1.54	0.19	335.77	0.03	0.03	0.51	0.12	0.81	0.16	0.03	<0.00	28.61	0.05	0
24	ADS 67682 (X10)	1	10	0.048	0.05	0.10	1.34	0.37	367.08	<0.00	0.06	0.47	0.16	0.99	0.14	0.03	<0.00	20.44	0.08	2
25	WASH BLANK 4	1	10	0.87	0.87	<0.00	1.20	0.06	0.30	0.02	0.02	0.52	0.06	<0.00	0.02	0.04	<0.00	<0.00	0.05	4
26	MULTINQC1	1	1.0	49	49.00	0.24	0.29	0.00	0.01	0.01	0.01	0.03	0.01	-0.04	0.00	0.00	0.00	0.11	0.01	0
27	MULTINQC2	1	1.0	0.063	0.06	50.23	49.83	50.07	49.89	51.20	49.97	49.87	49.77	50.45	50.54	50.02	50.85	50.09	50.22	51
28	WASH BLANK 5	1	10	0.74	0.74	0.32	5.94	0.25	0.32	0.23	0.28	2.58	0.28	<0.00	0.20	0.24	0.79	0.36	0.30	2
29	ADS 67682B (X10)	1	10	0.049	0.05	0.14	3.24	0.35	362.96	0.08	0.12	1.19	0.21	1.79	0.15	0.06	<0.00	20.59	0.11	<0
30	ADS 67683 (X10)	1	10	0.062	0.06	0.22	2.32	0.45	369.39	0.11	0.11	0.88	0.16	1.45	0.13	0.04	<0.00	18.68	0.08	7
31	ADS 67684 (X10)	1	10	0.035	0.03	0.19	1.78	0.30	261.68	0.08	0.06	0.67	0.08	0.69	0.07	0.03	<0.00	19.79	0.08	0
32	ADS 67685 (X10)	1	10	-0.016	<0.00	0.02	1.50	0.30	266.50	0.03	0.06	0.58	0.08	<0.00	0.10	0.03	0.02	15.76	0.00	<0
33	ADS 67685B (X10)	1	10	-0.004	<0.00	0.14	1.26	0.26	265.87	0.07	0.05	0.52	0.04	1.22	0.11	0.02	<0.00	15.79	0.07	<0
34	BLANK (X2)	5	10	0.041	0.04	0.01	0.21	0.00	0.03	<0.00	0.00	0.04	0.00	<0.00	<0.00	0.00	<0.00	0.00	0.01	0
35	WASH BLANK 6	5	10	0.17	0.17	0.03	0.20	0.01	0.03	<0.00	0.01	0.10	0.01	<0.00	0.00	0.01	0.01	<0.00	0.01	<0
36	MULTINQC1	1	1.0	50	50.00	0.27	0.28	0.01	0.01	0.01	0.01	0.03	0.01	-0.10	0.00	0.00	0.00	0.10	0.00	1
37	MULTINQC2	1	1.0	0.044	0.04	50.02	49.48	50.40	49.94	51.19	49.78	49.61	50.01	49.70	49.94	49.84	50.29	49.42	50.46	50
38	WASH BLANK 7	5	10	0.17	0.17	0.06	1.05	0.02	0.03	0.02	0.02	0.46	0.03	<0.00	0.02	0.02	0.10	0.04	0.01	<0
39	ADS 67674 (X2)	5	10	0.006	0.01	0.03	0.61	0.00	356.90	0.01	0.01	0.24	0.02	0.25	7.75	0.01	<0.00	11.96	<0.00	<0
40	ADS 67675 (X2)	5	10	0.007	0.01	0.30	0.46	0.07	359.26	0.00	0.00	0.18	1.51	0.37	11.63	0.01	<0.00	13.72	0.01	<0

Figure 9: Results reported from a PerkinElmer Optima showing colour coding of AQC samples

Both the electronic instrument setup and results uploading save Chemtest a considerable amount of time compared to doing this by hand. In addition the consistent interpretation of results provided by the Links for LIMS stored method has also saved time in reducing the amount of retesting.

AqcTools for routine analysis of AQCs

Chemtest is also currently rolling out another CSols software package called **AqcTools.** This will further help Chemtest in the following ways :

- Immediate charting of the instrument AQC results within the Links for LIMS program to help spot problems with performance with an automatic upload to a central **AqcTools** database upon LIMS approval.

- Online calculations of those specific variables and key parameters required by the accreditation bodies , for example, rolling bias, precision and so on.
- Central Database storage of the entire AQC dataset for easy processing and reporting.
- Ability to interact with discrete AQC values and flag results with comments and interpretation for later internal or external auditing.

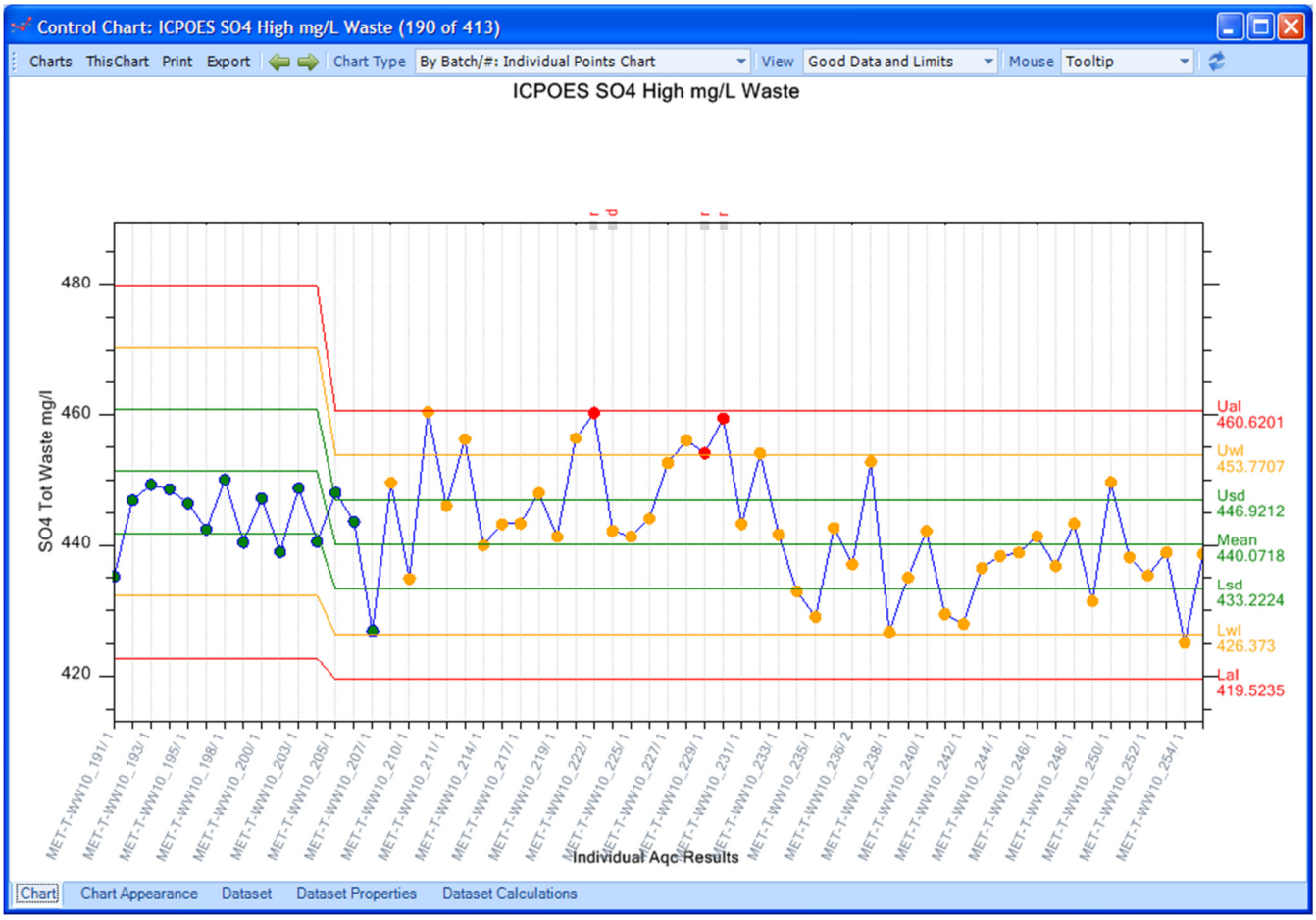
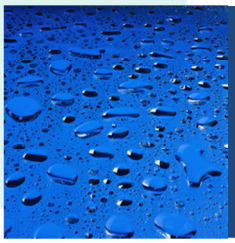


Figure 10: Chart of results for each instrument run showing upper & lower control and action limits for the results dataset.

AqcTools is designed to run both within Links for LIMS as well as any laboratory workstation. This makes sure that Chemtest analysts get a consistent view of the data at all times. As there is no need to manually transfer results there are time and quality savings. As all results are stored in a full database environment, reporting is simplified saving a considerable amount of time, especially when supporting audits.



case study
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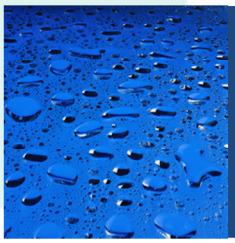
Summary

CSols have over 21 years experience in producing solutions that assist manufacturing, services and process control labs, interfacing with a wide range of instrument types. CSols software tools have helped maximize Chemtest's investment across their entire laboratory workflow. In particular CSols solutions benefit the laboratory in the following ways :

- an easy to follow sample preparation system for capturing sample information and for labelling samples using PrepLab, which cuts out a large amount of manual transcription and the opportunity for identification error
- easier instrument processing by the 'earlier' creation of instrument run files including useful parameters such as dilution factor and sample weights saving valuable analyst time
- 'electronically' applies Chemtest SOPs to every instrument result to ensure the consistent interpretation of each result as well as the process the result must follow after review
- more responsive AQC system giving analysts an opportunity to identify problems as they occur to reduce wasteful analysis and instrument down time
- rapid data entry from instrument and central storage of all results in a database environment for easier reporting.

Malcolm Avis, Technical Director at Chemtest said *"I have always found CSols very responsive to our needs. Our productivity gains made possible by their software, particularly with respect to sample preparation and instrument interfacing, have allowed us to reassign valuable resources to increase our throughput and reduce our turnaround times."*

Dr. Phil Goddard, CSols CEO said *"We constantly strive to achieve a close working relationship working with our customers, taking a hands-on approach, to ensure optimum efficiencies and performance. We believe that these are essential factors for creating and maintaining our customers' competitive advantage". We have enjoyed working with Chemtest and are delighted we have contributed to their continued success"*



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Further Information

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