



Tellus Border Project
Summary Report for Work Performed on Lot 2-A
Geochemical Analysis of Soil Samples

1.0 Introduction

Tellus Border is a mapping project collecting scientific data on soils, water and rocks across the six border counties of Ireland - Donegal, Sligo, Leitrim, Cavan, Monaghan and Louth - and continue the analysis and application of existing data in the counties of Northern Ireland. Information from the project will help manage the environment and support sustainable development of our natural resources. The project is a follow-on from the Tellus project successfully completed in Northern Ireland.

Tellus Border performed two major surveys. An airborne geophysical survey from September 2011 to July 2012 and a geochemical sampling survey of soils and streams from August 2011 to June 2012. The cross-border Tellus Border project is a joint initiative between the Geological Survey of Ireland (GSI), the Geological Survey of Northern Ireland, the Dundalk Institute of Technology and Queen's University, Belfast.

The overall aim of the geochemical survey is to determine a regional-scale geochemical baseline of soils, stream waters and stream sediments in northern border counties of Ireland. The objective of the soil geochemical survey is to collect soil samples from two depths at each sample site. The objective of the geochemical survey of streams is to collect stream water samples, vegetation samples, and samples of the fine fraction (<150 µm) of stream sediments and the heavy mineral panned concentrate (derived from the >150 µm to <2 mm sediment fraction) from active low- (typically first- and second-) order stream channels.

The Geological Survey of Ireland (GSI) issued a request for tender (RFT) in December 2011 for the preparation and analysis of the soils, stream waters and stream sediments from this survey. The RFT was divided into 5 Lots:

Lot 1-A

Preparation of topsoil samples and stream sediment samples to 'pulp' for geochemical analyses

Lot 1-B

Preparation of subsoil samples to <2 mm fraction, for long-term storage.

Lot 2-A

Multi-element soil geochemical analyses by Inductively Coupled Plasma–Mass Spectrometry (ICP-MS) following aqua regia extraction; soil pH determination by CaCl₂ slurry method; and soil loss-on-ignition at 450°C.

Lot 2-B

Pressed powder pellet preparation and multi-element soil geochemical analyses by X-ray fluorescence spectrometry (XRFS); soil pH determination by CaCl₂ slurry method; and soil loss-on-ignition at 450°C.

Lot 3-A

Multi-element stream sediment geochemical analyses by Inductively Coupled Plasma–Mass Spectrometry (ICP-MS) following aqua regia extraction.

Lot 3-B

Pressed powder pellet preparation and multi-element geochemical stream sediment analyses by X-ray fluorescence spectrometry (XRFS).

Lot 4-A

Lead fire-assay of a 10 g soil pulp sample for gold, platinum, palladium, and optionally rhodium, with ICP-MS finish.

Lot 4-B

Lead fire-assay of a 10 g stream sediment pulp sample for gold, platinum, palladium, and optionally rhodium, with ICP-MS finish.

Lot 5

Stream water Inductively Coupled Plasma–Mass Spectrometry (ICP-MS) or equivalent alternative; Non-purgeable organic carbon (NPOC); major anions by Ion Chromatography (IC).

SGS Minerals Services bid on all 5 Lots of the tender and was awarded the contract to perform the work for Lot 2-A.

2.0 Summary of Work

From August 2012 to December 2012 the SGS geochemistry laboratory in Toronto performed the geochemical analysis of soil samples for Lot 2-A.

The work involved:

- ICP-OES / ICP-MS analysis of the soil samples (SGS Method Code ICM11D)
- Loss on ignition (LOI) analysis of the soil samples (SGS Method Code PHY01D)
- pH analysis of the soil samples (SGS Method Code ISE15V)

Prior to the commencement of analysis, SGS proposed a method modification to the aqua regia extraction requested by the GSI. The proposed modification was to the acid mixture. Instead of an aqua regia acid mixture of 3:1 HCl:HNO₃ an acid mixture of 2:1 HNO₃:HCl was agreed upon. Previous analyses performed at SGS on soil samples for the Geological Survey of Northern Ireland had used this 2:1 HNO₃:HCl mixture and to keep a consistency in the methodology it was agreed to use the same extraction. The SGS method code for this analysis is ICM11D.

Results of the analyses have been compiled and reported separately in a series of Certificates of Analysis over the course of the project. This report provides a summary of the sample management, reporting schedule, methodology used for analysis, and analytical quality control during the period of analysis.

3.0 Sample Management

Samples were shipped directly from the contracted UK-based sample preparation facility to the SGS Toronto geochemical laboratory.

In total 4,063 soil samples for ICP analyses (method code ICM11D), 3817 samples for LOI analyses (method code ISE15V) and 3817 samples for pH analyses (method code PHY01D) were received at the SGS Toronto laboratory from GSI. The samples were received in eight batches as outlined in Table One below.

Upon receipt of each sample batch, samples were sorted and verified against the sample submittal sheets prepared by GSI which were included with the sample batch shipments. Sample batches were sorted into numerical order and sample identifications were matched against the sample submittal sheets in order to identify any missing, damaged or incorrectly labeled samples.

Each batch of samples was logged into the SGS Laboratory Information Management System (SLIM) in smaller groupings to create manageable work orders. For each batch of samples, separate work orders were created for analysis of ICM11D, PHY01D and ISE15V.

All samples were returned to the GSI in May 2013 in the original sample securitainers received from the GSI after final reports were issued. However, the original archive cardboard boxes were accidentally disposed of, so samples were returned in SGS cardboard sample boxes instead.

TABLE ONE - SAMPLE BATCHES RECEIVED

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Samples
TO122637	580001A	580074A	2-Aug-12	74
TO122638	580075A	580148A	2-Aug-12	74
TO122639	580149A	580222A	2-Aug-12	74
TO122640	580223A	580296A	2-Aug-12	74
TO122641	580297A	580370A	2-Aug-12	74
TO122642	580371A	580444A	2-Aug-12	74
TO122643	580445A	580500A	2-Aug-12	56
Batch One Total				500
TO122851	580501A	580574A	15-Aug-12	74
TO122852	580575A	580648A	15-Aug-12	74
TO122853	580649A	580722A	15-Aug-12	74
TO122854	580723A	580796A	15-Aug-12	74
TO122855	580797A	580870A	15-Aug-12	74
TO122856	580871A	580944A	15-Aug-12	74
TO122857	580945A	581000A	15-Aug-12	56
Batch Two Total				500
TO123166	581001A	581074A	29-Aug-12	74
TO123167	581075A	581148A	29-Aug-12	74
TO123168	581149A	581222A	29-Aug-12	74
TO123169	581223A	581296A	29-Aug-12	74
TO123171	581297A	581370A	29-Aug-12	74
TO123172	581371A	581444A	29-Aug-12	56
TO123173	581445A	581500A	29-Aug-12	74
Batch Three Total				500
TO123429	581501A	581574A	13-Sep-12	74
TO123430	581575A	581648A	13-Sep-12	74
TO123431	581649A	581722A	13-Sep-12	74
TO123432	581723A	581796A	13-Sep-12	74
TO123433	581797A	581870A	13-Sep-12	74
TO123434	581871A	581944A	13-Sep-12	74
TO123435	581945A	582000A	13-Sep-12	56
Batch Four Total				500
TO123616	582001A	582074A	25-Sep-12	74
TO123617	582075A	582148A	25-Sep-12	74
TO123618	582149A	582222A	25-Sep-12	74
TO123619	582223A	582296A	25-Sep-12	74
TO123620	582297A	582370A	25-Sep-12	74
TO123621	582371A	582444A	25-Sep-12	74
TO123622	582445A	582500A	25-Sep-12	56
Batch Five Total				500

TABLE ONE - SAMPLE BATCHES RECEIVED - continued

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Samples
TO123750	582501A	582574A	1-Oct-12	74
TO123751	582575A	582648A	1-Oct-12	74
TO123752	582649A	582722A	1-Oct-12	74
TO123753	582723A	582796A	1-Oct-12	74
TO123754	582797A	582870A	1-Oct-12	74
TO123755	582871A	582944A	1-Oct-12	74
TO123756	582945A	583000A	1-Oct-12	56
Batch Six Total				500
TO123851	583001A	583074A	9-Oct-12	74
TO123852	583075A	583148A	9-Oct-12	74
TO123853	583149A	583222A	9-Oct-12	74
TO123854	583223A	583296A	9-Oct-12	74
TO123855	583297A	583370A	9-Oct-12	74
TO123856	583371A	583444A	9-Oct-12	74
TO123857	583445A	583500A	9-Oct-12	56
Batch Seven Total				500
TO123971	583501A	583574A	19-Oct-12	74
TO123972	583575A	583648A	19-Oct-12	74
TO123973	583649A	583722A	19-Oct-12	74
TO123974	583723A	583796A	19-Oct-12	74
TO123975	583797A	583870A	19-Oct-12	74
TO123976	583871A	583944A	19-Oct-12	63
TO123977	583945A	584218A	19-Oct-12	55
TO123978	584219A	584300A	19-Oct-12	75
Batch Eight Total				563

4.0 Reporting Schedule

Samples results were reported by email to the GSI designate as assigned on the sample submittal sheets. Data was reported by email in Excel format as well as by PDF copies emailed to GSI, Ireland.

The reporting schedule for ICM11D results is outlined in Table Two below.

TABLE TWO - Reporting Schedule for Method ICM11D

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Reported	Samples
TO122637	580001A	580074A	02-Aug-12	8/17/12 2:09 PM	74
TO122638	580075A	580148A	02-Aug-12	9/20/12 12:41 PM	74
TO122639	580149A	580222A	02-Aug-12	8/17/12 2:18 PM	74
TO122640	580223A	580296A	02-Aug-12	8/17/12 2:25 PM	74
TO122641	580297A	580370A	02-Aug-12	8/17/12 7:24 PM	74
TO122642	580371A	580444A	02-Aug-12	8/17/12 2:33 PM	74
TO122643	580445A	580500A	02-Aug-12	8/17/12 2:38 PM	56
TO122851	580501A	580574A	15-Aug-12	8/24/12 2:44 PM	74
TO122852	580575A	580648A	15-Aug-12	8/24/12 2:48 PM	74
TO122853	580649A	580722A	15-Aug-12	8/24/12 2:52 PM	74
TO122854	580723A	580796A	15-Aug-12	8/24/12 2:55 PM	74
TO122855	580797A	580870A	15-Aug-12	8/24/12 3:10 PM	74
TO122856	580871A	580944A	15-Aug-12	8/24/12 4:27 PM	74
TO122857	580945A	581000A	15-Aug-12	8/24/12 4:31 PM	56
TO123166	581001A	581074A	29-Aug-12	9/18/12 4:35 PM	74
TO123167	581075A	581148A	29-Aug-12	9/18/12 4:40 PM	74
TO123168	581149A	581222A	29-Aug-12	9/18/12 5:21 PM	74
TO123169	581223A	581296A	29-Aug-12	9/18/12 6:08 PM	74
TO123171	581297A	581370A	29-Aug-12	9/18/12 6:12 PM	74
TO123172	581371A	581444A	29-Aug-12	9/18/12 7:27 PM	56
TO123173	581445A	581500A	29-Aug-12	9/18/12 6:38 PM	74
TO123921	581501A	581574A	17-Oct-12	12/20/12 5:02 PM	74
TO123430	581575A	581648A	13-Sep-12	10/17/12 10:13 AM	74
TO123431	581649A	581722A	13-Sep-12	11/22/12 5:12 PM	74
TO123432	581723A	581796A	13-Sep-12	10/17/12 10:18 AM	74
TO123920	581797A	581870A	17-Oct-12	12/5/12 3:58 PM	74
TO123434	581871A	581944A	13-Sep-12	10/17/12 10:22 AM	74
TO123435	581945A	582000A	13-Sep-12	10/17/12 10:34 AM	56
TO123923	582001A	582074A	17-Oct-12	12/5/12 4:01 PM	74
TO123617	582075A	582148A	25-Sep-12	10/19/12 3:01 PM	74
TO123618	582149A	582222A	25-Sep-12	10/19/12 6:19 PM	74
TO123925	582223A	582296A	17-Oct-12	12/5/12 4:07 PM	74
TO123926	582297A	582370A	17-Oct-12	12/5/12 4:10 PM	74
TO123621	582371A	582444A	25-Sep-12	10/19/12 3:32 PM	74
TO123622	582445A	582500A	25-Sep-12	10/19/12 3:22 PM	56
TO123750	582501A	582574A	01-Oct-12	10/23/12 3:59 PM	74
TO123751	582575A	582648A	01-Oct-12	10/26/12 2:39 PM	74
TO123752	582649A	582722A	01-Oct-12	10/23/12 4:01 PM	74
TO123753	582723A	582796A	01-Oct-12	10/23/12 4:18 PM	74
TO123754	582797A	582870A	01-Oct-12	10/23/12 4:04 PM	74
TO123755	582871A	582944A	01-Oct-12	10/23/12 4:08 PM	74
TO123756	582945A	583000A	01-Oct-12	10/23/12 4:12 PM	56
TO123851	583001A	583074A	09-Oct-12	10/31/12 12:44 PM	74
TO123852	583075A	583148A	09-Oct-12	10/31/12 12:51 PM	74
TO123853	583149A	583222A	09-Oct-12	10/31/12 1:59 PM	74
TO123854	583223A	583296A	09-Oct-12	10/31/12 2:08 PM	74
TO123855	583297A	583370A	09-Oct-12	10/31/12 1:47 PM	74
TO123856	583371A	583444A	09-Oct-12	10/31/12 2:14 PM	74

TABLE TWO - Reporting Schedule for Method ICM11D - continued

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Reported	Samples
TO123857	583445A	583500A	09-Oct-12	10/31/12 6:12 PM	56
TO123971	583501A	583574A	19-Oct-12	11/15/12 3:37 PM	74
TO123972	583575A	583648A	19-Oct-12	11/15/12 3:42 PM	74
TO123973	583649A	583722A	19-Oct-12	11/15/12 4:06 PM	74
TO123974	583723A	583796A	19-Oct-12	11/20/12 1:37 PM	74
TO123975	583797A	583870A	19-Oct-12	11/27/12 1:07 PM	74
TO123976	583871A	583944A	19-Oct-12	11/15/12 4:11 PM	63
TO123977	583945A	584218A	19-Oct-12	11/15/12 4:17 PM	55
TO123978	584219A	584300A	19-Oct-12	11/15/12 4:20 PM	75
Total Samples Reported					4063

The reporting schedule for PHY01D results is outlined in Table Three below.

TABLE THREE - Reporting Schedule for Method PHY01D

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Reported	Samples
TO122631	580001A	580087A	02-Aug-12	8/17/12 11:09 AM	74
TO122632	580088A	580174A	02-Aug-12	8/17/12 11:14 AM	74
TO122633	580175A	580257A	02-Aug-12	8/17/12 11:15 AM	74
TO122634	580258A	580345A	02-Aug-12	8/17/12 11:16 AM	74
TO122635	580346A	580430A	02-Aug-12	8/17/12 11:17 AM	74
TO122636	580431A	580500A	02-Aug-12	8/17/12 11:19 AM	60
TO122864	580501A	580585A	15-Aug-12	8/21/12 2:14 PM	80
TO122865	580586A	580672A	15-Aug-12	8/22/12 3:21 PM	82
TO122866	580674A	580760A	15-Aug-12	8/22/12 3:22 PM	83
TO122867	580761A	580845A	15-Aug-12	8/24/12 12:29 PM	80
TO122868	580846A	580931A	15-Aug-12	8/27/12 1:03 PM	79
TO122869	580932A	581000A	15-Aug-12	8/27/12 3:48 PM	66
TO122872	580006A	580498A	16-Aug-12	8/17/12 5:10 PM	40
TO123148	581001A	581074A	29-Aug-12	9/4/12 3:46 PM	68
TO123149	581075A	581148A	29-Aug-12	9/5/12 12:58 PM	70
TO123150	581149A	581222A	29-Aug-12	9/5/12 3:50 PM	71
TO123151	581223A	581296A	29-Aug-12	9/6/12 6:04 PM	69
TO123152	581297A	581370A	29-Aug-12	9/7/12 3:17 PM	71
TO123153	581372A	581444A	29-Aug-12	9/11/12 10:19 AM	69
TO123154	581445A	581500A	29-Aug-12	9/11/12 1:39 PM	52
TO123392	581501A	581579A	12-Sep-12	9/18/12 12:37 PM	74
TO123393	581580A	581658A	12-Sep-12	9/19/12 1:58 PM	74
TO123394	581660A	581737A	12-Sep-12	9/20/12 9:12 AM	74
TO123395	581738A	581815A	12-Sep-12	9/20/12 4:20 PM	74
TO123396	581816A	581894A	12-Sep-12	9/24/12 11:51 AM	74
TO123397	581895A	581972A	12-Sep-12	9/26/12 3:57 PM	74
TO123398	581973A	582000A	12-Sep-12	9/25/12 12:23 PM	26
TO123639	582471A	582500A	25-Sep-12	10/1/12 4:58 PM	65
TO123640	582071A	582140A	25-Sep-12	9/28/12 12:39 PM	66
TO123641	582141A	582210A	25-Sep-12	10/2/12 11:34 AM	67

TABLE THREE - Reporting Schedule for Method PHY01D - continued

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Reported	Samples
TO123642	582211A	582280A	25-Sep-12	10/3/12 10:53 AM	64
TO123643	582281A	582350A	25-Sep-12	10/4/12 9:46 AM	66
TO123644	582351A	582420A	25-Sep-12	10/5/12 1:54 PM	67
TO123645	582421A	582470A	25-Sep-12	10/5/12 1:56 PM	47
TO123646	582471A	582500A	25-Sep-12	10/1/12 4:59 PM	28
TO123735	582501A	582570A	01-Oct-12	10/9/12 3:58 PM	67
TO123736	582572A	582645A	01-Oct-12	10/11/12 10:08 AM	70
TO123737	582646A	582718A	01-Oct-12	10/12/12 10:42 AM	68
TO123738	582720A	582793A	01-Oct-12	10/15/12 12:37 PM	70
TO123739	582794A	582869A	01-Oct-12	10/15/12 12:36 PM	71
TO123740	582870A	582943A	01-Oct-12	10/15/12 12:35 PM	70
TO123742	582945A	583000A	01-Oct-12	10/9/12 10:44 AM	54
TO123834	583001A	583072A	09-Oct-12	10/15/12 12:38 PM	68
TO123835	583074A	583150A	09-Oct-12	10/19/12 11:31 AM	74
TO123836	583151A	583222A	09-Oct-12	10/19/12 11:34 AM	67
TO123837	583224A	583300A	09-Oct-12	10/22/12 11:30 AM	73
TO123841	583301A	583380A	09-Oct-12	10/22/12 11:33 AM	75
TO123842	583382A	583450A	09-Oct-12	10/22/12 11:35 AM	66
TO123843	583451A	583500A	09-Oct-12	10/22/12 11:36 AM	47
TO123964	583501A	583579A	19-Oct-12	10/29/12 5:01 PM	74
TO123965	583580A	583657A	19-Oct-12	10/29/12 5:02 PM	74
TO123966	583658A	583735A	19-Oct-12	10/30/12 3:28 PM	74
TO123967	583736A	583815A	19-Oct-12	10/31/12 10:34 AM	74
TO123968	583816A	583894A	19-Oct-12	10/31/12 10:35 AM	74
TO123969	583895A	584000A	19-Oct-12	11/1/12 12:29 PM	72
TO123970	584001A	584300A	19-Oct-12	11/1/12 12:31 PM	85
Total Samples Reported					3817

The reporting schedule for ISE15V results is outlined in Table Four below.

TABLE FOUR - Reporting Schedule for Method ISE15V

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Reported	Samples
TO122645	580001A	580087A	2-Aug-12	8/17/12 11:20 AM	74
TO122646	580088A	580174A	2-Aug-12	8/17/12 11:21 AM	74
TO122647	580175A	580257A	2-Aug-12	8/17/12 11:22 AM	74
TO122648	580258A	580345A	2-Aug-12	8/17/12 11:23 AM	74
TO122649	580346A	580430A	2-Aug-12	8/17/12 11:24 AM	74
TO122650	580431A	580500A	2-Aug-12	8/17/12 11:25 AM	60
TO122858	580501A	580585A	15-Aug-12	8/22/12 3:19 PM	80
TO122859	580586A	580672A	15-Aug-12	8/24/12 12:25 PM	82
TO122860	580674A	580760A	15-Aug-12	8/23/12 4:03 PM	83
TO122861	580761A	580845A	15-Aug-12	8/23/12 4:04 PM	80
TO122862	580846A	580931A	15-Aug-12	8/24/12 12:28 PM	79
TO122863	580932A	581000A	15-Aug-12	8/27/12 1:02 PM	66

TABLE FOUR - Reporting Schedule for Method ISE15V - continued

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Reported	Samples
TO122871	580006A	580498A	16-Aug-12	8/21/12 2:17 PM	40
TO123158	581001A	581074A	29-Aug-12	9/11/12 10:20 AM	68
TO123160	581075A	581148A	29-Aug-12	9/7/12 1:57 PM	70
TO123161	581149A	581222A	29-Aug-12	9/6/12 3:15 PM	71
TO123162	581223A	581296A	29-Aug-12	9/7/12 3:19 PM	69
TO123163	581297A	581370A	29-Aug-12	9/7/12 3:20 PM	71
TO123164	581372A	581444A	29-Aug-12	9/11/12 10:21 AM	69
TO123165	581445A	581500A	29-Aug-12	9/11/12 1:40 PM	52
TO123379	581501A	581579A	12-Sep-12	9/20/12 9:10 AM	74
TO123380	581580A	581658A	12-Sep-12	9/21/12 9:31 AM	74
TO123381	581660A	581737A	12-Sep-12	9/26/12 3:59 PM	74
TO123382	581738A	581815A	12-Sep-12	9/26/12 4:02 PM	74
TO123383	581816A	581894A	12-Sep-12	9/21/12 9:33 AM	74
TO123384	581895A	581972A	12-Sep-12	9/24/12 1:26 PM	74
TO123385	581973A	582000A	12-Sep-12	9/24/12 1:27 PM	26
TO123623	582001A	582070A	25-Sep-12	10/12/12 10:47 AM	73
TO123624	582071A	582140A	25-Sep-12	10/11/12 9:59 AM	74
TO123625	582141A	582210A	25-Sep-12	10/10/12 11:51 AM	72
TO123626	582211A	582280A	25-Sep-12	10/16/12 1:56 PM	73
TO123627	582281A	582350A	25-Sep-12	10/10/12 11:52 AM	74
TO123628	582351A	582420A	25-Sep-12	10/11/12 10:02 AM	74
TO123630	582421A	582470A	25-Sep-12	10/12/12 10:44 AM	30
TO123743	582501A	582570A	1-Oct-12	10/12/12 10:46 AM	67
TO123744	582572A	582645A	1-Oct-12	10/17/12 10:37 AM	70
TO123745	582646A	582718A	1-Oct-12	10/18/12 9:36 AM	68
TO123746	582720A	582793A	1-Oct-12	10/15/12 1:36 PM	70
TO123747	582794A	582869A	1-Oct-12	10/15/12 1:37 PM	71
TO123748	582870A	582943A	1-Oct-12	10/19/12 11:30 AM	70
TO123749	582945A	583000A	1-Oct-12	10/22/12 11:40 AM	54
TO123844	583001A	583072A	9-Oct-12	10/30/12 11:22 AM	68
TO123845	583074A	583150A	9-Oct-12	10/30/12 11:30 AM	74
TO123846	583151A	583222A	9-Oct-12	10/30/12 11:31 AM	67
TO123847	583224A	583300A	9-Oct-12	11/2/12 10:31 AM	73
TO123848	583301A	583380A	9-Oct-12	11/2/12 10:37 AM	75
TO123849	583382A	583450A	9-Oct-12	11/6/12 9:37 AM	66
TO123850	583451A	583500A	9-Oct-12	10/30/12 11:32 AM	47
TO123981	583501A	583579A	19-Oct-12	11/6/12 10:53 AM	74
TO123982	583580A	583657A	19-Oct-12	11/14/12 11:59 AM	74
TO123983	583658A	583735A	19-Oct-12	11/14/12 12:00 PM	74
TO123984	583736A	583815A	19-Oct-12	11/19/12 11:26 AM	74
TO123985	583816A	583894A	19-Oct-12	11/19/12 1:05 PM	74
TO123986	583895A	584000A	19-Oct-12	11/20/12 9:03 AM	72
TO123987	584001A	584300A	19-Oct-12	11/20/12 9:05 AM	85
Total Samples Reported					3817

5.0 Variation from Expected Reporting

Date and Time Stamp of Analysis

The date and time of analysis was required to be reported with all data files. For the first three batches of samples received August 2, August 15 and Aug 29 the date and time stamp was not reported on the initial Excel data files issued. Data files for these three batches of samples were reissued to include the date and time stamps of analysis. The certificates of analysis for these three batches of samples were also reissued to include the instrument information on the certificate for the suite of elements that were analyzed by ICP-OES and ICP-MS. This was not included on the first issue of these certificates.

Excel data files for the subsequent 5 batches of samples received September 13, 25 and October 1, 9 and 19 were issued with date and time stamps of analysis. Certificates of analysis for these 5 batches were also issued with the instrument used for the analysis suites.

The SGS work order numbers relating to the first 3 batches of samples that required reissue to include date and time stamp of analysis were:

SGS Work Order Number	Starting Sample ID	Ending Sample ID	Received	Samples
TO122637	580001A	580074A	2-Aug-12	74
TO122638	580075A	580148A	2-Aug-12	74
TO122639	580149A	580222A	2-Aug-12	74
TO122640	580223A	580296A	2-Aug-12	74
TO122641	580297A	580370A	2-Aug-12	74
TO122642	580371A	580444A	2-Aug-12	74
TO122643	580445A	580500A	2-Aug-12	56
			Batch One Total	500
TO122851	580501A	580574A	15-Aug-12	74
TO122852	580575A	580648A	15-Aug-12	74
TO122853	580649A	580722A	15-Aug-12	74
TO122854	580723A	580796A	15-Aug-12	74
TO122855	580797A	580870A	15-Aug-12	74
TO122856	580871A	580944A	15-Aug-12	74
TO122857	580945A	581000A	15-Aug-12	56
			Batch Two Total	500
TO123166	581001A	581074A	29-Aug-12	74
TO123167	581075A	581148A	29-Aug-12	74
TO123168	581149A	581222A	29-Aug-12	74
TO123169	581223A	581296A	29-Aug-12	74
TO123171	581297A	581370A	29-Aug-12	74
TO123172	581371A	581444A	29-Aug-12	56
TO123173	581445A	581500A	29-Aug-12	74
			Batch Three Total	500

Numerical Sequence Analysis

Six work orders had samples that were not analyzed in numerical sequence as required. This was due to an out of sequence grouping of samples on the ICP auto sampler. All samples from these six work orders were redigested and reanalyzed in sequence.

The following work orders were reanalyzed and reissued under the work orders indicated:

Original Work Order Number	Starting Sample ID	Ending Sample ID	Reanalysis Work Order Number	Date Original Work Order Reported	Date Reanalysis Work Order Reported	Number of Samples
TO122642	580371A	580444A	TO123917	17-Aug-12	5-Dec-12	74
TO123429	581501A	581574A	TO123921	17-Oct-12	20-Dec-12	74
TO123433	581797A	581870A	TO123920	17-Oct-12	5-Dec-12	74
TO123616	582001A	582074A	TO123923	19-Oct-12	5-Dec-12	74
TO123619	582223A	582296A	TO123925	19-Oct-12	5-Dec-12	74
TO123620	582297A	582370A	TO123926	19-Oct-12	5-Dec-12	74

From the 6 original work orders above there were 48 samples that had insufficient sample mass remaining from the as received ICM11B sample split to perform a reanalysis. It was agreed that reanalysis for ICM11B could be performed on splits of the material originally submitted for LOI analysis. Where there was insufficient sample from the LOI split, a new sample was reprepared from the original soil sample by the GSI contracted UK-based sample preparation facility and shipped to SGS.

The following is the list of samples that were reanalyzed from the LOI split:

580401A	581521A	581561A	582270A
580412A	581522A	581563A	582271A
580444A	581524A	581564A	582272A
581503A	581527A	581567A	582273A
581504A	581529A	581569A	582274A
581509A	581530A	581572A	582275A
581511A	581532A	581574A	582276A
581512A	581537A	581828A	
581515A	581546A	582074A	
581519A	581547A	582264A	

The following is the list of samples that were reprepared from the original soil sample by the GSI contracted UK-based sample preparation facility and shipped to SGS.:

581542A	581552A	581558A
581544A	581553A	581560A
581545A	581555A	581566A
581550A	581557A	

6.0 Analytical Method Summaries

Methods summaries are described in Appendix One for:

SGS Method Code PHY01D

SGS Method Code ICM11D

SGS Method Code ISE15V

7.0 Analytical Quality Control

Quality control sample frequency for a typical batch of 74 samples for method ICM11D was:

- Six reference materials
- Two method blanks
- Two replicate samples

For sample batches differing from 74 samples, a proportional percentage of quality control samples was employed.

In general, the six certified reference materials were randomly inserted into Method ICM11D as per the QC requirements specified in the method summaries listed in Appendix 1. The certified reference materials were from two reputable sources that adhere to ISO guidelines for general and statistical principles for certification; Ore Research and Exploration (OREAS) and Natural Resources Canada (CCRMP).

SUPPLIER	REFERENCE MATERIAL	SOURCE MATERIALS
OREAS	901	Carbonaceous and argillaceous sandstones and siltstones collected from Queensland Australia
OREAS	902	Carbonaceous and argillaceous sandstones and siltstones collected from Queensland Australia
OREAS	903	Carbonaceous and argillaceous sandstones and siltstones collected from Queensland Australia
OREAS	904	Carbonaceous and argillaceous sandstones and siltstones collected from Queensland Australia
CCRMP	Till-3	Surficial Till collected from Northern Ontario, Canada
CCRMP	Till-4	Surficial Till collection from New Brunswick, Canada

SGS's LIMS (Laboratory Information Management System) automatically flags whenever a QC material fails to meet established statistical rules preset in the system. The SLIM QC module is based on a Thompson and Howarth hyperbolic precision curve that approaches the Limit of Repeatability as the concentration approaches the upper limit of the method and sets tolerance requirements that are associated with the detection limit and expected precision of the analyte within the method. These rules are based on rigorous method validation requirements established for our methodology that are fit for purpose.

Certification of reference materials is method dependent and subject to variances in the analyte recoveries depending upon the strength and acid ratios employed in relation to the mineralogy of the reference material. Certification of the OREAS reference materials used for ICM11D is based on an aqua regia digestion (3:1 hydrochloric acid:Nitric acid). The TILL series reference materials are partial extraction techniques in varying acid strengths and combinations and termed provisional. The ICM11D method is a reverse acid (dilute 2:1 nitric acid:hydrochloric acid) ratio. Recoveries can exceed or fall below expected means generated based on the certification process. SGS performs a rigorous in-house certification process for methodologies that vary from typical reference material certification processes that are limited to method dependency. In house certification studies are based on long term data and compare this data to equivalent method recoveries and/or laboratories using the same methodology. In Appendix Two, the reference materials depicted for all methods involved in this project are based on the certificates of analysis from the reference material suppliers and/or our in house certification process, depending upon the supplier certification process information and applicability to the method employed. All reference material certificates can be found at:

Ore Research <http://www.ore.com.au/>

Natural Resources Canada <http://www.nrcan.gc.ca/minerals-metals/technology/3847>

Quality control sample frequency for a typical batch of 74 samples for method PHY01D was:

- Two reference materials

For sample batches differing from 74 samples, a proportional percentage of quality control samples was employed.

The certified reference materials were from a reputable source that adhere to ISO guidelines for general and statistical principles for certification; Natural Resources Canada (CCRMP).

SUPPLIER	REFERENCE MATERIAL	SOURCE MATERIALS
CCRMP	LKSD-4	Lake sediment
CCRMP	STSD-1	Stream sediment
CCRMP	SY4	Diorite gneiss

Quality control sample frequency for a typical batch of 74 samples for method ISE15V was:

- One in house reference material
- Calibration after every 10 samples using buffer solutions of pH 4 and pH 7 and check with pH 10 (tolerances of ± 0.02)

For sample batches other than 74 samples a proportional percentage of quality control samples was employed.

The reference material used was an in-house reference solution.

Summary charts for quality control samples analyzed with methods ICM11D, ISE15V and PHY01D are detailed in Appendix Two

APPENDIX ONE

Method Summaries

SGS Method Code PHY01K (client modified):

The Determination of Loss of Ignition (LOI) in Geological Samples.

1. Parameter(s) measured, unit(s):

L.O.I.:(%)

2. Typical sample size:

1.0 g

3. Type of sample applicable (media):

Crushed and pulverized rock, soil and /or sediment samples.

4. Sample preparation technique used:

As received soil samples were combusted.

5. Method of analysis used:

Loss on Ignition consists of combustion of a sample of the material at 450°C for 4 hours. The simple test typically consists of placing a few grams of the material in a tared, pre-ignited crucible and determining its mass, placing it in a temperature-controlled furnace for a set time, cooling it in a controlled atmosphere, and re-determining the mass. The equipment used for the Tellus Border Project was a Thermolyne benchtop muffle furnace and Sartorius balance.

6. Calculations:

L.O.I. % =

$$\frac{(\text{Weight of Crucible + Sample before combustion}) - (\text{Weight of Crucible + Sample after combustion})}{\text{Weight of Sample}} \times 100\%$$

7. Data reduction by:

The results are exported via computer, on line, data fed to the SGS Laboratory Information Management System (SLIM) with secure audit trail

8. Figures of Merit:

Element	Reporting Limits %	Upper Limit %
LOI%	0.01	100

9. Quality control:

Quality control materials include method blanks, replicates, duplicates and reference materials and are randomly inserted with the frequency set according to method protocols at ~14%.

Quality assurance measures of precision and accuracy are verified statistically using SLIM control charts with set criteria for data acceptance. Data that fails is subject to investigation and repeated as necessary.

SGS Method Code ISE15V :

The Determination of pH of Geological Samples using Orion 720 pH meter.

1. Parameter(s) measured, unit(s):

Potential of Hydrogen (pH)

2. Typical sample size:

5 g

3. Type of sample applicable (media):

Soils and sediments.

4. Sample preparation technique used:

5 g of as received soil sample was weighed and 12.5 mL of 0.01 calcium chloride is added to the soil samples and shaken for 30 min.

5. Method of analysis used:

The pH electrodes measure the pH of a solution potentiometrically using an Orion 720 pH meter. A potentiometric measurement relies on an electrical signal. When a pH sensing electrode comes in contact with sample, a potential develops across the sensing membrane surface. The membrane potential varies with the pH. The result is recorded and when calibrated against standards the technique provides a quantitative analysis of the original sample.

6. Data reduction by:

The results are exported via computer, on line, data fed to the SGS Laboratory Information Management System (SLIM) with secure audit trail.

7. Figures of Merit:

Element	Reporting Limit range
pH	0 -14

8. Quality control:

Instrument calibration is performed for each batch or work order and calibration checks are analyzed within each analytical run. Quality control materials include method blanks, replicates, duplicates and reference materials and are randomly inserted with the frequency set according to method protocols at ~14%.

Quality assurance measures of precision and accuracy are verified statistically using SLIM control charts with set criteria for data acceptance. Data that fails is subject to investigation and repeated as necessary.

SGS Method Code ICM11D:

The Determination of 52 Elements using 2 acid(2:1 HNO₃:HCL) digestion followed by ICP-OES and/or ICP-MS.

1. Parameter(s) measured, unit(s):

Silver (Ag); Aluminum (Al); Arsenic (As); Boron (B); Barium (Ba); Beryllium (Be); Bismuth (Bi); Calcium (Ca); Cadmium (Cd); Cerium (Ce); Chromium (Cr); Cobalt (Co); Cesium (Cs); Copper (Cu); Iron (Fe); Gallium (Ga); Germanium (Ge); Hafnium (Hf); Mercury (Hg); Indium (In); Potassium (K); Lanthanum (La); Lithium (Li); Lutetium (Lu); Magnesium (Mg); Manganese (Mn); Molybdenum (Mo); Sodium (Na); Niobium (Nb); Nickel (Ni); Phosphorus (P); Lead (Pb); Rubidium (Rb); Sulphur (S); Antimony (Sb); Scandium (Sc); Selenium (Se); Tin (Sn); Strontium (Sr); Tantalum (Ta); Tellurium (Te); Terbium (Tb); Thallium (Tl); Thorium (Th); Titanium (Ti); Uranium (U); Vanadium (V); Tungsten (W); Yttrium (Y); Ytterbium (Yb); Zinc (Zn); Zirconium (Zr) : ppm and %

2. Typical sample size:

1.0 g

3. Type of sample applicable (media):

Dried Soils

4. Sample preparation technique used:

1 g of as received soil sample was weighed into 50mL tubes and digested at 85°C for 30 minutes using 8 mL HNO₃ cooled and digested for 2 hours adding 4 mL HCl. The sample is cooled and bulked with dH₂O water to 50 mL. The sample solution is divided and half is analyzed by ICP-OES and the other half is analyzed to ICP-MS. All acids used in the preparation of the Tellus Border samples were ACS Grade acids.

5. Method of Analysis used:

The digested sample solution is analyzed by inductively coupled plasma Mass Spectrometer (ICP-MS) and inductively coupled plasma Optical Emission Spectrometer (ICP-OES). Samples are analyzed against known calibration materials to provide quantitative analysis of the original sample.

6. Data Reduction by:

The results are exported via computer, on line, data fed to the SGS Laboratory Information Management System (SLIM) with secure audit trail.

7. Figures of Merit:

Element	Reporting Limit (ppm)	Upper Limit	Element	Reporting Limit (ppm)	Upper Limit	Element	Reporting Limit (ppm)	Upper Limit	Element	Reporting Limit (ppm)
Ag	0.01	10 ppm	Cu	0.50	1.0%	Mo	0.05	1.0%	Ta	0.05
Al	0.01(%)	15%	Fe	0.01(%)	15%	Na	0.01(%)	15%	Tb	0.02
As	1.00	1.0%	Ga	0.10	1.0%	Nb	0.05	0.10%	Te	0.05
B	10	1.0%	Ge	0.10	1.0%	Ni	0.50	1.0%	Th	0.10
Ba	5.00	1.0%	Hf	0.05	0.05%	P	50	1.0%	Ti	0.01(%)
Be	0.10	0.01%	Hg	0.01	1.0%	Pb	0.20	1.0%	Tl	0.02
Bi	0.02	1.0%	In	0.02	0.05%	Rb	0.20	1.0%	U	0.05
Ca	0.01%	15%	K	0.01(%)	25%	S	0.01(%)	5.0%	V	1.00
Cd	0.01	1.0%	La	0.10	1.0%	Sb	0.05	1.0%	W	0.10
Ce	0.05	0.10%	Li	1.00	5.0%	Sc	0.10	1.0%	Y	0.05
Co	0.10	1.0%	Lu	0.01	0.10%	Se	1.00	0.10%	Yb	0.10
Cr	1.0	1.0%	Mg	0.01(%)	15%	Sn	0.30	0.10%	Zn	1.00
Cs	0.05	0.10%	Mn	2.00	1.0%	Sr	0.50	1.0%	Zr	0.50

8. Quality control:

Instrument calibration is performed for each batch or work order and calibration checks are analyzed within each analytical run. Quality control materials include method blanks, replicates, duplicates and reference materials and are randomly inserted with the frequency set according to method protocols at ~14%. Quality assurance measures of precision and accuracy are verified statistically using SLIM control charts with set criteria for data acceptance. Data that fails is subject to investigation and repeated as necessary.

9. Details of Instrumentation:

ICP-OES Analysis

Samples were analysed using a PerkinElmer Optima 5300DV ICP-OES (PerkinElmer Corporation, CT, USA), coupled with a FAST sample introduction system and SC-14DX Autosampler (Elemental Scientific Inc., NE, USA). The system uses a valve coupled with a vacuum pump to improve throughput and stability. A PFA nebulizer, baffled cyclonic spray chamber and sapphire injector (all ESI) were used for the analysis. The analytical cycle consists of a sample loop-fill stage, after which the sample is injected into the plasma. Next is a read delay to ensure stability of the signal, followed by measurement. After analysis, the loop and spray chamber are rinsed with clean dilute acid solution prior to the next sample. The instrument is calibrated using aqueous standards and lutetium is used as an internal standard to allow for differences in matrices between samples and standards. Instrument QC consisted of periodic measurement of a calibration check solution to monitor drift.

ICP-MS Analysis

A portion of the sample was diluted and measured using a PerkinElmer Elan 9000 ICP-MS (PerkinElmer Corporation, CT, USA). The sample introduction system consisted of a FAST valve system coupled to an SC-14DX autosampler (Elemental Scientific Inc., NE, USA). The valve system is connected to a PFA nebulizer, housed in a baffled cyclonic spraychamber. The sample enters the plasma through a sapphire nebulizer (ESI). The sample cycle consists of a loop-fill stage, followed by injection into the plasma. A read delay ensures that the signal is stable, before measurement occurs. After measurement, there is a wash stage for both the sample loop and the spray chamber prior to beginning the next cycle. Samples are measured against aqueous multi-element calibration solutions, with rhodium and rhenium used as internal standards to allow for matrix effects. Periodic measurement of a calibration check standard was used to monitor drift.

APPENDIX TWO

Quality Control Summary

A summary of the reference material data extracted for the Tellus Border samples analyzed from the period of August 2012 to March 2013 follows. The performance charts depicted for ICM11D method are a representation of the two reference material suppliers used in this project, Ore Research and Natural Resources Canada. For method PHY01D, the two reference materials analyzed were from Natural Resources Canada. Method ISE15D used an in house reference material.

In general, and when possible, each analyte in ICM11D is presented using graphical presentation of the statistical data representing the two reference material sources (Ore Research and Natural Resources Canada). The LOI for the method PHY01D is presented using graphical presentation of the statistical data represented by the two reference materials from Natural Resources Canada. The pH by method ISE15D is presented using graphical presentation of the statistical data representing the in house reference material certificate.

Performance Chart

All results are plotted in chronological order. The solid purple line represents the mean for the data; the blue dotted lines represent the warning limits at 2 standard deviations and the dotted red line represent the action limits at 3 standard deviations. The % within 2 standard deviations should be >95.4% for normal distribution and the % within 3 standard deviations should be >99.7% for a normal distribution. Data is calculated from the expected mean which is either from the certificate of analysis for the reference material using the applicable method and/or from the in house certification process when the reference material certification process does not meet the method capabilities.

Additional Terms

- Expected Mean is the expected value for the particular reference material
- Laboratory Mean is the average of the results obtained over the period of time
- Laboratory Std. Dev is the standard deviation of the results obtained of the period of time
- Bias is the percentage difference between Laboratory Mean and Expected Mean
 - = $[(\text{Lab Mean}) - (\text{Expected Mean})] / (\text{Expected Mean}) * 100$
- Bias Levels
 - Excellent <0.2
 - Good 0.2-0.4
 - Acceptable 0.4-0.8
 - Marginal 0.8-1.2
 - Not Acceptable >1.2
- Avg Z Score* is the average of normalised standard deviations
 - = average $[(\text{Lab result}) - (\text{Expected Mean})] / (\text{Expected Std Dev})$
- * this is a better measure of bias than percentage difference
- RSD is the relative standard deviation
 - = $(\text{Laboratory Std Dev}) / (\text{Expected Mean}) * 100$
- Avg Abs Z Score*
 - Average $\{ \text{Abs} [(\text{Lab result}) - (\text{Expected Mean})] / (\text{Expected Std Dev}) \}$
- * this is a better measure of precision than RSD

- **Detection Limit:** The limit of detection (or Detection Limit) is the lowest concentration of measurand in a real sample matrix that can be reliably detected using a single analytical procedure (test method) which is statistically different from the response obtained from a method blank carried through the complete method. Typically, three times the standard deviation of 8 method blanks.
- **Reporting Limit:** The method reporting limit is the lowest concentration that will be reported for a specific method. It must not be less than DL, however if it is 10xSD of the 8 method blanks, no further validation is required. If the RL is less than 10Xsd of the 8 method blanks, a spike test is performed using a concentration at ~10Xsd and analyze this spike 8 times. A Chi-squared test is then performed to determine if the precision is appropriate. If 'yes' the RL is acceptable; if no, a re-test is performed at a slightly higher RL.

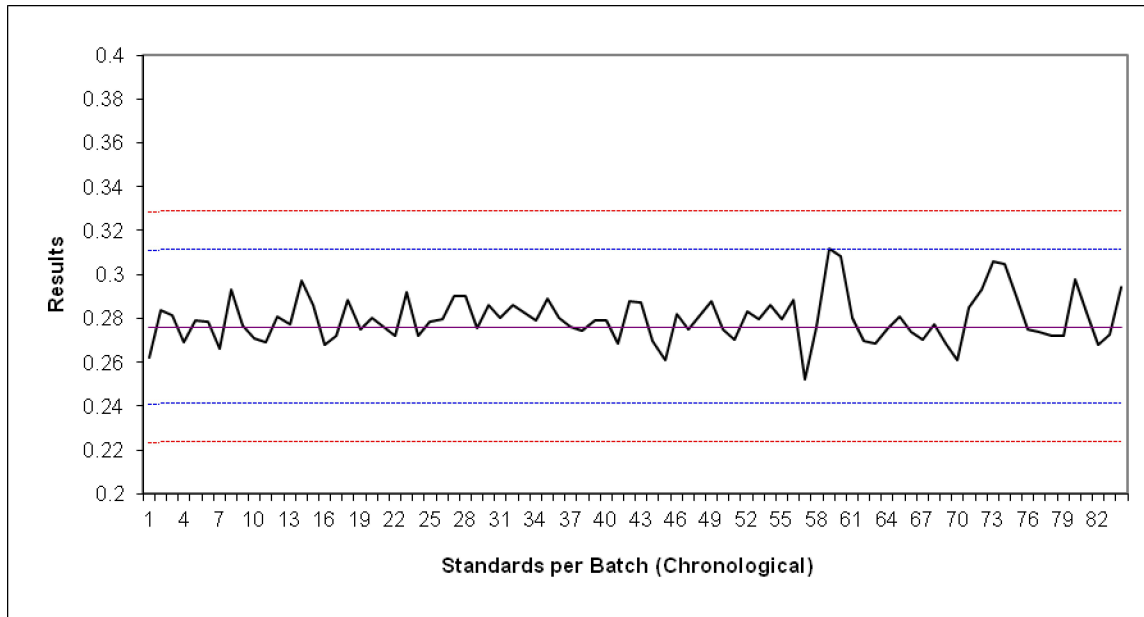
Method: ICM11D

Analyte: Ag

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.241	+2 Standard Deviation =	0.311
-3 Standard Deviation =	0.223	+3 Standard Deviation =	0.329
% within 2 Standard Deviations =	98.81%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.276	Bias =	1.36%
Laboratory Mean =	0.280	Avg Z Score =	0.214
Number of Values =	84	Bias Level =	Good
Expected Std. Dev. =	0.018	RSD =	3.86%
Laboratory Std. Dev. =	0.011	Avg Abs Z =	0.475

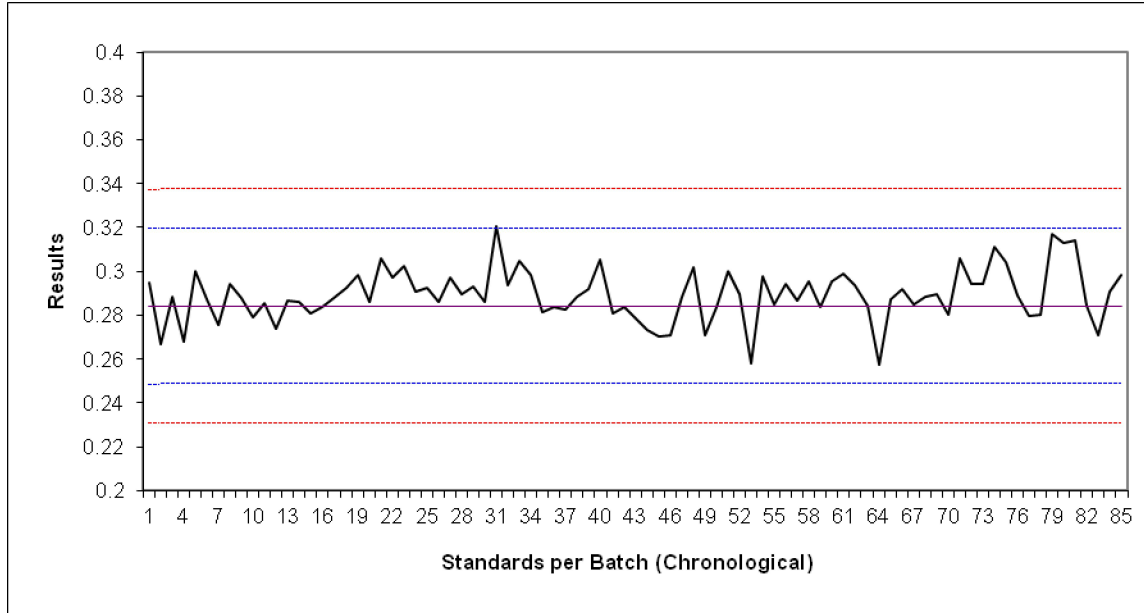
Method: ICM11D

Analyte: Ag

Instrumentation: ICP-MS

Reference Material: OREAS902 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.248	+2 Standard Deviation =	0.320
-3 Standard Deviation =	0.231	+3 Standard Deviation =	0.337
% within 2 Standard Deviations =	98.82%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.284	Bias =	1.85%
Laboratory Mean =	0.289	Avg Z Score =	0.296
Number of Values =	85	Bias Level =	Good
Expected Std. Dev. =	0.018	RSD =	4.23%
Laboratory Std. Dev. =	0.012	Avg Abs Z =	0.563

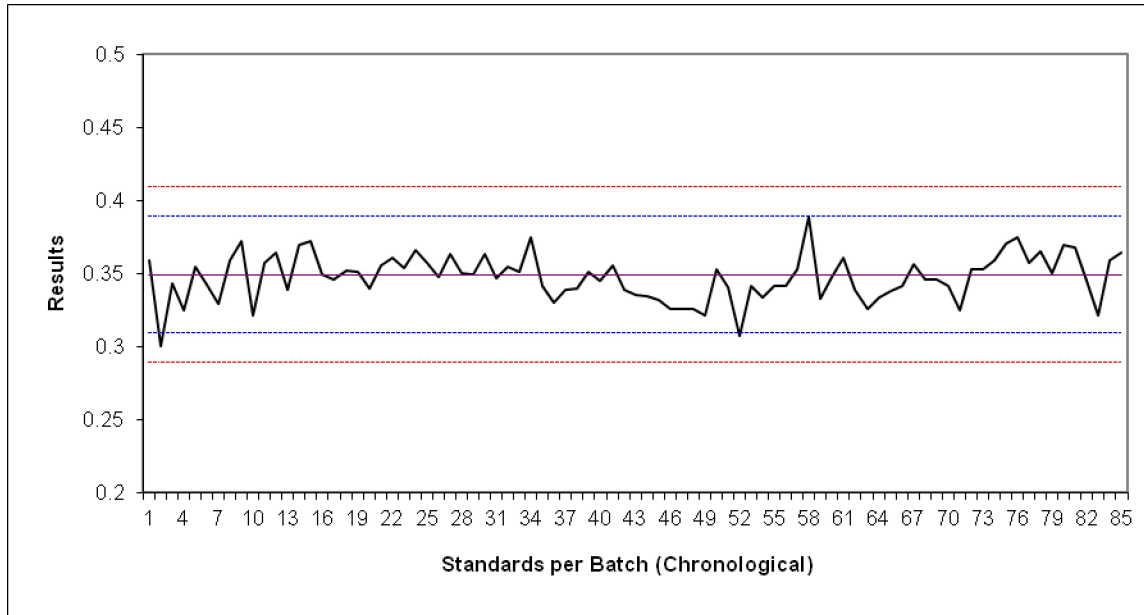
Method: ICM11D

Analyte: Ag

Instrumentation: ICP-MS

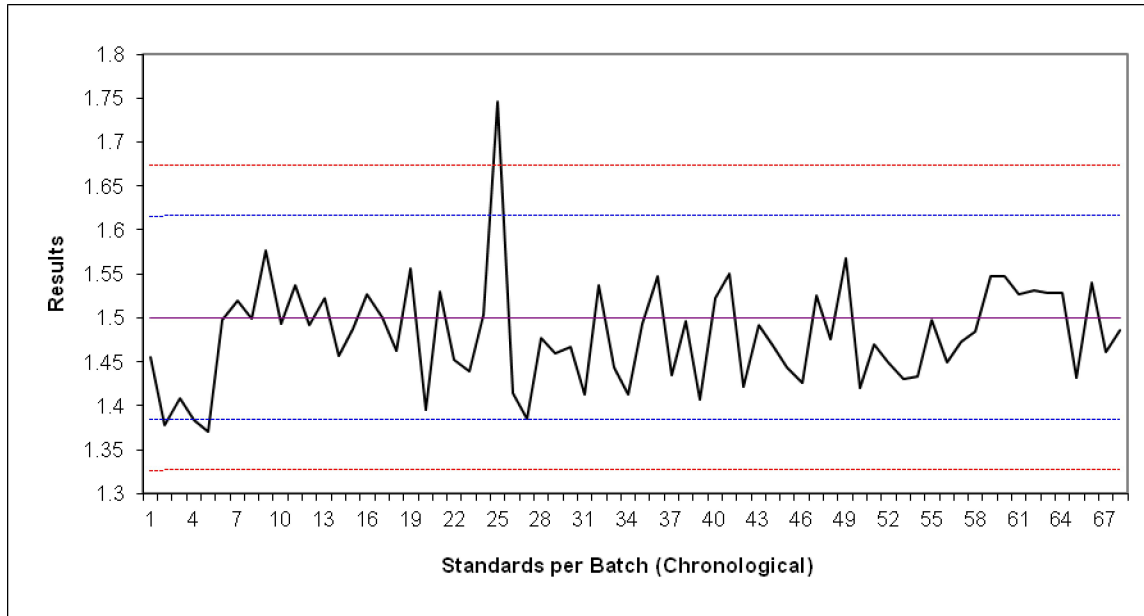
Reference Material: OREAS903 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.309	+2 Standard Deviation =	0.389
-3 Standard Deviation =	0.289	+3 Standard Deviation =	0.409
% within 2 Standard Deviations =	97.65%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.349	Bias =	-0.50%
Laboratory Mean =	0.347	Avg Z Score =	-0.088
Number of Values =	85	Bias Level =	Excellent
Expected Std. Dev. =	0.020	RSD =	4.56%
Laboratory Std. Dev. =	0.016	Avg Abs Z =	0.631

Method: ICM11D
Analyte: Ag
Instrumentation: ICP-MS
Reference Material: TILL-3 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.384	+2 Standard Deviation =	1.616
-3 Standard Deviation =	1.327	+3 Standard Deviation =	1.673
% within 2 Standard Deviations =	94.12%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.53%	(Expect 99.7%)	

Expected Mean =	1.500	Bias =	-1.27%
Laboratory Mean =	1.481	Avg Z Score =	-0.329
Number of Values =	68	Bias Level =	Good
Expected Std. Dev. =	0.058	RSD =	4.05%
Laboratory Std. Dev. =	0.061	Avg Abs Z =	0.848

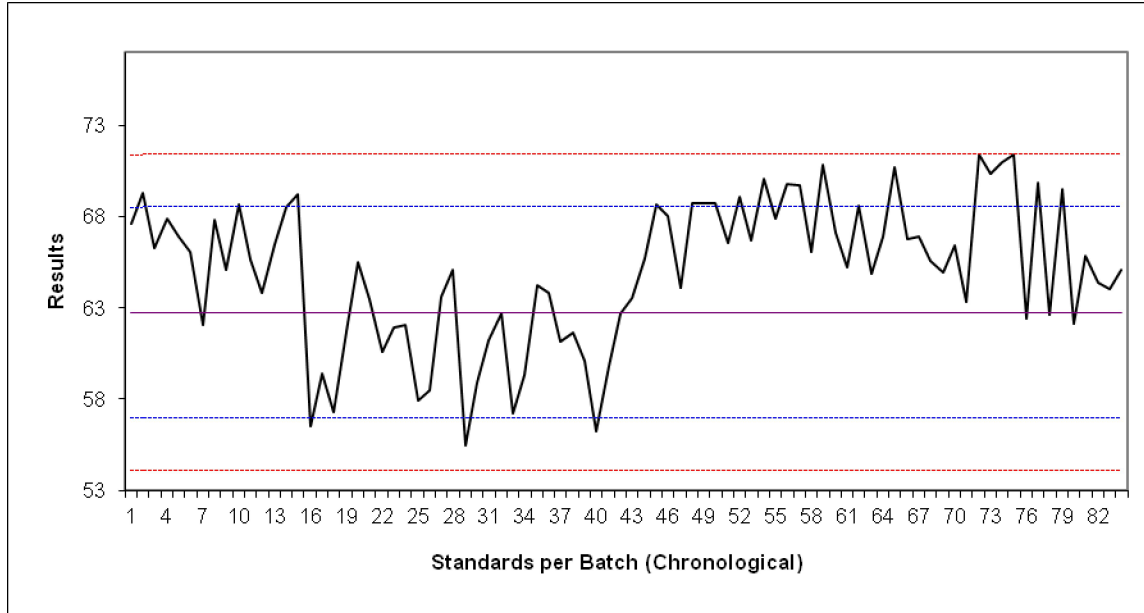
Method: ICM11D

Analyte: As

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on in-house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	56.964	+2 Standard Deviation =	68.496
-3 Standard Deviation =	54.081	+3 Standard Deviation =	71.379
% within 2 Standard Deviations =	71.43%	(Expect 95.4%)	
% within 3 Standard Deviations =	97.62%	(Expect 99.7%)	

Expected Mean =	62.730	Bias =	3.61%
Laboratory Mean =	64.997	Avg Z Score =	0.786
Number of Values =	84	Bias Level =	Acceptable
Expected Std. Dev. =	2.883	RSD =	6.29%
Laboratory Std. Dev. =	3.946	Avg Abs Z =	1.335

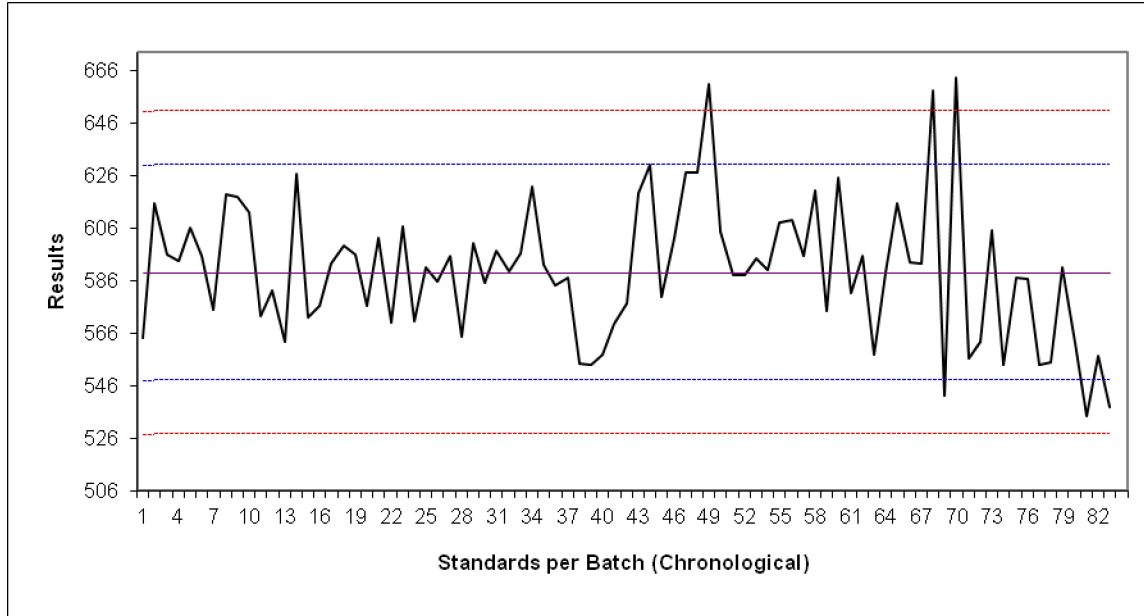
Method: ICM11D

Analyte: As

Instrumentation: ICP-MS

Reference Material: OREAS902 – based on in-house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	548.008	+2 Standard Deviation =	629.992
-3 Standard Deviation =	527.512	+3 Standard Deviation =	650.488
% within 2 Standard Deviations =	92.77%	(Expect 95.4%)	
% within 3 Standard Deviations =	96.39%	(Expect 99.7%)	
Expected Mean =	589.000	Bias =	0.19%
Laboratory Mean =	590.133	Avg Z Score =	0.055
Number of Values =	83	Bias Level =	Excellent
Expected Std. Dev. =	20.496		
Laboratory Std. Dev. =	26.164	RSD =	4.44%
		Avg Abs Z =	0.973

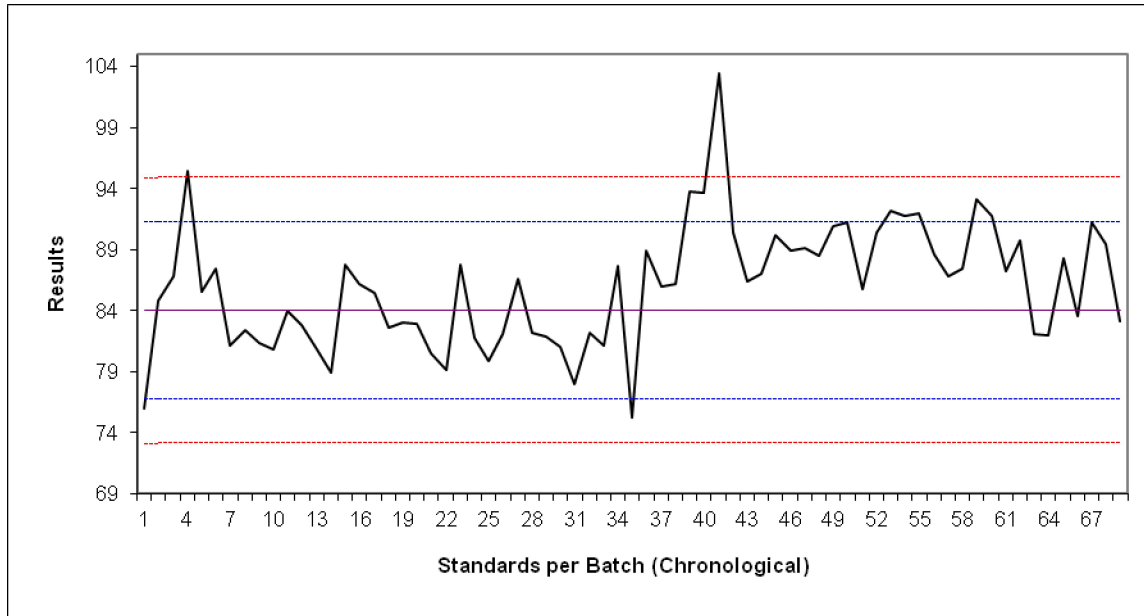
Method: ICM11D

Analyte: As

Instrumentation: ICP-MS

Reference Material: TILL-3 – based on in-house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	76.733	+2 Standard Deviation =	91.267
-3 Standard Deviation =	73.100	+3 Standard Deviation =	94.900
% within 2 Standard Deviations =	84.06%	(Expect 95.4%)	
% within 3 Standard Deviations =	97.10%	(Expect 99.7%)	
Expected Mean =	84.000	Bias =	2.37%
Laboratory Mean =	85.995	Avg Z Score =	0.549
Number of Values =	69	Bias Level =	Acceptable
Expected Std. Dev. =	3.633		
Laboratory Std. Dev. =	5.006	RSD =	5.96%
		Avg Abs Z =	1.186

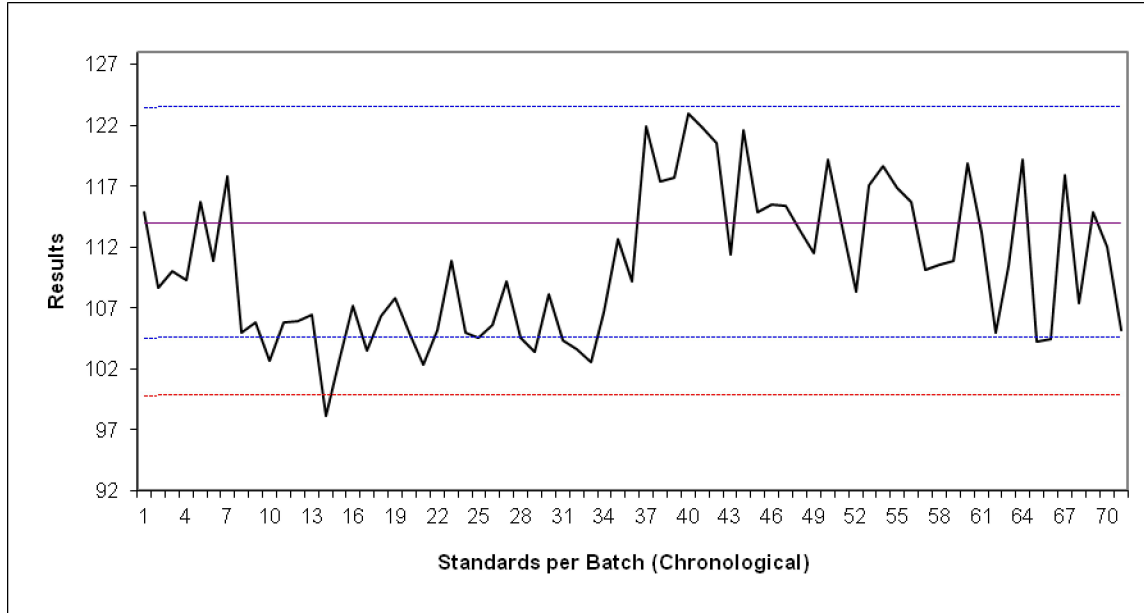
Method: ICM11D

Analyte: As

Instrumentation: ICP-MS

Reference Material: TILL-4 – based on in-house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	104.537	+2 Standard Deviation =	123.463
-3 Standard Deviation =	99.806	+3 Standard Deviation =	128.194
% within 2 Standard Deviations =	84.51%		(Expect 95.4%)
% within 3 Standard Deviations =	98.59%		(Expect 99.7%)
Expected Mean =	114.000	Bias =	-3.05%
Laboratory Mean =	110.519	Avg Z Score =	-0.736
Number of Values =	71	Bias Level =	Acceptable
Expected Std. Dev. =	4.731		
Laboratory Std. Dev. =	5.986	RSD =	5.25%
		Avg Abs Z =	1.261

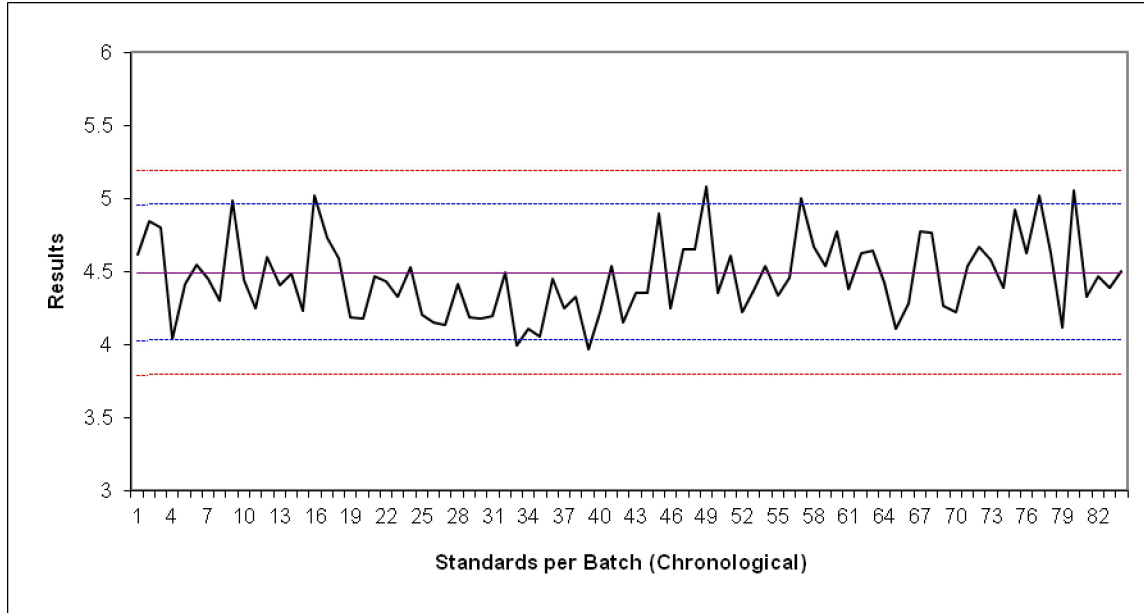
Method: ICM11D

Analyte: Be

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	4.024	+2 Standard Deviation =	4.956
-3 Standard Deviation =	3.791	+3 Standard Deviation =	5.189
% within 2 Standard Deviations =	90.48%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	4.490	Bias =	-0.68%
Laboratory Mean =	4.459	Avg Z Score =	-0.131
Number of Values =	84	Bias Level =	Excellent
Expected Std. Dev. =	0.233		
Laboratory Std. Dev. =	0.266	RSD =	5.93%
		Avg Abs Z =	0.933

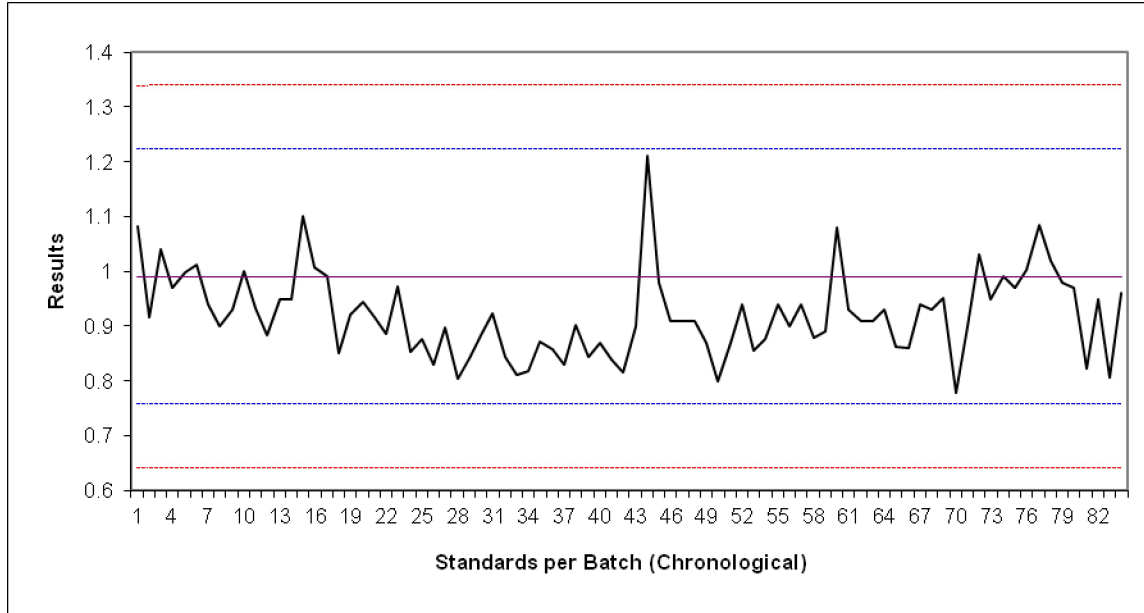
Method: ICM11D

Analyte: Be

Instrumentation: ICP-MS

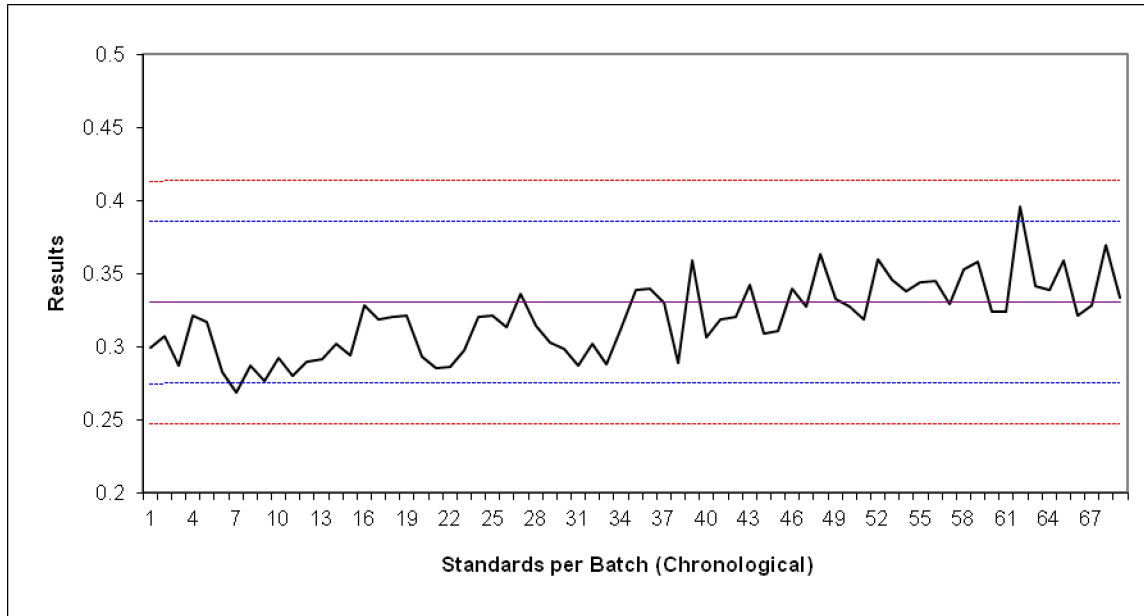
Reference Material: OREAS902 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.757	+2 Standard Deviation =	1.223
-3 Standard Deviation =	0.641	+3 Standard Deviation =	1.339
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.990	Bias =	-6.92%
Laboratory Mean =	0.922	Avg Z Score =	-0.589
Number of Values =	84	Bias Level =	Acceptable
Expected Std. Dev. =	0.116	RSD =	7.80%
Laboratory Std. Dev. =	0.077	Avg Abs Z =	0.752

Method: ICM11D
Analyte: Bi
Instrumentation: ICP-MS
Reference Material: TILL-3 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.275	+2 Standard Deviation =	0.385
-3 Standard Deviation =	0.247	+3 Standard Deviation =	0.413
% within 2 Standard Deviations =	97.10%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.330	Bias =	-3.29%
Laboratory Mean =	0.319	Avg Z Score =	-0.393
Number of Values =	69	Bias Level =	Good
Expected Std. Dev. =	0.028	RSD =	7.80%
Laboratory Std. Dev. =	0.026	Avg Abs Z =	0.816

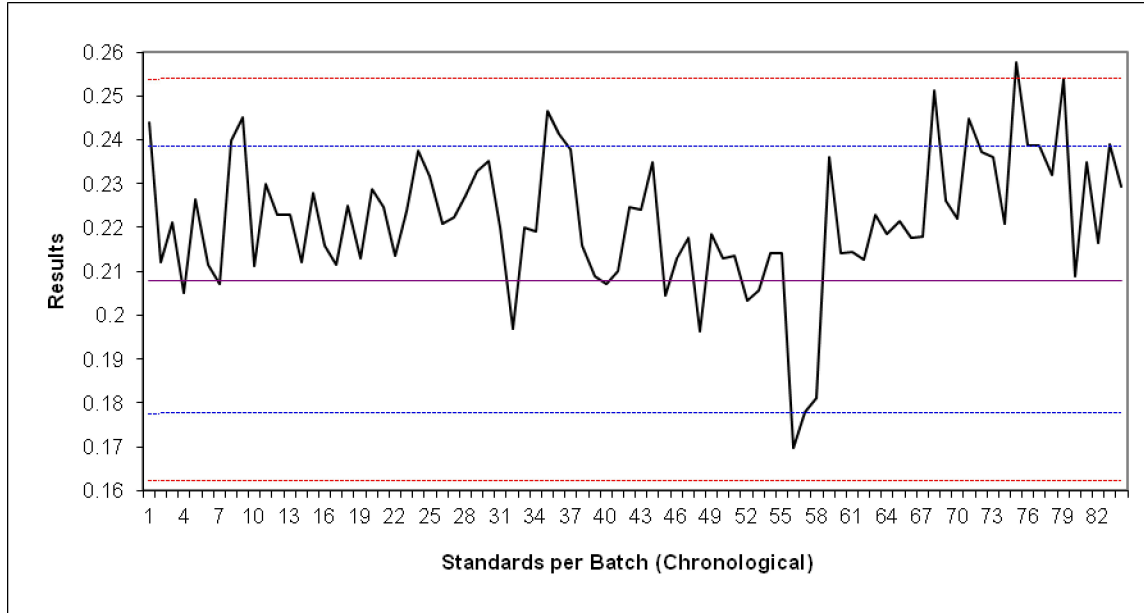
Method: ICM11D

Analyte: Cd

Instrumentation: ICP-MS

Reference Material: OREAS903 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.177	+2 Standard Deviation =	0.239
-3 Standard Deviation =	0.162	+3 Standard Deviation =	0.254
% within 2 Standard Deviations =	84.52%	(Expect 95.4%)	
% within 3 Standard Deviations =	97.62%	(Expect 99.7%)	

Expected Mean =	0.208	Bias =	6.55%
Laboratory Mean =	0.222	Avg Z Score =	0.892
Number of Values =	84	Bias Level =	Marginal
Expected Std. Dev. =	0.015	RSD =	7.51%
Laboratory Std. Dev. =	0.016	Avg Abs Z =	1.100

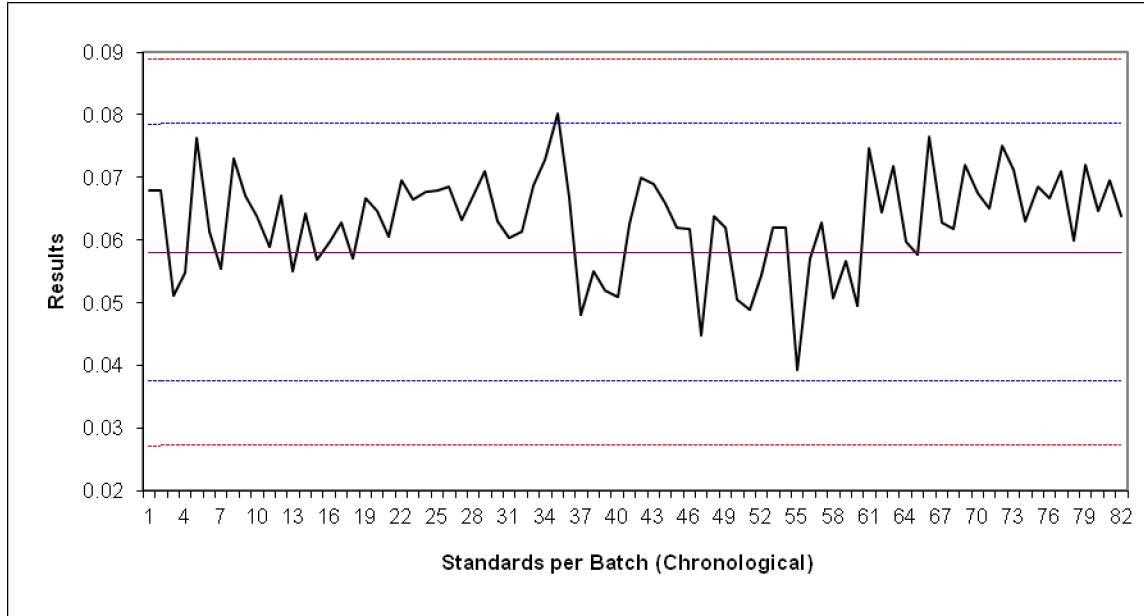
Method: ICM11D

Analyte: Cd

Instrumentation: ICP-MS

Reference Material: OREAS904 – based on certificate value

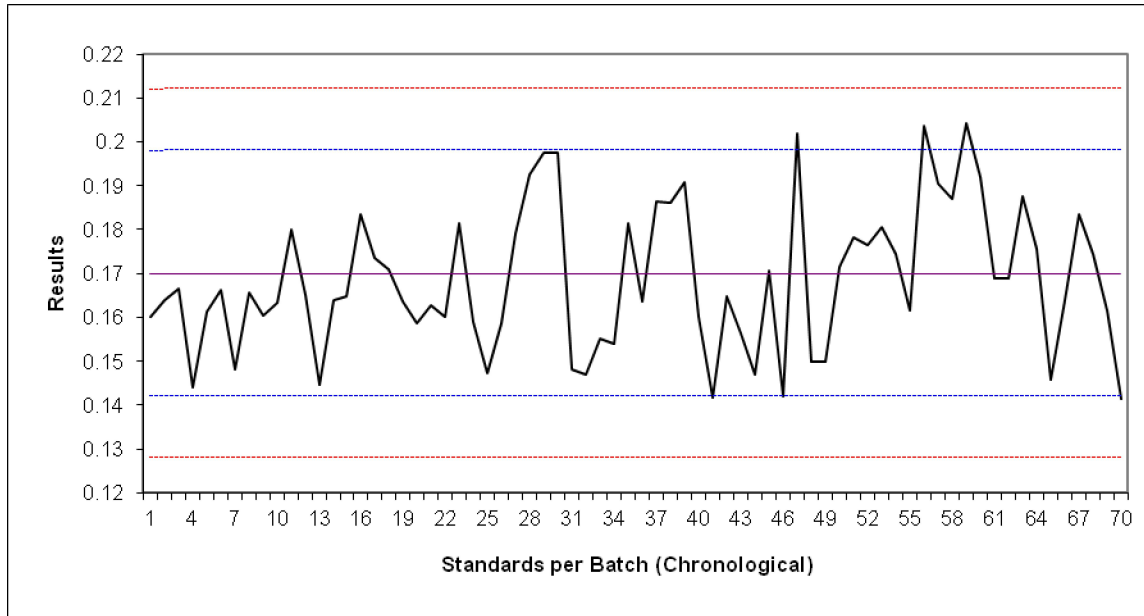
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.037	+2 Standard Deviation =	0.079
-3 Standard Deviation =	0.027	+3 Standard Deviation =	0.089
% within 2 Standard Deviations =	98.78%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.058	Bias =	8.67%
Laboratory Mean =	0.063	Avg Z Score =	0.490
Number of Values =	82	Bias Level =	Acceptable
Expected Std. Dev. =	0.010	RSD =	13.36%
Laboratory Std. Dev. =	0.008	Avg Abs Z =	0.761

Method: ICM11D
Analyte: Cd
Instrumentation: ICP-MS
Reference Material: TILL-4 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.142	+2 Standard Deviation =	0.198
-3 Standard Deviation =	0.128	+3 Standard Deviation =	0.212
% within 2 Standard Deviations =	91.43%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.170	Bias =	-0.90%
Laboratory Mean =	0.168	Avg Z Score =	-0.110
Number of Values =	70	Bias Level =	Excellent
Expected Std. Dev. =	0.014	RSD =	9.63%
Laboratory Std. Dev. =	0.016	Avg Abs Z =	0.973

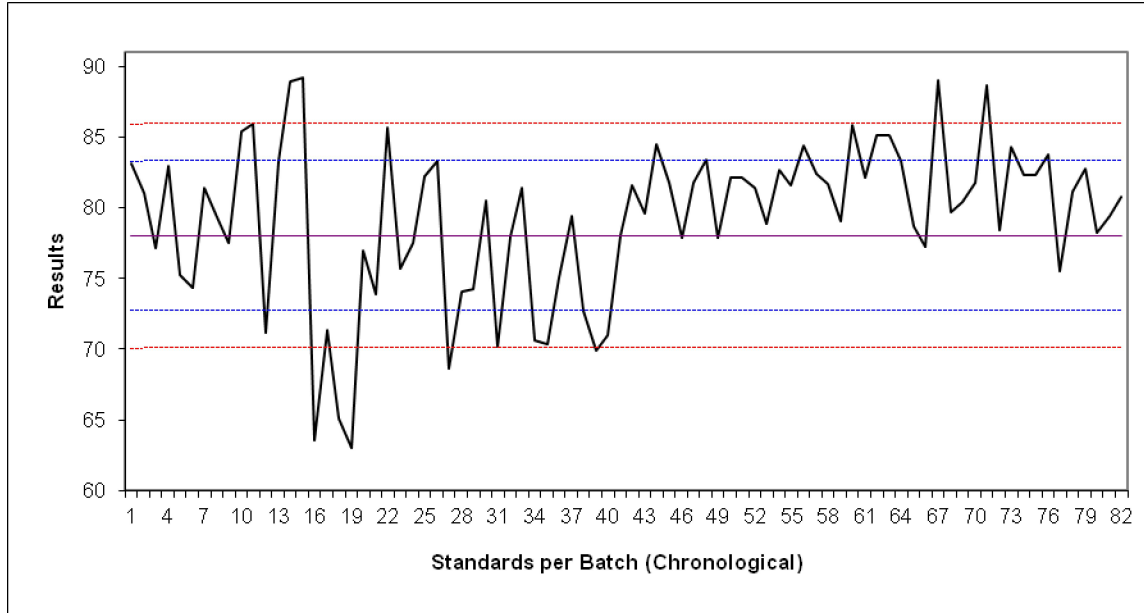
Method: ICM11D

Analyte: Ce

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	72.717	+2 Standard Deviation =	83.283
-3 Standard Deviation =	70.075	+3 Standard Deviation =	85.925
% within 2 Standard Deviations =	64.63%	(Expect 95.4%)	
% within 3 Standard Deviations =	89.02%	(Expect 99.7%)	

Expected Mean =	78.000	Bias =	1.61%
Laboratory Mean =	79.254	Avg Z Score =	0.475
Number of Values =	82	Bias Level =	Acceptable
Expected Std. Dev. =	2.642	RSD =	7.17%
Laboratory Std. Dev. =	5.593	Avg Abs Z =	1.753

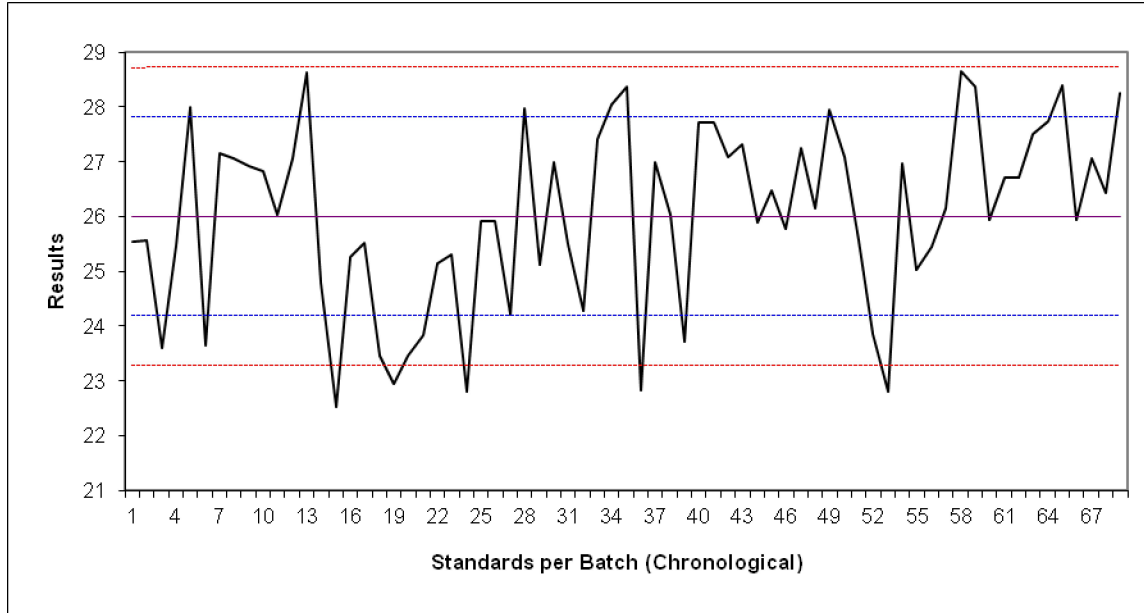
Method: ICM11D

Analyte: Ce

Instrumentation: ICP-MS

Reference Material: OREAS902 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	24.190	+2 Standard Deviation =	27.810
-3 Standard Deviation =	23.285	+3 Standard Deviation =	28.715
% within 2 Standard Deviations =	68.12%	(Expect 95.4%)	
% within 3 Standard Deviations =	92.75%	(Expect 99.7%)	
Expected Mean =	26.000	Bias =	0.10%
Laboratory Mean =	26.026	Avg Z Score =	0.029
Number of Values =	69	Bias Level =	Excellent
Expected Std. Dev. =	0.905	RSD =	6.34%
Laboratory Std. Dev. =	1.648	Avg Abs Z =	1.482

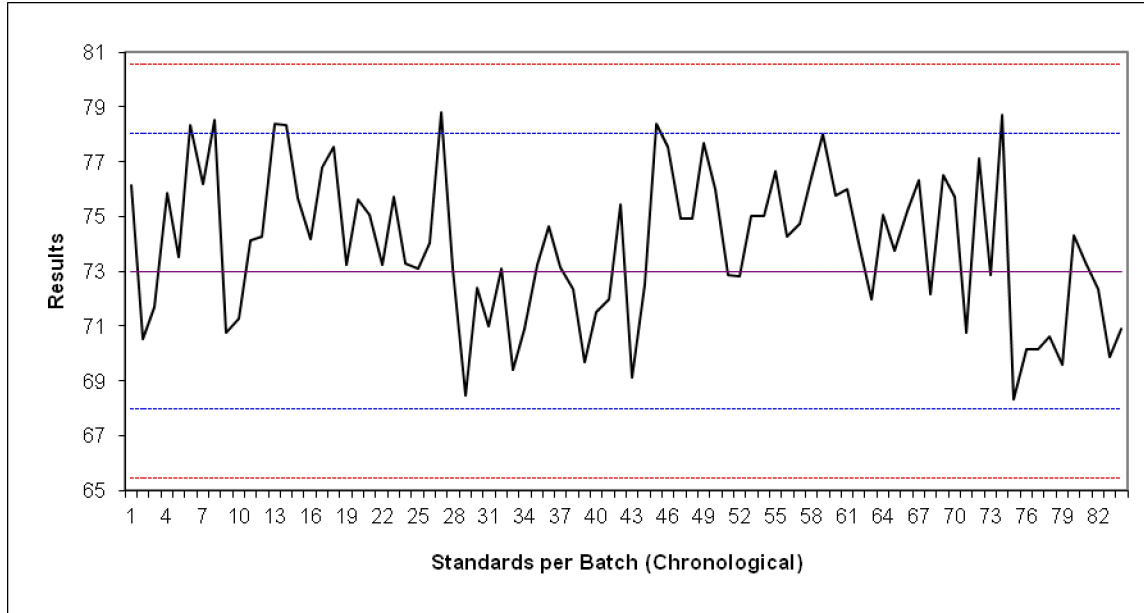
Method: ICM11D

Analyte: Co

Instrumentation: ICP-MS

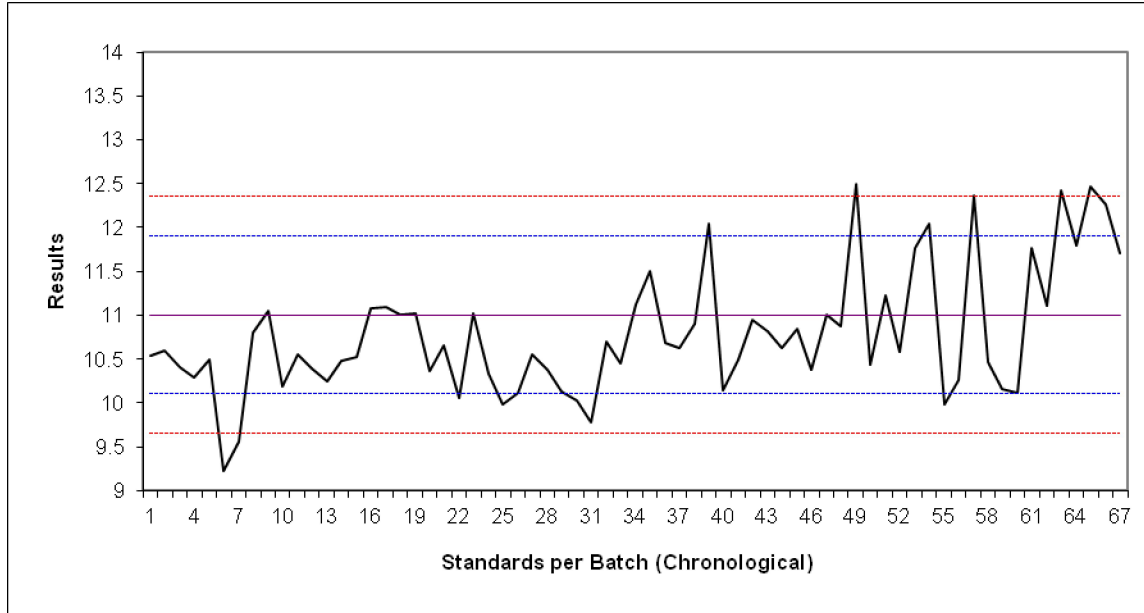
Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



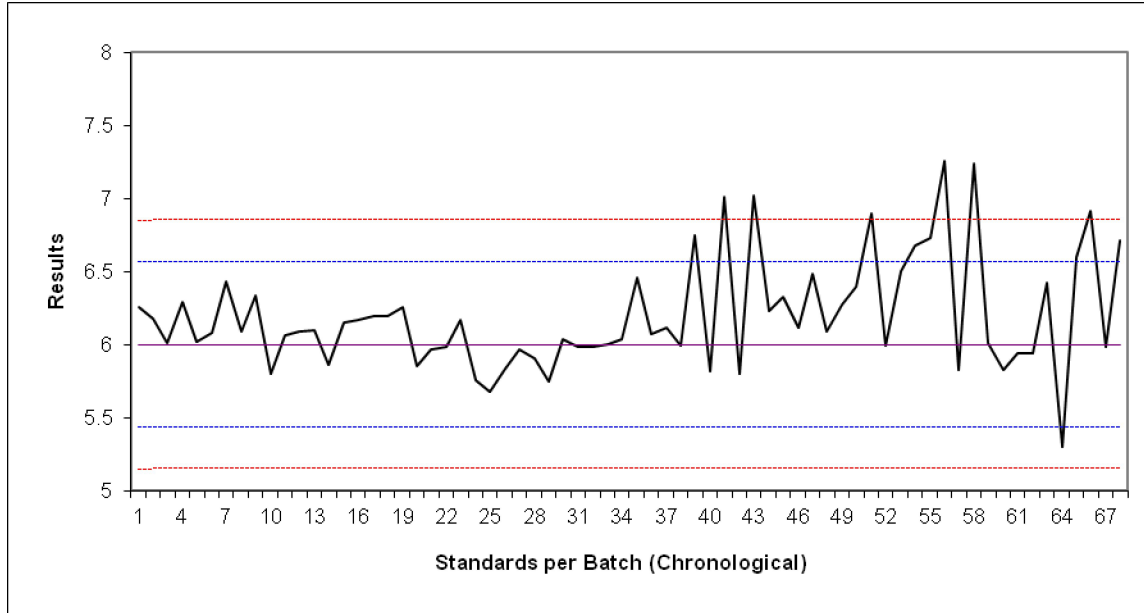
-2 Standard Deviation =	67.967	+2 Standard Deviation =	78.033
-3 Standard Deviation =	65.450	+3 Standard Deviation =	80.550
% within 2 Standard Deviations =	91.67%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	73.000	Bias =	1.33%
Laboratory Mean =	73.968	Avg Z Score =	0.385
Number of Values =	84	Bias Level =	Good
Expected Std. Dev. =	2.517		
Laboratory Std. Dev. =	2.688	RSD =	3.68%
		Avg Abs Z =	0.932

Method: ICM11D
Analyte: Co
Instrumentation: ICP-MS
Reference Material: TILL-3 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	10.100	+2 Standard Deviation =	11.900
-3 Standard Deviation =	9.650	+3 Standard Deviation =	12.350
% within 2 Standard Deviations =	79.10%	(Expect 95.4%)	
% within 3 Standard Deviations =	91.04%	(Expect 99.7%)	
Expected Mean =	11.000	Bias =	-1.97%
Laboratory Mean =	10.783	Avg Z Score =	-0.481
Number of Values =	67	Bias Level =	Acceptable
Expected Std. Dev. =	0.450	RSD =	6.54%
Laboratory Std. Dev. =	0.720	Avg Abs Z =	1.367

Method: ICM11D
Analyte: Co
Instrumentation: ICP-MS
Reference Material: TILL-4 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	5.433	+2 Standard Deviation =	6.567
-3 Standard Deviation =	5.150	+3 Standard Deviation =	6.850
% within 2 Standard Deviations =	82.35%	(Expect 95.4%)	
% within 3 Standard Deviations =	91.18%	(Expect 99.7%)	
Expected Mean =	6.000	Bias =	3.23%
Laboratory Mean =	6.194	Avg Z Score =	0.684
Number of Values =	68	Bias Level =	Acceptable
Expected Std. Dev. =	0.283	RSD =	6.34%
Laboratory Std. Dev. =	0.380	Avg Abs Z =	1.024

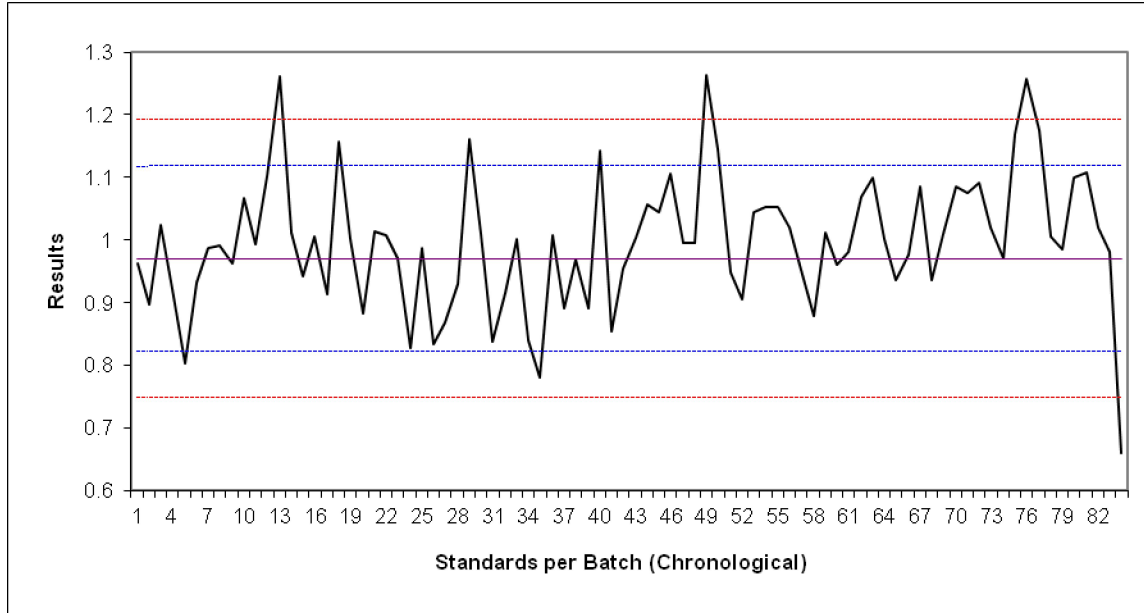
Method: ICM11D

Analyte: Cs

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.822	+2 Standard Deviation =	1.118
-3 Standard Deviation =	0.748	+3 Standard Deviation =	1.192
% within 2 Standard Deviations =	85.71%	(Expect 95.4%)	
% within 3 Standard Deviations =	95.24%	(Expect 99.7%)	

Expected Mean =	0.970	Bias =	2.78%
Laboratory Mean =	0.997	Avg Z Score =	0.364
Number of Values =	84	Bias Level =	Good
Expected Std. Dev. =	0.074	RSD =	10.97%
Laboratory Std. Dev. =	0.106	Avg Abs Z =	1.108

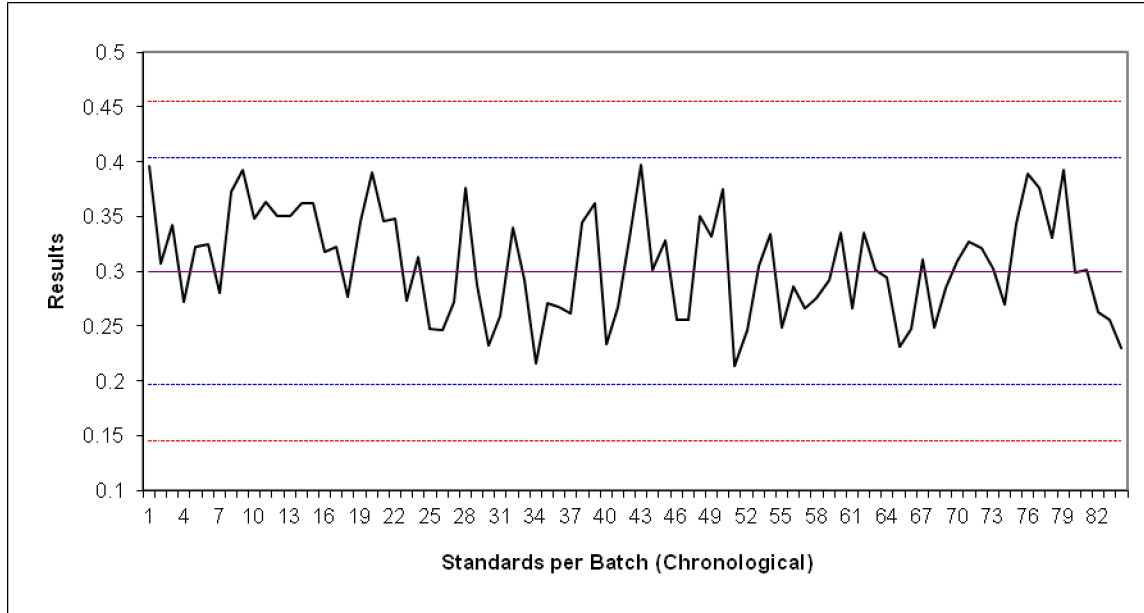
Method: ICM11D

Analyte: Cs

Instrumentation: ICP-MS

Reference Material: OREAS902 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.197	+2 Standard Deviation =	0.403
-3 Standard Deviation =	0.145	+3 Standard Deviation =	0.455
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.300	Bias =	2.45%
Laboratory Mean =	0.307	Avg Z Score =	0.143
Number of Values =	84	Bias Level =	Excellent
Expected Std. Dev. =	0.052		
Laboratory Std. Dev. =	0.048	RSD =	15.96%
		Avg Abs Z =	0.792

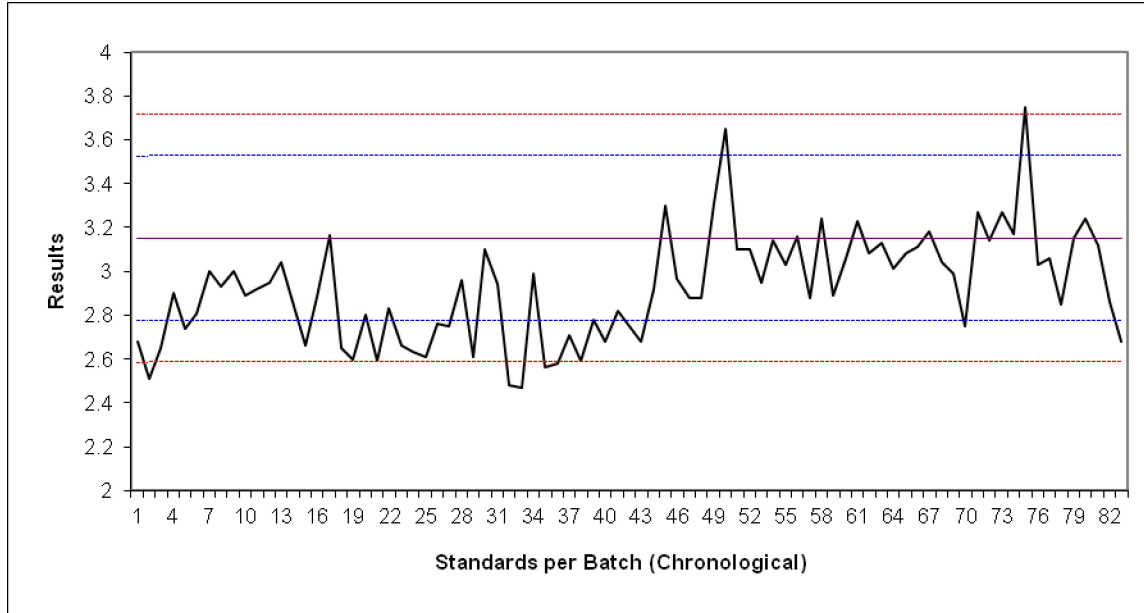
Method: ICM11D

Analyte: Ga

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	2.773	+2 Standard Deviation =	3.527
-3 Standard Deviation =	2.585	+3 Standard Deviation =	3.715
% within 2 Standard Deviations =	67.47%	(Expect 95.4%)	
% within 3 Standard Deviations =	92.77%	(Expect 99.7%)	

Expected Mean =	3.150	Bias =	-7.12%
Laboratory Mean =	2.926	Avg Z Score =	-1.191
Number of Values =	83	Bias Level =	Marginal
Expected Std. Dev. =	0.188	RSD =	7.88%
Laboratory Std. Dev. =	0.248	Avg Abs Z =	1.447

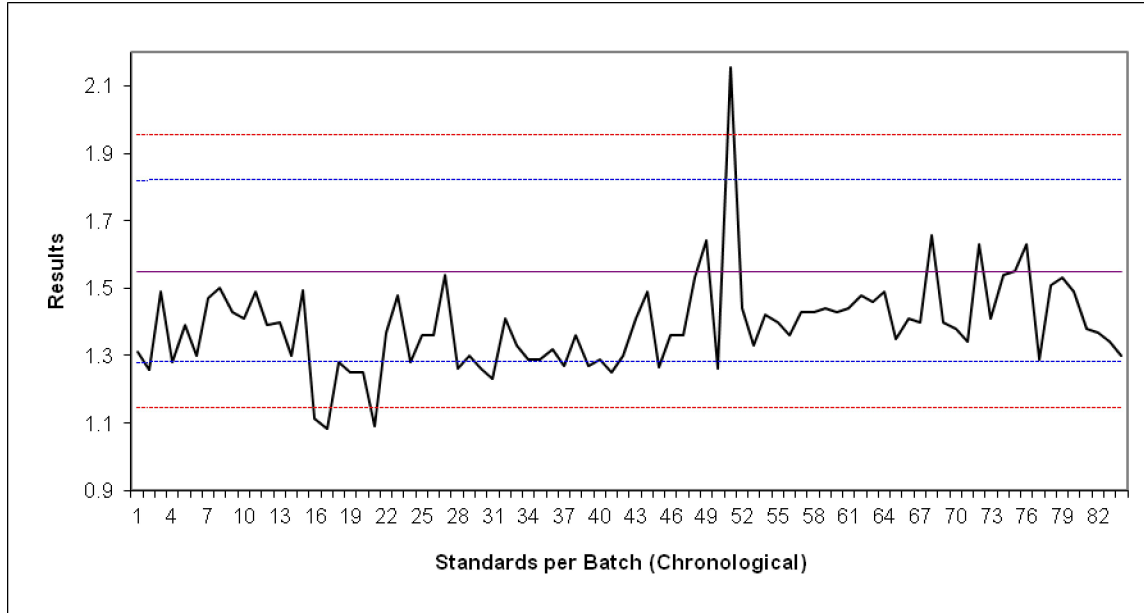
Method: ICM11D

Analyte: Ga

Instrumentation: ICP-MS

Reference Material: OREAS902 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.280	+2 Standard Deviation =	1.820
-3 Standard Deviation =	1.145	+3 Standard Deviation =	1.955
% within 2 Standard Deviations =	78.57%	(Expect 95.4%)	
% within 3 Standard Deviations =	95.24%	(Expect 99.7%)	

Expected Mean =	1.550	Bias =	10.35%
Laboratory Mean =	1.390	Avg Z Score =	-1.188
Number of Values =	84	Bias Level =	Marginal
Expected Std. Dev. =	0.135	RSD =	9.18%
Laboratory Std. Dev. =	0.142	Avg Abs Z =	1.358

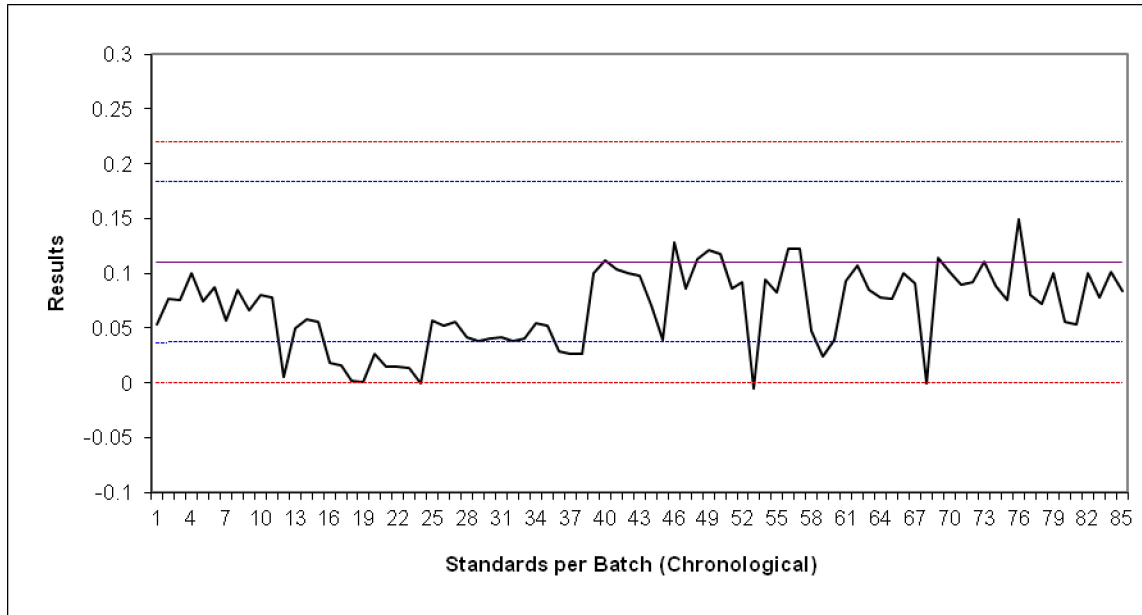
Method: ICM11D

Analyte: Ge

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.037	+2 Standard Deviation =	0.183
-3 Standard Deviation =	0.000	+3 Standard Deviation =	0.220
% within 2 Standard Deviations =	81.18%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.82%	(Expect 99.7%)	

Expected Mean =	0.110	Bias =	38.18%
Laboratory Mean =	0.068	Avg Z Score =	-1.145
Number of Values =	85	Bias Level =	Marginal
Expected Std. Dev. =	0.037	RSD =	32.49%
Laboratory Std. Dev. =	0.036	Avg Abs Z =	1.218

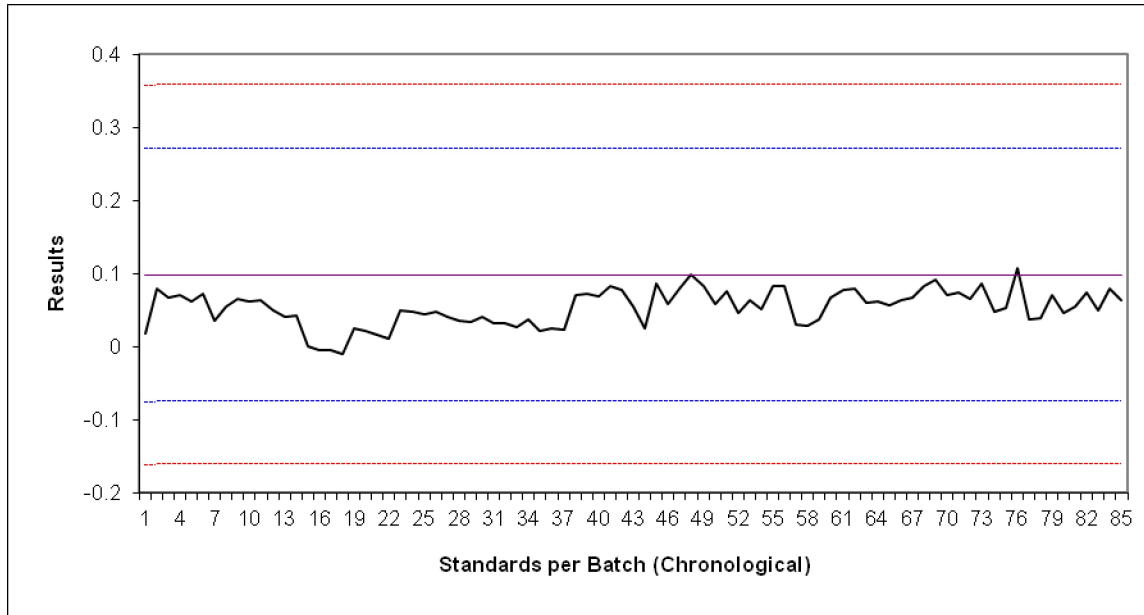
Method: ICM11D

Analyte: Ge

Instrumentation: ICP-MS

Reference Material: OREAS903 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	-0.075	+2 Standard Deviation =	0.271
-3 Standard Deviation =	-0.162	+3 Standard Deviation =	0.358
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.098	Bias =	45.87%
Laboratory Mean =	0.053	Avg Z Score =	-0.519
Number of Values =	85	Bias Level =	Acceptable
Expected Std. Dev. =	0.087	RSD =	25.12%
Laboratory Std. Dev. =	0.025	Avg Abs Z =	0.522

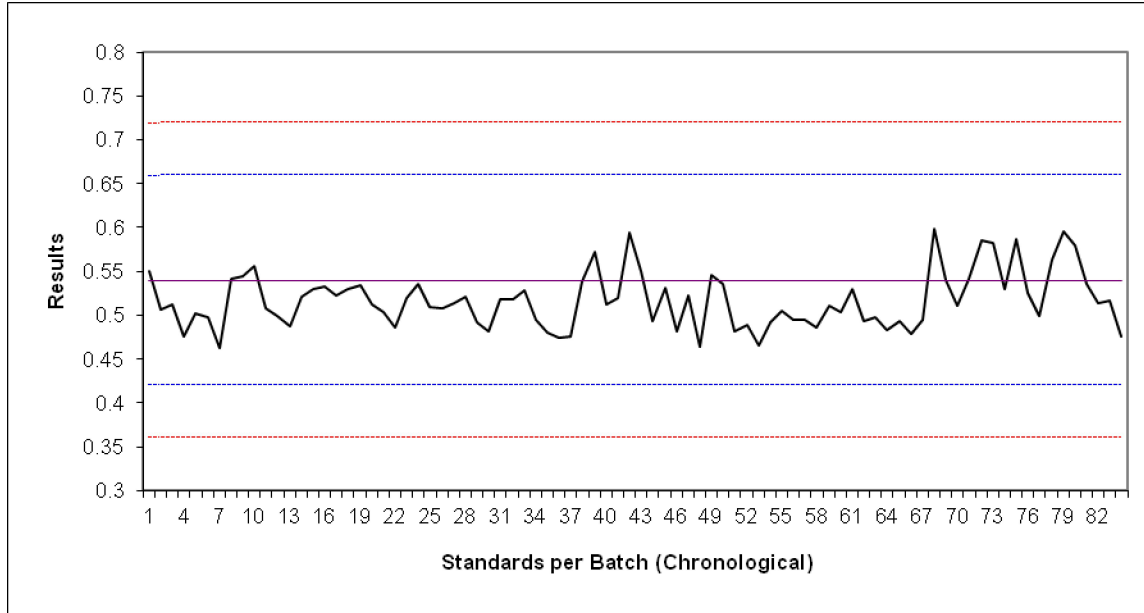
Method: ICM11D

Analyte: Hf

Instrumentation: ICP-MS

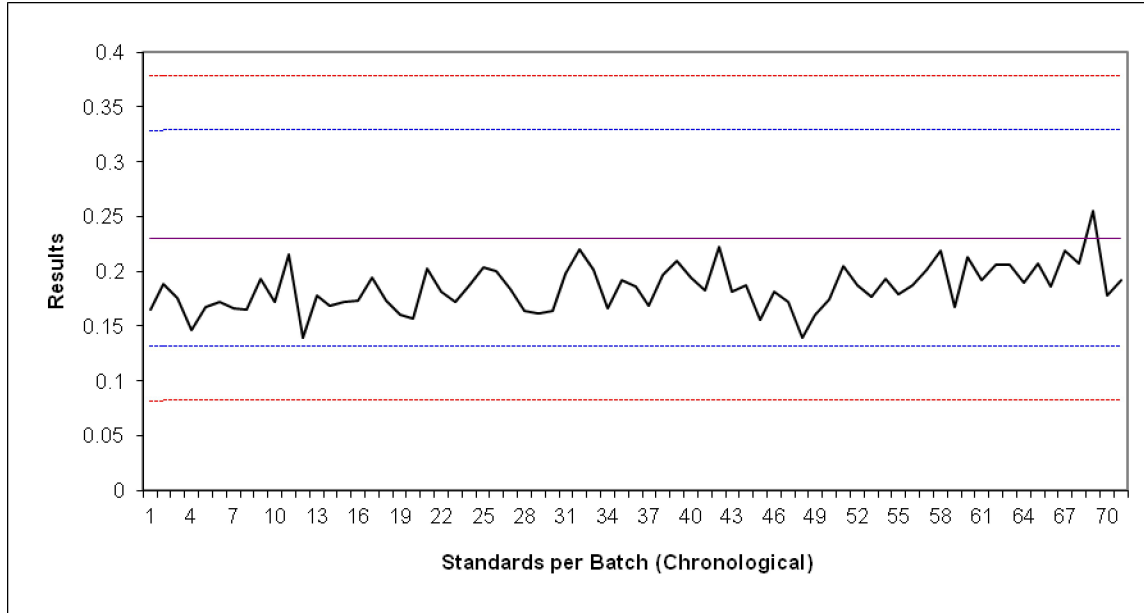
Reference Material: OREAS902 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.421	+2 Standard Deviation =	0.659
-3 Standard Deviation =	0.361	+3 Standard Deviation =	0.719
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.540	Bias =	-4.29%
Laboratory Mean =	0.517	Avg Z Score =	-0.388
Number of Values =	84	Bias Level =	Good
Expected Std. Dev. =	0.060		
Laboratory Std. Dev. =	0.032	RSD =	5.95%
		Avg Abs Z =	0.565

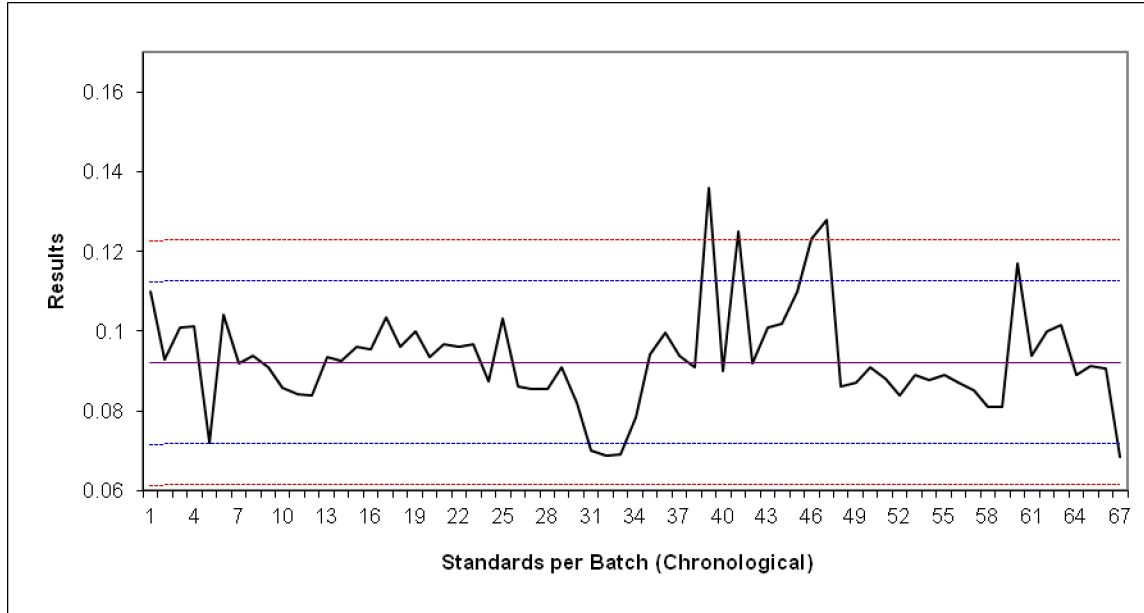
Method: ICM11D
Analyte: Hf
Instrumentation: ICP-MS
Reference Material: TILL-4 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.131	+2 Standard Deviation =	0.329
-3 Standard Deviation =	0.082	+3 Standard Deviation =	0.378
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

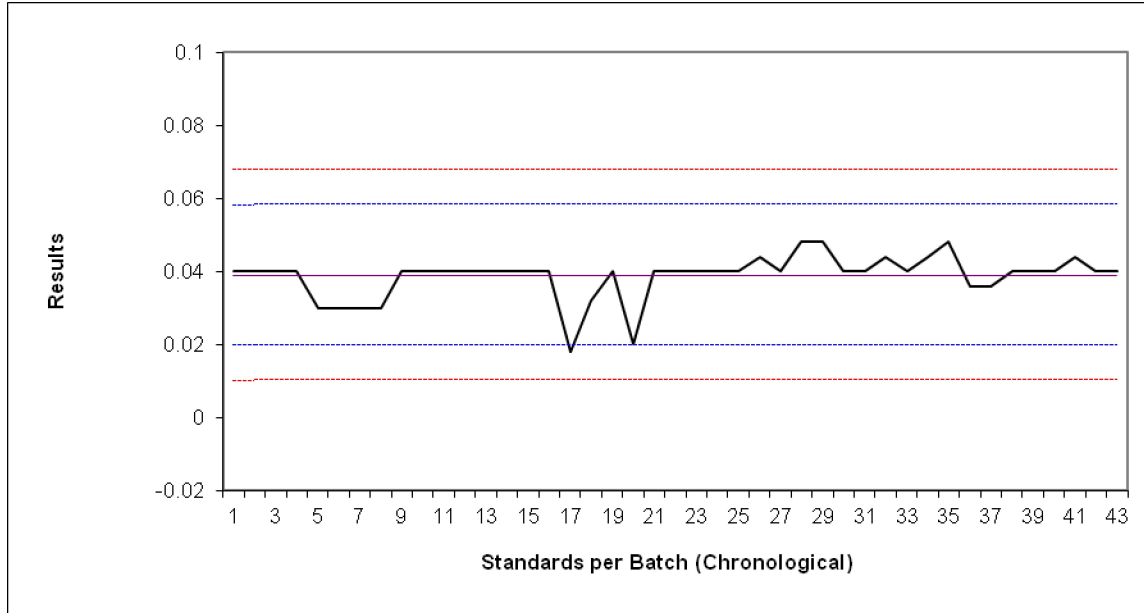
Expected Mean =	0.230	Bias =	19.65%
Laboratory Mean =	0.185	Avg Z Score =	-0.916
Number of Values =	71	Bias Level =	Marginal
Expected Std. Dev. =	0.049	RSD =	9.08%
Laboratory Std. Dev. =	0.021	Avg Abs Z =	0.930

Method: ICM11D
Analyte: Hg
Instrumentation: ICP-MS
Reference Material: TILL-3 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.072	+2 Standard Deviation =	0.112
-3 Standard Deviation =	0.061	+3 Standard Deviation =	0.123
% within 2 Standard Deviations =	86.57%	(Expect 95.4%)	
% within 3 Standard Deviations =	94.03%	(Expect 99.7%)	
Expected Mean =	0.092	Bias =	1.44%
Laboratory Mean =	0.093	Avg Z Score =	0.129
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	0.010	RSD =	14.17%
Laboratory Std. Dev. =	0.013	Avg Abs Z =	0.885

Method: ICM11D
Analyte: Hg
Instrumentation: ICP-MS
Reference Material: TILL-4 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.020	+2 Standard Deviation =	0.058
-3 Standard Deviation =	0.010	+3 Standard Deviation =	0.068
% within 2 Standard Deviations =	97.67%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.039	Bias =	-0.89%
Laboratory Mean =	0.039	Avg Z Score =	-0.036
Number of Values =	43	Bias Level =	Excellent
Expected Std. Dev. =	0.010	RSD =	15.62%
Laboratory Std. Dev. =	0.006	Avg Abs Z =	0.393

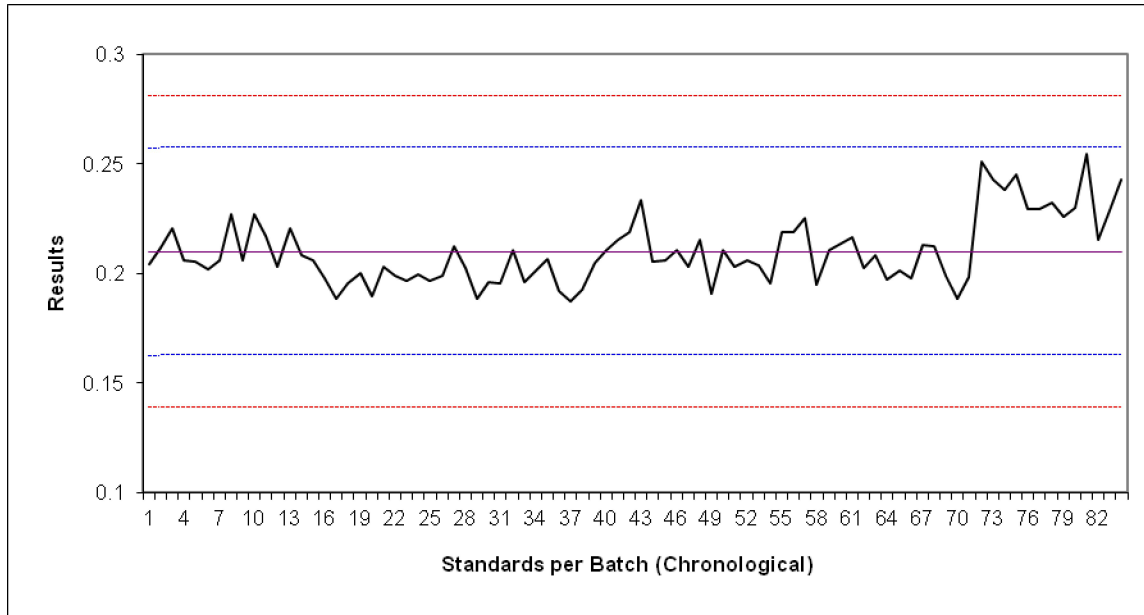
Method: ICM11D

Analyte: In

Instrumentation: ICP-MS

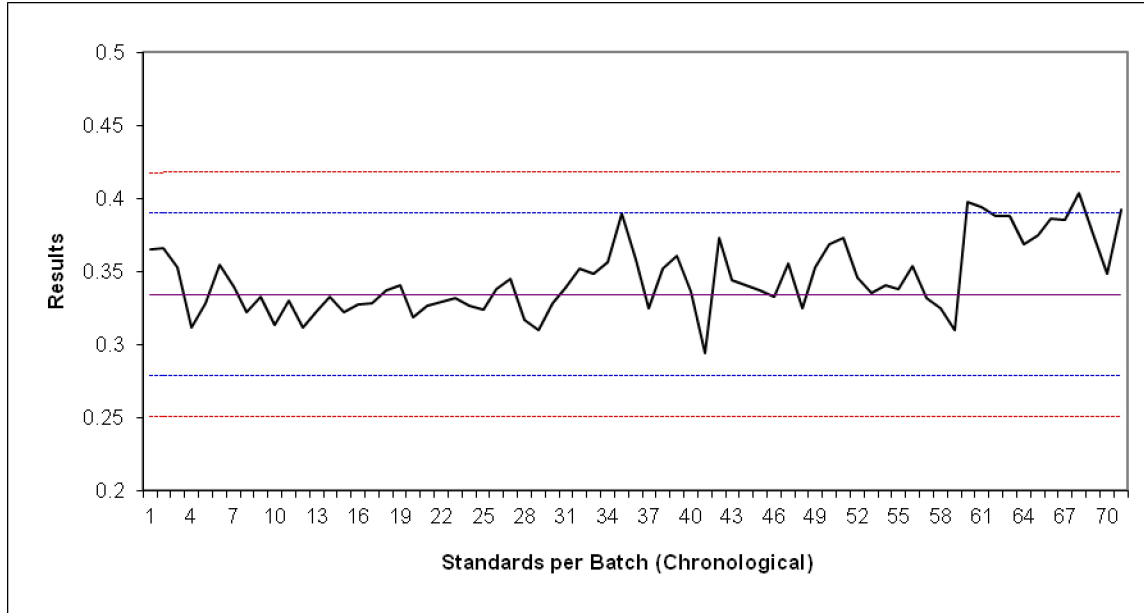
Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.163	+2 Standard Deviation =	0.257
-3 Standard Deviation =	0.139	+3 Standard Deviation =	0.281
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.210	Bias =	-0.06%
Laboratory Mean =	0.210	Avg Z Score =	-0.006
Number of Values =	84	Bias Level =	Excellent
Expected Std. Dev. =	0.024		
Laboratory Std. Dev. =	0.015	RSD =	7.20%
		Avg Abs Z =	0.503

Method: ICM11D
Analyte: In
Instrumentation: ICP-MS
Reference Material: TILL-4 – based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.278	+2 Standard Deviation =	0.390
-3 Standard Deviation =	0.251	+3 Standard Deviation =	0.417
% within 2 Standard Deviations =	92.96%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.334	Bias =	3.42%
Laboratory Mean =	0.345	Avg Z Score =	0.411
Number of Values =	71	Bias Level =	Acceptable
Expected Std. Dev. =	0.028		
Laboratory Std. Dev. =	0.025	RSD =	7.41%
		Avg Abs Z =	0.731

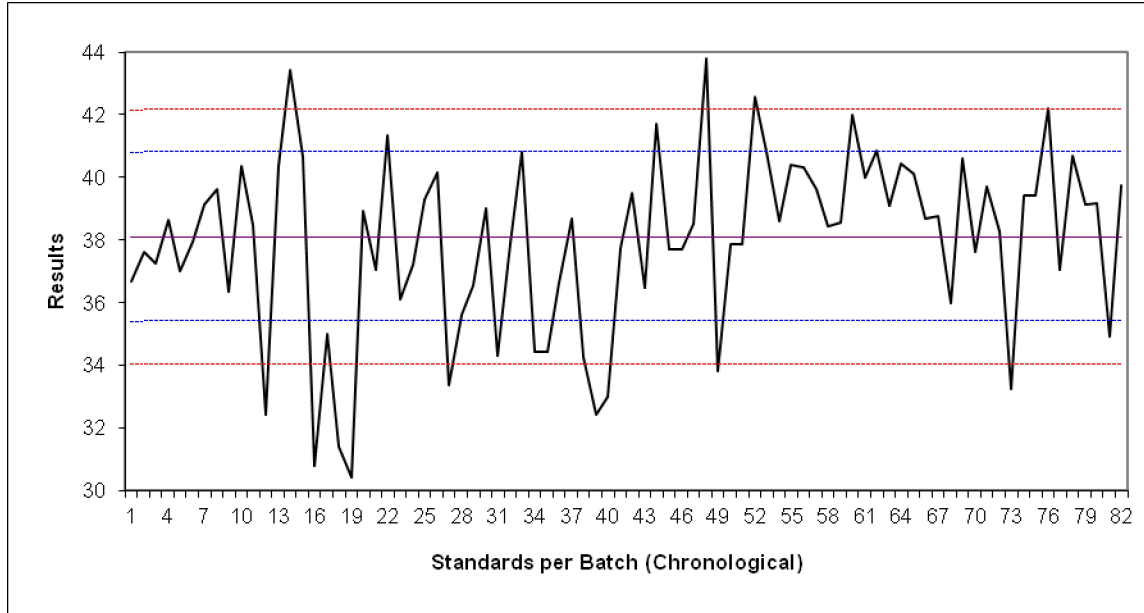
Method: ICM11D

Analyte: La

Instrumentation: ICP-MS

Reference Material: OREAS901 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	35.393	+2 Standard Deviation =	40.807
-3 Standard Deviation =	34.040	+3 Standard Deviation =	42.160
% within 2 Standard Deviations =	69.51%	(Expect 95.4%)	
% within 3 Standard Deviations =	84.15%	(Expect 99.7%)	
Expected Mean =	38.100	Bias =	-0.32%
Laboratory Mean =	37.980	Avg Z Score =	-0.089
Number of Values =	82	Bias Level =	Excellent
Expected Std. Dev. =	1.353		
Laboratory Std. Dev. =	2.856	RSD =	7.49%
		Avg Abs Z =	1.632

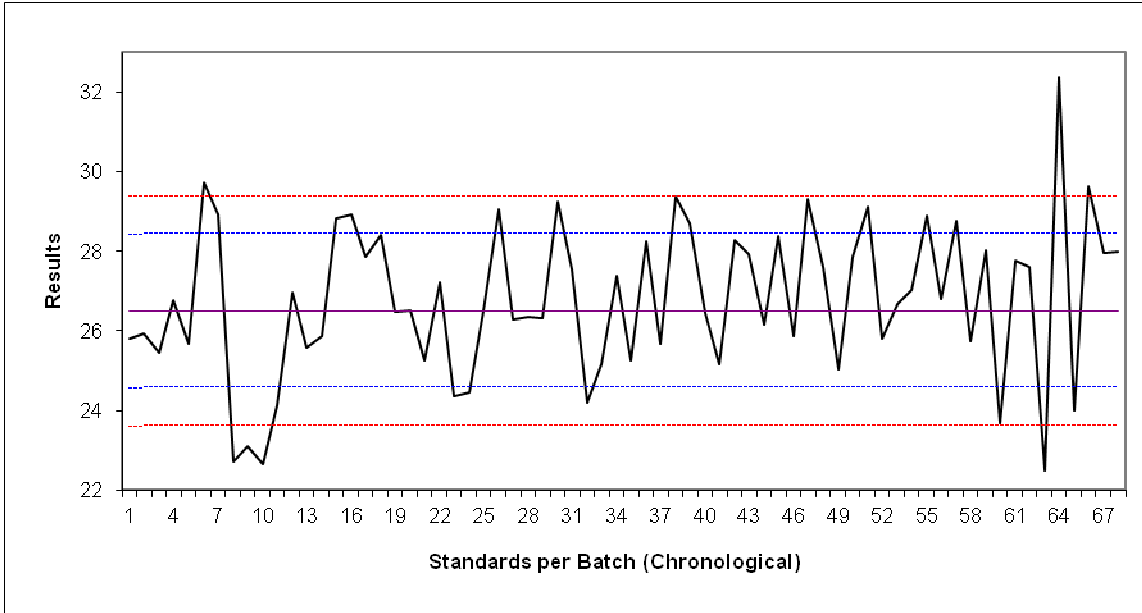
Method: ICM11D

Analyte: La

Instrumentation: ICP-MS

Reference Material: TILL-4 – based on in house certification

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	24.577	+2 Standard Deviation =	28.423
-3 Standard Deviation =	23.615	+3 Standard Deviation =	29.385
% within 2 Standard Deviations =	64.71%	(Expect 95.4%)	
% within 3 Standard Deviations =	89.71%	(Expect 99.7%)	
Expected Mean =	26.500	Bias =	1.07%
Laboratory Mean =	26.783	Avg Z Score =	0.294
Number of Values =	68	Bias Level =	Good
Expected Std. Dev. =	0.962		
Laboratory Std. Dev. =	1.961	RSD =	7.40%
		Avg Abs Z =	1.652

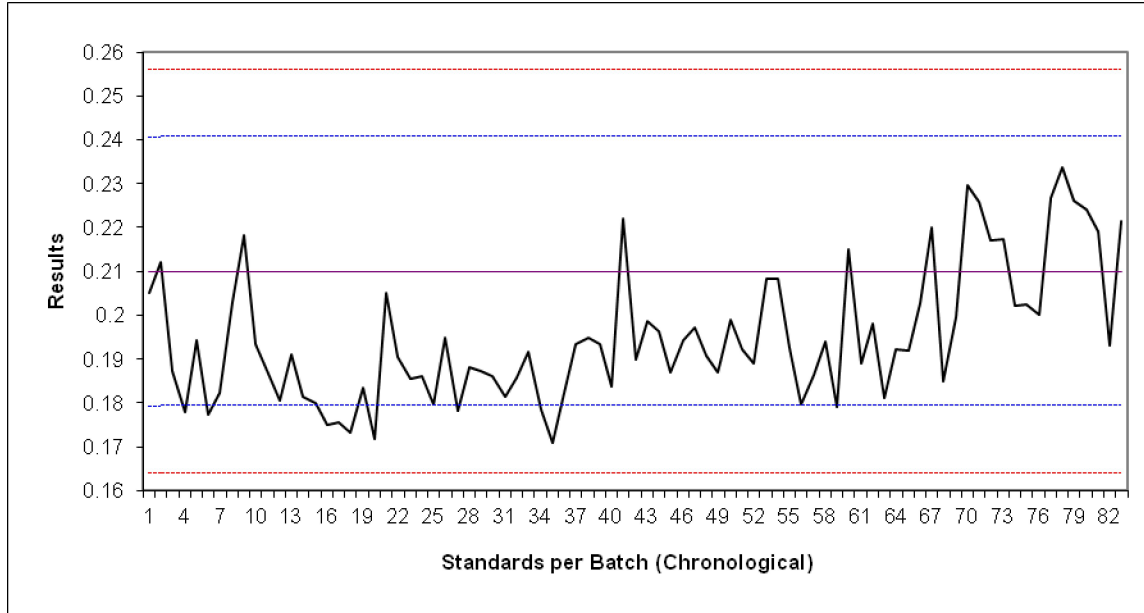
Method: ICM11D

Analyte: Lu

Instrumentation: ICP-MS

Reference Material: OREAS904 – based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.179	+2 Standard Deviation =	0.241
-3 Standard Deviation =	0.164	+3 Standard Deviation =	0.256
% within 2 Standard Deviations =	87.95%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.210	Bias =	-7.11%
Laboratory Mean =	0.195	Avg Z Score =	-0.974
Number of Values =	83	Bias Level =	Marginal
Expected Std. Dev. =	0.015	RSD =	7.27%
Laboratory Std. Dev. =	0.015	Avg Abs Z =	1.253

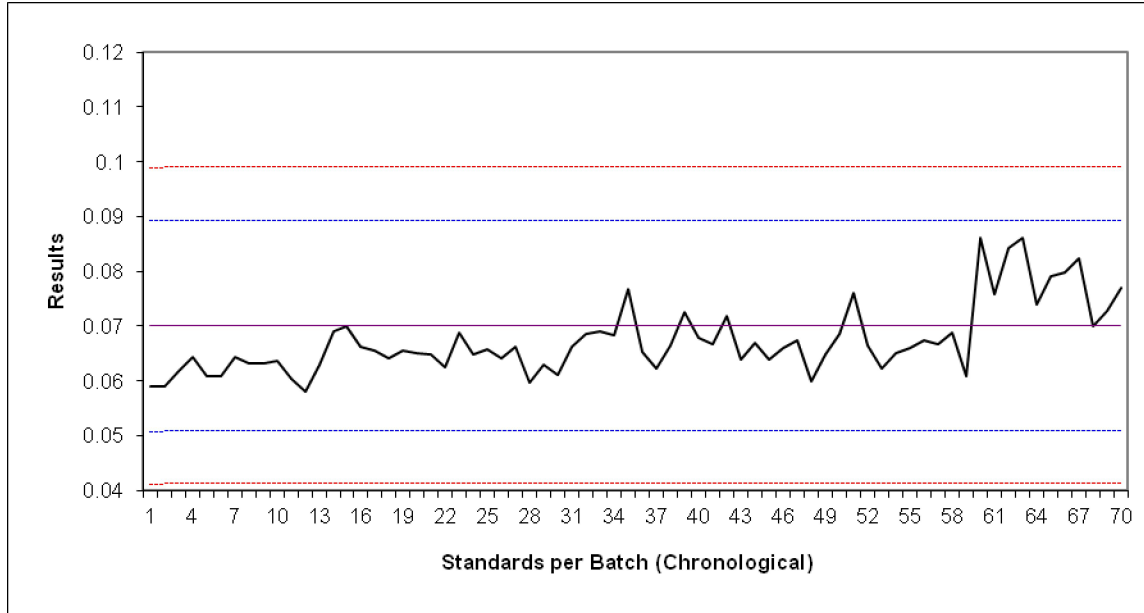
Method: ICM11D

Analyte: Lu

Instrumentation: ICP-MS

Reference Material: TILL-3 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.051	+2 Standard Deviation =	0.089
-3 Standard Deviation =	0.041	+3 Standard Deviation =	0.099
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.070	Bias =	-3.70%
Laboratory Mean =	0.067	Avg Z Score =	-0.269
Number of Values =	70	Bias Level =	Good
Expected Std. Dev. =	0.010		
Laboratory Std. Dev. =	0.006	RSD =	9.15%
		Avg Abs Z =	0.608

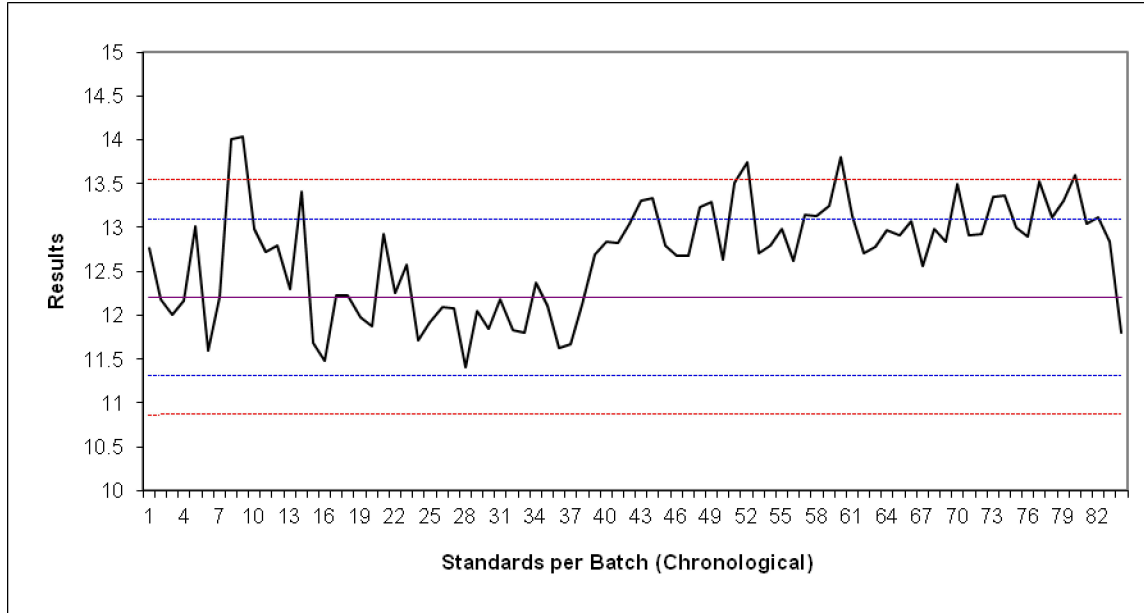
Method: ICM11D

Analyte: Mo

Instrumentation: ICP-MS

Reference Material: OREAS902 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	11.306	+2 Standard Deviation =	13.094
-3 Standard Deviation =	10.859	+3 Standard Deviation =	13.541
% within 2 Standard Deviations =	73.81%	(Expect 95.4%)	
% within 3 Standard Deviations =	94.05%	(Expect 99.7%)	

Expected Mean =	12.200	Bias =	3.98%
Laboratory Mean =	12.686	Avg Z Score =	1.087
Number of Values =	84	Bias Level =	Marginal
Expected Std. Dev. =	0.447	RSD =	5.09%
Laboratory Std. Dev. =	0.621	Avg Abs Z =	1.479

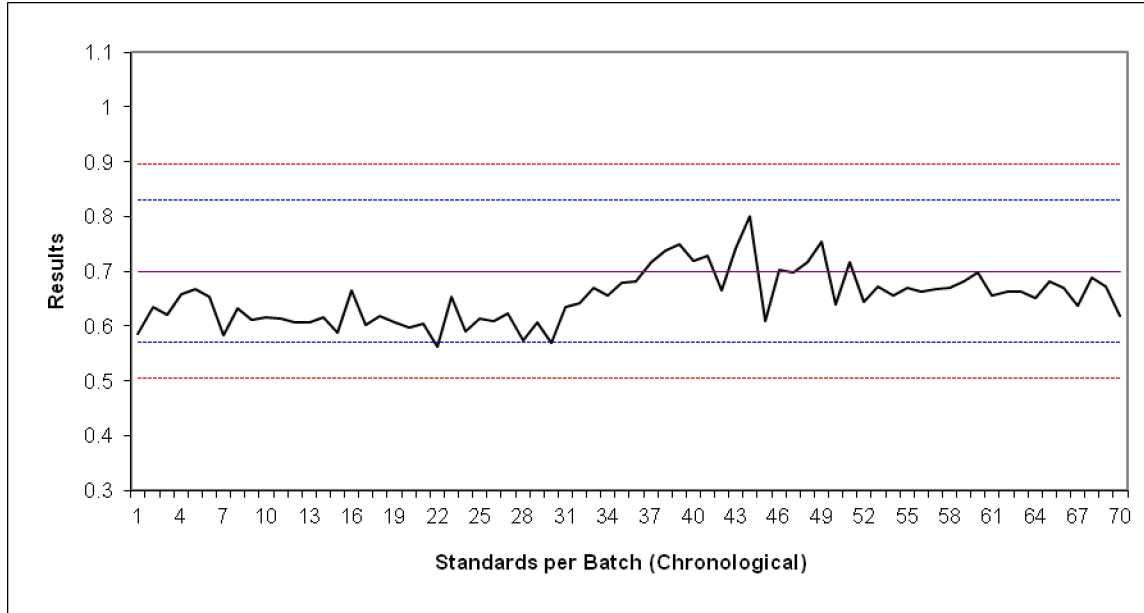
Method: ICM11D

Analyte: Mo

Instrumentation: ICP-MS

Reference Material: TILL-3 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.570	+2 Standard Deviation =	0.830
-3 Standard Deviation =	0.505	+3 Standard Deviation =	0.895
% within 2 Standard Deviations =	98.57%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.700	Bias =	-6.77%
Laboratory Mean =	0.653	Avg Z Score =	-0.729
Number of Values =	70	Bias Level =	Acceptable
Expected Std. Dev. =	0.065		
Laboratory Std. Dev. =	0.049	RSD =	7.00%
		Avg Abs Z =	0.898

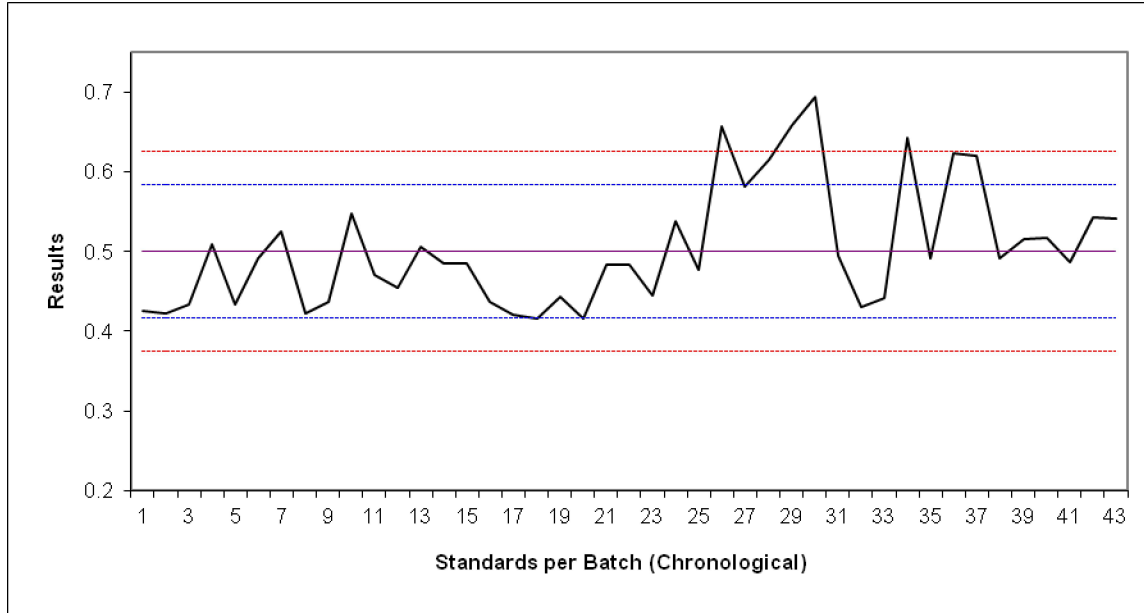
Method: ICM11D

Analyte: Nb

Instrumentation: ICP-MS

Reference Material: TILL-3 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.416	+2 Standard Deviation =	0.584
-3 Standard Deviation =	0.375	+3 Standard Deviation =	0.625
% within 2 Standard Deviations =	79.07%		(Expect 95.4%)
% within 3 Standard Deviations =	90.70%		(Expect 99.7%)
Expected Mean =	0.500	Bias =	0.67%
Laboratory Mean =	0.503	Avg Z Score =	0.080
Number of Values =	43	Bias Level =	Excellent
Expected Std. Dev. =	0.042		
Laboratory Std. Dev. =	0.076	RSD =	15.10%
		Avg Abs Z =	1.403

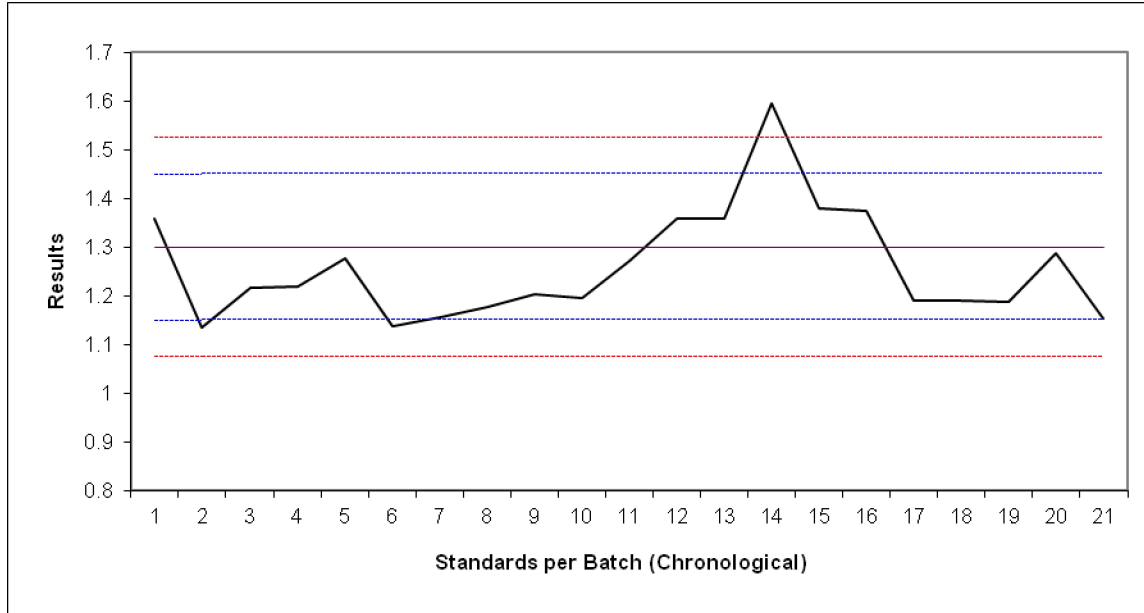
Method: ICM11D

Analyte: Nb

Instrumentation: ICP-MS

Reference Material: TILL-4 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.150	+2 Standard Deviation =	1.450
-3 Standard Deviation =	1.075	+3 Standard Deviation =	1.525
% within 2 Standard Deviations =	85.71%		(Expect 95.4%)
% within 3 Standard Deviations =	95.24%		(Expect 99.7%)
Expected Mean =	1.300	Bias =	-3.23%
Laboratory Mean =	1.258	Avg Z Score =	-0.561
Number of Values =	21	Bias Level =	Acceptable
Expected Std. Dev. =	0.075		
Laboratory Std. Dev. =	0.113	RSD =	8.69%
		Avg Abs Z =	1.354

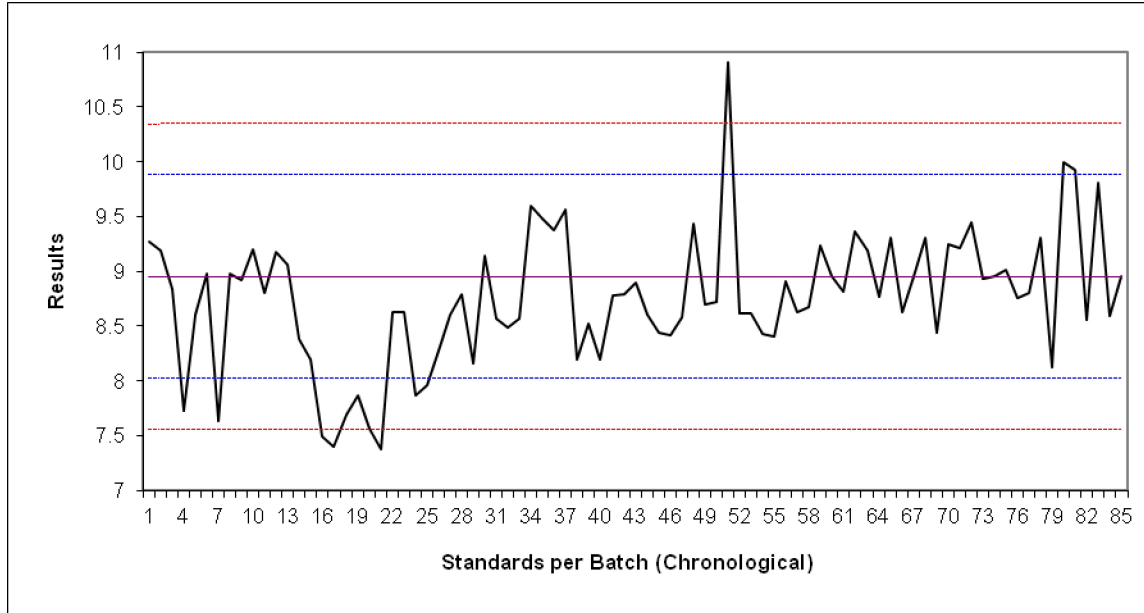
Method: ICM11D

Analyte: Pb

Instrumentation: ICP-MS

Reference Material: OREAS903 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	8.020	+2 Standard Deviation =	9.880
-3 Standard Deviation =	7.555	+3 Standard Deviation =	10.345
% within 2 Standard Deviations =	84.71%	(Expect 95.4%)	
% within 3 Standard Deviations =	95.29%	(Expect 99.7%)	
Expected Mean =	8.950	Bias =	-2.19%
Laboratory Mean =	8.754	Avg Z Score =	-0.421
Number of Values =	85	Bias Level =	Acceptable
Expected Std. Dev. =	0.465		
Laboratory Std. Dev. =	0.607	RSD =	6.78%
		Avg Abs Z =	1.032

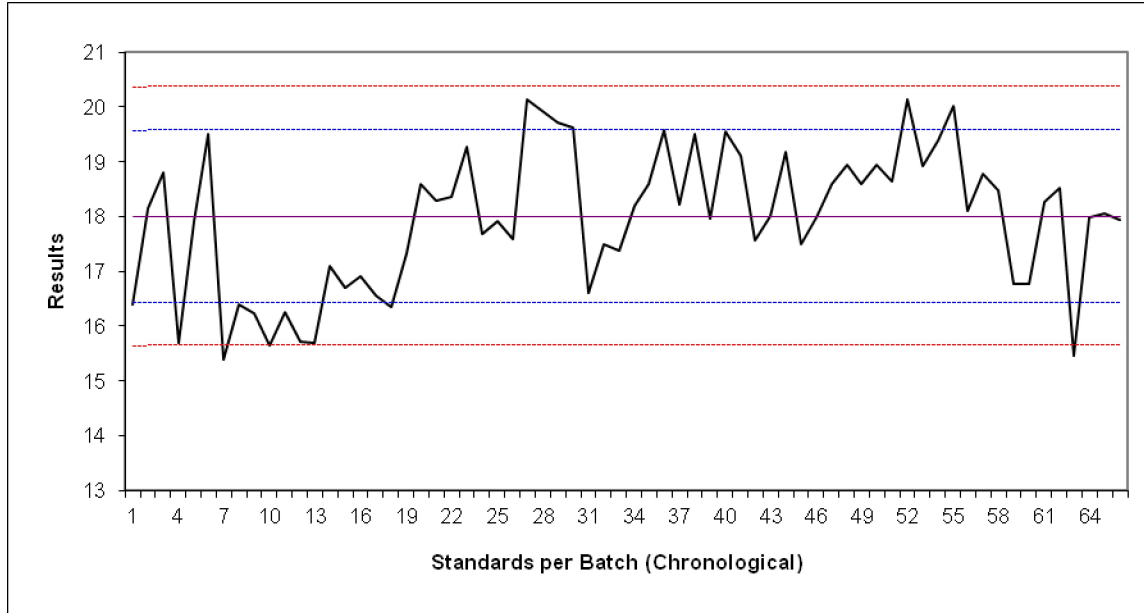
Method: ICM11D

Analyte: Pb

Instrumentation: ICP-MS

Reference Material: TILL-3 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	16.425	+2 Standard Deviation =	19.575
-3 Standard Deviation =	15.638	+3 Standard Deviation =	20.363
% within 2 Standard Deviations =	74.24%	(Expect 95.4%)	
% within 3 Standard Deviations =	96.97%	(Expect 99.7%)	
Expected Mean =	18.000	Bias =	-0.21%
Laboratory Mean =	17.963	Avg Z Score =	-0.047
Number of Values =	66	Bias Level =	Excellent
Expected Std. Dev. =	0.788		
Laboratory Std. Dev. =	1.276	RSD =	7.09%
		Avg Abs Z =	1.305

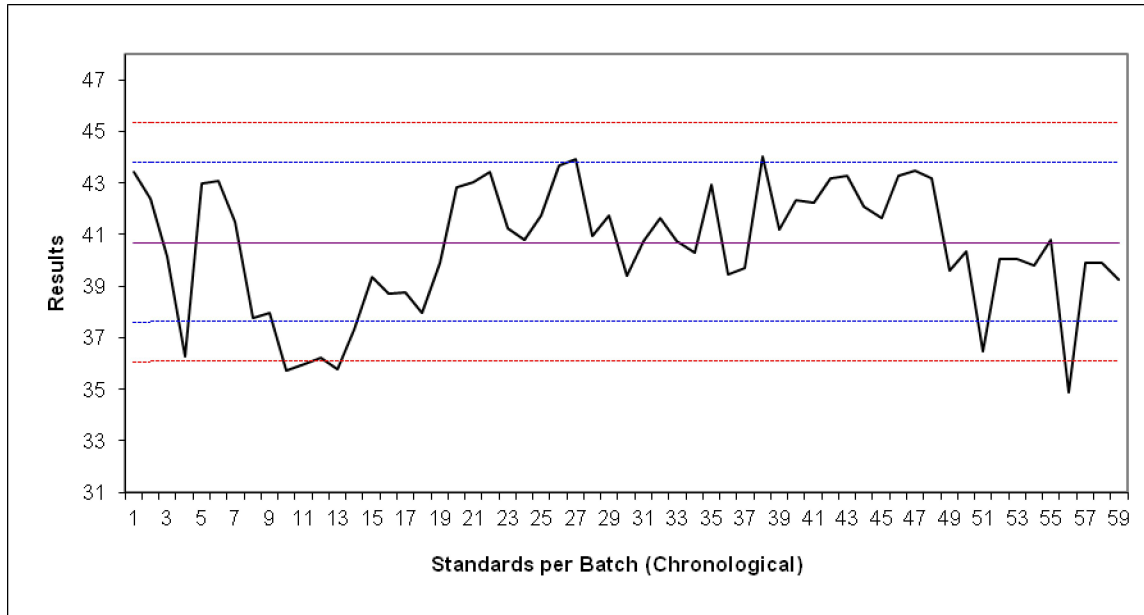
Method: ICM11D

Analyte: Pb

Instrumentation: ICP-MS

Reference Material: TILL-4 – based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	37.610	+2 Standard Deviation =	43.790
-3 Standard Deviation =	36.065	+3 Standard Deviation =	45.335
% within 2 Standard Deviations =	83.05%		(Expect 95.4%)
% within 3 Standard Deviations =	93.22%		(Expect 99.7%)
Expected Mean =	40.700	Bias =	-0.44%
Laboratory Mean =	40.521	Avg Z Score =	-0.116
Number of Values =	59	Bias Level =	Excellent
Expected Std. Dev. =	1.545		
Laboratory Std. Dev. =	2.407	RSD =	5.91%
		Avg Abs Z =	1.255

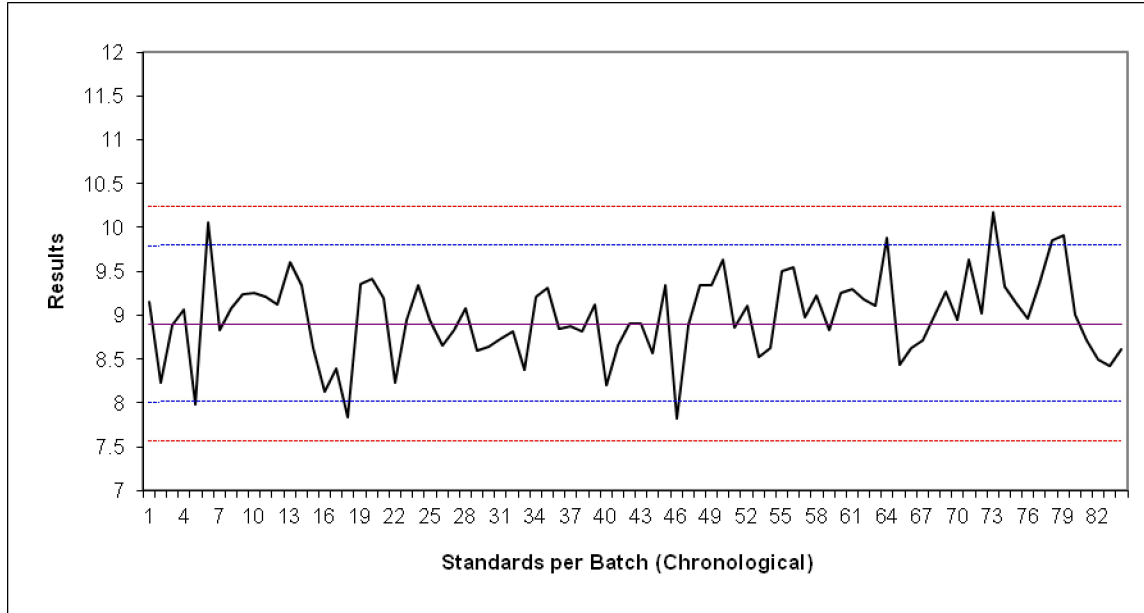
Method: ICM11D

Analyte: Rb

Instrumentation: ICP-MS

Reference Material: OREAS902 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	8.007	+2 Standard Deviation =	9.793
-3 Standard Deviation =	7.561	+3 Standard Deviation =	10.239
% within 2 Standard Deviations =	90.48%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	8.900	Bias =	0.93%
Laboratory Mean =	8.982	Avg Z Score =	0.184
Number of Values =	84	Bias Level =	Excellent
Expected Std. Dev. =	0.446	 	
Laboratory Std. Dev. =	0.472	RSD =	5.30%
		Avg Abs Z =	0.834

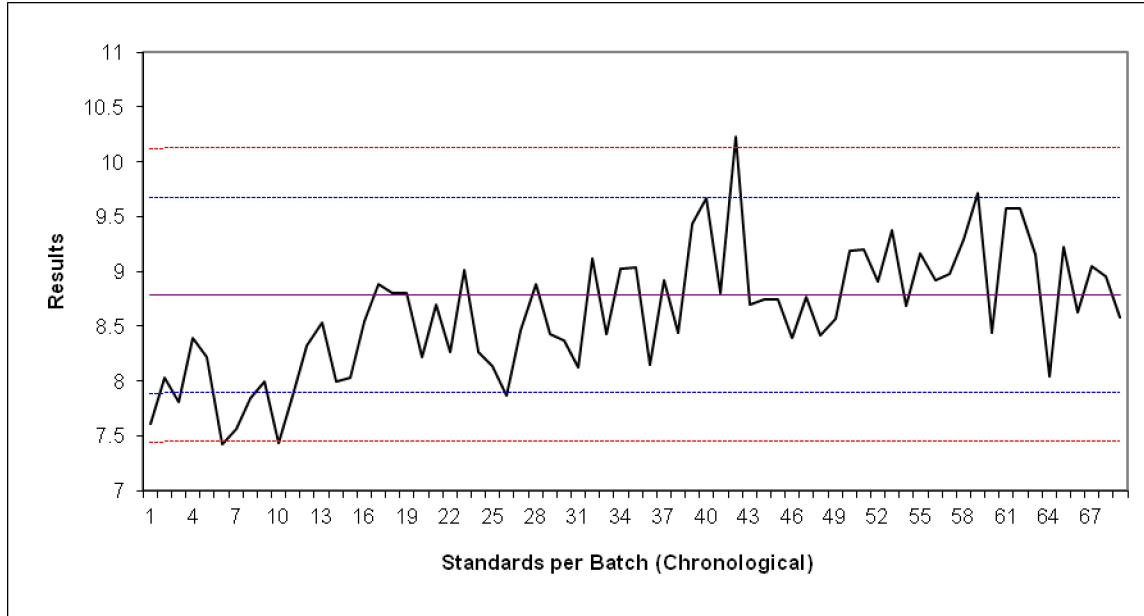
Method: ICM11D

Analyte: Rb

Instrumentation: ICP-MS

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	7.888	+2 Standard Deviation =	9.672
-3 Standard Deviation =	7.441	+3 Standard Deviation =	10.119
% within 2 Standard Deviations =	85.51%	(Expect 95.4%)	
% within 3 Standard Deviations =	95.65%	(Expect 99.7%)	
Expected Mean =	8.780	Bias =	-1.77%
Laboratory Mean =	8.625	Avg Z Score =	-0.348
Number of Values =	69	Bias Level =	Good
Expected Std. Dev. =	0.446		
Laboratory Std. Dev. =	0.577	RSD =	6.57%
		Avg Abs Z =	1.065

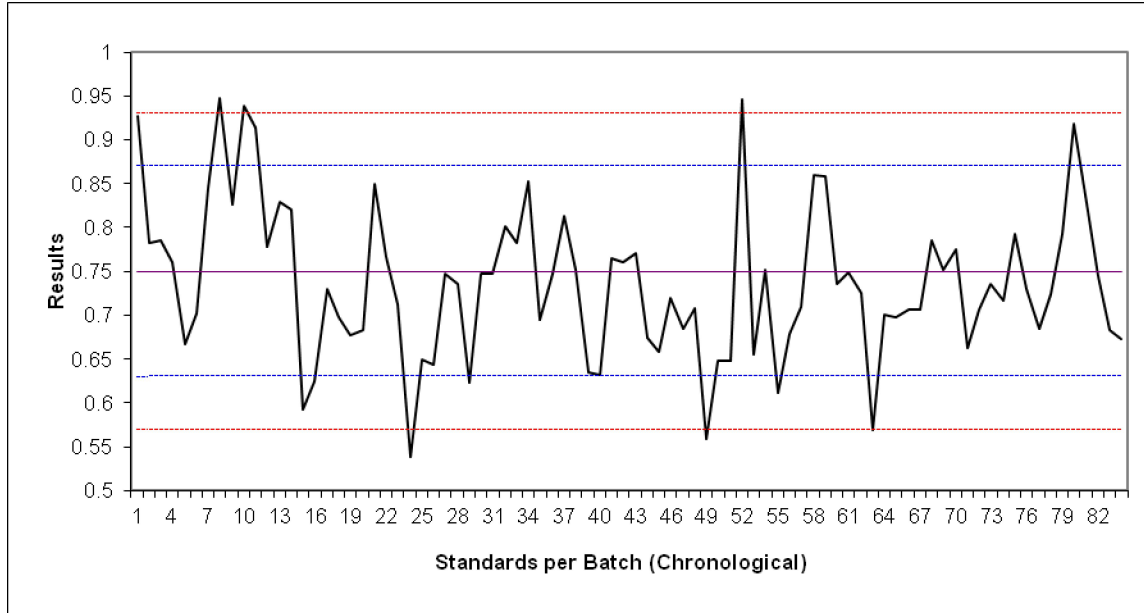
Method: ICM11D

Analyte: Sb

Instrumentation: ICP-MS

Reference Material: OREAS902 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.630	+2 Standard Deviation =	0.870
-3 Standard Deviation =	0.570	+3 Standard Deviation =	0.930
% within 2 Standard Deviations =	84.52%	(Expect 95.4%)	
% within 3 Standard Deviations =	92.86%	(Expect 99.7%)	
Expected Mean =	0.750	Bias =	-1.66%
Laboratory Mean =	0.738	Avg Z Score =	-0.207
Number of Values =	84	Bias Level =	Good
Expected Std. Dev. =	0.060	RSD =	11.70%
Laboratory Std. Dev. =	0.088	Avg Abs Z =	1.146

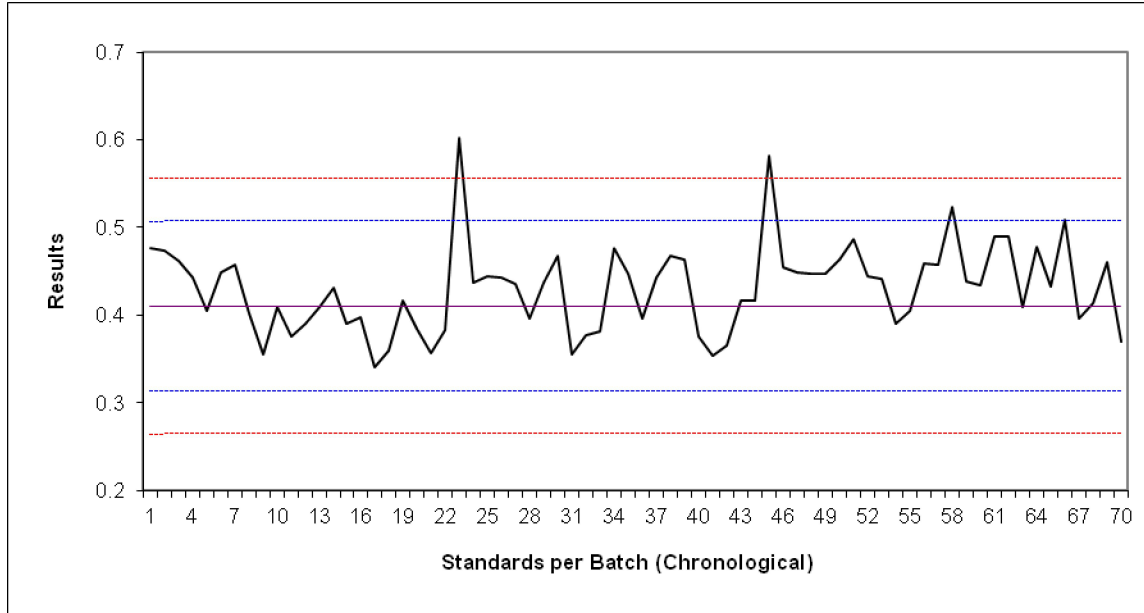
Method: ICM11D

Analyte: Sb

Instrumentation: ICP-MS

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.313	+2 Standard Deviation =	0.507
-3 Standard Deviation =	0.264	+3 Standard Deviation =	0.556
% within 2 Standard Deviations =	94.29%		(Expect 95.4%)
% within 3 Standard Deviations =	97.14%		(Expect 99.7%)
Expected Mean =	0.410	Bias =	5.00%
Laboratory Mean =	0.431	Avg Z Score =	0.423
Number of Values =	70	Bias Level =	Acceptable
Expected Std. Dev. =	0.049		
Laboratory Std. Dev. =	0.050	RSD =	12.16%
		Avg Abs Z =	0.860

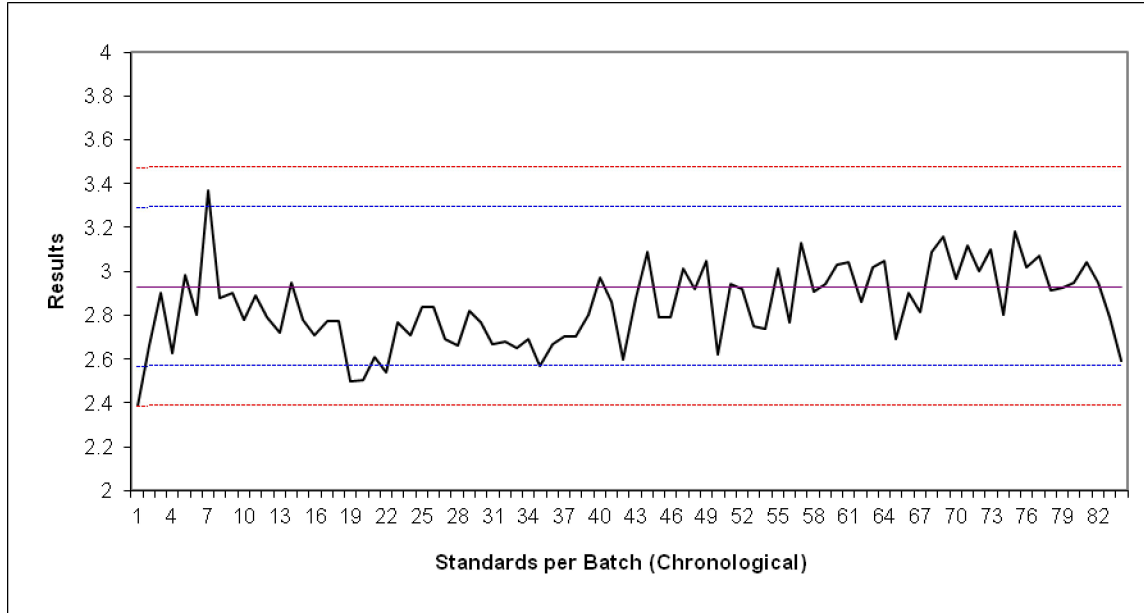
Method: ICM11D

Analyte: Sc

Instrumentation: ICP-MS

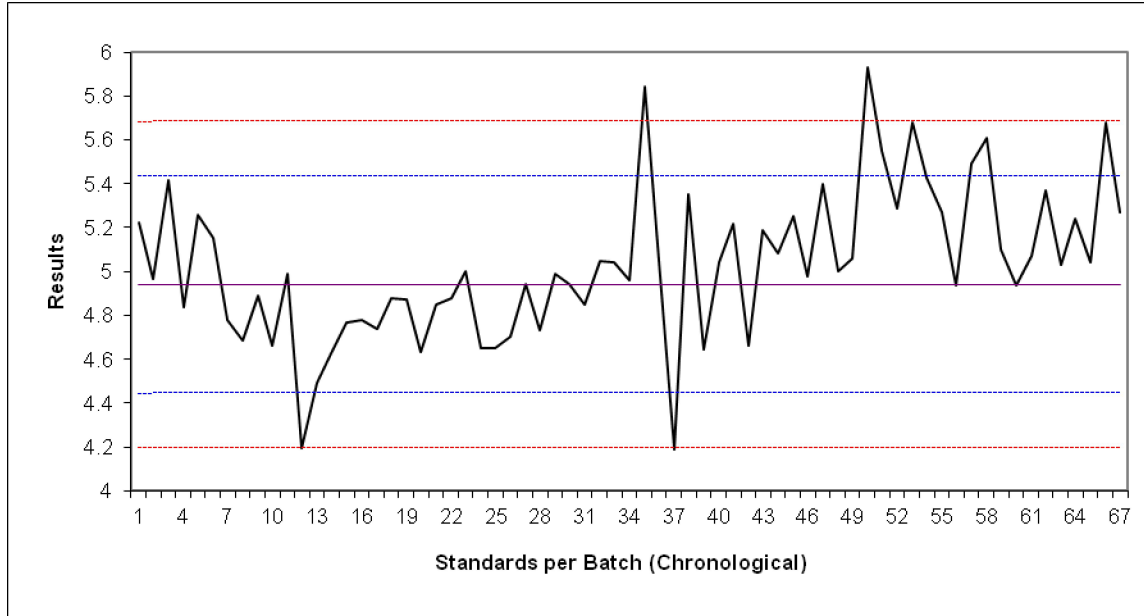
Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	2.568	+2 Standard Deviation =	3.292
-3 Standard Deviation =	2.387	+3 Standard Deviation =	3.473
% within 2 Standard Deviations =	94.05%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	2.930	Bias =	-2.97%
Laboratory Mean =	2.843	Avg Z Score =	-0.480
Number of Values =	84	Bias Level =	Acceptable
Expected Std. Dev. =	0.181		
Laboratory Std. Dev. =	0.180	RSD =	6.14%
		Avg Abs Z =	0.890

Method: ICM11D
Analyte: Sc
Instrumentation: ICP-MS
Reference Material: TILL-3 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	4.444	+2 Standard Deviation =	5.436
-3 Standard Deviation =	4.196	+3 Standard Deviation =	5.684
% within 2 Standard Deviations =	86.57%	(Expect 95.4%)	
% within 3 Standard Deviations =	94.03%	(Expect 99.7%)	

Expected Mean =	4.940	Bias =	1.81%
Laboratory Mean =	5.029	Avg Z Score =	0.360
Number of Values =	67	Bias Level =	Good
Expected Std. Dev. =	0.248	RSD =	6.96%
Laboratory Std. Dev. =	0.344	Avg Abs Z =	1.072

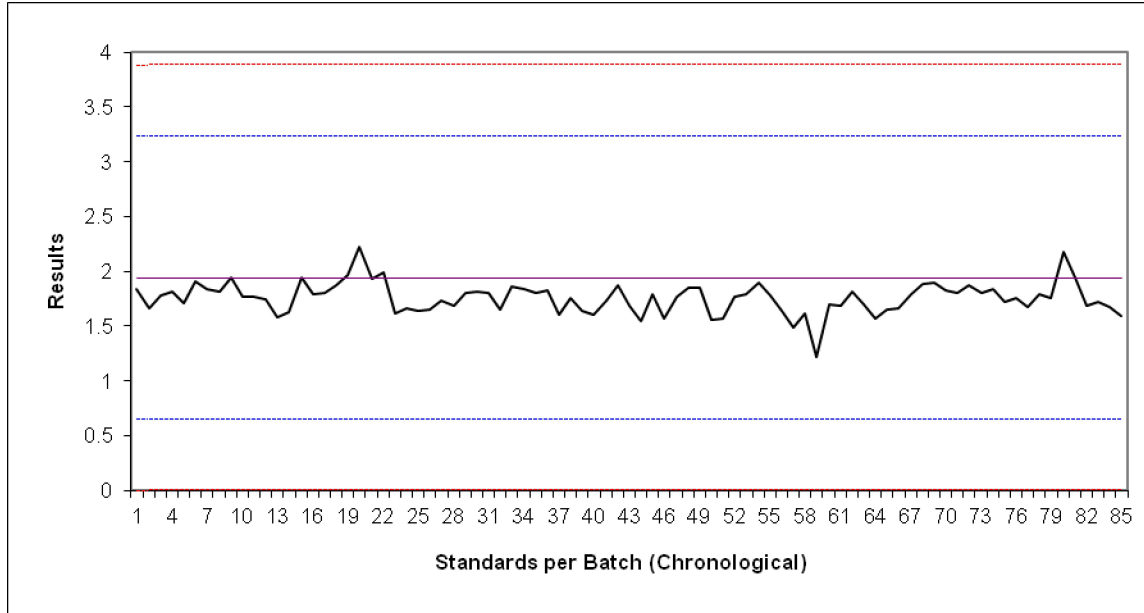
Method: ICM11D

Analyte: Se

Instrumentation: ICP-MS

Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.647	+2 Standard Deviation =	3.233
-3 Standard Deviation =	0.000	+3 Standard Deviation =	3.880
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	1.940	Bias =	-9.47%
Laboratory Mean =	1.756	Avg Z Score =	-0.284
Number of Values =	85	Bias Level =	Good
Expected Std. Dev. =	0.647		
Laboratory Std. Dev. =	0.143	RSD =	7.35%
		Avg Abs Z =	0.306

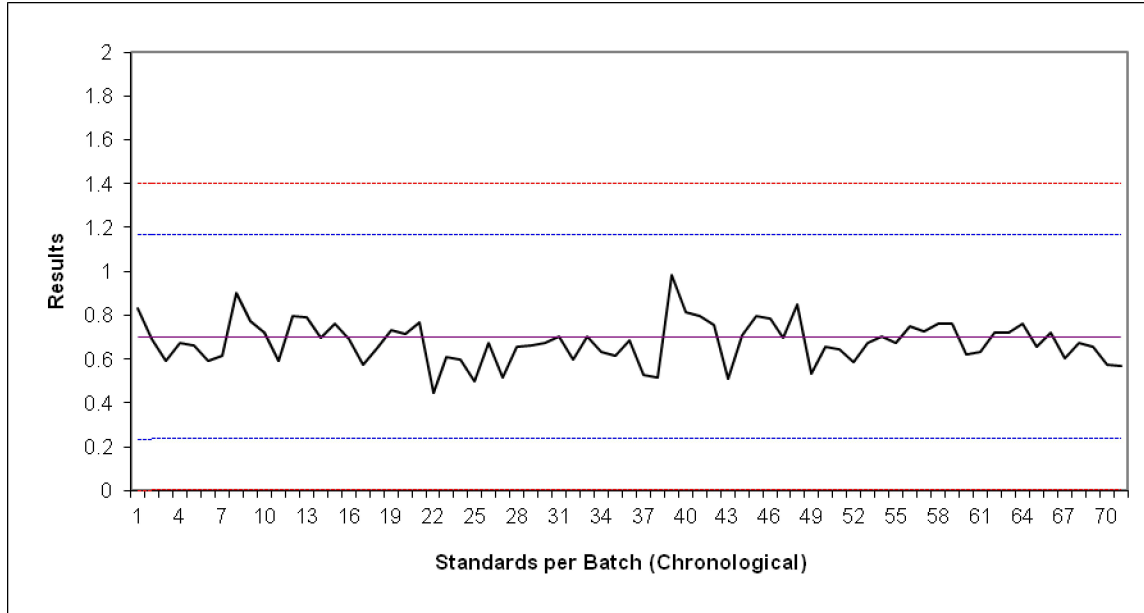
Method: ICM11D

Analyte: Se

Instrumentation: ICP-MS

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.233	+2 Standard Deviation =	1.167
-3 Standard Deviation =	0.000	+3 Standard Deviation =	1.400
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.700	Bias =	-3.02%
Laboratory Mean =	0.679	Avg Z Score =	-0.091
Number of Values =	71	Bias Level =	Excellent
Expected Std. Dev. =	0.233		
Laboratory Std. Dev. =	0.098	RSD =	13.98%
		Avg Abs Z =	0.332

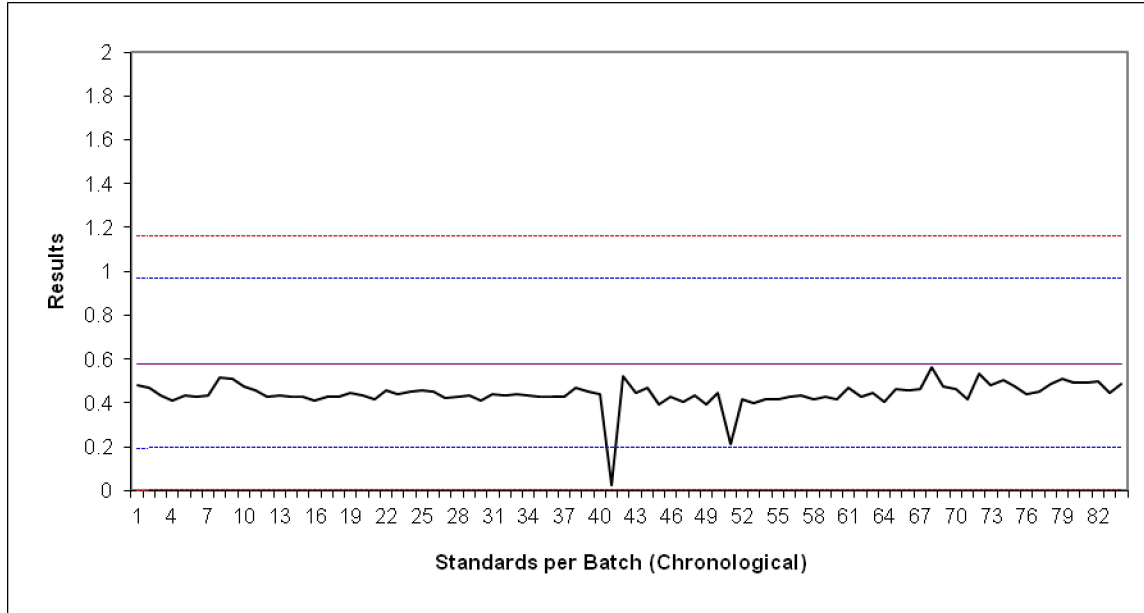
Method: ICM11D

Analyte: Sn

Instrumentation: ICP-MS

Reference Material: OREAS904 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.193	+2 Standard Deviation =	0.967
-3 Standard Deviation =	0.000	+3 Standard Deviation =	1.160
% within 2 Standard Deviations =	98.81%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.580	Bias =	24.14%
Laboratory Mean =	0.440	Avg Z Score =	-0.724
Number of Values =	84	Bias Level =	Acceptable
Expected Std. Dev. =	0.193	RSD =	10.69%
Laboratory Std. Dev. =	0.062	Avg Abs Z =	0.724

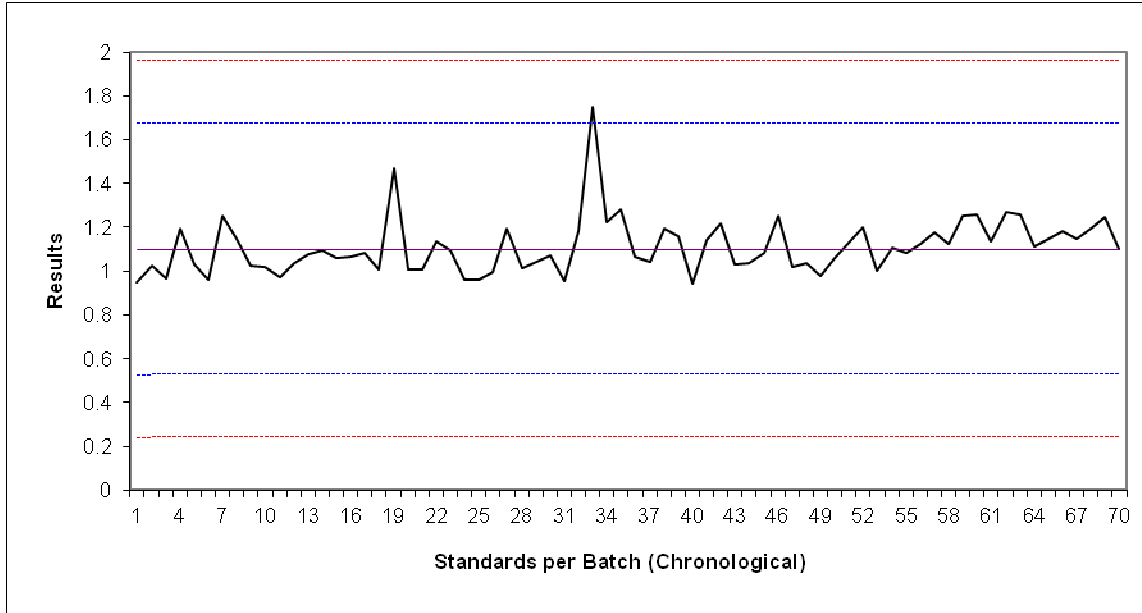
Method: ICM11D

Analyte: Sn

Instrumentation: ICP-MS

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.527	+2 Standard Deviation =	1.673
-3 Standard Deviation =	0.240	+3 Standard Deviation =	1.960
% within 2 Standard Deviations =	98.57%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	1.100	Bias =	1.04%
Laboratory Mean =	1.111	Avg Z Score =	0.040
Number of Values =	70	Bias Level =	Excellent
Expected Std. Dev. =	0.287	RSD =	11.75%
Laboratory Std. Dev. =	0.129	Avg Abs Z =	0.324

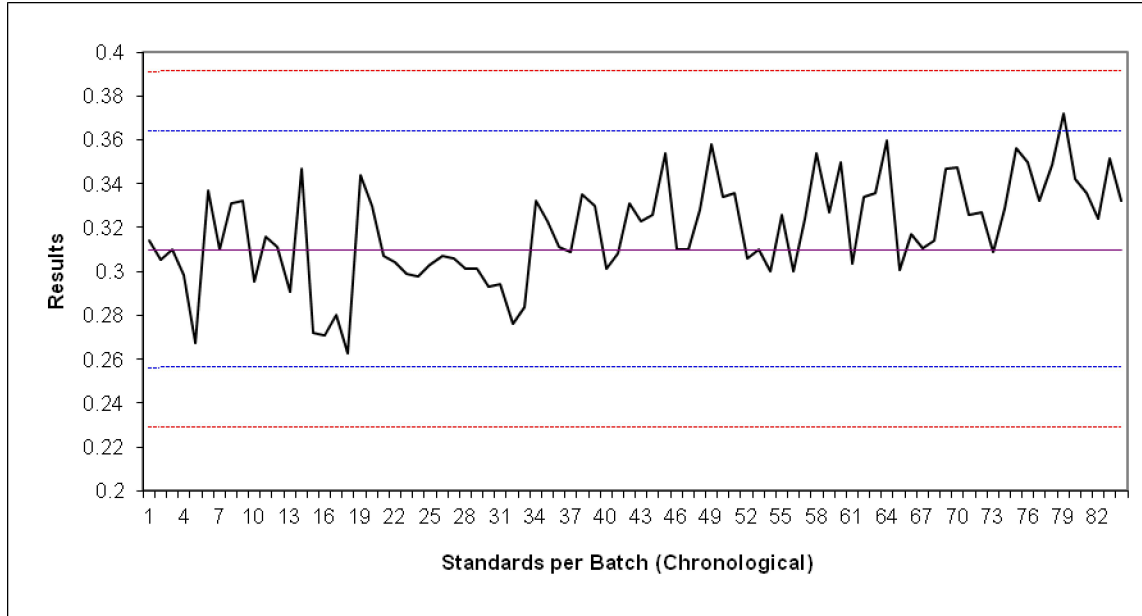
Method: ICM11D

Analyte: Tb

Instrumentation: ICP-MS

Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.256	+2 Standard Deviation =	0.364
-3 Standard Deviation =	0.229	+3 Standard Deviation =	0.391
% within 2 Standard Deviations =	98.81%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.310	Bias =	2.76%
Laboratory Mean =	0.319	Avg Z Score =	0.317
Number of Values =	84	Bias Level =	Good
Expected Std. Dev. =	0.027		
Laboratory Std. Dev. =	0.023	RSD =	7.45%
		Avg Abs Z =	0.720

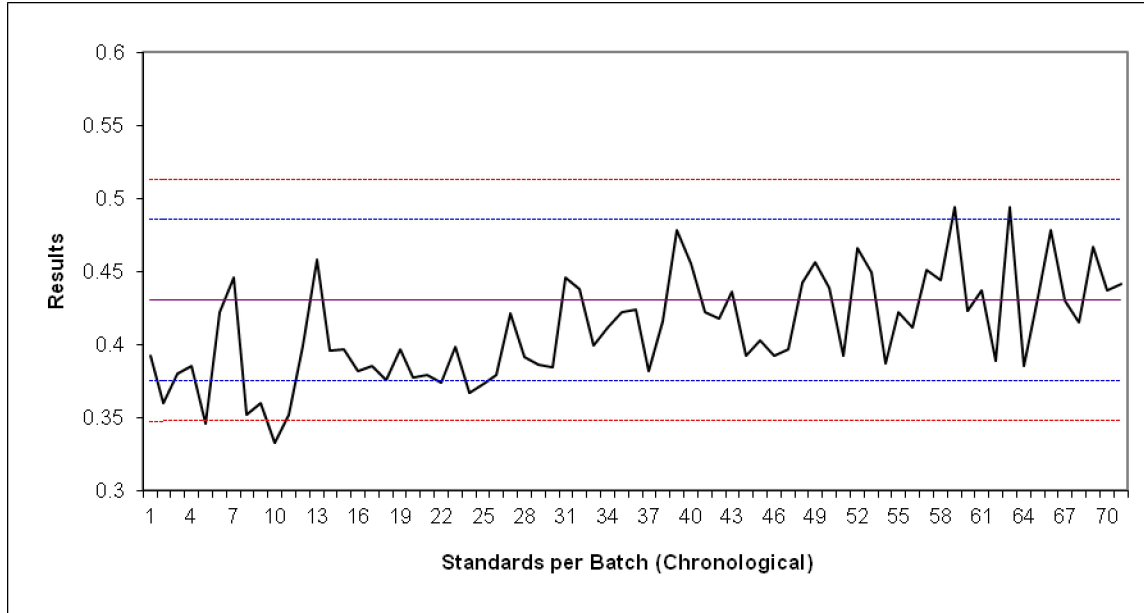
Method: ICM11D

Analyte: Tb

Instrumentation: ICP-MS

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.375	+2 Standard Deviation =	0.485
-3 Standard Deviation =	0.347	+3 Standard Deviation =	0.513
% within 2 Standard Deviations =	84.51%	(Expect 95.4%)	
% within 3 Standard Deviations =	97.18%	(Expect 99.7%)	
Expected Mean =	0.430	Bias =	-4.48%
Laboratory Mean =	0.411	Avg Z Score =	-0.698
Number of Values =	71	Bias Level =	Acceptable
Expected Std. Dev. =	0.028		
Laboratory Std. Dev. =	0.036	RSD =	8.39%
		Avg Abs Z =	1.234

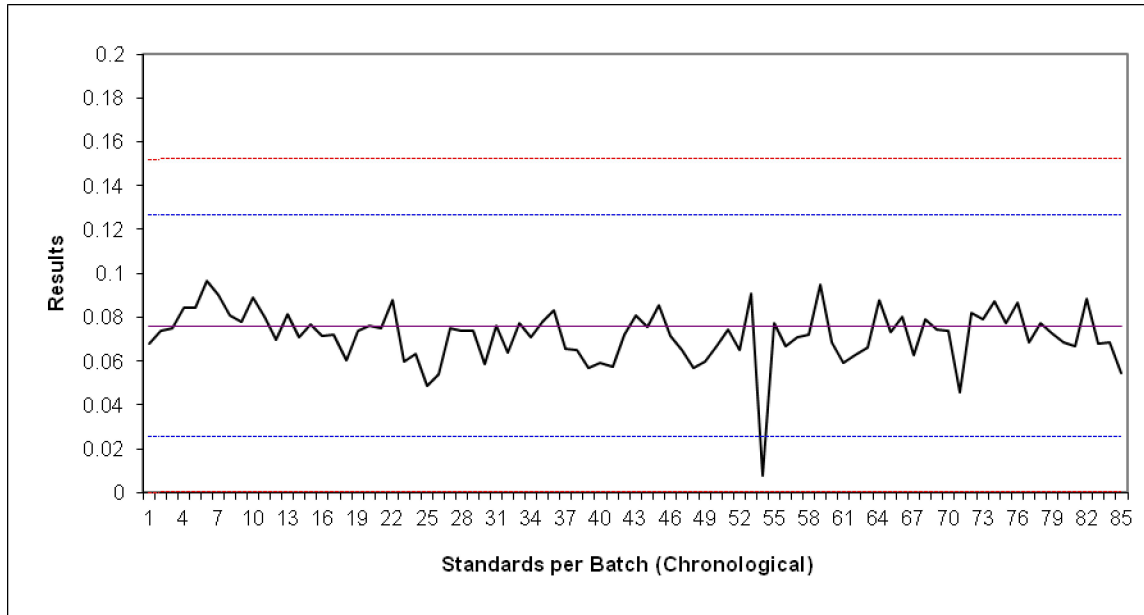
Method: ICM11D

Analyte: Te

Instrumentation: ICP-MS

Reference Material: OREAS901 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.025	+2 Standard Deviation =	0.127
-3 Standard Deviation =	0.000	+3 Standard Deviation =	0.152
% within 2 Standard Deviations =	98.82%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.076	Bias =	-5.44%
Laboratory Mean =	0.072	Avg Z Score =	-0.163
Number of Values =	85	Bias Level =	Excellent
Expected Std. Dev. =	0.025	RSD =	16.47%
Laboratory Std. Dev. =	0.013	Avg Abs Z =	0.365

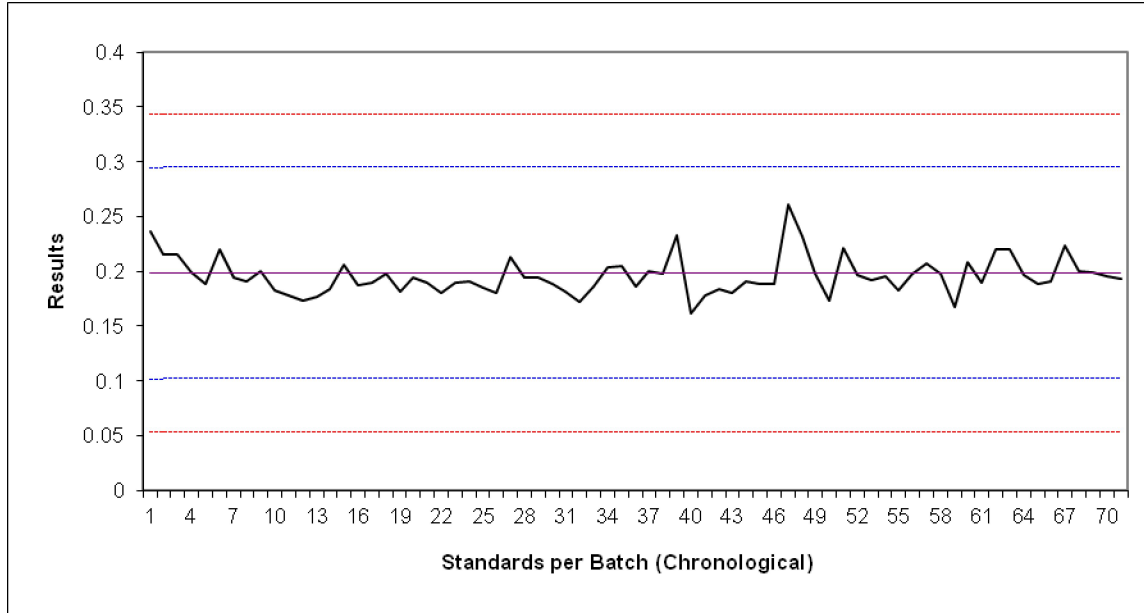
Method: ICM11D

Analyte: Te

Instrumentation: ICP-MS

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.101	+2 Standard Deviation =	0.295
-3 Standard Deviation =	0.053	+3 Standard Deviation =	0.343
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.198	Bias =	-1.14%
Laboratory Mean =	0.196	Avg Z Score =	-0.047
Number of Values =	71	Bias Level =	Excellent
Expected Std. Dev. =	0.048		
Laboratory Std. Dev. =	0.017	RSD =	8.69%
		Avg Abs Z =	0.270

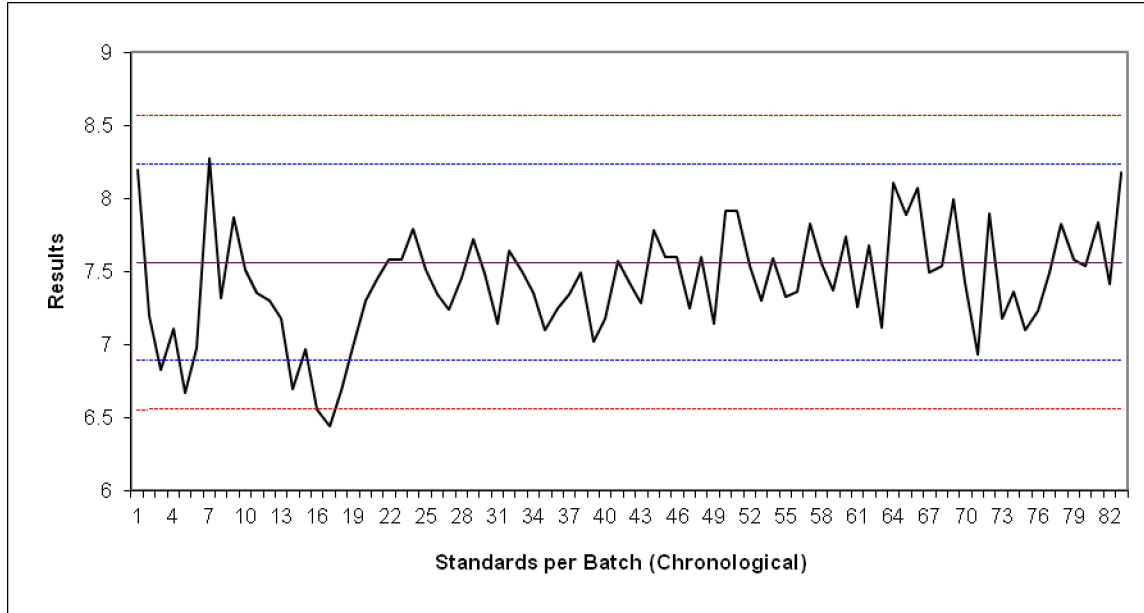
Method: ICM11D

Analyte: Th

Instrumentation: ICP-MS

Reference Material: OREAS904 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	6.889	+2 Standard Deviation =	8.231
-3 Standard Deviation =	6.554	+3 Standard Deviation =	8.566
% within 2 Standard Deviations =	91.57%	(Expect 95.4%)	
% within 3 Standard Deviations =	97.59%	(Expect 99.7%)	
Expected Mean =	7.560	Bias =	-1.78%
Laboratory Mean =	7.426	Avg Z Score =	-0.401
Number of Values =	83	Bias Level =	Acceptable
Expected Std. Dev. =	0.335		
Laboratory Std. Dev. =	0.372	RSD =	4.92%
		Avg Abs Z =	0.913

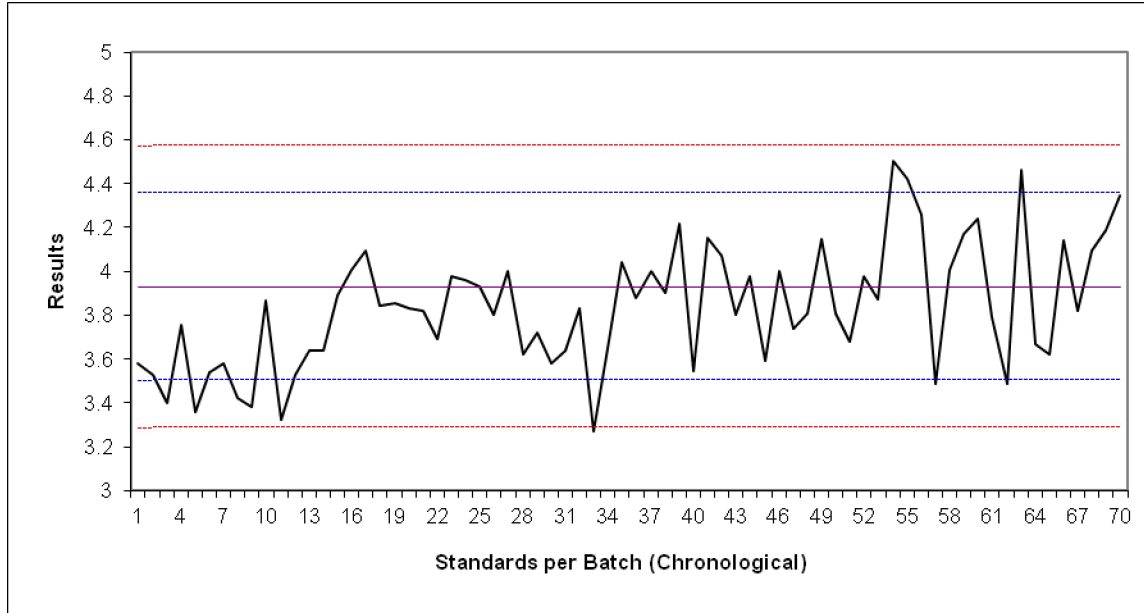
Method: ICM11D

Analyte: Th

Instrumentation: ICP-MS

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	3.501	+2 Standard Deviation =	4.359
-3 Standard Deviation =	3.287	+3 Standard Deviation =	4.573
% within 2 Standard Deviations =	84.29%		(Expect 95.4%)
% within 3 Standard Deviations =	98.57%		(Expect 99.7%)
Expected Mean =	3.930	Bias =	-2.41%
Laboratory Mean =	3.835	Avg Z Score =	-0.442
Number of Values =	70	Bias Level =	Acceptable
Expected Std. Dev. =	0.214		
Laboratory Std. Dev. =	0.283	RSD =	7.20%
		Avg Abs Z =	1.137

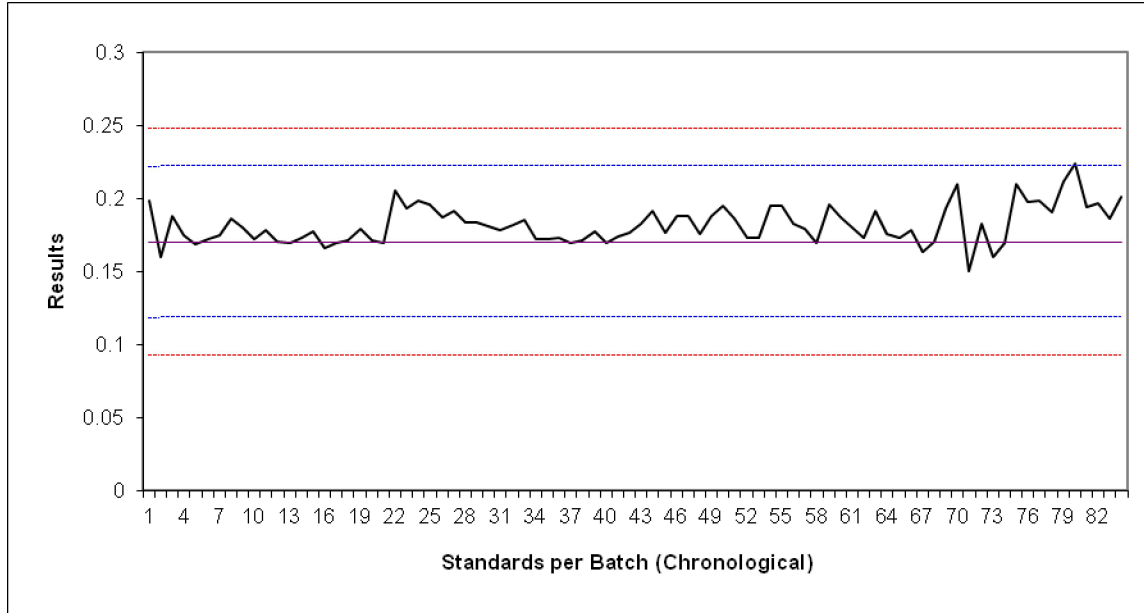
Method: ICM11D

Analyte: Tl

Instrumentation: ICP-MS

Reference Material: OREAS903 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.118	+2 Standard Deviation =	0.222
-3 Standard Deviation =	0.092	+3 Standard Deviation =	0.248
% within 2 Standard Deviations =	98.81%		(Expect 95.4%)
% within 3 Standard Deviations =	100.00%		(Expect 99.7%)
Expected Mean =	0.170	Bias =	7.02%
Laboratory Mean =	0.182	Avg Z Score =	0.461
Number of Values =	84	Bias Level =	Acceptable
Expected Std. Dev. =	0.026		
Laboratory Std. Dev. =	0.013	RSD =	7.65%
		Avg Abs Z =	0.514

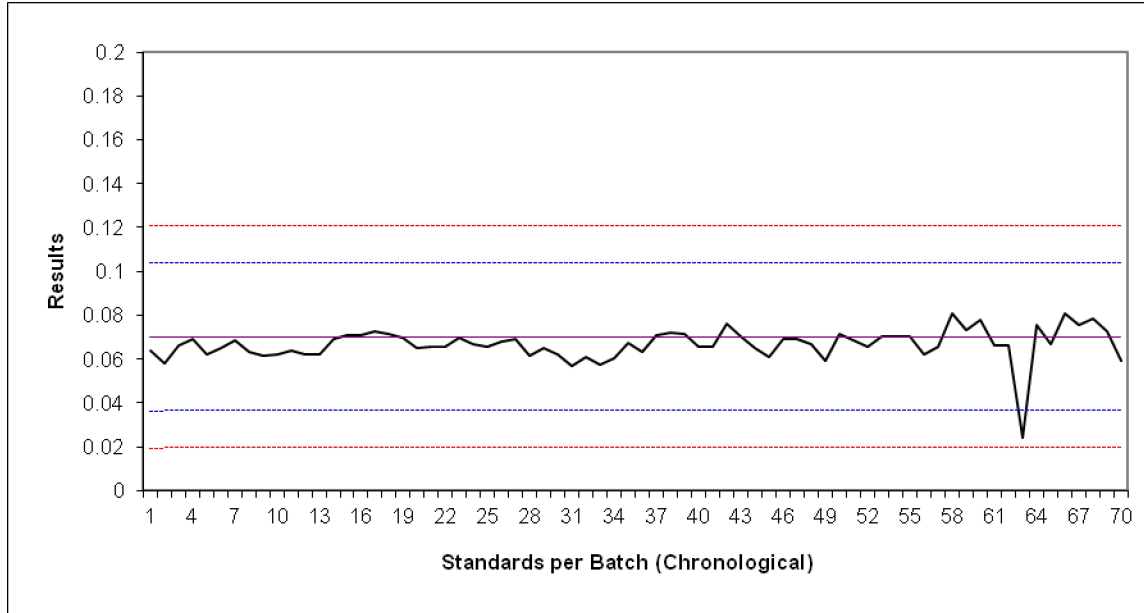
Method: ICM11D

Analyte: Tl

Instrumentation: ICP-MS

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.036	+2 Standard Deviation =	0.104
-3 Standard Deviation =	0.019	+3 Standard Deviation =	0.121
% within 2 Standard Deviations =	98.57%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.070	Bias =	-4.79%
Laboratory Mean =	0.067	Avg Z Score =	-0.198
Number of Values =	70	Bias Level =	Excellent
Expected Std. Dev. =	0.017	RSD =	10.61%
Laboratory Std. Dev. =	0.007	Avg Abs Z =	0.321

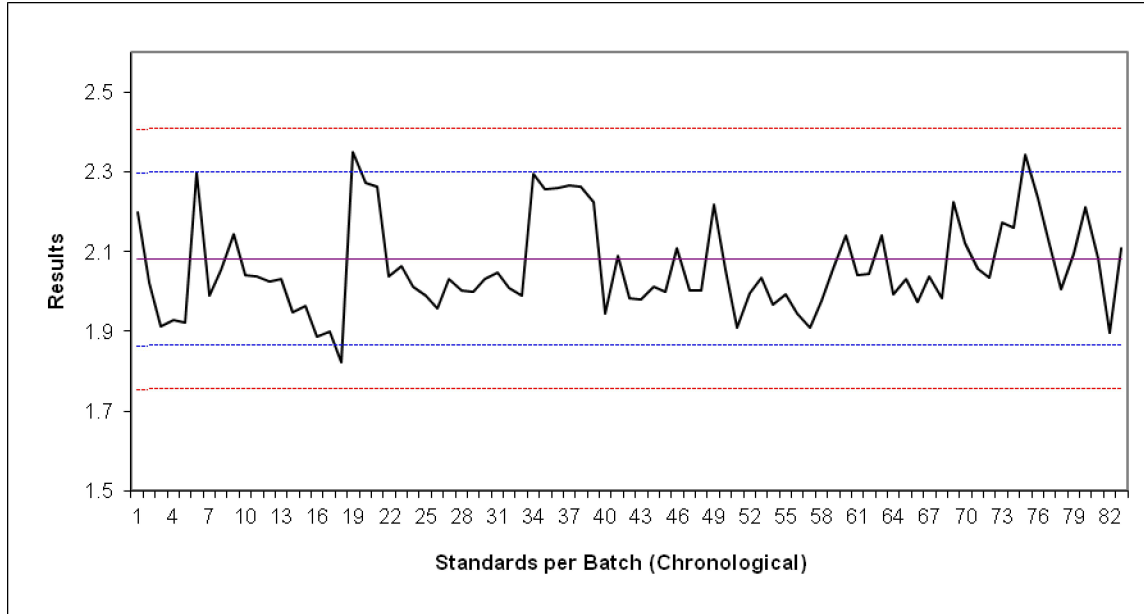
Method: ICM11D

Analyte: U

Instrumentation: ICP-MS

Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.863	+2 Standard Deviation =	2.297
-3 Standard Deviation =	1.754	+3 Standard Deviation =	2.406
% within 2 Standard Deviations =	96.39%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	2.080	Bias =	-0.85%
Laboratory Mean =	2.062	Avg Z Score =	-0.163
Number of Values =	83	Bias Level =	Excellent
Expected Std. Dev. =	0.109	RSD =	5.67%
Laboratory Std. Dev. =	0.118	Avg Abs Z =	0.920

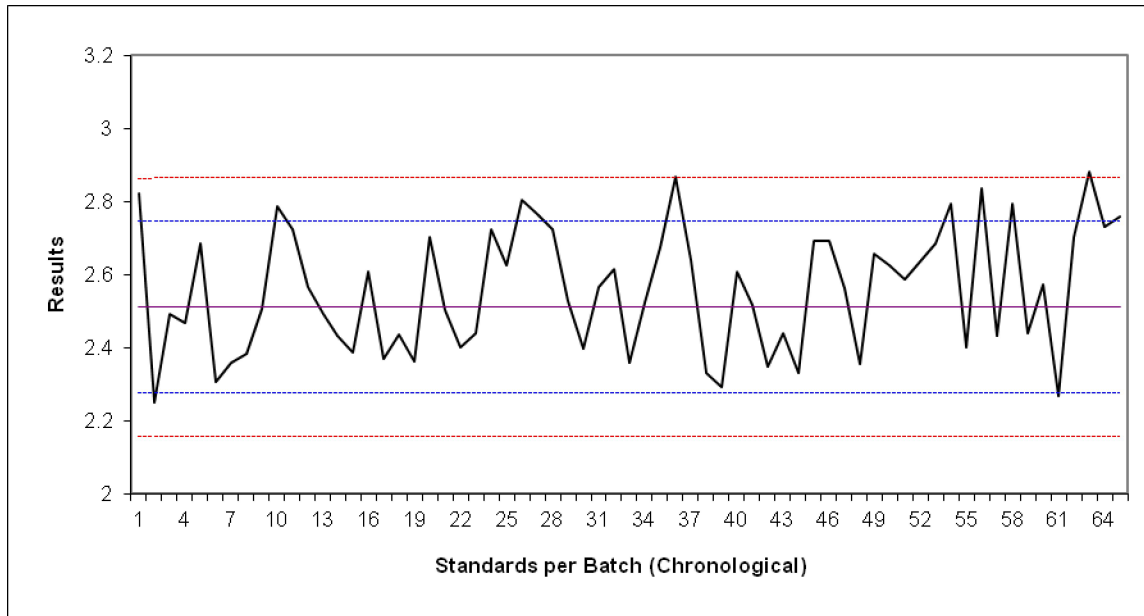
Method: ICM11D

Analyte: U

Instrumentation: ICP-MS

Reference Material: TILL-4 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	2.274	+2 Standard Deviation =	2.746
-3 Standard Deviation =	2.157	+3 Standard Deviation =	2.863
% within 2 Standard Deviations =	81.54%	(Expect 95.4%)	
% within 3 Standard Deviations =	96.92%	(Expect 99.7%)	

Expected Mean =	2.510	Bias =	1.89%
Laboratory Mean =	2.558	Avg Z Score =	0.404
Number of Values =	65	Bias Level =	Acceptable
Expected Std. Dev. =	0.118	RSD =	6.74%
Laboratory Std. Dev. =	0.169	Avg Abs Z =	1.267

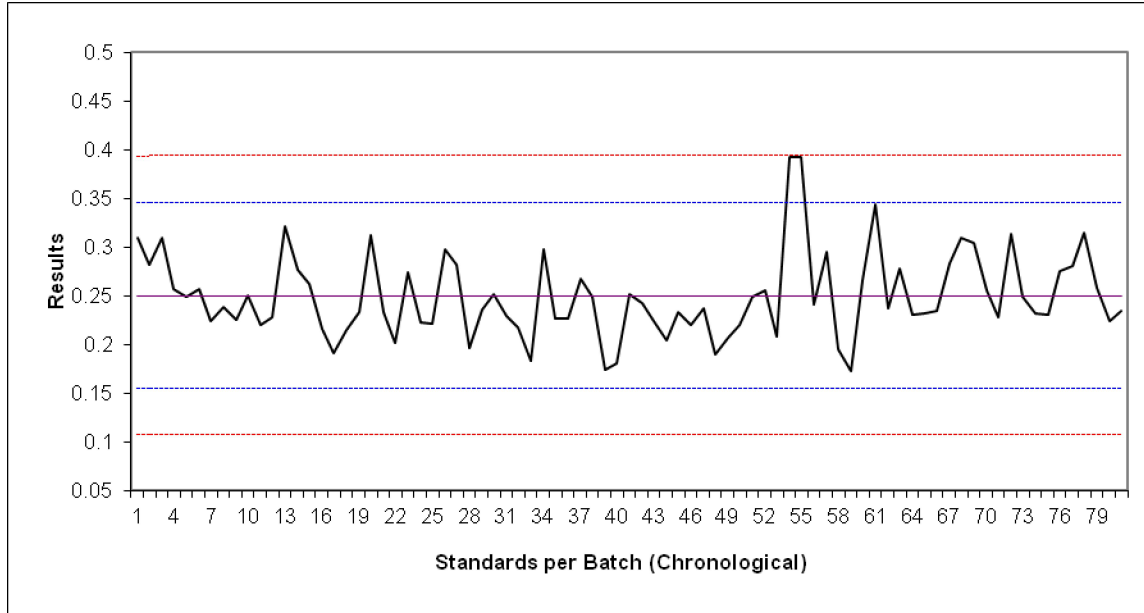
Method: ICM11D

Analyte: W

Instrumentation: ICP-MS

Reference Material: OREAS903 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.155	+2 Standard Deviation =	0.345
-3 Standard Deviation =	0.107	+3 Standard Deviation =	0.393
% within 2 Standard Deviations =	97.53%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.250	Bias =	-0.33%
Laboratory Mean =	0.249	Avg Z Score =	-0.017
Number of Values =	81	Bias Level =	Excellent
Expected Std. Dev. =	0.048		
Laboratory Std. Dev. =	0.044	RSD =	17.49%
		Avg Abs Z =	0.704

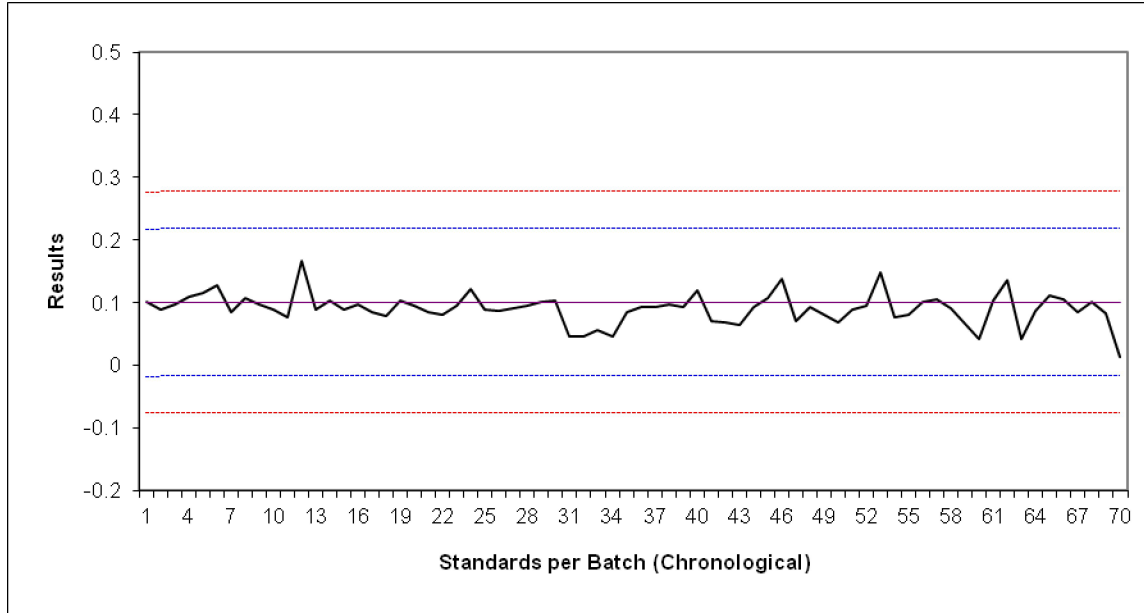
Method: ICM11D

Analyte: W

Instrumentation: ICP-MS

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	-0.018	+2 Standard Deviation =	0.218
-3 Standard Deviation =	-0.077	+3 Standard Deviation =	0.277
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.100	Bias =	-9.40%
Laboratory Mean =	0.091	Avg Z Score =	-0.160
Number of Values =	70	Bias Level =	Excellent
Expected Std. Dev. =	0.059	RSD =	24.91%
Laboratory Std. Dev. =	0.025	Avg Abs Z =	0.325

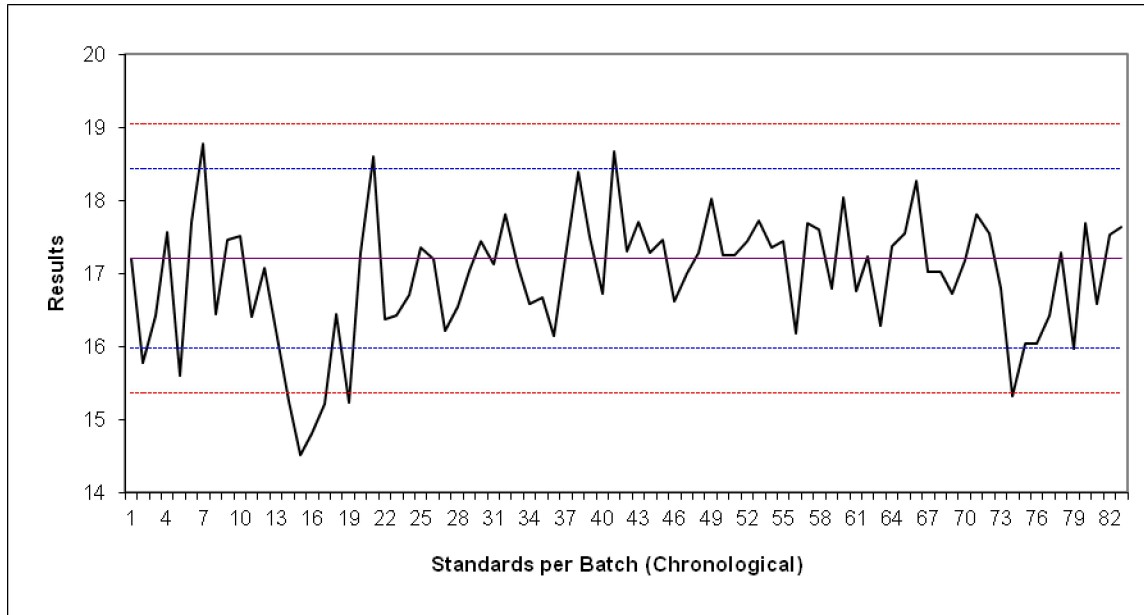
Method: ICM11D

Analyte: Y

Instrumentation: ICP-MS

Reference Material: OREAS904 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	15.970	+2 Standard Deviation =	18.430
-3 Standard Deviation =	15.355	+3 Standard Deviation =	19.045
% within 2 Standard Deviations =	85.54%	(Expect 95.4%)	
% within 3 Standard Deviations =	92.77%	(Expect 99.7%)	

Expected Mean =	17.200	Bias =	-1.36%
Laboratory Mean =	16.966	Avg Z Score =	-0.381
Number of Values =	83	Bias Level =	Good
Expected Std. Dev. =	0.615	RSD =	4.92%
Laboratory Std. Dev. =	0.846	Avg Abs Z =	1.056

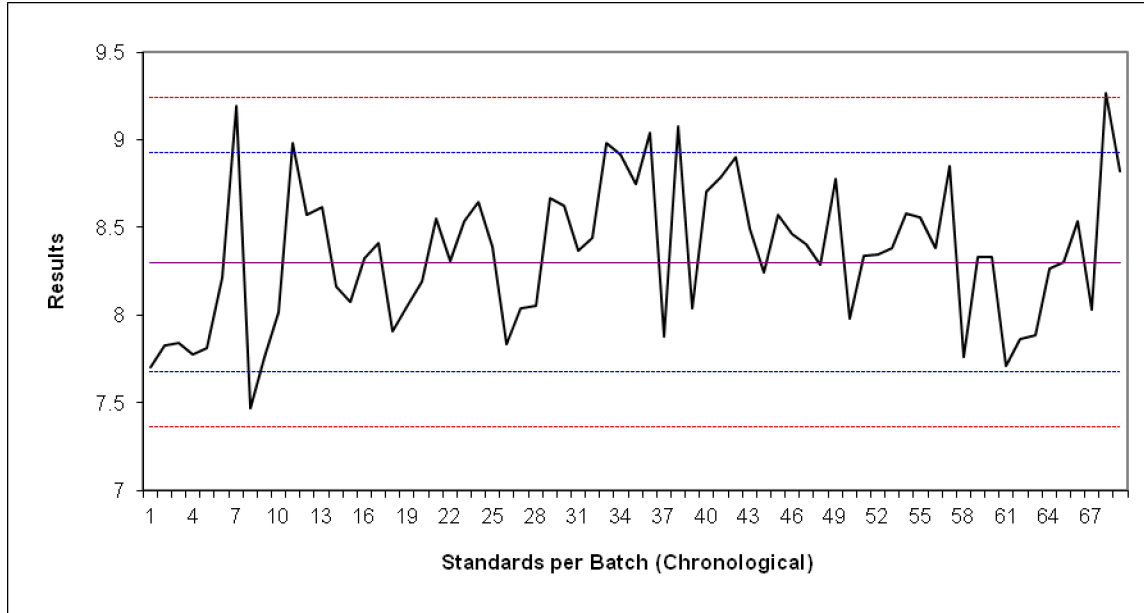
Method: ICM11D

Analyte: Y

Instrumentation: ICP-MS

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	7.674	+2 Standard Deviation =	8.926
-3 Standard Deviation =	7.361	+3 Standard Deviation =	9.239
% within 2 Standard Deviations =	89.86%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.55%	(Expect 99.7%)	
Expected Mean =	8.300	Bias =	0.61%
Laboratory Mean =	8.351	Avg Z Score =	0.162
Number of Values =	69	Bias Level =	Excellent
Expected Std. Dev. =	0.313	 	
Laboratory Std. Dev. =	0.407	RSD =	4.91%
		Avg Abs Z =	1.062

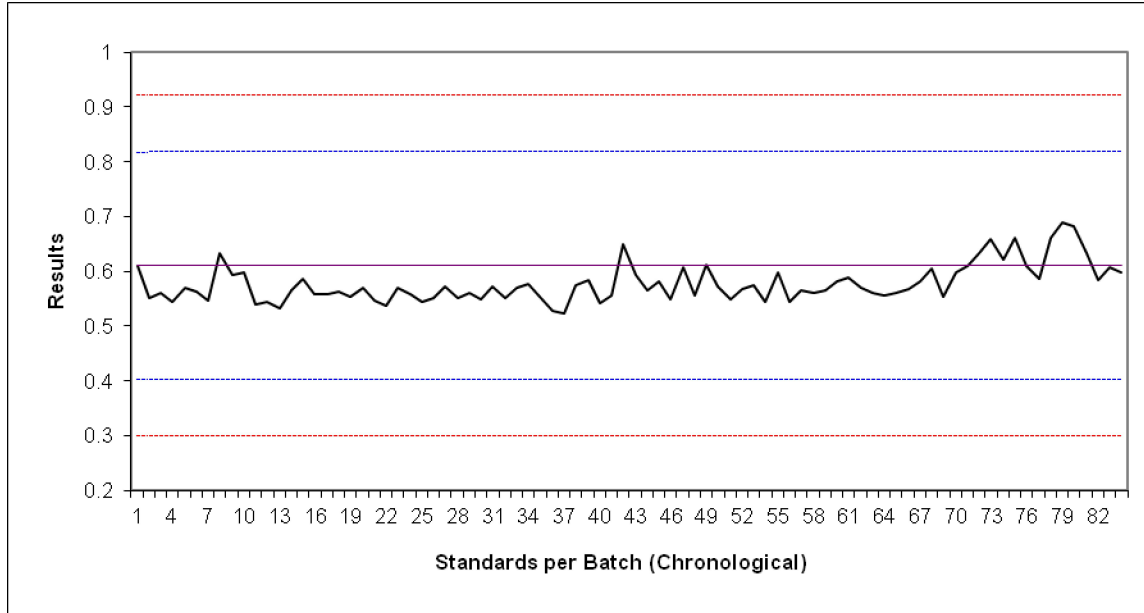
Method: ICM11D

Analyte: Yb

Instrumentation: ICP-MS

Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.403	+2 Standard Deviation =	0.817
-3 Standard Deviation =	0.299	+3 Standard Deviation =	0.921
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.610	Bias =	-5.30%
Laboratory Mean =	0.578	Avg Z Score =	-0.312
Number of Values =	84	Bias Level =	Good
Expected Std. Dev. =	0.104		
Laboratory Std. Dev. =	0.035	RSD =	5.72%
		Avg Abs Z =	0.409

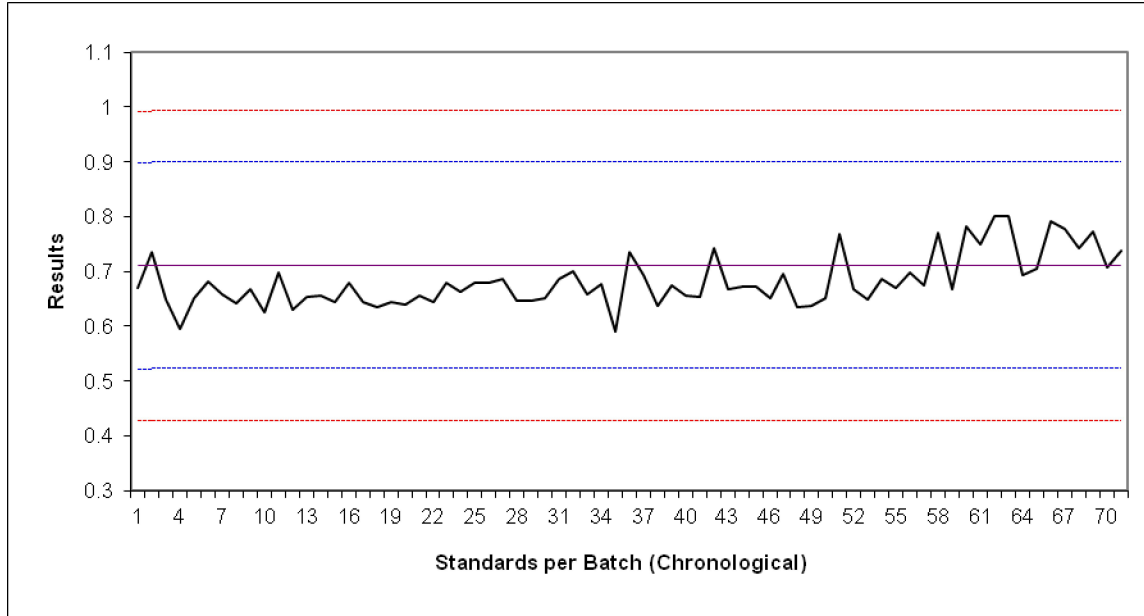
Method: ICM11D

Analyte: Yb

Instrumentation: ICP-MS

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.522	+2 Standard Deviation =	0.898
-3 Standard Deviation =	0.428	+3 Standard Deviation =	0.992
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	0.710	Bias =	-3.93%
Laboratory Mean =	0.682	Avg Z Score =	-0.297
Number of Values =	71	Bias Level =	Good
Expected Std. Dev. =	0.094	RSD =	6.76%
Laboratory Std. Dev. =	0.048	Avg Abs Z =	0.526

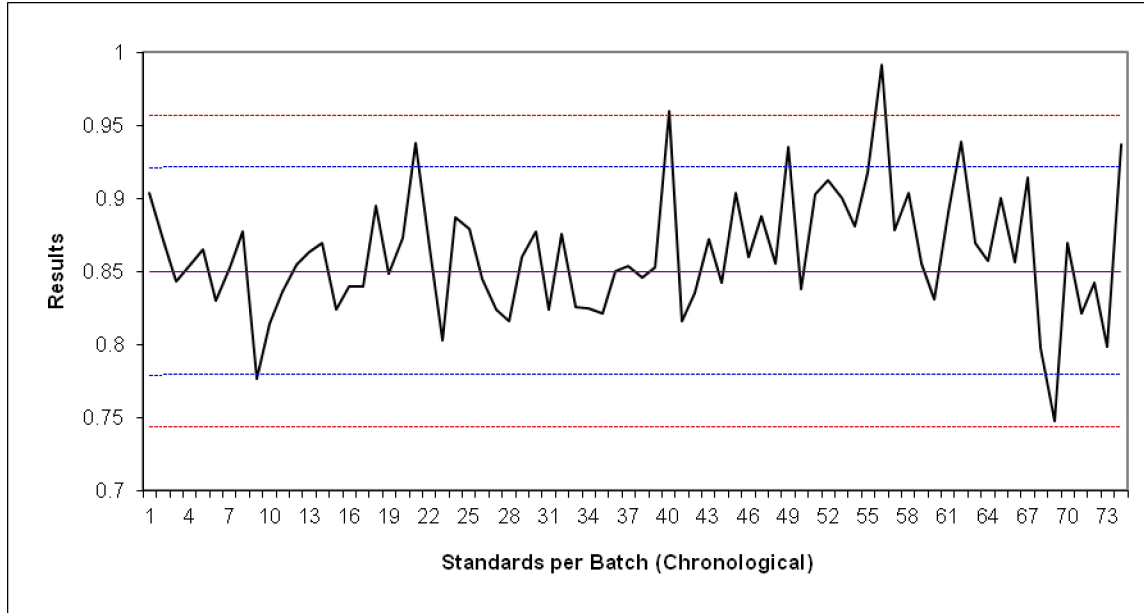
Method: ICM11D

Analyte: Al

Instrumentation: ICP-OES

Reference Material: OREAS901- based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.779	+2 Standard Deviation =	0.921
-3 Standard Deviation =	0.744	+3 Standard Deviation =	0.956
% within 2 Standard Deviations =	89.19%	(Expect 95.4%)	
% within 3 Standard Deviations =	97.30%	(Expect 99.7%)	
Expected Mean =	0.850	Bias =	1.46%
Laboratory Mean =	0.862	Avg Z Score =	0.349
Number of Values =	74	Bias Level =	Good
Expected Std. Dev. =	0.035		
Laboratory Std. Dev. =	0.042	RSD =	4.94%
		Avg Abs Z =	0.920

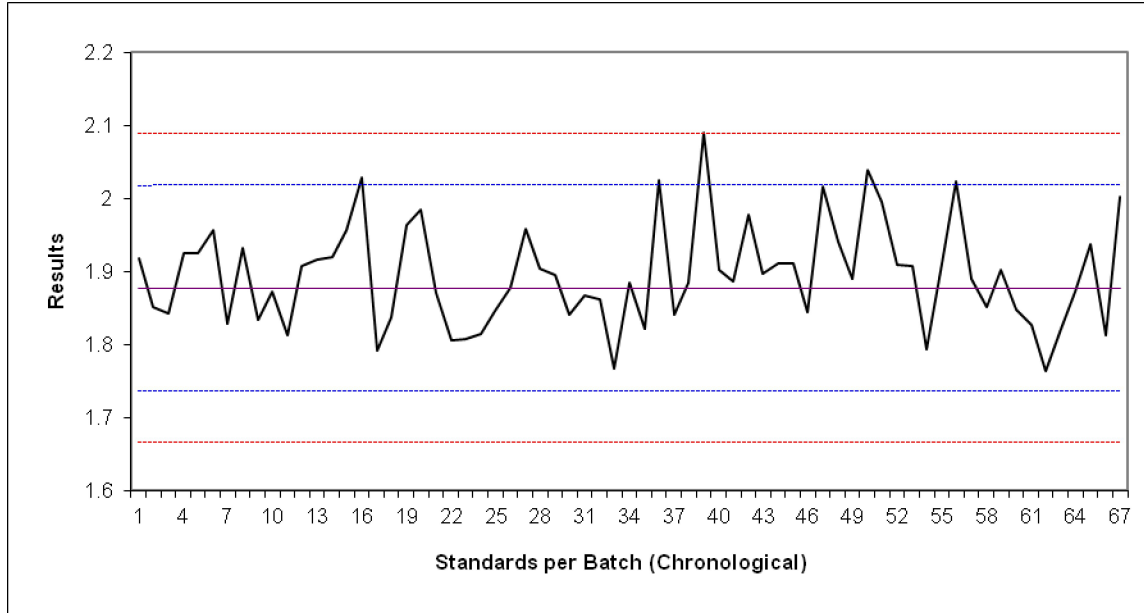
Method: ICM11D

Analyte: Al

Instrumentation: ICP-OES

Reference Material: TILL-4 -based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.736	+2 Standard Deviation =	2.018
-3 Standard Deviation =	1.666	+3 Standard Deviation =	2.088
% within 2 Standard Deviations =	92.54%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.51%	(Expect 99.7%)	

Expected Mean =	1.877	Bias =	0.95%
Laboratory Mean =	1.895	Avg Z Score =	0.253
Number of Values =	67	Bias Level =	Good
Expected Std. Dev. =	0.070	RSD =	3.76%
Laboratory Std. Dev. =	0.071	Avg Abs Z =	0.807

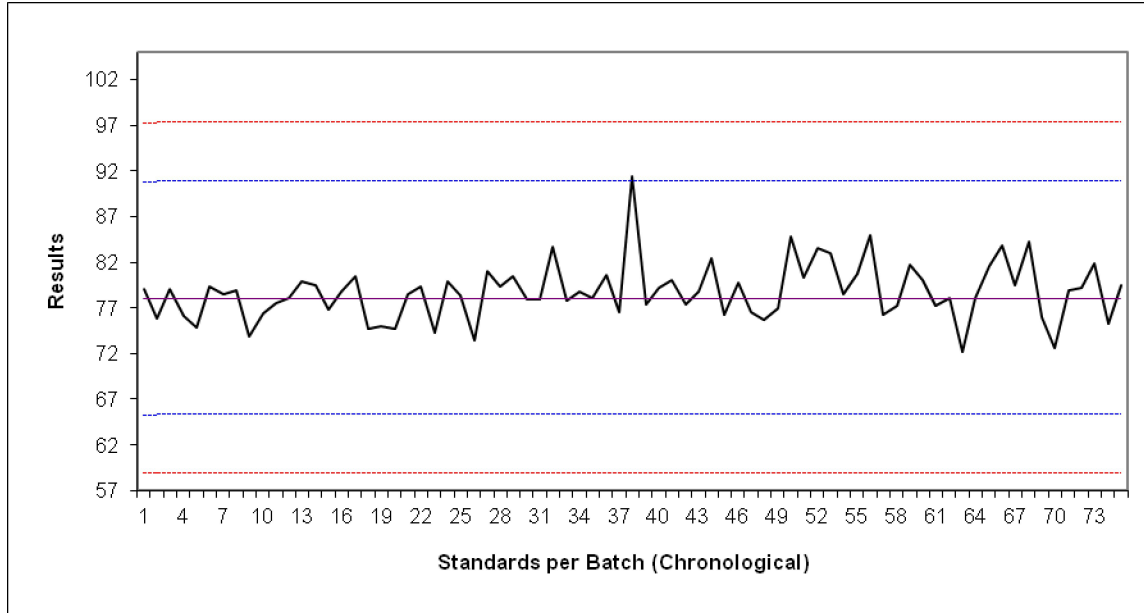
Method: ICM11D

Analyte: Ba

Instrumentation: ICP-OES

Reference Material: OREAS901 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	65.300	+2 Standard Deviation =	90.840
-3 Standard Deviation =	58.916	+3 Standard Deviation =	97.224
% within 2 Standard Deviations =	98.67%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	78.070	Bias =	0.83%
Laboratory Mean =	78.719	Avg Z Score =	0.102
Number of Values =	75	Bias Level =	Excellent
Expected Std. Dev. =	6.385	 	
Laboratory Std. Dev. =	3.156	RSD =	4.04%
		Avg Abs Z =	0.367

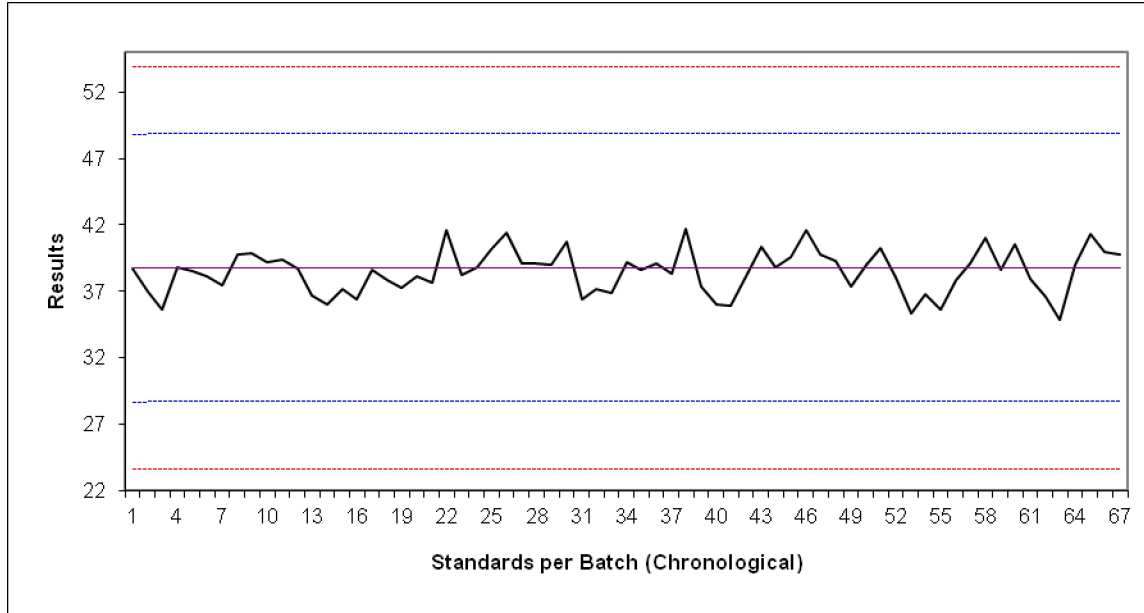
Method: ICM11D

Analyte: Ba

Instrumentation: ICP-OES

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	28.640	+2 Standard Deviation =	48.815
-3 Standard Deviation =	23.597	+3 Standard Deviation =	53.858
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	38.728	Bias =	-0.64%
Laboratory Mean =	38.478	Avg Z Score =	-0.049
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	5.044	RSD =	4.27%
Laboratory Std. Dev. =	1.652	Avg Abs Z =	0.261

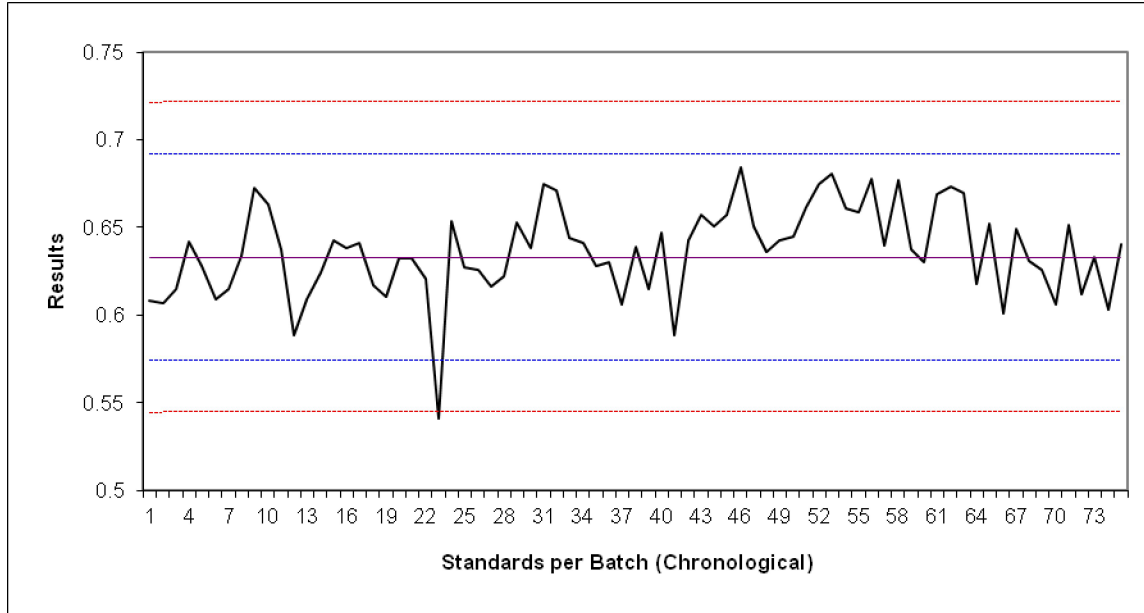
Method: ICM11D

Analyte: Ca

Instrumentation: ICP-OES

Reference Material: OREAS903 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.574	+2 Standard Deviation =	0.692
-3 Standard Deviation =	0.545	+3 Standard Deviation =	0.721
% within 2 Standard Deviations =	98.67%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.67%	(Expect 99.7%)	
Expected Mean =	0.633	Bias =	0.59%
Laboratory Mean =	0.637	Avg Z Score =	0.127
Number of Values =	75	Bias Level =	Excellent
Expected Std. Dev. =	0.029	RSD =	4.02%
Laboratory Std. Dev. =	0.025	Avg Abs Z =	0.680

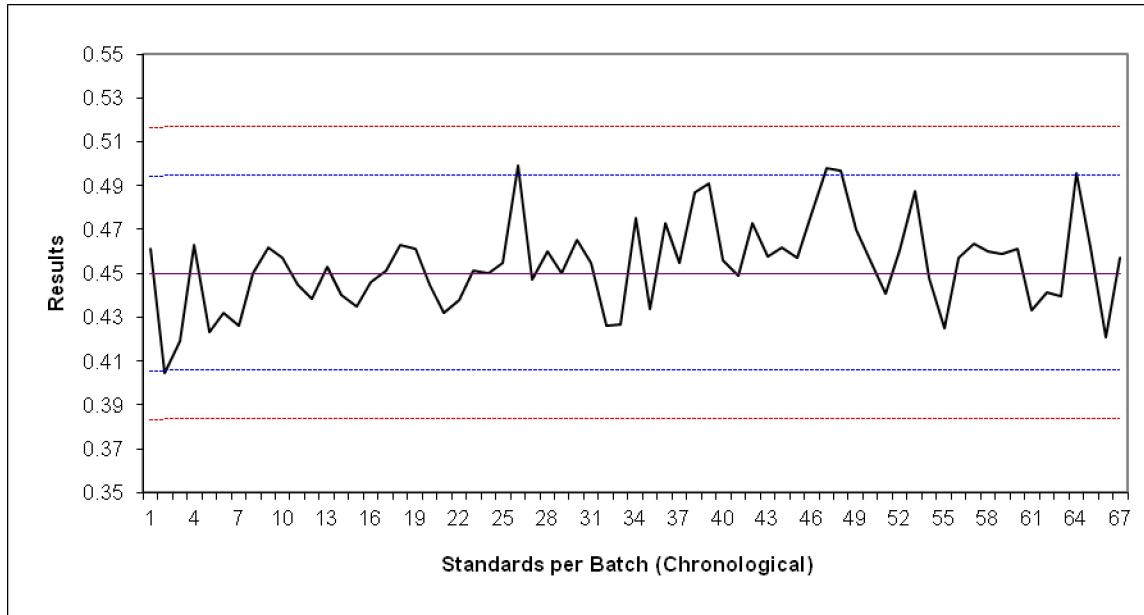
Method: ICM11D

Analyte: Ca

Instrumentation: ICP-OES

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.405	+2 Standard Deviation =	0.494
-3 Standard Deviation =	0.383	+3 Standard Deviation =	0.517
% within 2 Standard Deviations =	92.54%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.450	Bias =	0.88%
Laboratory Mean =	0.454	Avg Z Score =	0.179
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	0.022		
Laboratory Std. Dev. =	0.020	RSD =	4.47%
		Avg Abs Z =	0.706

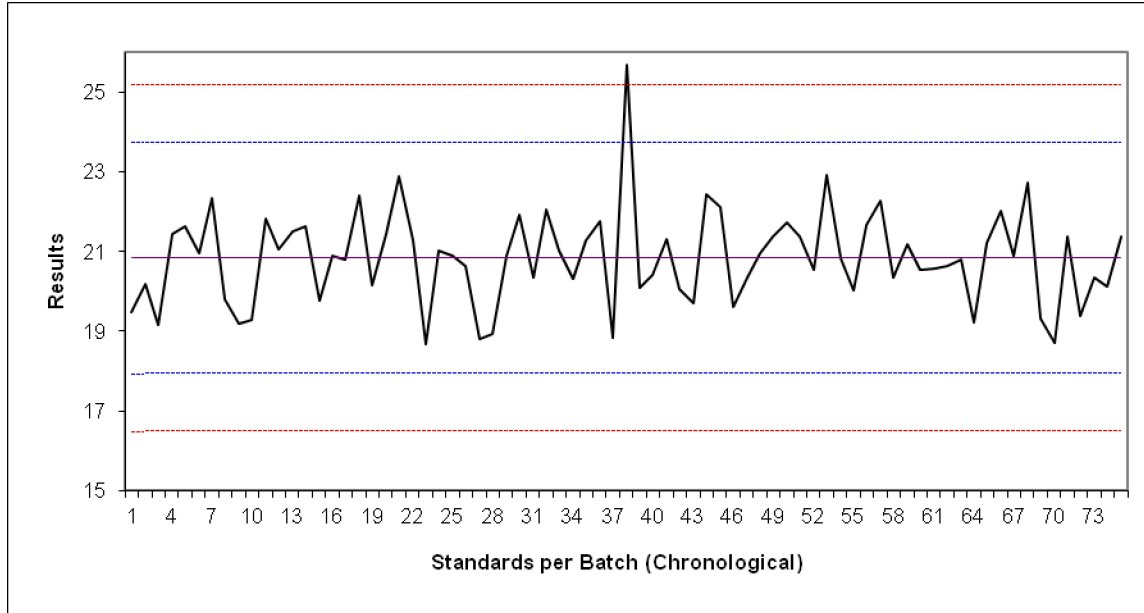
Method: ICM11D

Analyte: Cr

Instrumentation: ICP-OES

Reference Material: OREAS901 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	17.932	+2 Standard Deviation =	23.728
-3 Standard Deviation =	16.483	+3 Standard Deviation =	25.177
% within 2 Standard Deviations =	98.67%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.67%	(Expect 99.7%)	
Expected Mean =	20.830	Bias =	0.01%
Laboratory Mean =	20.832	Avg Z Score =	0.001
Number of Values =	75	Bias Level =	Excellent
Expected Std. Dev. =	1.449	RSD =	5.76%
Laboratory Std. Dev. =	1.199	Avg Abs Z =	0.629

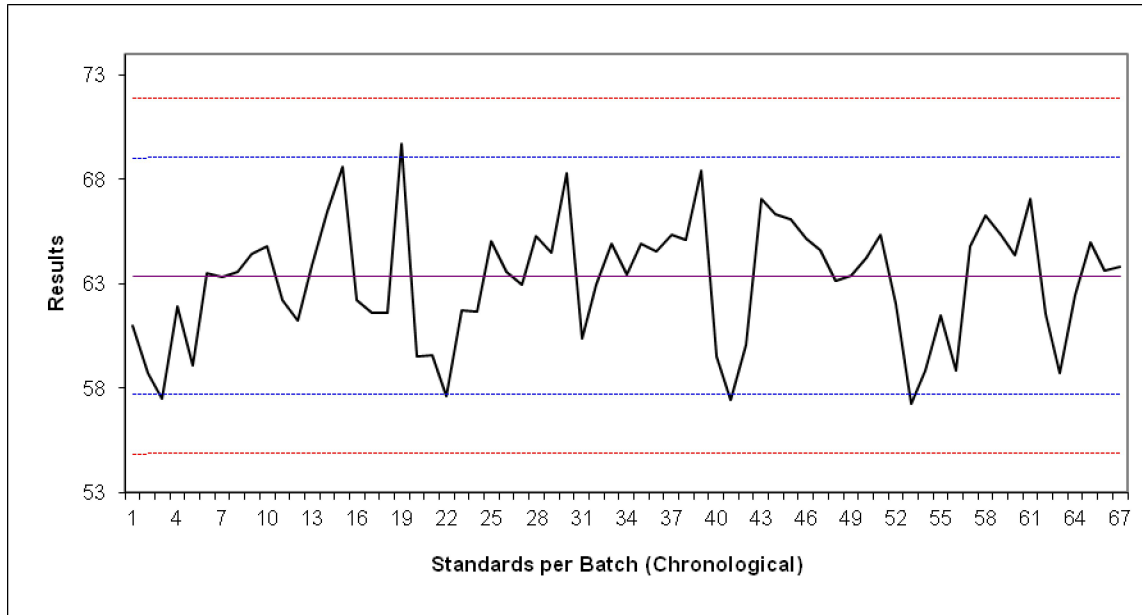
Method: ICM11D

Analyte: Cr

Instrumentation: ICP-OES

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	57.682	+2 Standard Deviation =	69.021
-3 Standard Deviation =	54.847	+3 Standard Deviation =	71.856
% within 2 Standard Deviations =	92.54%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	63.351	Bias =	-0.36%
Laboratory Mean =	63.123	Avg Z Score =	-0.081
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	2.835	RSD =	4.60%
Laboratory Std. Dev. =	2.917	Avg Abs Z =	0.822

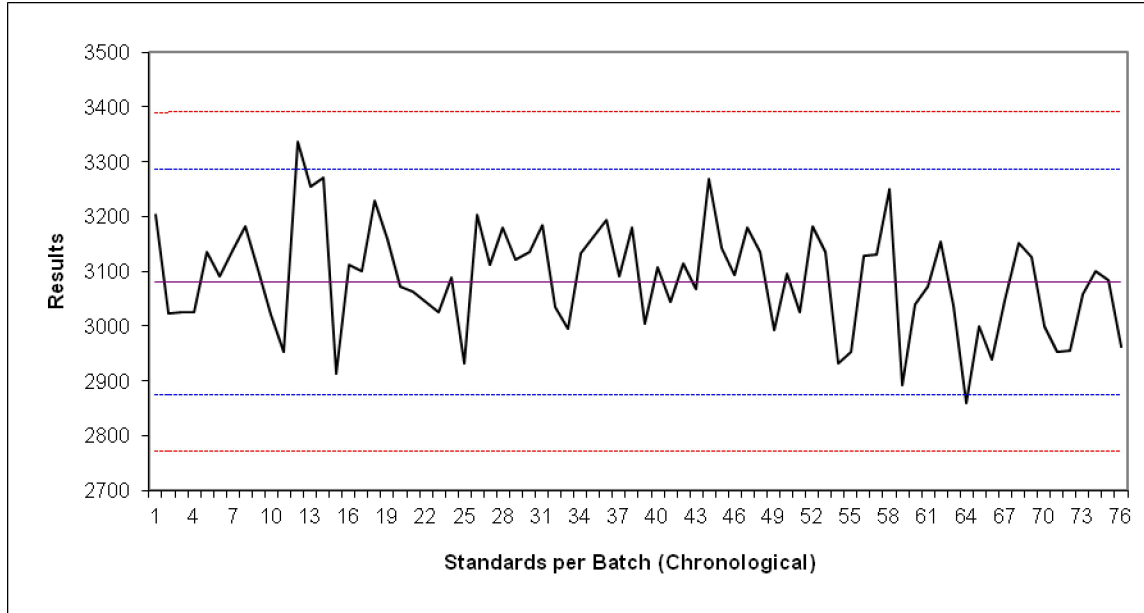
Method: ICM11D

Analyte: Cu

Instrumentation: ICP-OES

Reference Material: OREAS902 - based on certificate value

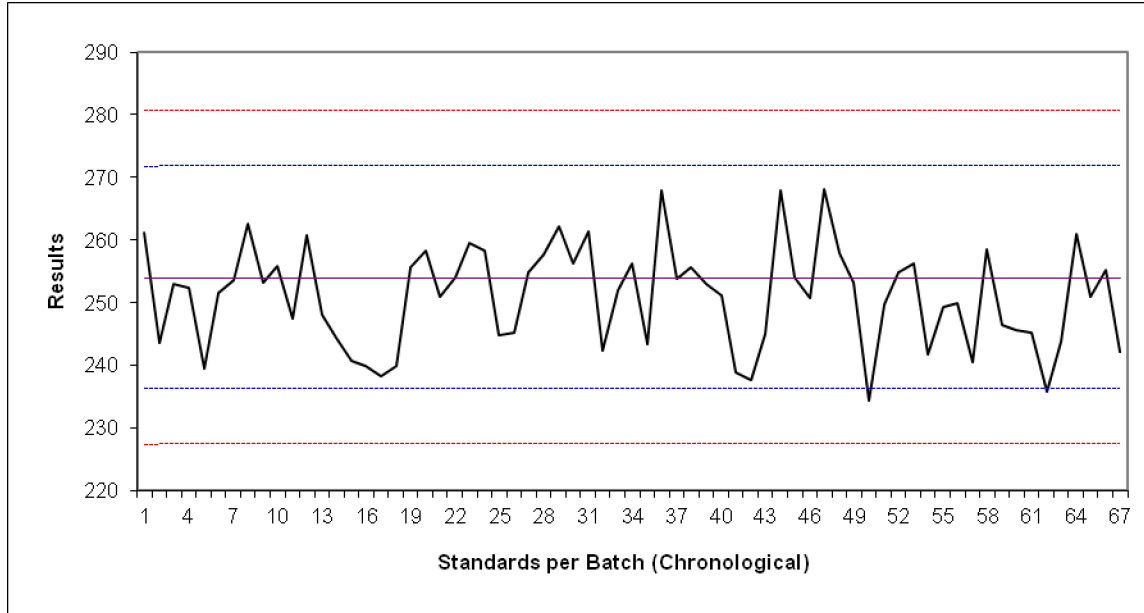
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	2873.833	+2 Standard Deviation =	3286.167
-3 Standard Deviation =	2770.750	+3 Standard Deviation =	3389.250
% within 2 Standard Deviations =	97.37%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	3080.000	Bias =	0.25%
Laboratory Mean =	3087.608	Avg Z Score =	0.074
Number of Values =	76	Bias Level =	Excellent
Expected Std. Dev. =	103.083	RSD =	3.13%
Laboratory Std. Dev. =	96.346	Avg Abs Z =	0.755

Method: ICM11D
Analyte: Cu
Instrumentation: ICP-OES
Reference Material: TILL-4 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	236.233	+2 Standard Deviation =	271.767
-3 Standard Deviation =	227.350	+3 Standard Deviation =	280.650
% within 2 Standard Deviations =	97.01%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	254.000	Bias =	-1.19%
Laboratory Mean =	250.972	Avg Z Score =	-0.341
Number of Values =	67	Bias Level =	Good
Expected Std. Dev. =	8.883	RSD =	3.20%
Laboratory Std. Dev. =	8.125	Avg Abs Z =	0.770

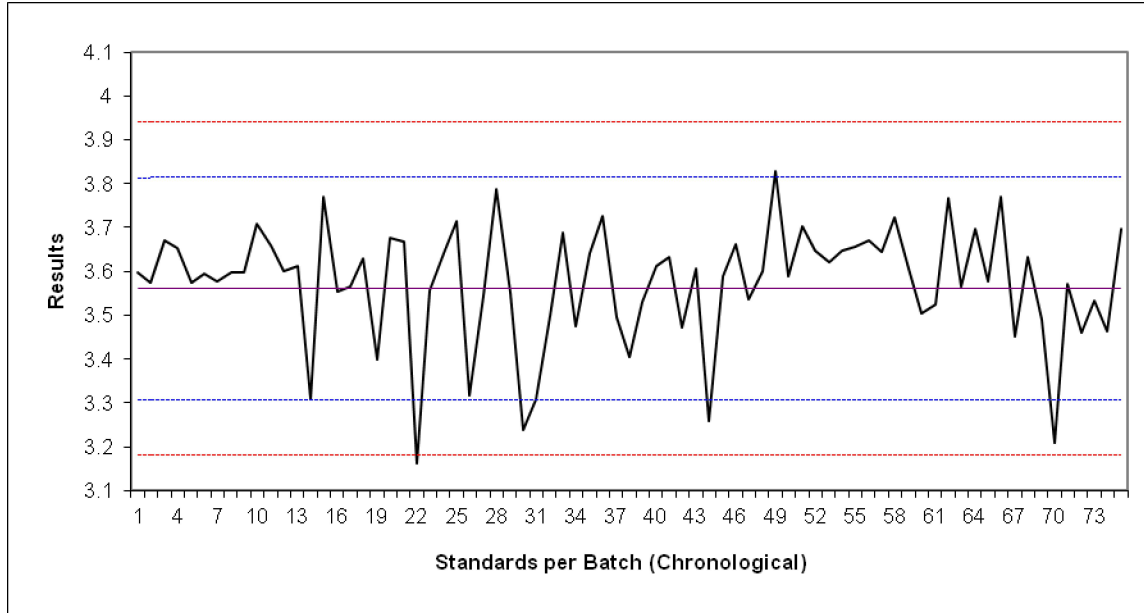
Method: ICM11D

Analyte: Fe

Instrumentation: ICP-OES

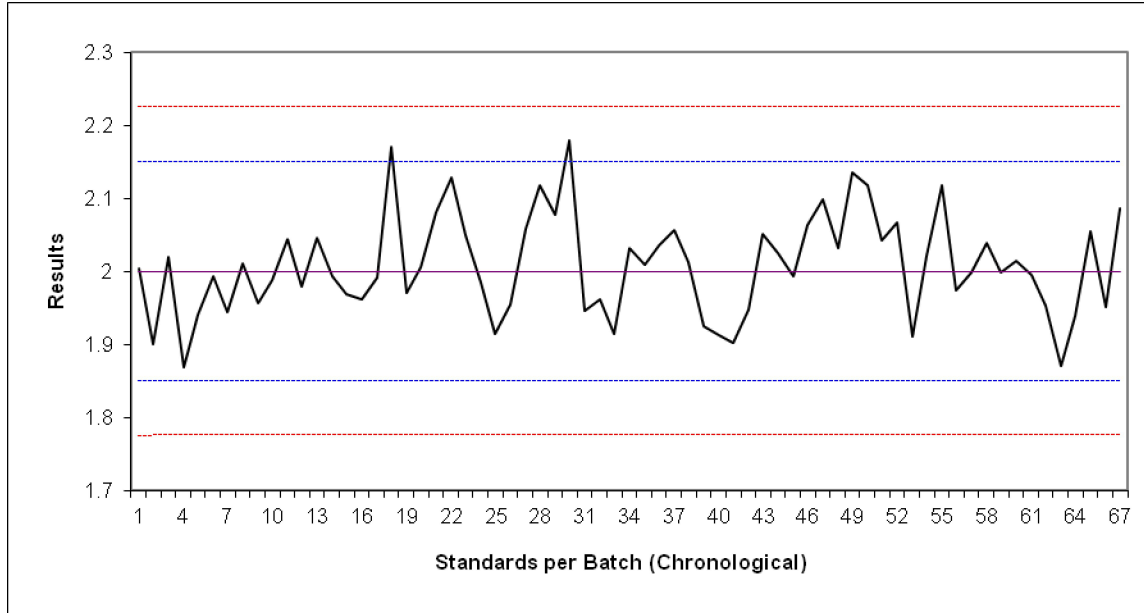
Reference Material: OREAS901 - based on in house certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	3.307	+2 Standard Deviation =	3.813
-3 Standard Deviation =	3.180	+3 Standard Deviation =	3.940
% within 2 Standard Deviations =	93.33%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.67%	(Expect 99.7%)	
Expected Mean =	3.560	Bias =	0.41%
Laboratory Mean =	3.575	Avg Z Score =	0.115
Number of Values =	75	Bias Level =	Excellent
Expected Std. Dev. =	0.127	RSD =	3.80%
Laboratory Std. Dev. =	0.135	Avg Abs Z =	0.811

Method: ICM11D
Analyte: Fe
Instrumentation: ICP-OES
Reference Material: TILL-3 - based on certification value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.850	+2 Standard Deviation =	2.150
-3 Standard Deviation =	1.775	+3 Standard Deviation =	2.225
% within 2 Standard Deviations =	97.01%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	2.000	Bias =	0.37%
Laboratory Mean =	2.007	Avg Z Score =	0.100
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	0.075		
Laboratory Std. Dev. =	0.070	RSD =	3.48%
		Avg Abs Z =	0.736

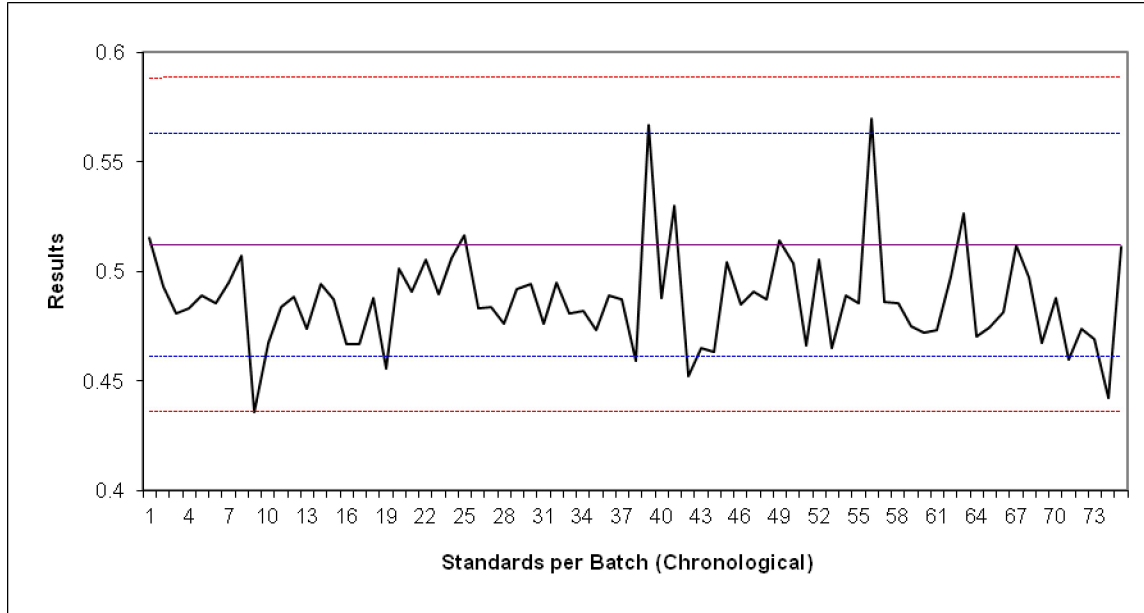
Method: ICM11D

Analyte: K

Instrumentation: ICP-OES

Reference Material: OREAS901 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.461	+2 Standard Deviation =	0.563
-3 Standard Deviation =	0.436	+3 Standard Deviation =	0.588
% within 2 Standard Deviations =	89.33%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.67%	(Expect 99.7%)	

Expected Mean =	0.512	Bias =	-4.87%
Laboratory Mean =	0.487	Avg Z Score =	-0.981
Number of Values =	75	Bias Level =	Marginal
Expected Std. Dev. =	0.025	RSD =	4.38%
Laboratory Std. Dev. =	0.022	Avg Abs Z =	1.144

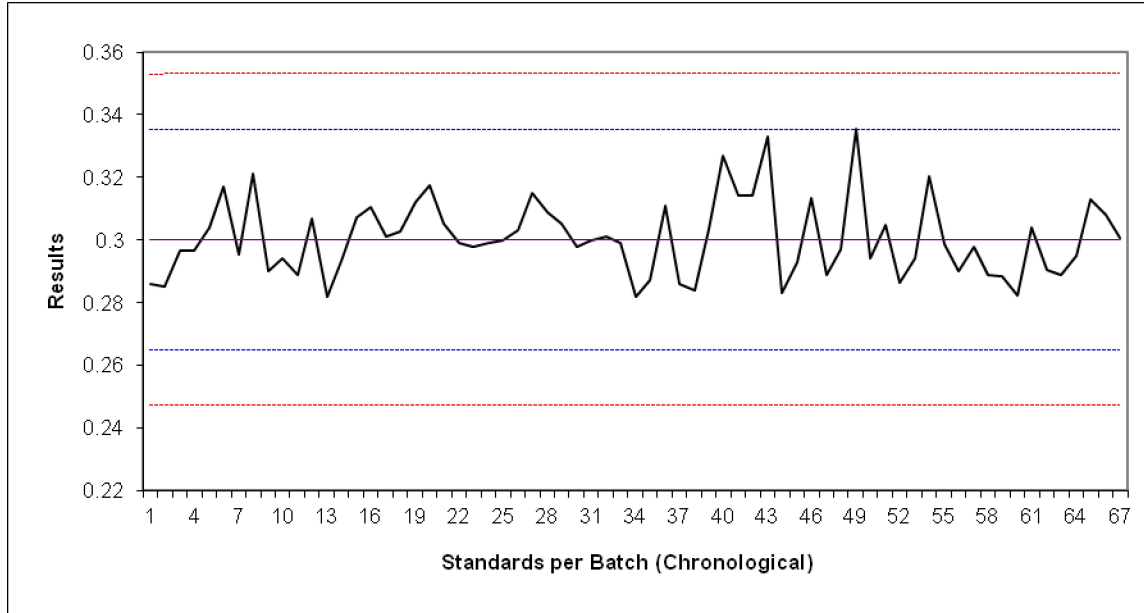
Method: ICM11D

Analyte: K

Instrumentation: ICP-OES

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.265	+2 Standard Deviation =	0.335
-3 Standard Deviation =	0.247	+3 Standard Deviation =	0.353
% within 2 Standard Deviations =	98.51%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.300	Bias =	0.19%
Laboratory Mean =	0.301	Avg Z Score =	0.032
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	0.018		
Laboratory Std. Dev. =	0.012	RSD =	4.08%
		Avg Abs Z =	0.544

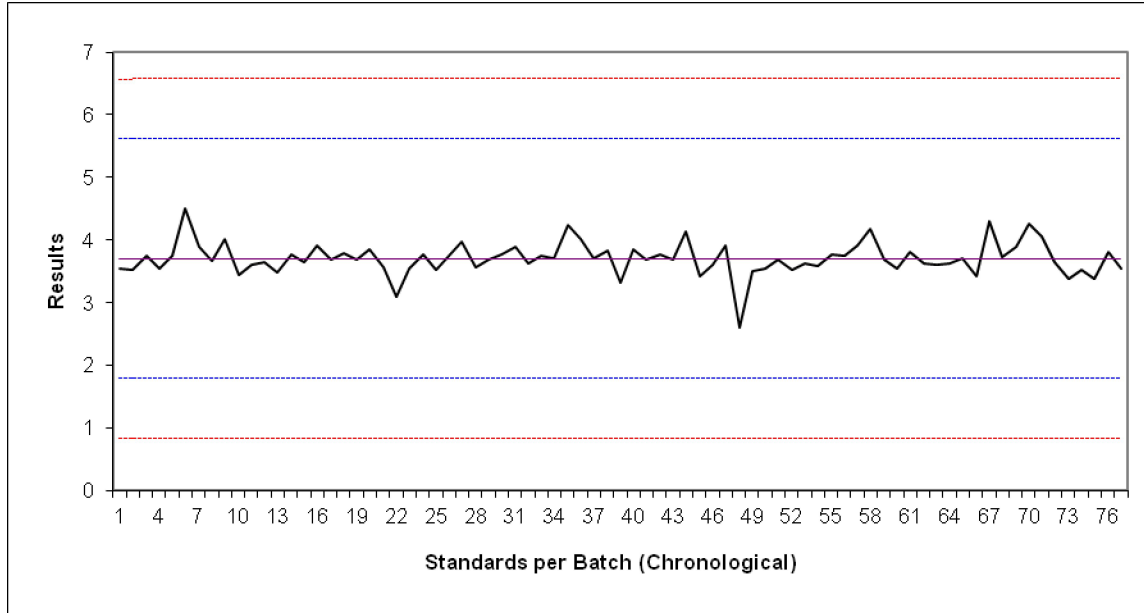
Method: ICM11D

Analyte: Li

Instrumentation: ICP-OES

Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.787	+2 Standard Deviation =	5.613
-3 Standard Deviation =	0.830	+3 Standard Deviation =	6.570
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	3.700	Bias =	0.16%
Laboratory Mean =	3.706	Avg Z Score =	0.006
Number of Values =	77	Bias Level =	Excellent
Expected Std. Dev. =	0.957	RSD =	7.19%
Laboratory Std. Dev. =	0.266	Avg Abs Z =	0.190

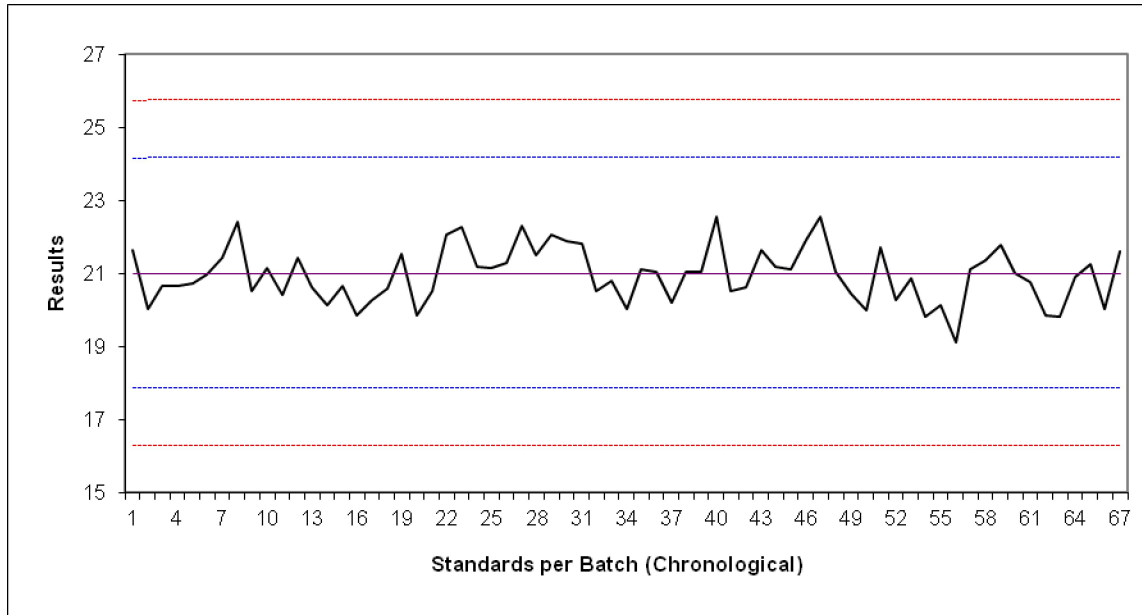
Method: ICM11D

Analyte: Li

Instrumentation: ICP-OES

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	17.850	+2 Standard Deviation =	24.150
-3 Standard Deviation =	16.275	+3 Standard Deviation =	25.725
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	21.000	Bias =	-0.20%
Laboratory Mean =	20.958	Avg Z Score =	-0.027
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	1.575		
Laboratory Std. Dev. =	0.763	RSD =	3.63%
		Avg Abs Z =	0.390

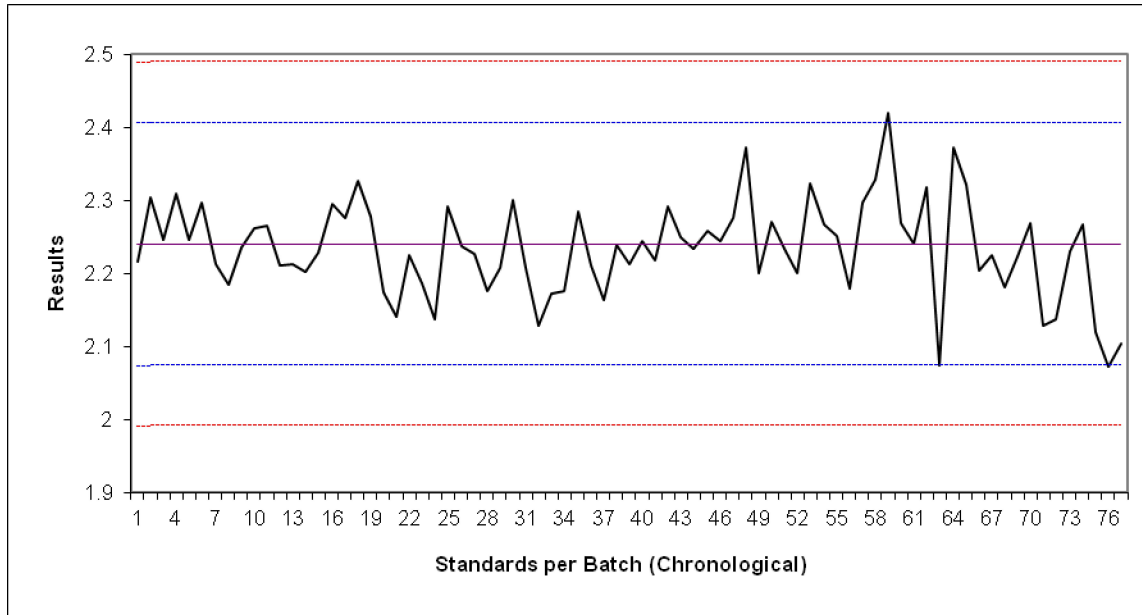
Method: ICM11D

Analyte: Mg

Instrumentation: ICP-OES

Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	2.074	+2 Standard Deviation =	2.406
-3 Standard Deviation =	1.991	+3 Standard Deviation =	2.489
% within 2 Standard Deviations =	97.40%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	2.240	Bias =	-0.27%
Laboratory Mean =	2.234	Avg Z Score =	-0.074
Number of Values =	77	Bias Level =	Excellent
Expected Std. Dev. =	0.083	RSD =	2.95%
Laboratory Std. Dev. =	0.066	Avg Abs Z =	0.613

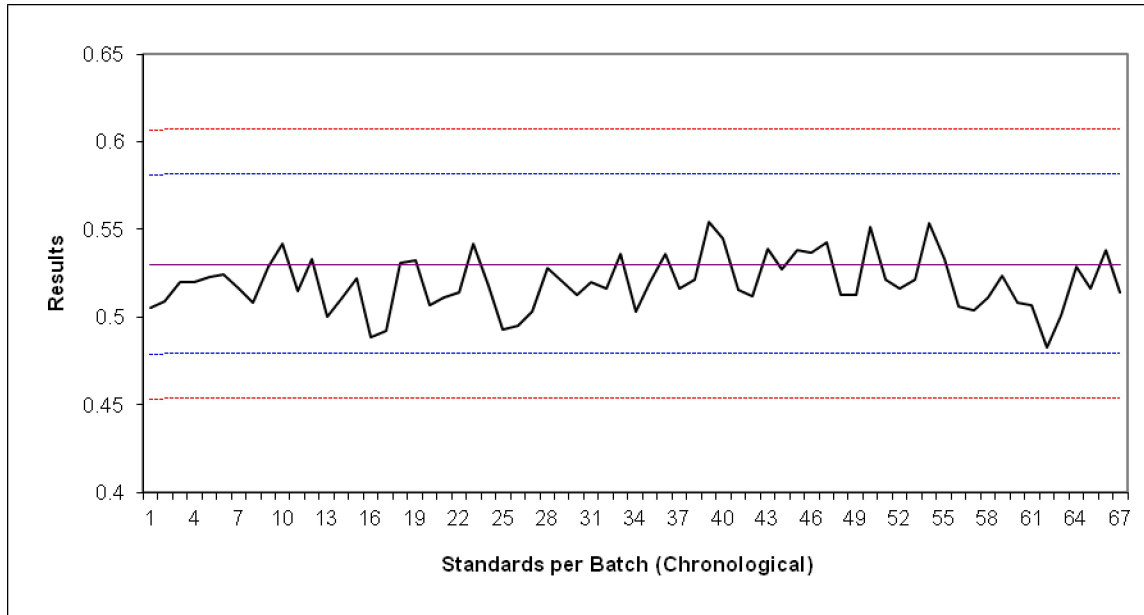
Method: ICM11D

Analyte: Mg

Instrumentation: ICP-OES

Reference Material: TILL-4 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.479	+2 Standard Deviation =	0.581
-3 Standard Deviation =	0.453	+3 Standard Deviation =	0.607
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.530	Bias =	-1.97%
Laboratory Mean =	0.520	Avg Z Score =	-0.409
Number of Values =	67	Bias Level =	Acceptable
Expected Std. Dev. =	0.026		
Laboratory Std. Dev. =	0.016	RSD =	2.93%
		Avg Abs Z =	0.612

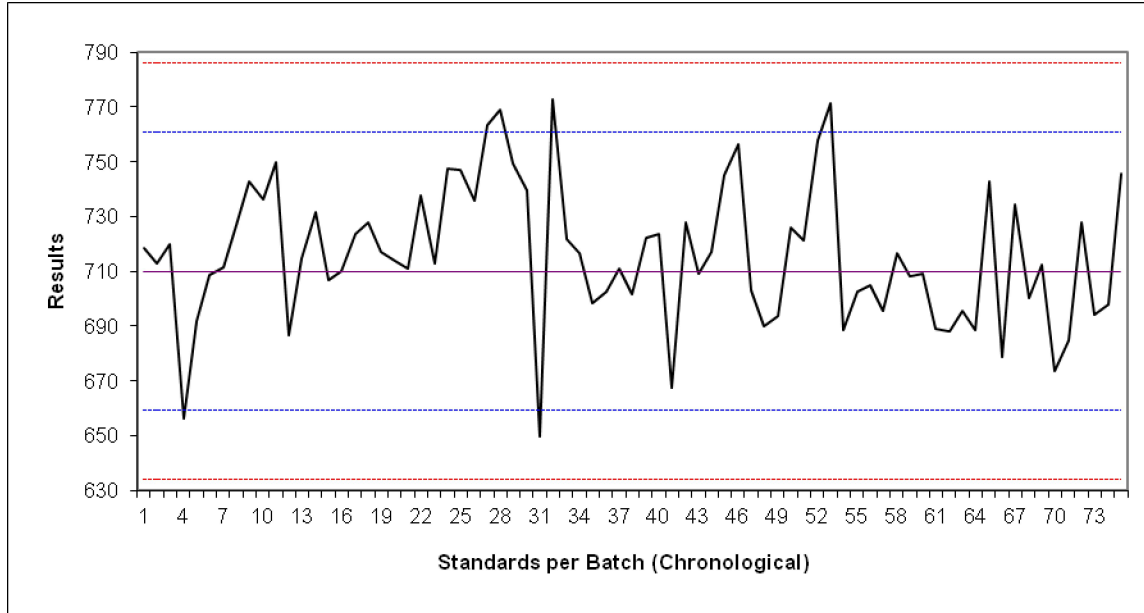
Method: ICM11D

Analyte: Mn

Instrumentation: ICP-OES

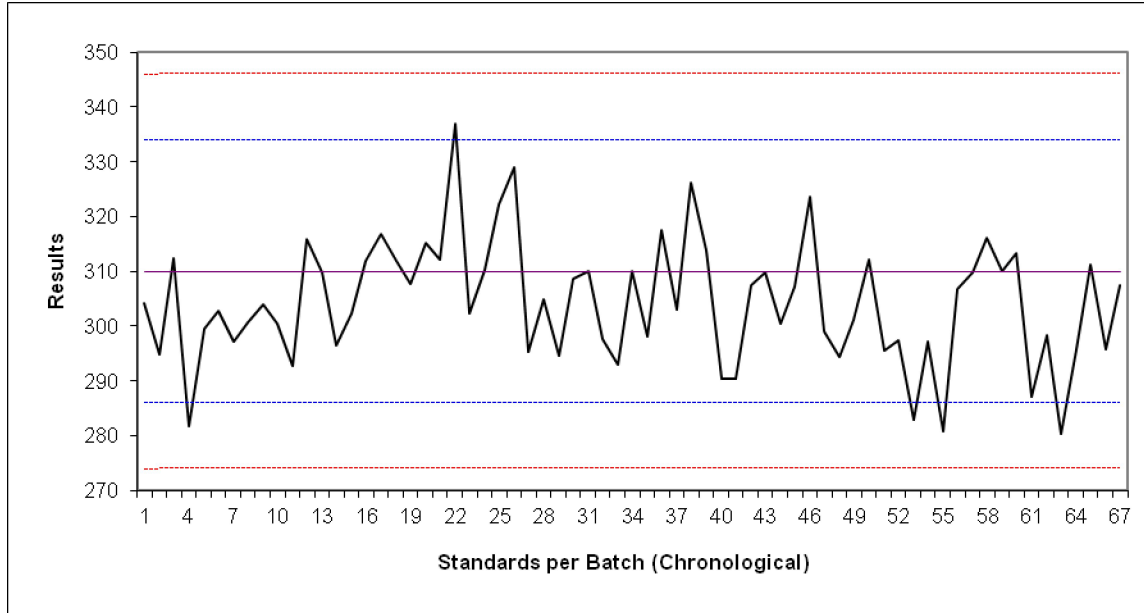
Reference Material: OREAS903 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	659.333	+2 Standard Deviation =	760.667
-3 Standard Deviation =	634.000	+3 Standard Deviation =	786.000
% within 2 Standard Deviations =	92.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	710.000	Bias =	0.86%
Laboratory Mean =	716.089	Avg Z Score =	0.240
Number of Values =	75	Bias Level =	Good
Expected Std. Dev. =	25.333		
Laboratory Std. Dev. =	25.722	RSD =	3.62%
		Avg Abs Z =	0.802

Method: ICM11D
Analyte: Mn
Instrumentation: ICP-OES
Reference Material: TILL-3 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	286.000	+2 Standard Deviation =	334.000
-3 Standard Deviation =	274.000	+3 Standard Deviation =	346.000
% within 2 Standard Deviations =	92.54%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	310.000	Bias =	-1.85%
Laboratory Mean =	304.271	Avg Z Score =	-0.477
Number of Values =	67	Bias Level =	Acceptable
Expected Std. Dev. =	12.000		
Laboratory Std. Dev. =	11.305	RSD =	3.65%
		Avg Abs Z =	0.822

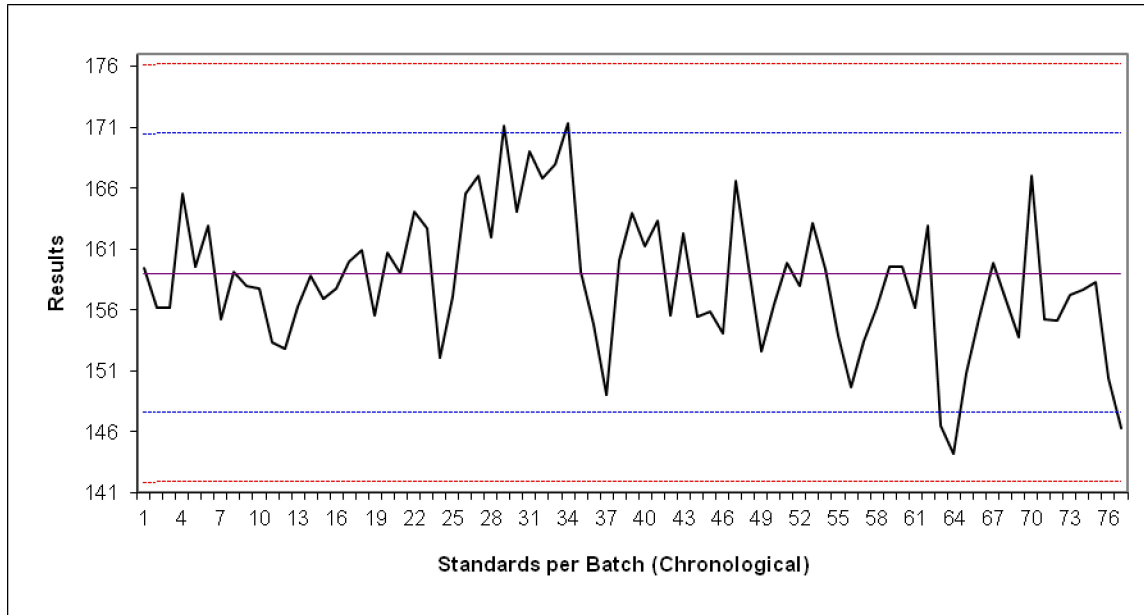
Method: ICM11D

Analyte: Ni

Instrumentation: ICP-OES

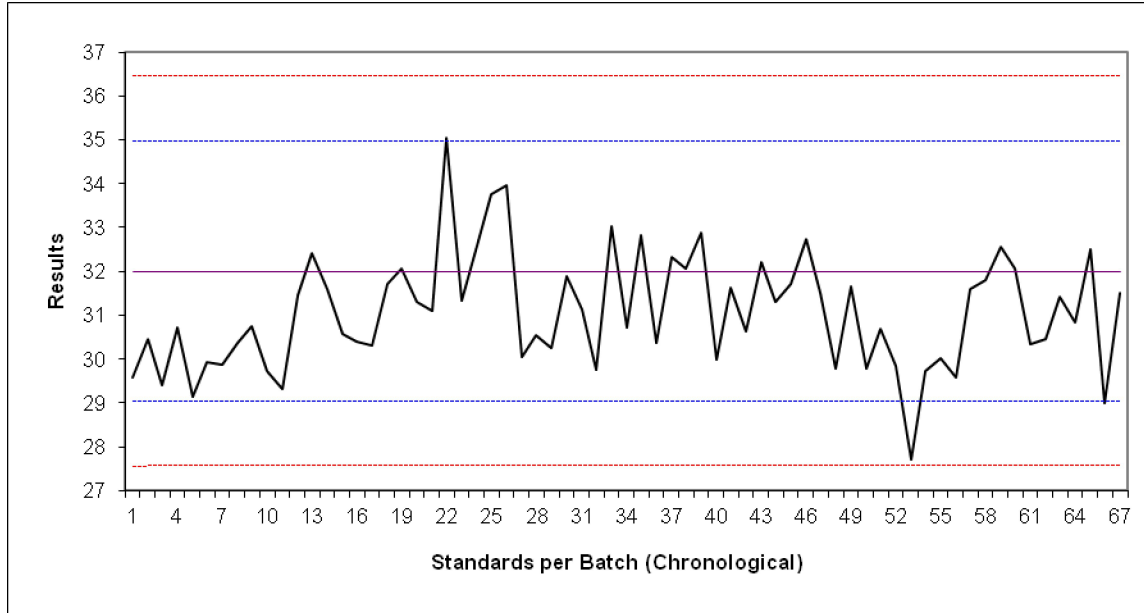
Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	147.567	+2 Standard Deviation =	170.433
-3 Standard Deviation =	141.850	+3 Standard Deviation =	176.150
% within 2 Standard Deviations =	93.51%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	159.000	Bias =	-0.36%
Laboratory Mean =	158.425	Avg Z Score =	-0.101
Number of Values =	77	Bias Level =	Excellent
Expected Std. Dev. =	5.717		
Laboratory Std. Dev. =	5.511	RSD =	3.47%
		Avg Abs Z =	0.747

Method: ICM11D
Analyte: Ni
Instrumentation: ICP-OES
Reference Material: TILL-3 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	29.033	+2 Standard Deviation =	34.967
-3 Standard Deviation =	27.550	+3 Standard Deviation =	36.450
% within 2 Standard Deviations =	95.52%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	32.000	Bias =	-2.93%
Laboratory Mean =	31.063	Avg Z Score =	-0.631
Number of Values =	67	Bias Level =	Acceptable
Expected Std. Dev. =	1.483	RSD =	4.10%
Laboratory Std. Dev. =	1.312	Avg Abs Z =	0.893

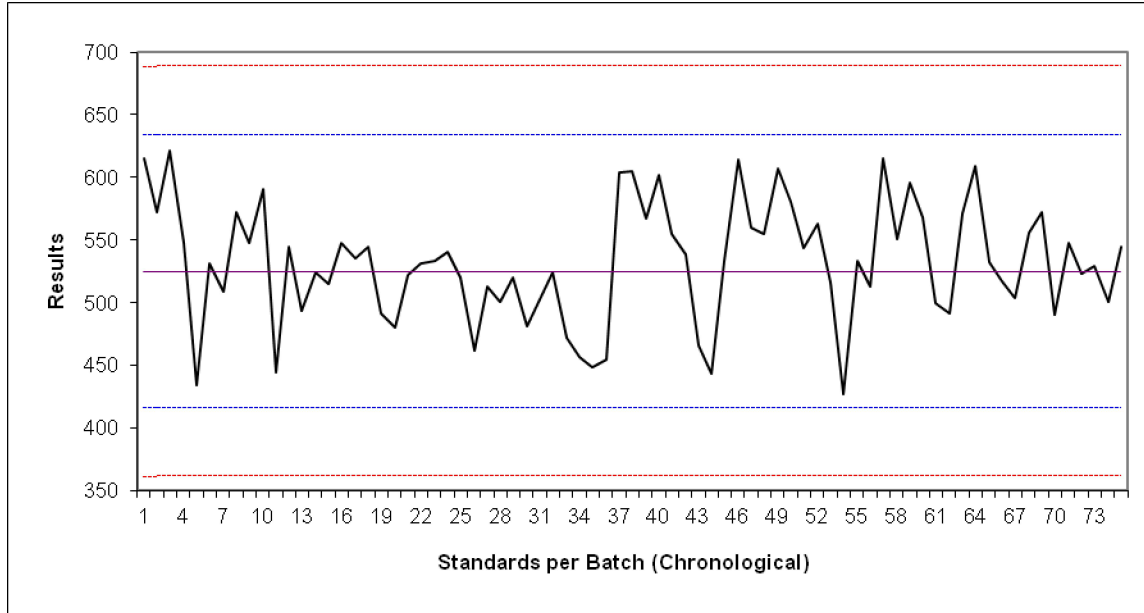
Method: ICM11D

Analyte: P

Instrumentation: ICP-OES

Reference Material: OREAS901 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	415.776	+2 Standard Deviation =	634.044
-3 Standard Deviation =	361.209	+3 Standard Deviation =	688.611
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	524.910	Bias =	1.31%
Laboratory Mean =	531.798	Avg Z Score =	0.126
Number of Values =	75	Bias Level =	Excellent
Expected Std. Dev. =	54.567	RSD =	9.04%
Laboratory Std. Dev. =	47.445	Avg Abs Z =	0.695

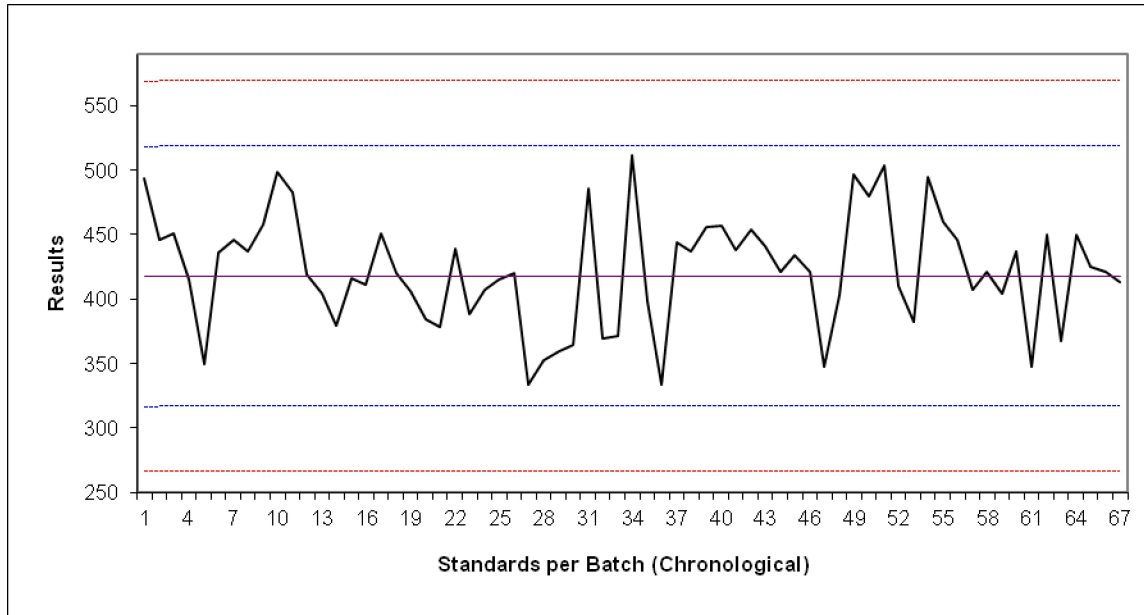
Method: ICM11D

Analyte: P

Instrumentation: ICP-OES

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	316.616	+2 Standard Deviation =	518.291
-3 Standard Deviation =	266.198	+3 Standard Deviation =	568.709
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	417.453	Bias =	1.22%
Laboratory Mean =	422.530	Avg Z Score =	0.101
Number of Values =	67	Bias Level =	Excellent
Expected Std. Dev. =	50.419		
Laboratory Std. Dev. =	43.358	RSD =	10.39%
		Avg Abs Z =	0.683

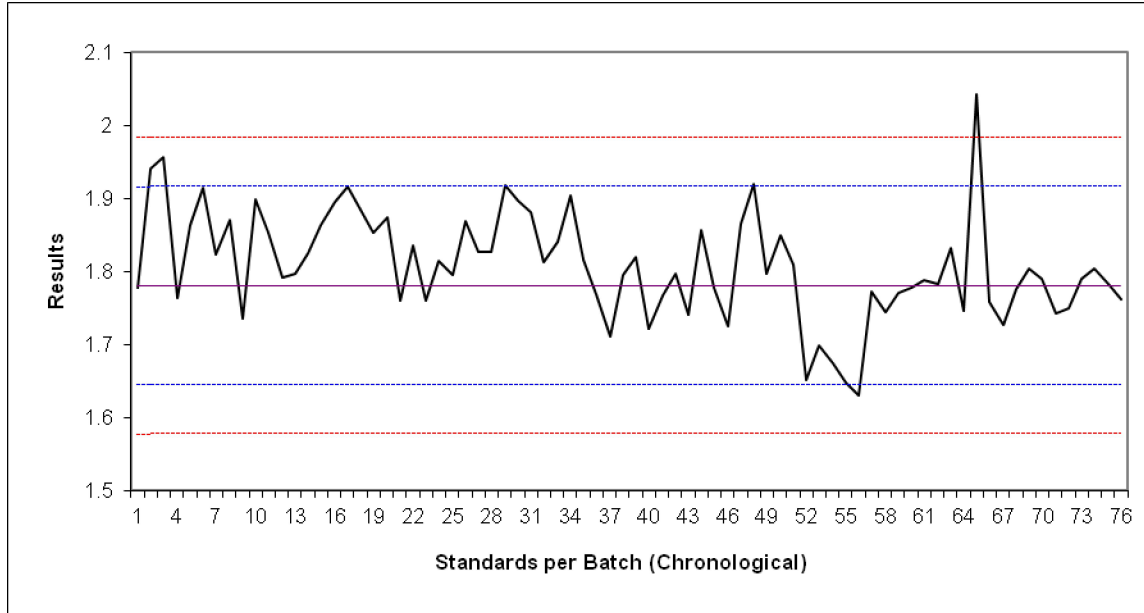
Method: ICM11D

Analyte: S

Instrumentation: ICP-OES

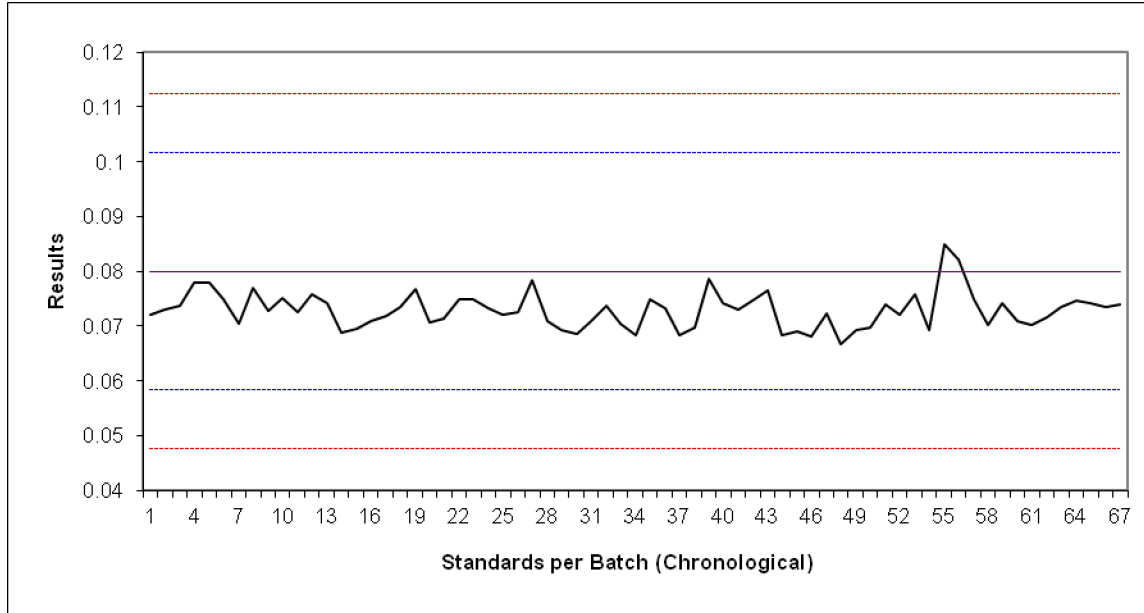
Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	1.645	+2 Standard Deviation =	1.915
-3 Standard Deviation =	1.577	+3 Standard Deviation =	1.983
% within 2 Standard Deviations =	90.79%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.68%	(Expect 99.7%)	
Expected Mean =	1.780	Bias =	1.58%
Laboratory Mean =	1.808	Avg Z Score =	0.415
Number of Values =	76	Bias Level =	Acceptable
Expected Std. Dev. =	0.068		
Laboratory Std. Dev. =	0.074	RSD =	4.16%
		Avg Abs Z =	0.884

Method: ICM11D
Analyte: S
Instrumentation: ICP-OES
Reference Material: TILL-4 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	0.058	+2 Standard Deviation =	0.102
-3 Standard Deviation =	0.048	+3 Standard Deviation =	0.112
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	0.080	Bias =	-8.85%
Laboratory Mean =	0.073	Avg Z Score =	-0.655
Number of Values =	67	Bias Level =	Acceptable
Expected Std. Dev. =	0.011		
Laboratory Std. Dev. =	0.003	RSD =	4.21%
		Avg Abs Z =	0.675

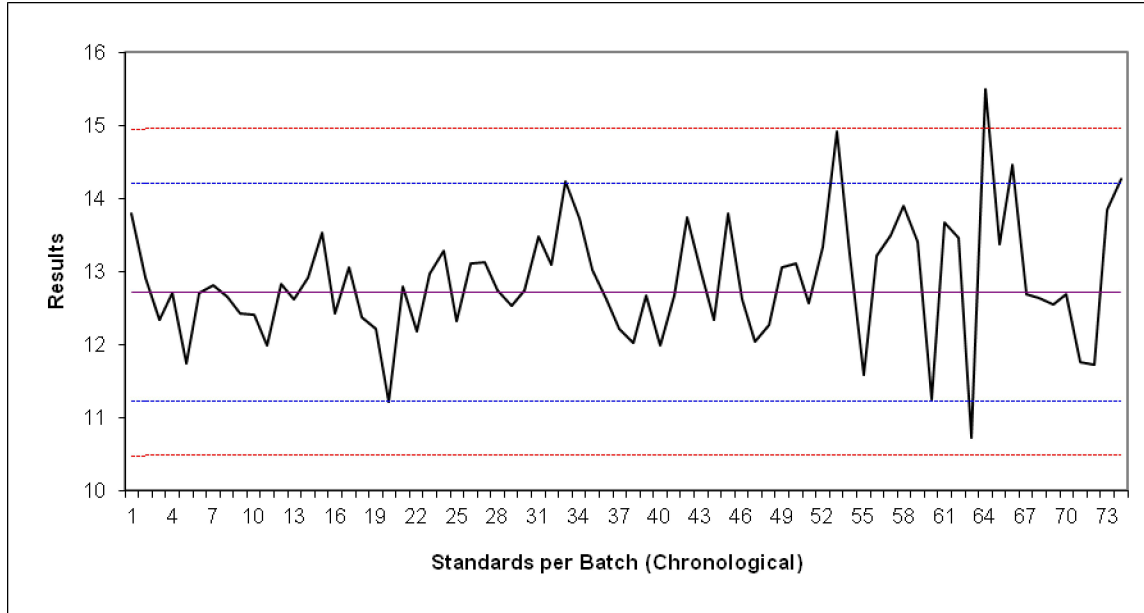
Method: ICM11D

Analyte: Sr

Instrumentation: ICP-OES

Reference Material: OREAS904 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	11.219	+2 Standard Deviation =	14.197
-3 Standard Deviation =	10.474	+3 Standard Deviation =	14.942
% within 2 Standard Deviations =	90.54%	(Expect 95.4%)	
% within 3 Standard Deviations =	98.65%	(Expect 99.7%)	
Expected Mean =	12.708	Bias =	1.15%
Laboratory Mean =	12.854	Avg Z Score =	0.196
Number of Values =	74	Bias Level =	Excellent
Expected Std. Dev. =	0.745	RSD =	6.45%
Laboratory Std. Dev. =	0.819	Avg Abs Z =	0.817

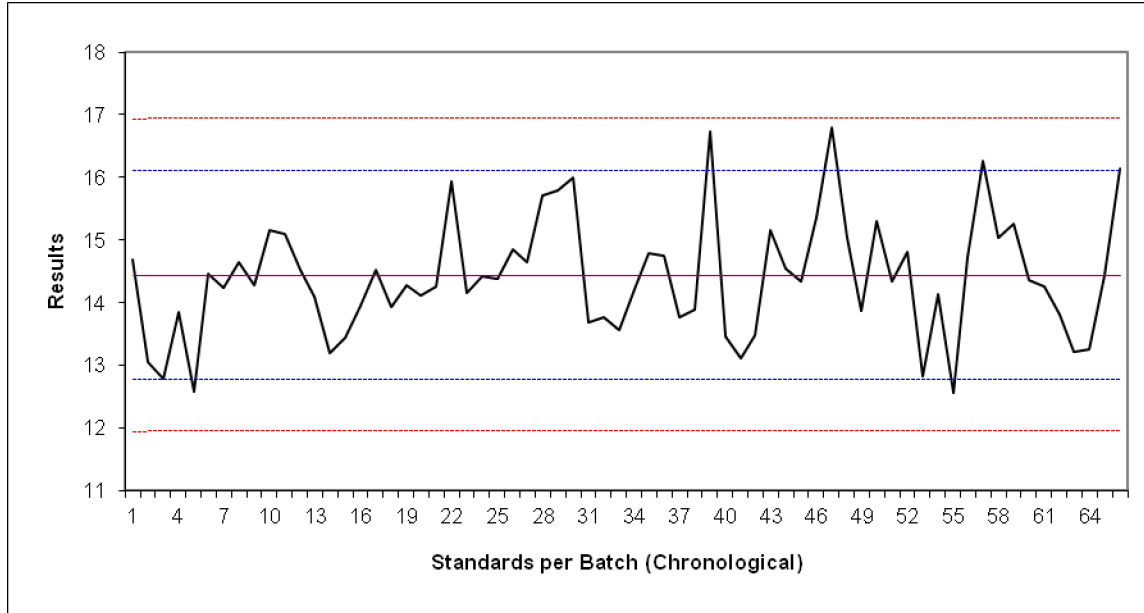
Method: ICM11D

Analyte: Sr

Instrumentation: ICP-OES

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	12.773	+2 Standard Deviation =	16.104
-3 Standard Deviation =	11.940	+3 Standard Deviation =	16.937
% within 2 Standard Deviations =	90.91%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	14.439	Bias =	-0.31%
Laboratory Mean =	14.394	Avg Z Score =	-0.053
Number of Values =	66	Bias Level =	Excellent
Expected Std. Dev. =	0.833		
Laboratory Std. Dev. =	0.948	RSD =	6.56%
		Avg Abs Z =	0.870

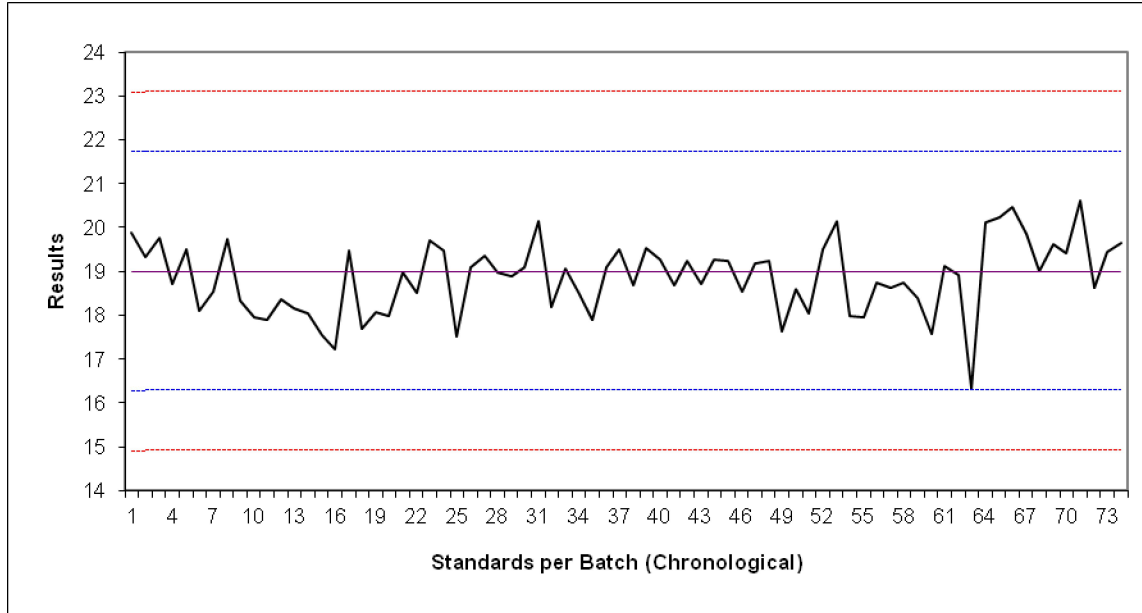
Method: ICM11D

Analyte: V

Instrumentation: ICP-OES

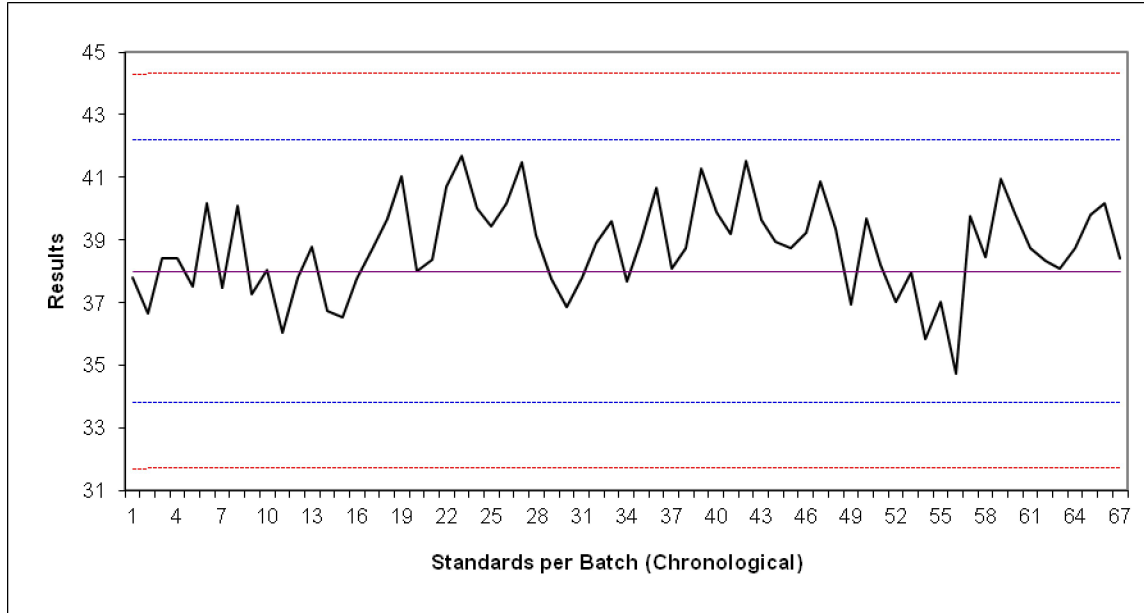
Reference Material: OREAS904 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	16.274	+2 Standard Deviation =	21.726
-3 Standard Deviation =	14.911	+3 Standard Deviation =	23.089
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	19.000	Bias =	-0.76%
Laboratory Mean =	18.856	Avg Z Score =	-0.106
Number of Values =	74	Bias Level =	Excellent
Expected Std. Dev. =	1.363		
Laboratory Std. Dev. =	0.827	RSD =	4.35%
		Avg Abs Z =	0.491

Method: ICM11D
Analyte: V
Instrumentation: ICP-OES
Reference Material: TILL-4 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	33.800	+2 Standard Deviation =	42.200
-3 Standard Deviation =	31.700	+3 Standard Deviation =	44.300
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	38.000	Bias =	1.97%
Laboratory Mean =	38.750	Avg Z Score =	0.357
Number of Values =	67	Bias Level =	Good
Expected Std. Dev. =	2.100		
Laboratory Std. Dev. =	1.475	RSD =	3.88%
		Avg Abs Z =	0.625

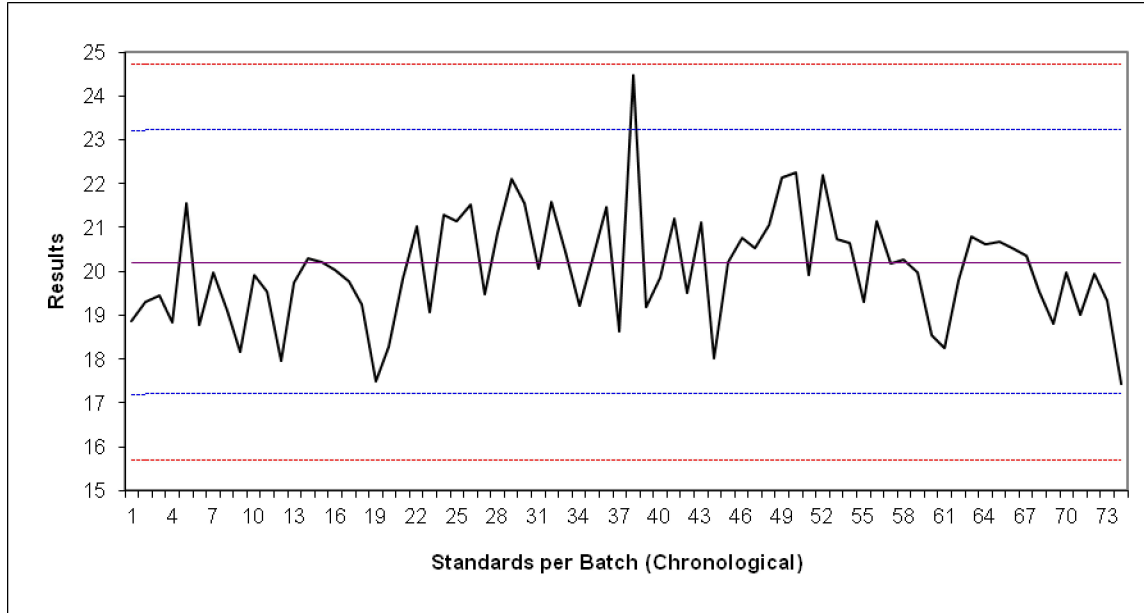
Method: ICM11D

Analyte: Zn

Instrumentation: ICP-OES

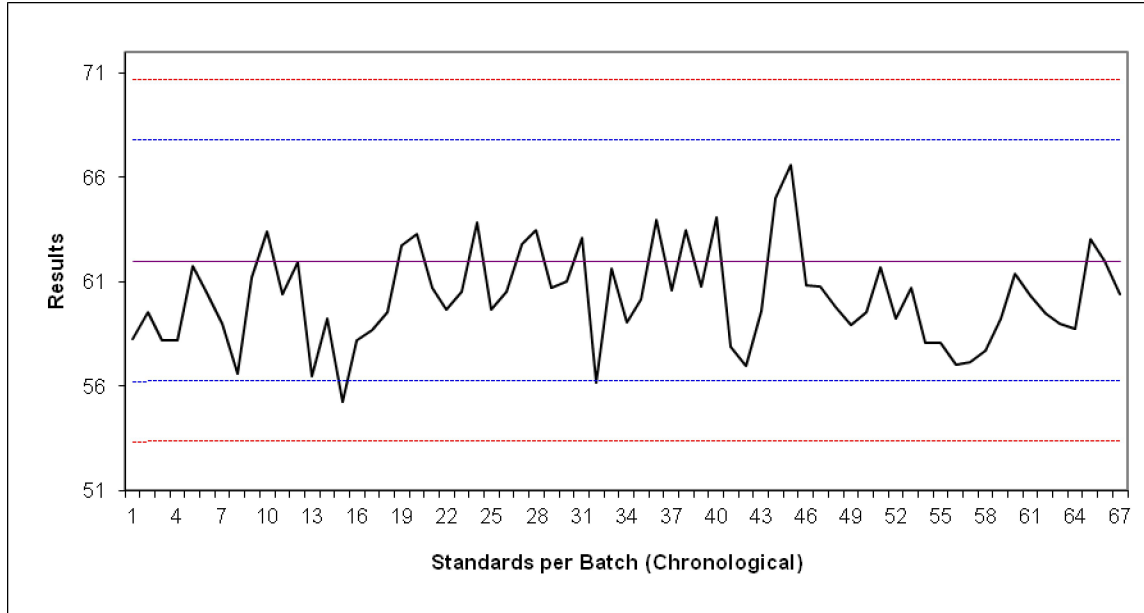
Reference Material: OREAS901 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	17.187	+2 Standard Deviation =	23.213
-3 Standard Deviation =	15.680	+3 Standard Deviation =	24.720
% within 2 Standard Deviations =	98.65%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	20.200	Bias =	-0.70%
Laboratory Mean =	20.059	Avg Z Score =	-0.093
Number of Values =	74	Bias Level =	Excellent
Expected Std. Dev. =	1.507	RSD =	6.14%
Laboratory Std. Dev. =	1.240	Avg Abs Z =	0.640

Method: ICM11D
Analyte: Zn
Instrumentation: ICP-OES
Reference Material: TILL-4 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	56.226	+2 Standard Deviation =	67.774
-3 Standard Deviation =	53.340	+3 Standard Deviation =	70.660
% within 2 Standard Deviations =	97.01%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	62.000	Bias =	-2.80%
Laboratory Mean =	60.264	Avg Z Score =	-0.601
Number of Values =	67	Bias Level =	Acceptable
Expected Std. Dev. =	2.887	RSD =	3.69%
Laboratory Std. Dev. =	2.288	Avg Abs Z =	0.838

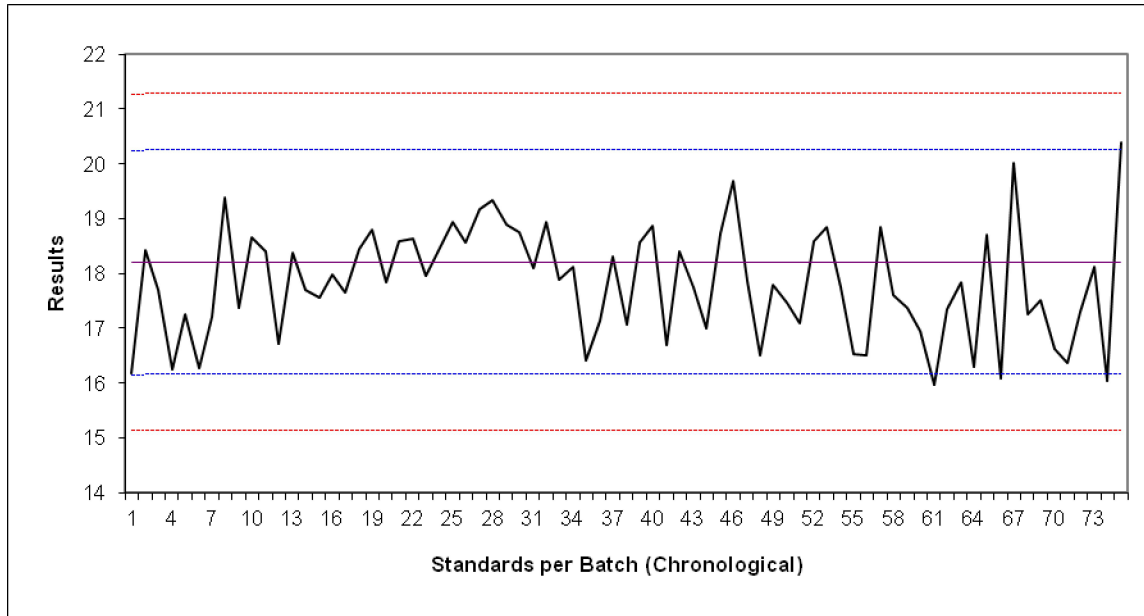
Method: ICM11D

Analyte: Zr

Instrumentation: ICP-OES

Reference Material: OREAS902 - based on certificate value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	16.153	+2 Standard Deviation =	20.247
-3 Standard Deviation =	15.130	+3 Standard Deviation =	21.270
% within 2 Standard Deviations =	94.67%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	18.200	Bias =	-2.08%
Laboratory Mean =	17.822	Avg Z Score =	-0.369
Number of Values =	75	Bias Level =	Good
Expected Std. Dev. =	1.023	RSD =	5.56%
Laboratory Std. Dev. =	1.012	Avg Abs Z =	0.859

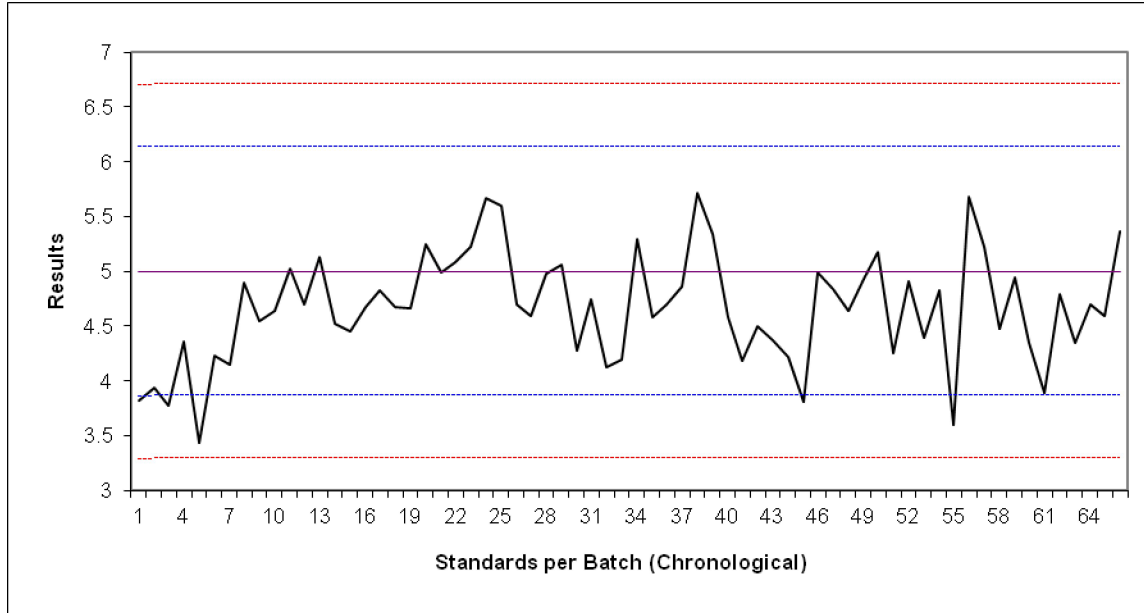
Method: ICM11D

Analyte: Zr

Instrumentation: ICP-OES

Reference Material: TILL-3 - based on in house certification value

Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	3.862	+2 Standard Deviation =	6.138
-3 Standard Deviation =	3.293	+3 Standard Deviation =	6.707
% within 2 Standard Deviations =	92.42%		(Expect 95.4%)
% within 3 Standard Deviations =	100.00%		(Expect 99.7%)
Expected Mean =	5.000	Bias =	-6.67%
Laboratory Mean =	4.666	Avg Z Score =	-0.586
Number of Values =	66	Bias Level =	Acceptable
Expected Std. Dev. =	0.569		
Laboratory Std. Dev. =	0.501	RSD =	10.02%
		Avg Abs Z =	0.843

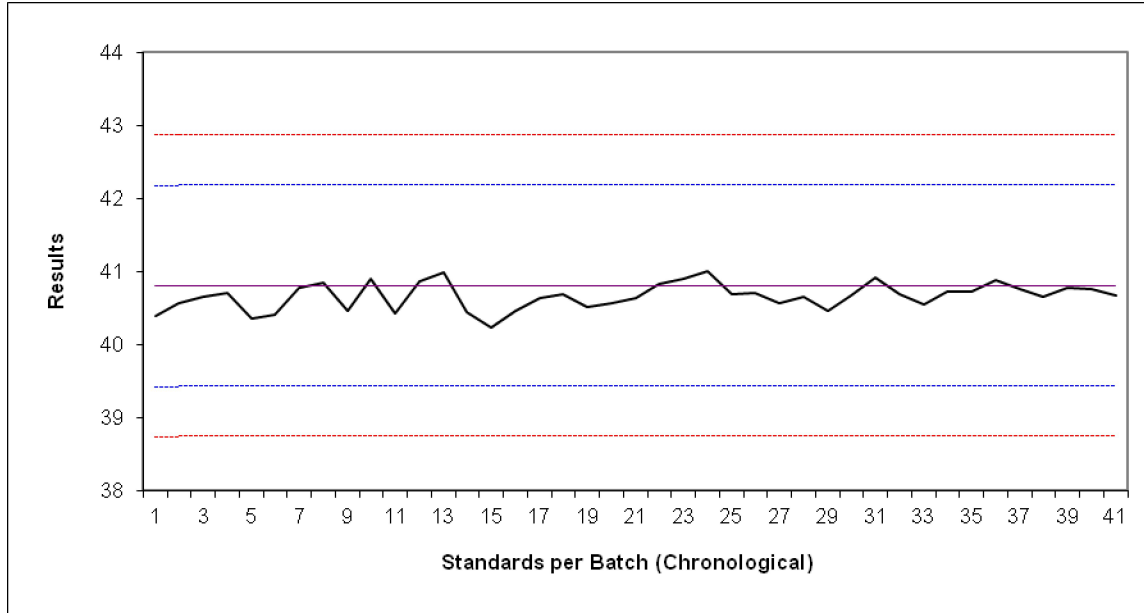
Method: PHY01D

Analyte: LOI (at 450°C / 4 hours)

Instrumentation: Oven

Reference Material: LKSD-4 - based on certificate value

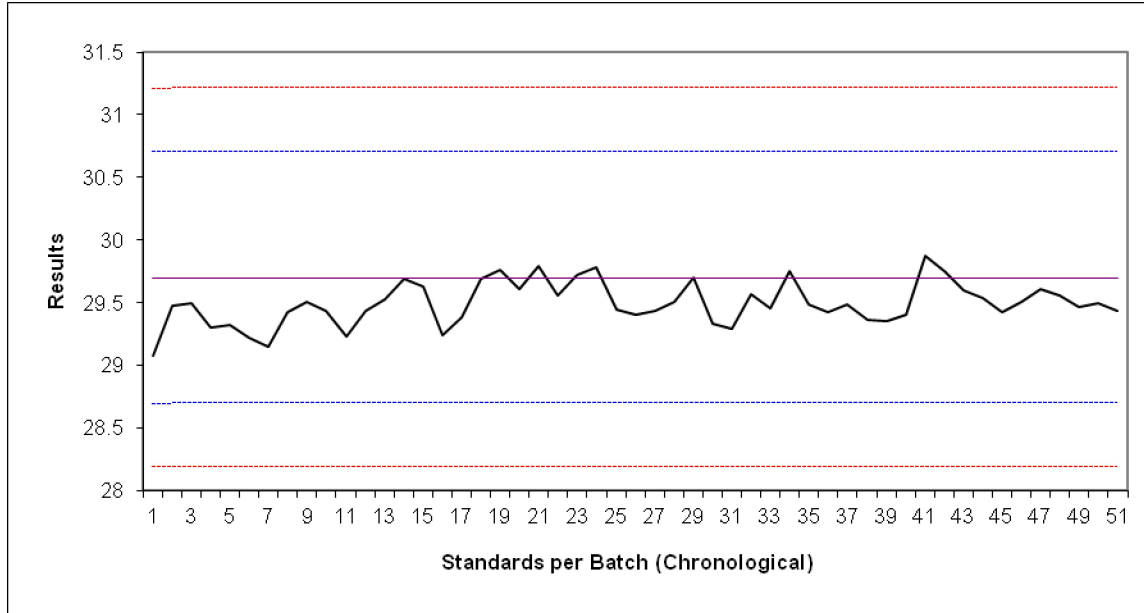
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	39.423	+2 Standard Deviation =	42.177
-3 Standard Deviation =	38.735	+3 Standard Deviation =	42.865
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	

Expected Mean =	40.800	Bias =	-0.34%
Laboratory Mean =	40.660	Avg Z Score =	-0.203
Number of Values =	41	Bias Level =	Good
Expected Std. Dev. =	0.688	RSD =	0.45%
Laboratory Std. Dev. =	0.182	Avg Abs Z =	0.267

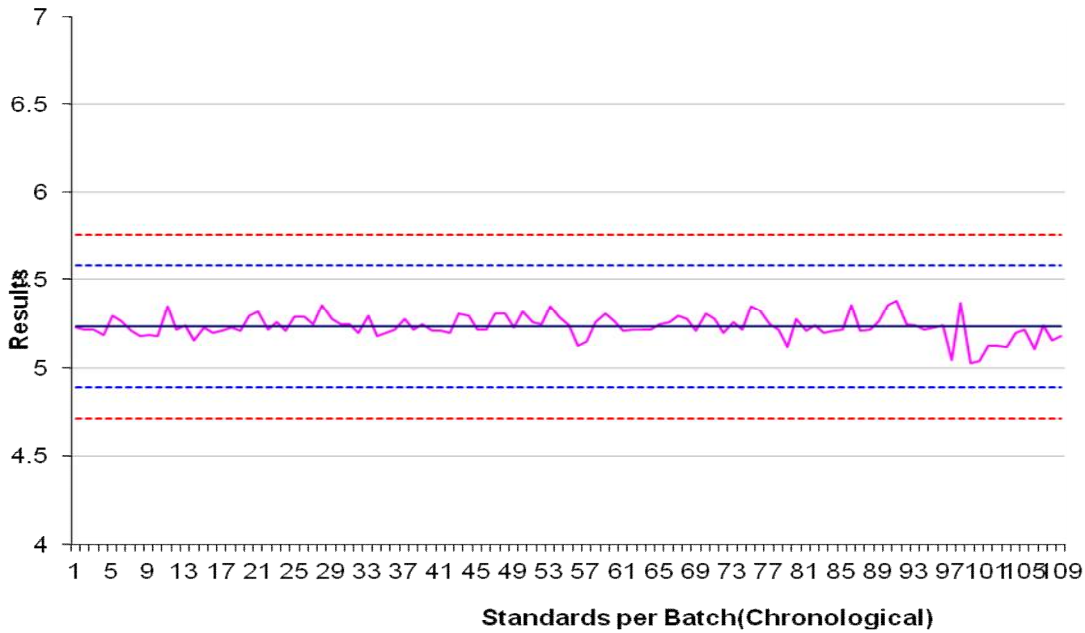
Method: PHY01D
Analyte: LOI (at 450°C / 4 hours)
Instrumentation: Furnace
Reference Material: STSD-1 - based on certificate value
Data Collection Period: 01-08-2012 to 07-03-2013



-2 Standard Deviation =	28.693	+2 Standard Deviation =	30.707
-3 Standard Deviation =	28.190	+3 Standard Deviation =	31.210
% within 2 Standard Deviations =	100.00%	(Expect 95.4%)	
% within 3 Standard Deviations =	100.00%	(Expect 99.7%)	
Expected Mean =	29.700	Bias =	-0.70%
Laboratory Mean =	29.493	Avg Z Score =	-0.412
Number of Values =	51	Bias Level =	Acceptable
Expected Std. Dev. =	0.503	RSD =	0.58%
Laboratory Std. Dev. =	0.173	Avg Abs Z =	0.454

Method: ISE15D
Analyte: pH
Instrumentation: Orion Ph Meter
Reference Material: In House Reference
Data Collection Period: 01-08-2012 to 07-03-2013

In House Reference performance for PH in ISE15D method



Exp. Val. =	5.236239	+3StdDev	5.434093	5.759862
Lab Std. Dev. =	0.065952	+2StdDev	5.368142	5.585321
Exp. Std. Dev. =	0.174541	Exp. Val	5.236239	5.236239
Min. Val. =	5.03	-2StdDev	5.104335	4.887156
Max. Val. =	5.38	-3StdDev	5.038384	4.712615

