

# **EVALUATION OF THE INTERLABORATORY COMPARISON TEST**

## **Sum parameters SP02**

Sample dispatch on 30<sup>th</sup> May 2017

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[www.imatest.eu](http://www.imatest.eu)

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## 1 Interlaboratory comparison test: Sum parameters SP02

### 1.1 Participants and time schedule

- Number of registrations: 31
- Number of submitted data records: 31
- Dispatch of samples: 30<sup>th</sup> May 2017
- Closing date for submission of data: 27<sup>th</sup> June 2017

To anonymize results, each laboratory was given a laboratory code on a random basis. Due to an error at the dispatch, the laboratory code LC0012 is omitted.

### 1.2 Sampling, sample material and distribution

The following samples were made available

- synthetic water (Sample A)
- ground water (Sample B)

The sampling of ground water was carried out on 26<sup>th</sup> May 2017. The sample was stored at < 4 °C until further processing.

The samples for the HC-Index (SP02 A KWI and SP02 B KWI) were prepared on 29<sup>th</sup> May 2017 and stored at < 4 °C.

The samples for the Phenol Index (SP02 A PHE and SP02 B PHE) were prepared at the day of dispatch. For stabilisation they were brought to pH < 4 with phosphoric acid and 1 g/L Copper sulfate pentahydrate was added.

All samples were spiked with the corresponding substances.

The homogenous samples were dispatched on 30<sup>th</sup> May 2017.

Each participant received:

- 2 samples (each 2000 ml), each filled in 2x 1000 ml glas bottles for the assay of HC-Index

Depending on thier order, several laboratories also received:

- 2 samples (each 2000 ml), each filled in 2x 1000 ml glas bottles for the assay of phenol Index

### 1.3 Control testing

During filling the bottles, aliquots of each sample were collected randomly for control testing at the Environment Agency Austria. Testing was performed close to the time of sample dispatch. The phenol index was determined by an external laboratory.

In the parameter-oriented evaluation, the results of the control testing are given in the form of arithmetic means of the detected concentrations as check value  $\pm$  U.

## 2 Evaluation

The analytical results had to be made available to the organiser not later than 27<sup>th</sup> June 2017. Any values received at a later date were not considered. A statistical evaluation of interlaboratory comparison data was only carried out if at least 6 valid results per parameter were available.

To evaluate the data, outliers were detected first by using the outlier test method according to Hampel. Values identified as conspicuous by this test method are marked specifically in the parameter-oriented evaluation. Further evaluation was performed in accordance with DIN ISO 5725-2. Results < LOQ or < LOD are not taken into account for calculation.

The adjusted average value (after removal of outliers) for all submitted results was used as a basis for the calculation of recovery rates and z-scores.

### z-Score

z-Scores were calculated on the basis of the following formula:

$$z - score = \frac{x_i - \bar{X}}{SD}$$

In this context,

$x_i$  is the measurement value of the participating laboratory.

$\bar{X}$  is the adjusted average value (i.e. after removal of outliers) of the participants' results.

$SD$  is the reproducibility standard deviation, calculated from the participants' results (after removal of outliers) in the relevant test round.

### Interpretation of z-Scores in the parameter-oriented evaluation:

- $|z| < 2$             result: good
- $2 < |z| < 3$         result: questionable
- $|z| > 3$              result: not satisfactory

## 3 Representation and interpretation of measurement results

The parameter oriented report shows the measurement values including uncertainty, recovery rate, calculated z-Score and the outliers in tabular form. The results listed in the table are also represented graphically.

The laboratory oriented report shows the results of the individual laboratories, including the recovery rates and z-Scores.

An annotation of the tables and graphics is given in section 5.

## 4 Explanatory notes

As explained in section 2, the z-Score is calculated using the reproducibility standard deviation, calculated from the participants' results (after removal of outliers) in the relevant test round. As a consequence it might occur that the z-Score between -2 and 2 covers an extraordinary range, due to a high variance of the results. On the other hand, a low variation of the participants' results leads to an extraordinary small recovery rate range when applying a z-Score of -2 to +2.

The recovery rate is calculated for the individual result based on the target value. Therefore, in the case of a high variance of the results, participants should also consider recovery rates as an indicator for the necessity of internal quality assurance measures.

At this Interlaboratory comparison test the HC-Index in both samples shows a high variance of the results.

If low results were received we recommend to check, if the entire bottle was extracted and/or rinsed with solvent to exclude adsorption effects on the glass wall.

## 5 Annotations on tables and charts

### 5.1 Information and abbreviations in tables

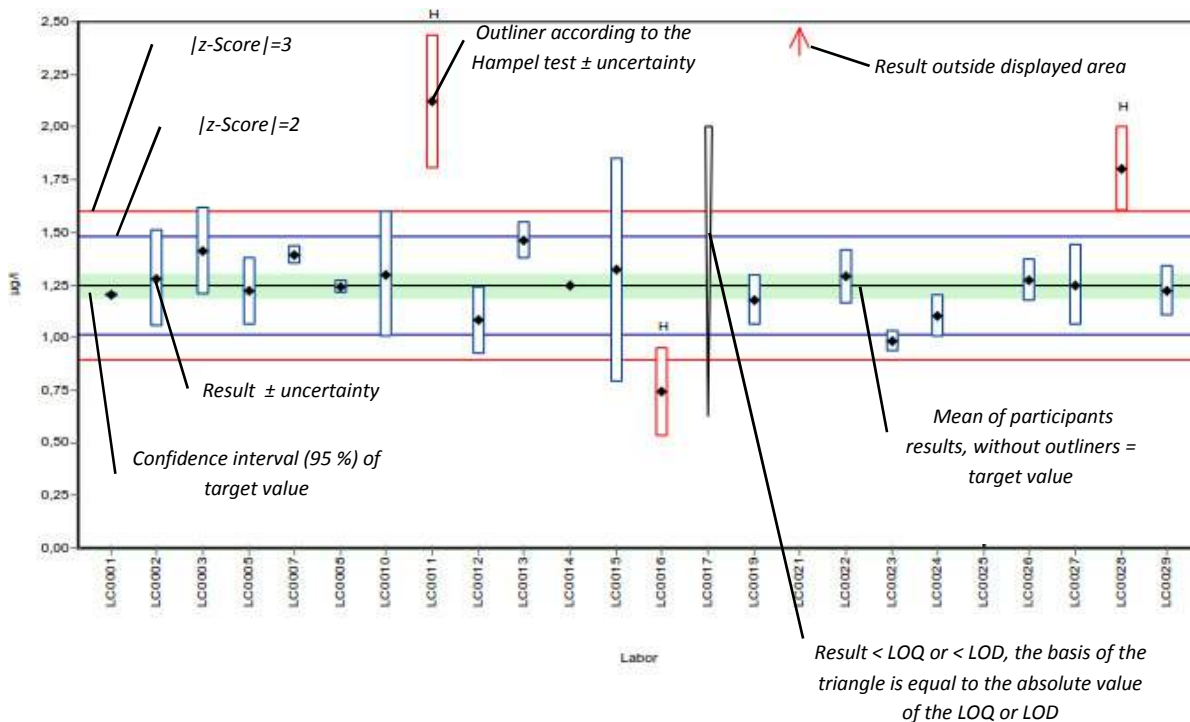
Parameter	Analyte identifier
Sample	Sample identifier
Unit	Given unit for result and uncertainty (e.g. µg/l)
Mean	Mean of the participants results, without outliers (3 significant digits)
CI (99 %)	99% confidence interval (3 significant digits)
Minimum	Minimum of all submitted results, after removal of outliers (3 significant digits)
Maximum	Maximum of all submitted results, after removal of outliers (3 significant digits)
SD	Reproducibility standard deviation, calculated from the participants results, after removal of outliers (3 significant digits)
RSD %	Reproducibility standard deviation, calculated from the participants results relative to the target value, given in %, after removal of outliers (2 significant digits)
Check value ± U	Mean of check value ± measurement uncertainty (3 significant digits)
Labcode	Laboratory identifier (anonymized)
Result	Result as indicated by participant (max. 5 decimal places)
± U	Results uncertainty as indicated by participant (max. 5 decimal places)
LOQ	Limit of quantification
LOD	Limit of detection
Recovery	Recovery rate in % based on target value (3 significant digits, max. one decimal place given)
z-Score	Deviation of result based on target value depicted as a multiple of the criteria (3 significant digits, max. 2 decimal places given)
-	<i>No data available</i>
Comments	Comment on the respective result (e.g. H, FN, FP)
H	Outlier according to Hampel-Test
FN	False negative – for a result < LOQ or result < LOD: The absolute value of the LOQ or LOD fulfils the condition of an outlier according to the Hampel test.
FP	False positive – for parameters where no target value is available because of a too low analyte content (n < 6):

	Result that exceeds the median of the absolute values of the transmitted LOQs or LODs by more than 100 %.
Standard deviation	Reproducibility standard deviation, calculated from the participants results (3 significant digits)
Rel. standard deviation	Reproducibility standard deviation, calculated from the participants results relative to the target value, given in %, (3 significant digits)
n	Number of results
Target value	Mean of the participants results, without outliers (3 significant digits)
Criteria	Criteria for z-Score calculation. The given value matches the reproducibility standard deviation, calculated from the participants' results, after removal of outliers (3 significant digits).

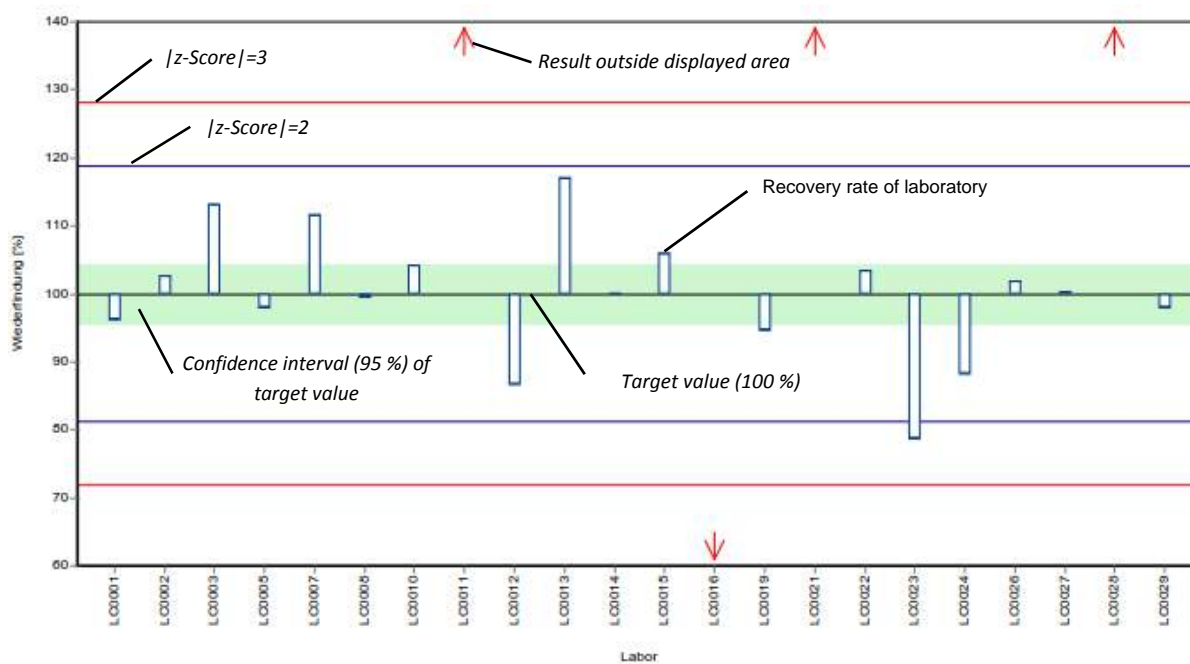


## 5.2 Graphical presentation of results

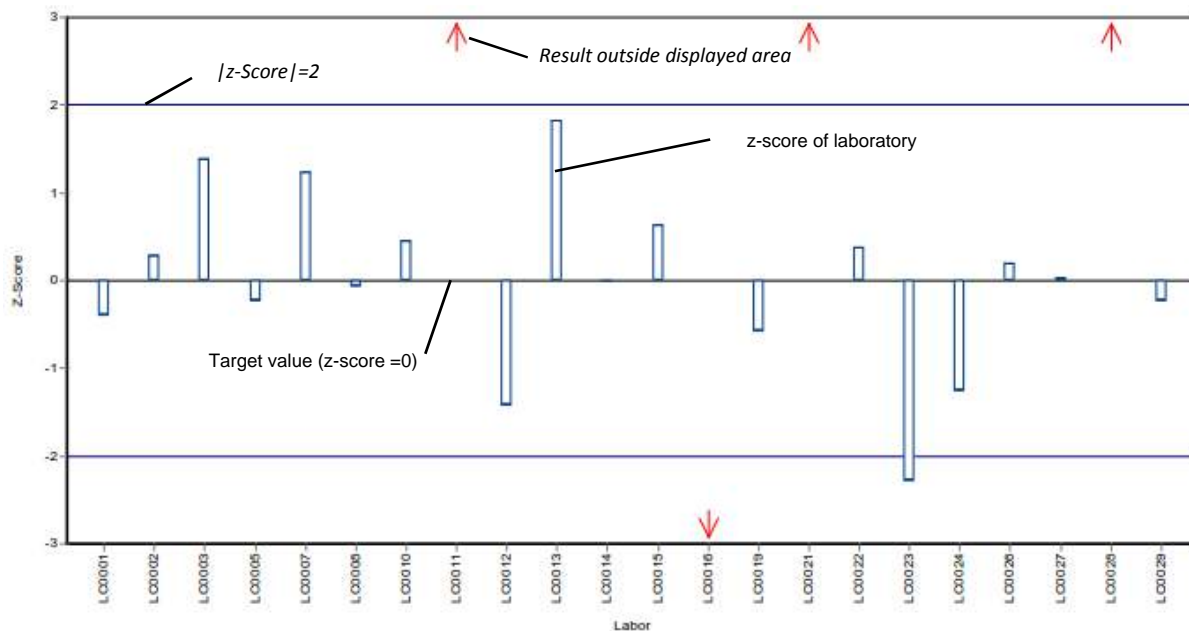
### Example chart: Results



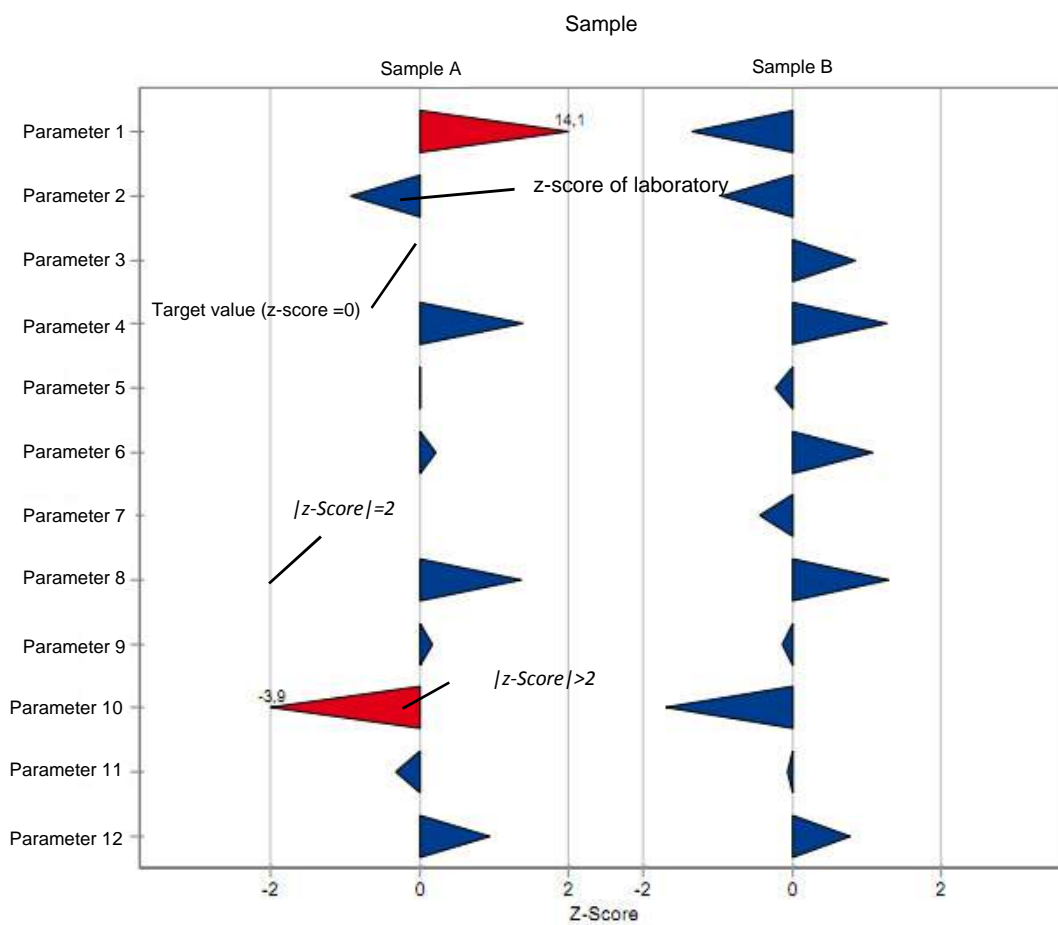
### Example chart: Recovery



**Example chart: z-score**



**Example chart: z-score - laboratory oriented report**



Summary of results, after removal of outliers: Sum parameters SP02

## 6 Summary of results, after removal of outliers

Parameter	Sample	Unit	Number of results for calculation	Number of outliers	Mean	± CI (99%)	Minimum	Maximum	SD	RSD %
HC-Index	SP02 A - HC-Index	mg/l	27	1	1.06	± 0.206	0.4	1.82	0.357	34
	SP02 B - HC-index	mg/l	24	4	0.279	± 0.073	0.0899	0.63	0.119	43
Phenol Index	SP02 A - Phenol index	mg/l	17	1	0.156	± 0.00367	0.147	0.163	0.00504	3.2
	SP02 B - Phenol index	mg/l	17	1	0.0664	± 0.00341	0.06	0.078	0.00468	7

## 7 Parameter oriented report

HC-Index.....	13
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## Parameter oriented report

### SP02 A - HC-Index

#### HC-Index

Unit	mg/l
Mean ± CI (99%)	1.06 ± 0.206
Minimum - Maximum	0.4 - 1.82
Control test value ± U	1.28 ± 0.261

Labcode	Result	± U	Recovery [%]	z-score	Comments
LC0001	1.1	0.22	104	0.11	
LC0002	1.39	0.21	131	0.93	
LC0003	0.85	-	80.2	-0.59	
LC0004	1.31	0.13	124	0.7	
LC0005	-	-	-	-	
LC0006	12.7	0.7	1200	32.6	H
LC0007	1.4	0.067	132	0.95	
LC0008	0.965	0.289	91.1	-0.26	
LC0009	1.091	0.2182	103	0.09	
LC0010	0.899	-	84.9	-0.45	
LC0011	1.39	0.05	131	0.93	
LC0013	1.821	0.1	172	2.13	
LC0014	0.84	0.25	79.3	-0.61	
LC0015	0.4615	0.06922	43.6	-1.67	
LC0016	0.51	0.1	48.1	-1.54	
LC0017	1.13	0.3	107	0.2	
LC0018	-	-	-	-	
LC0019	1.13	0.2	107	0.2	
LC0020	0.63	0.06	59.5	-1.2	
LC0021	1.35	0.02	127	0.81	
LC0022	1.46	0.52	138	1.12	
LC0023	1.44	-	136	1.07	
LC0024	0.71	0.1633	67	-0.98	
LC0025	1.13	-	107	0.2	
LC0026	0.72	0.09	68	-0.95	
LC0027	0.4	0.2	37.8	-1.85	
LC0028	1.23	0.06	116	0.48	
LC0029	0.86	0.097	81.2	-0.56	
LC0030	0.8855	0.09	83.6	-0.49	
LC0031	1.5	0.25	142	1.23	
LC0032	-	-	-	-	

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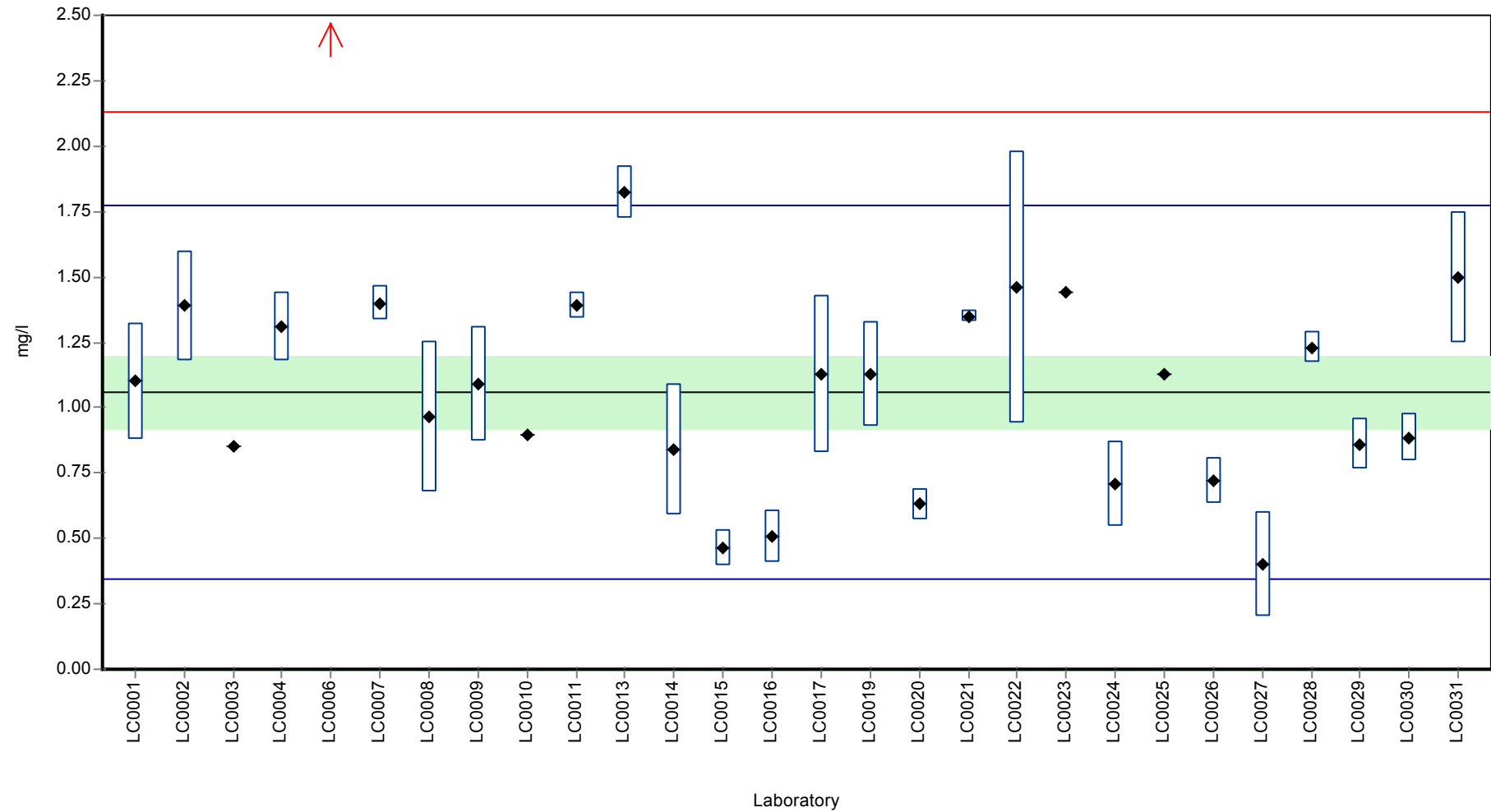
**Characteristics of parameter**

	all results	without outliers	Unit
Mean ± CI (99%)	1.48 ± 1.26	1.06 ± 0.206	mg/l
Minimum	0.4	0.4	mg/l
Maximum	12.7	1.82	mg/l
Standard deviation	2.23	0.357	mg/l
rel. Standard deviation	151	33.7	%
n	28	27	-

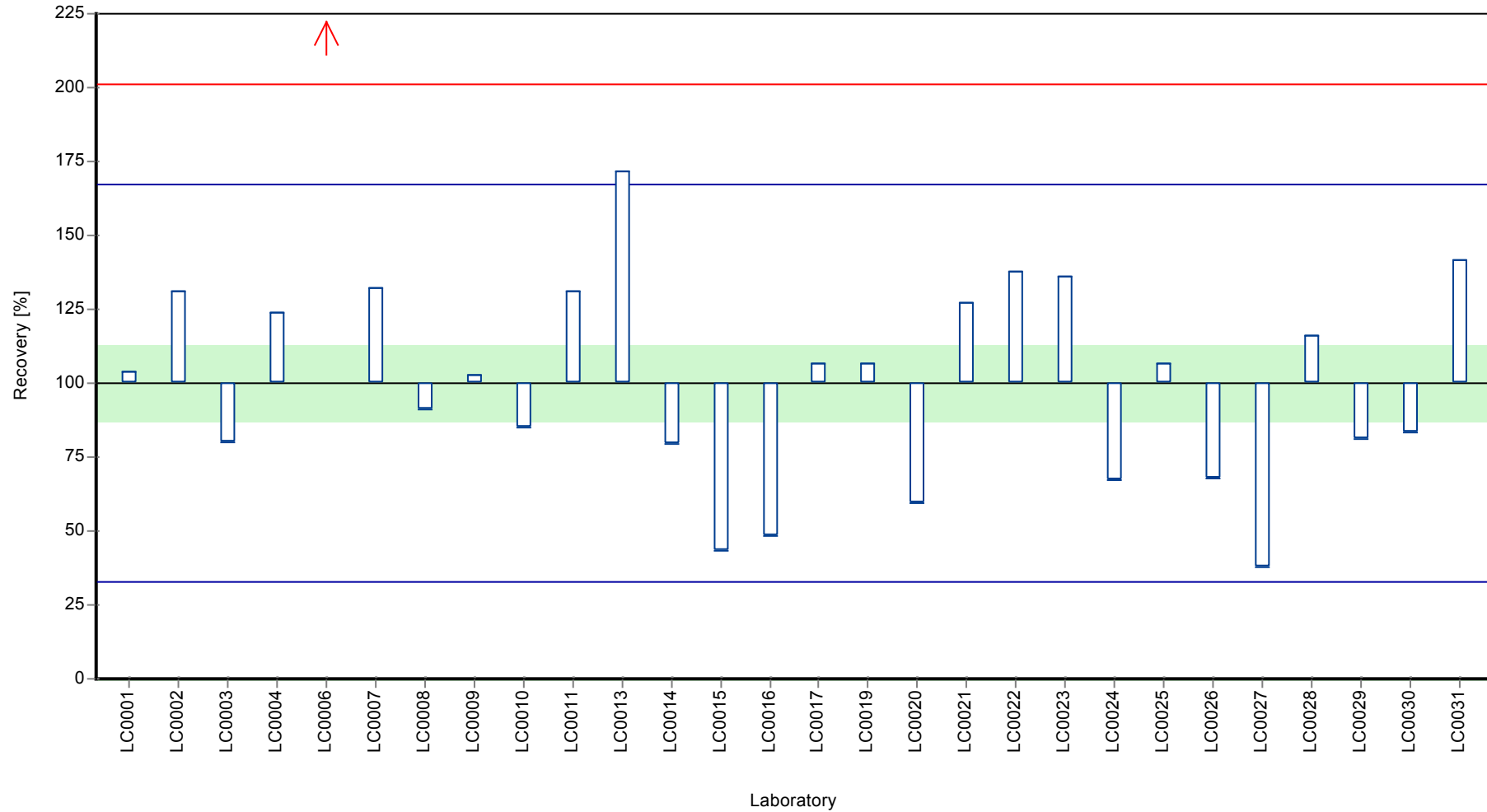
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Graphical presentation of results

Results

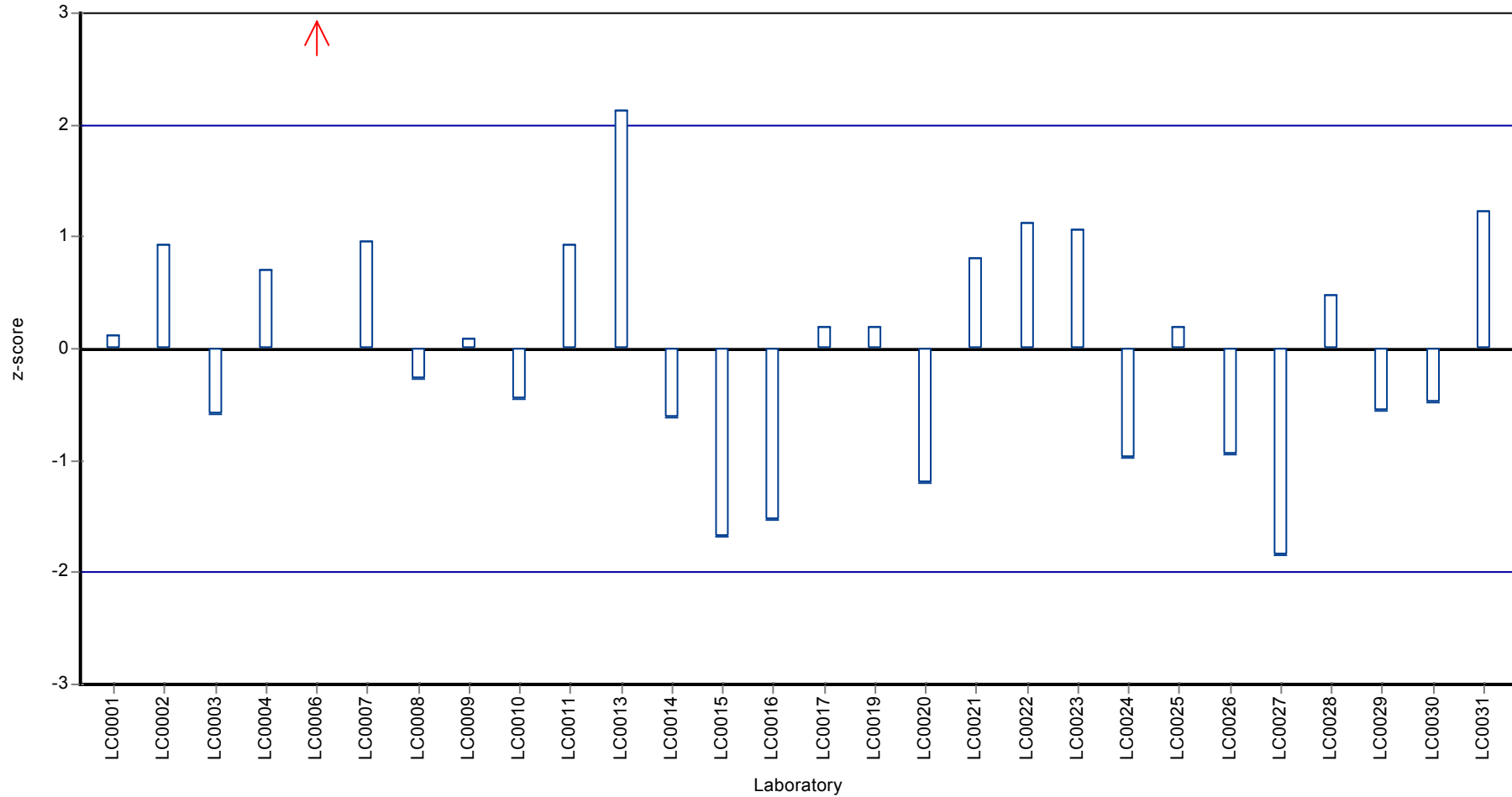


Recovery rate





Z-score



## Parameter oriented report

### SP02 B - HC-index

#### HC-Index

Unit	mg/l
Mean ± CI (99%)	0.279 ± 0.073
Minimum - Maximum	0.0899 - 0.63
Control test value ± U	0.312 ± 0.0456

Labcode	Result	± U	Recovery [%]	z-score	Comments
LC0001	0.23	0.05	82.4	-0.41	
LC0002	0.38	0.057	136	0.85	
LC0003	0.26	-	93.2	-0.16	
LC0004	0.26	0.03	93.2	-0.16	
LC0005	-	-	-	-	
LC0006	1.4	0.5	502	9.41	H
LC0007	0.4	0.038	143	1.02	
LC0008	0.16	0.048	57.3	-1	
LC0009	0.812	0.1624	291	4.47	H
LC0010	0.7	-	251	3.53	H
LC0011	0.63	0.03	226	2.95	
LC0013	0.943	0.05	338	5.57	H
LC0014	0.17	0.05	60.9	-0.92	
LC0015	0.0899	0.01349	32.2	-1.59	
LC0016	0.16	0.03	57.3	-1	
LC0017	0.36	0.1	129	0.68	
LC0018	-	-	-	-	
LC0019	0.284	0.04	102	0.04	
LC0020	0.23	0.02	82.4	-0.41	
LC0021	0.363	0.016	130	0.7	
LC0022	0.292	0.104	105	0.11	
LC0023	0.35	-	125	0.6	
LC0024	0.17	0.0391	60.9	-0.92	
LC0025	0.21	-	75.3	-0.58	
LC0026	0.25	0.03	89.6	-0.24	
LC0027	0.2	0.1	71.7	-0.66	
LC0028	0.25	0.012	89.6	-0.24	
LC0029	0.21	0.024	75.3	-0.58	
LC0030	0.287	0.03	103	0.07	
LC0031	0.5	0.15	179	1.85	
LC0032	-	-	-	-	

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**Characteristics of parameter**

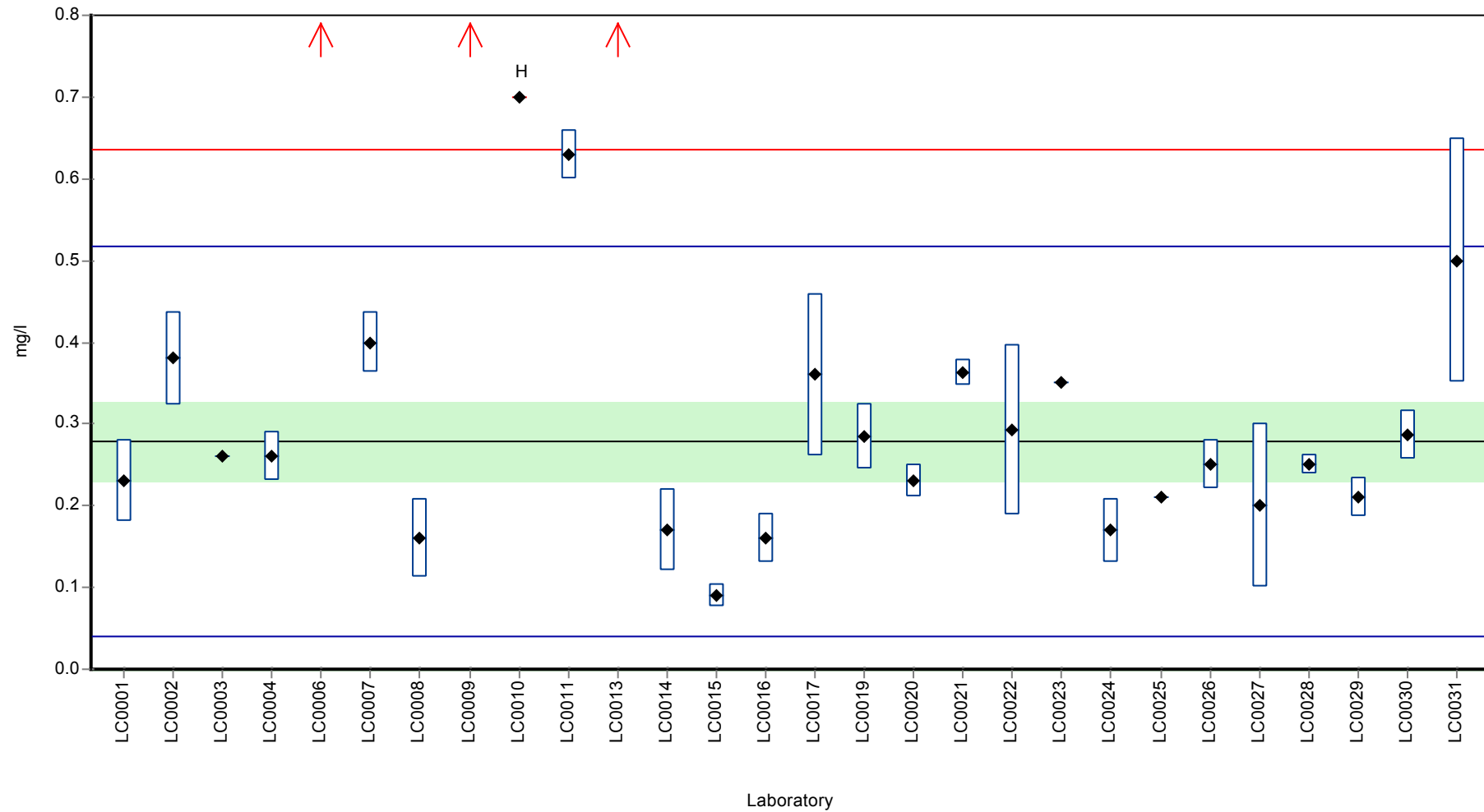
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	all results	without outliers	Unit
Mean ± CI (99%)	0.377 ± 0.162	0.279 ± 0.073	mg/l
Minimum	0.0899	0.0899	mg/l
Maximum	1.4	0.63	mg/l
Standard deviation	0.287	0.119	mg/l
rel. Standard deviation	76.1	42.7	%
n	28	24	-

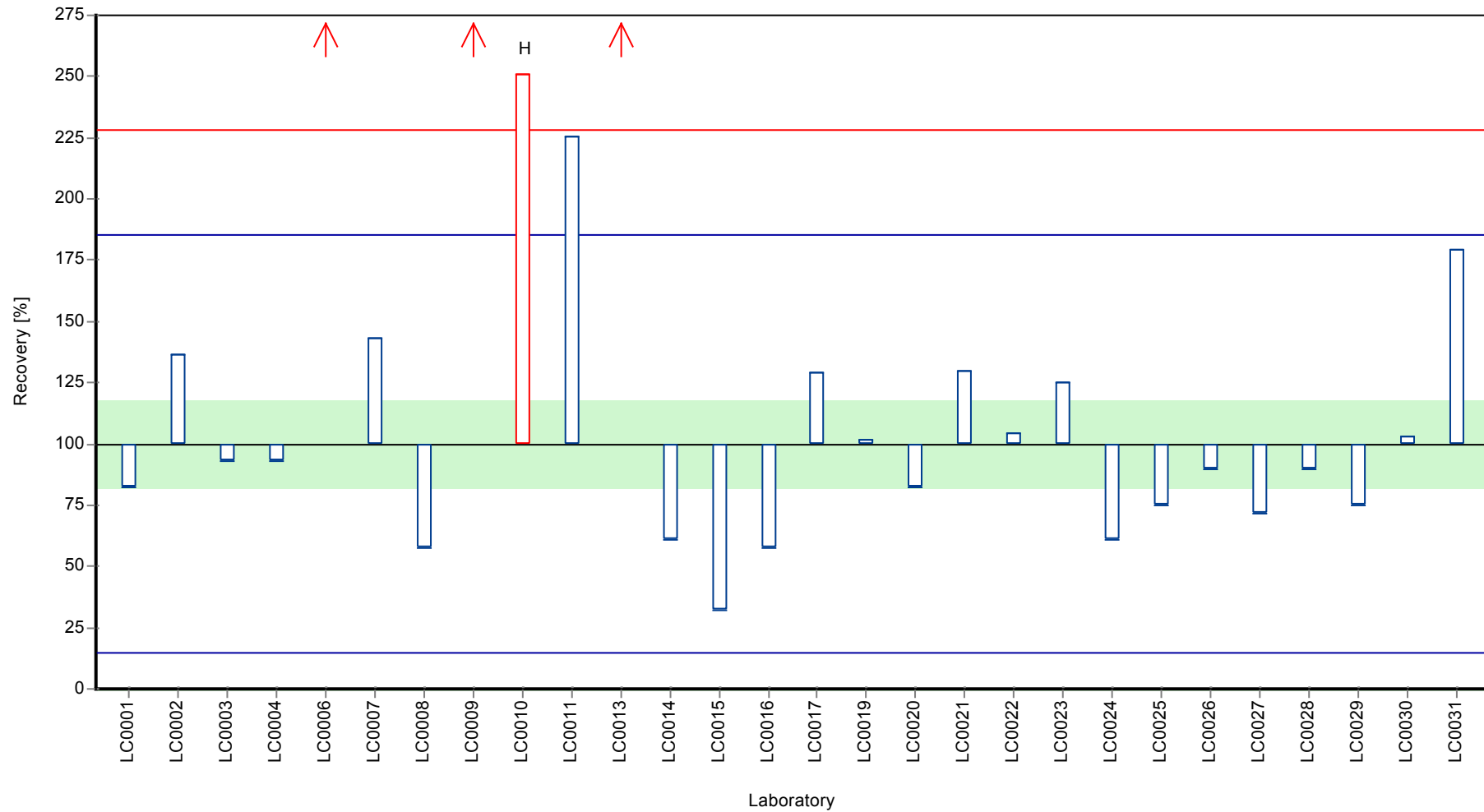
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Graphical presentation of results

Results



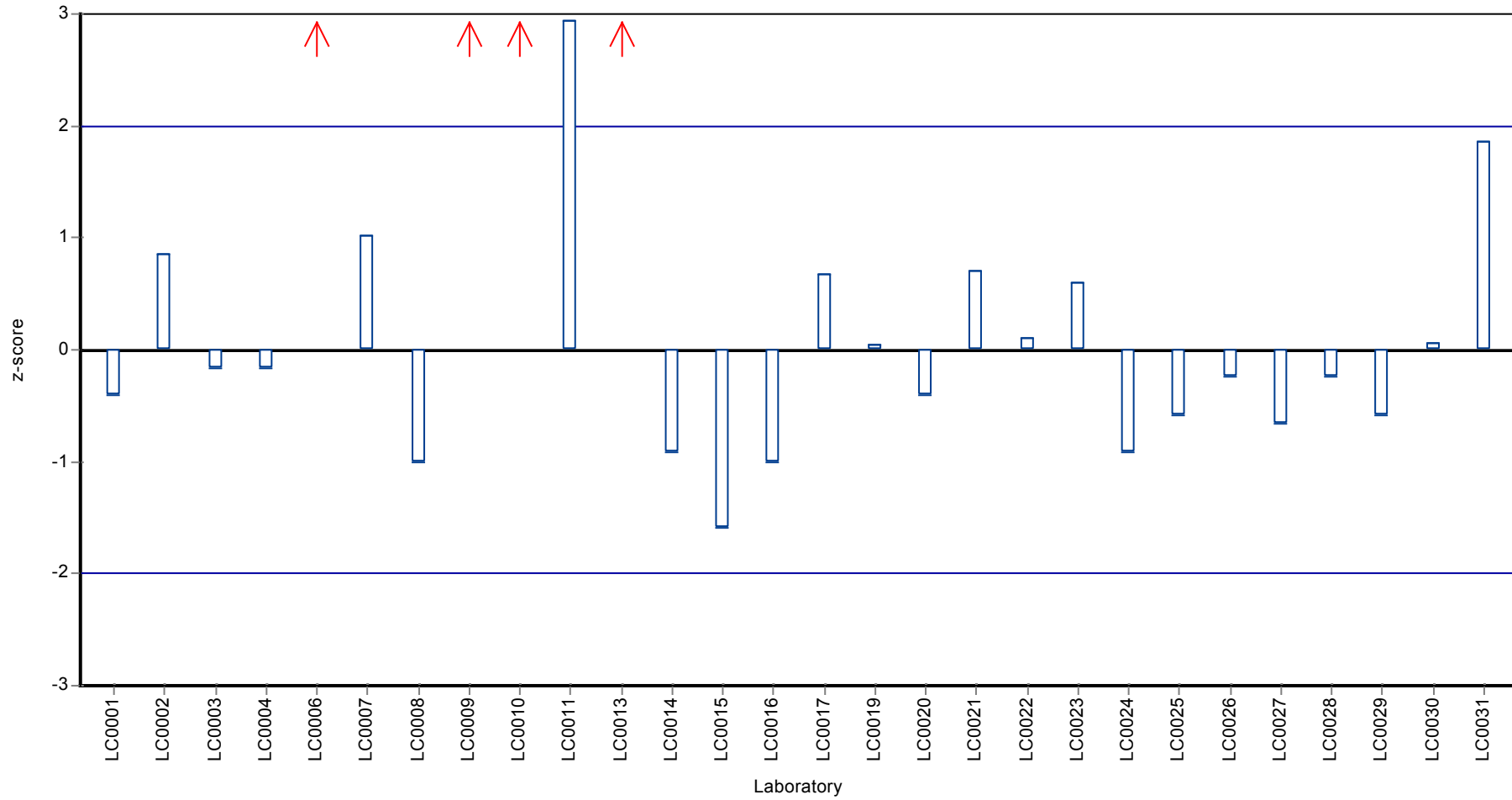
Recovery rate



Parameter oriented report Sum parameters SP02

Sample: SP02BKWI, Parameter: HC-Index

Z-score



## Parameter oriented report

### SP02 A - Phenol index

#### Phenol Index

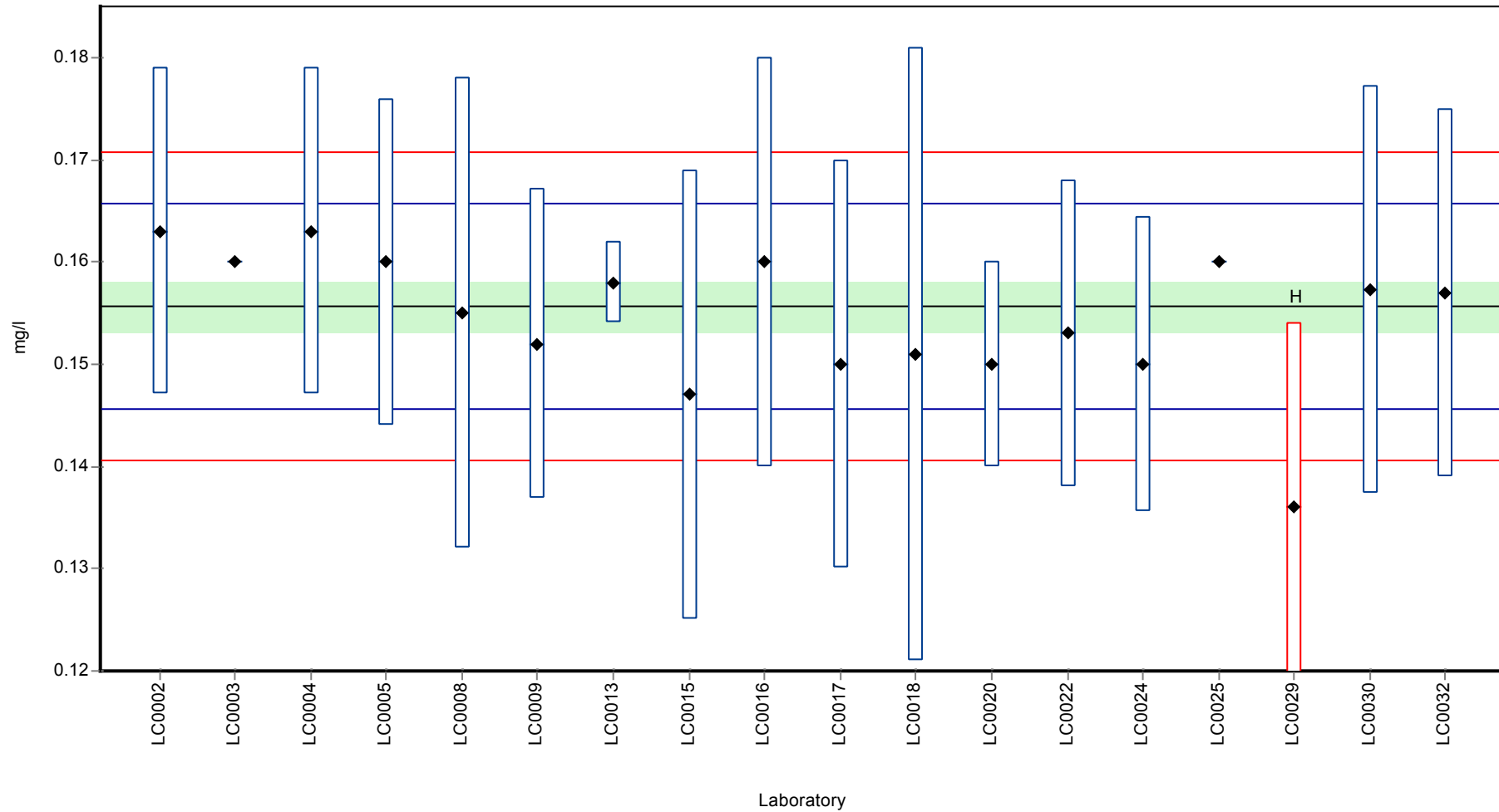
Unit	mg/l
Mean ± CI (99%)	0.156 ± 0.00367
Minimum - Maximum	0.147 - 0.163
Control test value ± U	0.159 ± 0.00179

Labcode	Result	± U	Recovery [%]	z-score	Comments
LC0002	0.163	0.016	105	1.46	
LC0003	0.16	-	103	0.86	
LC0004	0.163	0.016	105	1.46	
LC0005	0.16	0.016	103	0.86	
LC0008	0.155	0.023	99.6	-0.13	
LC0009	0.152	0.0152	97.6	-0.73	
LC0013	0.158	0.004	102	0.46	
LC0015	0.147	0.022	94.4	-1.72	
LC0016	0.16	0.02	103	0.86	
LC0017	0.15	0.02	96.4	-1.12	
LC0018	0.151	0.03	97	-0.93	
LC0020	0.15	0.01	96.4	-1.12	
LC0022	0.153	0.015	98.3	-0.53	
LC0023	-	-	-	-	
LC0024	0.15	0.0144	96.4	-1.12	
LC0025	0.16	-	103	0.86	
LC0028	-	-	-	-	
LC0029	0.136	0.018	87.4	-3.9	H
LC0030	0.15727	0.02	101	0.32	
LC0032	0.157	0.018	101	0.27	

#### Characteristics of parameter

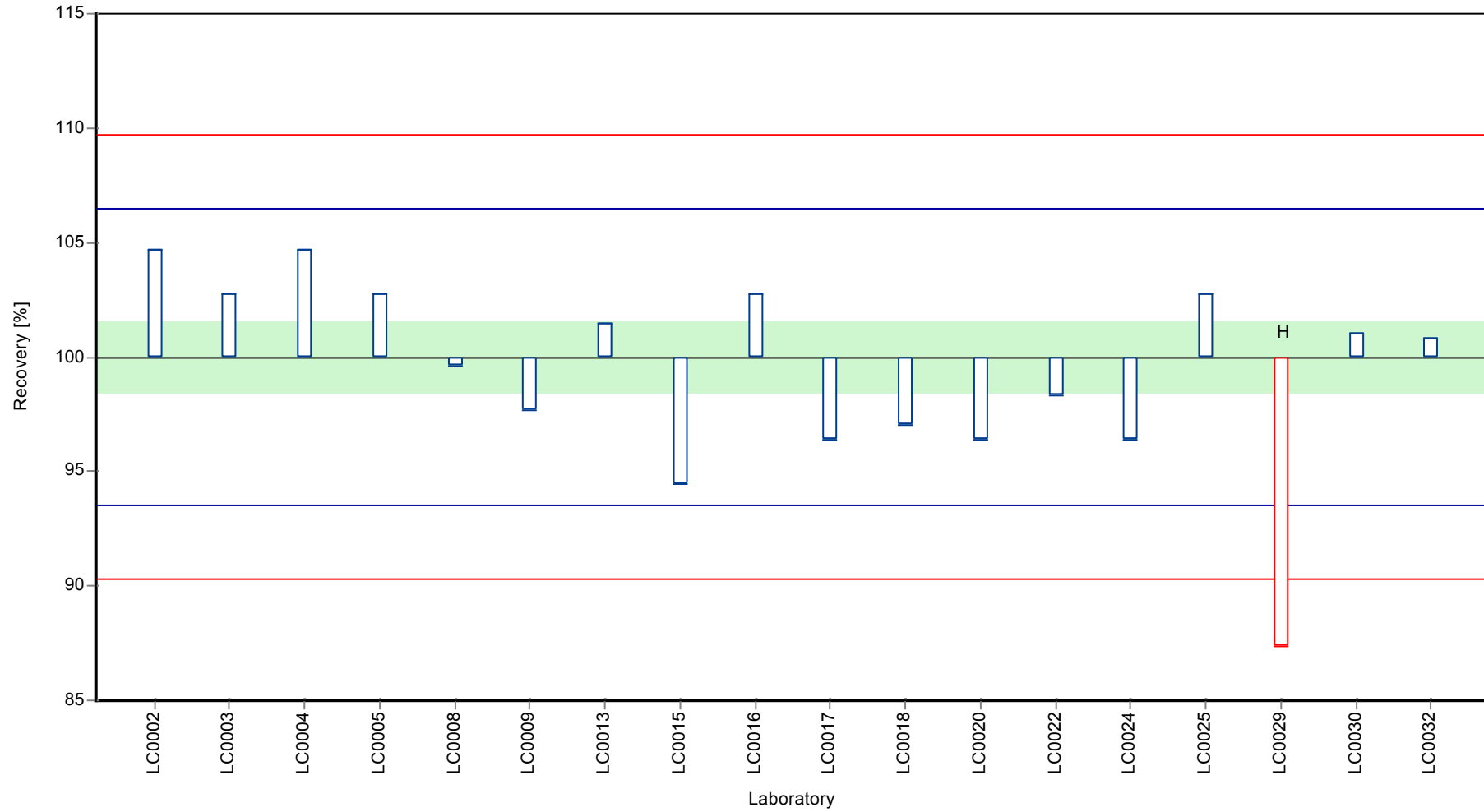
	all results	without outliers	Unit
Mean ± CI (99%)	0.155 ± 0.00476	0.156 ± 0.00367	mg/l
Minimum	0.136	0.147	mg/l
Maximum	0.163	0.163	mg/l
Standard deviation	0.00674	0.00504	mg/l
rel. Standard deviation	4.36	3.24	%
n	18	17	-

**Graphical presentation of results**  
**Results**





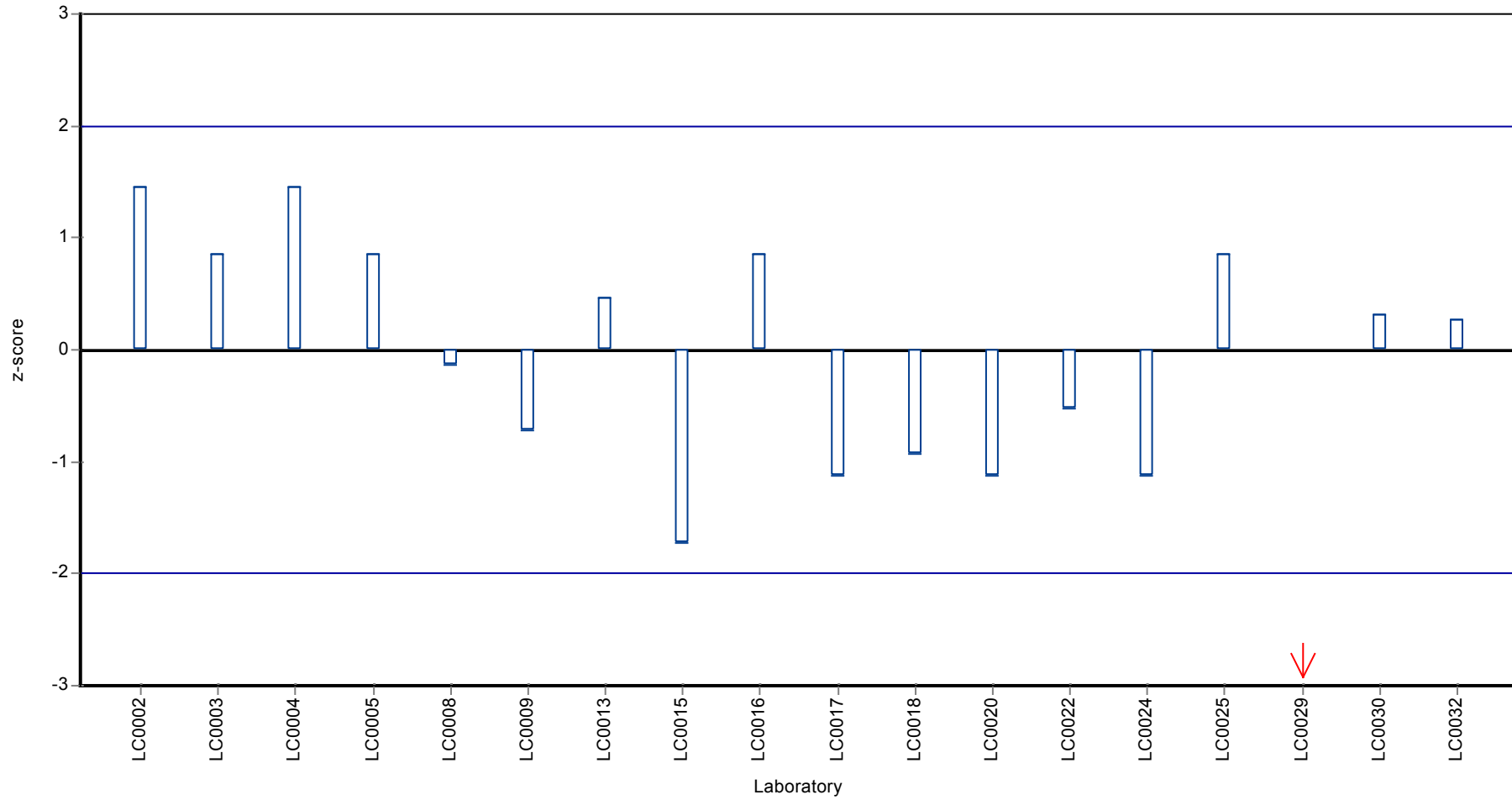
Recovery rate



Parameter oriented report Sum parameters SP02

Sample: SP02APHE, Parameter: Phenol Index

Z-score



## Parameter oriented report

### SP02 B - Phenol index

#### Phenol Index

Unit	mg/l
Mean ± CI (99%)	0.0664 ± 0.00341
Minimum - Maximum	0.06 - 0.078
Control test value ± U	0.068 ± 0.00141

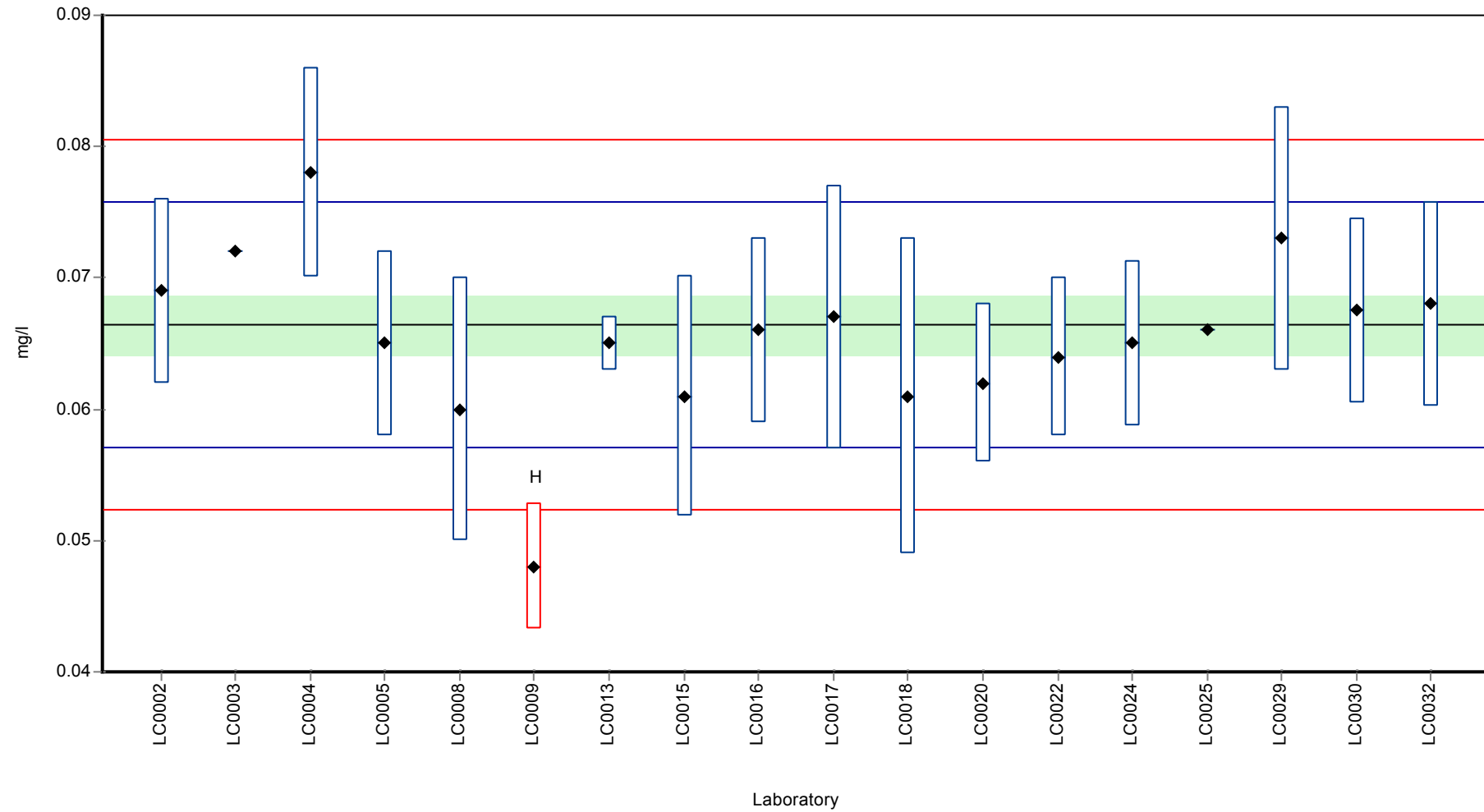
Labcode	Result	± U	Recovery [%]	z-score	Comments
LC0002	0.069	0.007	104	0.55	
LC0003	0.072	-	108	1.19	
LC0004	0.078	0.008	117	2.47	
LC0005	0.065	0.007	97.8	-0.31	
LC0008	0.06	0.01	90.3	-1.38	
LC0009	0.048	0.0048	72.2	-3.94	H
LC0013	0.065	0.002	97.8	-0.31	
LC0015	0.061	0.0092	91.8	-1.16	
LC0016	0.066	0.007	99.3	-0.09	
LC0017	0.067	0.01	101	0.12	
LC0018	0.061	0.012	91.8	-1.16	
LC0020	0.062	0.006	93.3	-0.95	
LC0022	0.064	0.006	96.3	-0.52	
LC0023	-	-	-	-	
LC0024	0.065	0.00624	97.8	-0.31	
LC0025	0.066	-	99.3	-0.09	
LC0028	-	-	-	-	
LC0029	0.073	0.01	110	1.4	
LC0030	0.06751	0.007	102	0.23	
LC0032	0.068	0.0078	102	0.33	

#### Characteristics of parameter

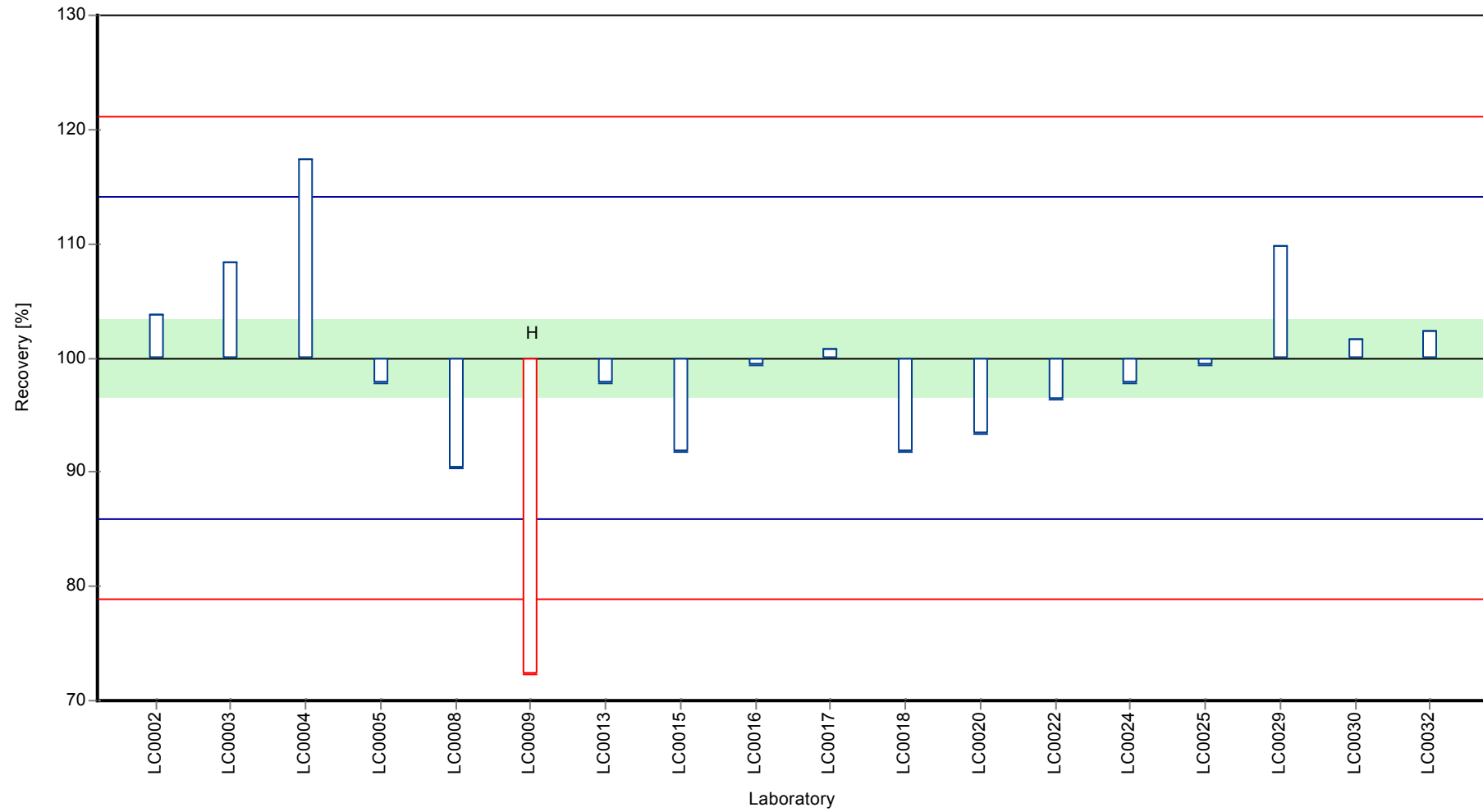
	all results	without outliers	Unit
Mean ± CI (99%)	0.0654 ± 0.00445	0.0664 ± 0.00341	mg/l
Minimum	0.048	0.06	mg/l
Maximum	0.078	0.078	mg/l
Standard deviation	0.00629	0.00468	mg/l
rel. Standard deviation	9.61	7.05	%
n	18	17	-

Graphical presentation of results

Results



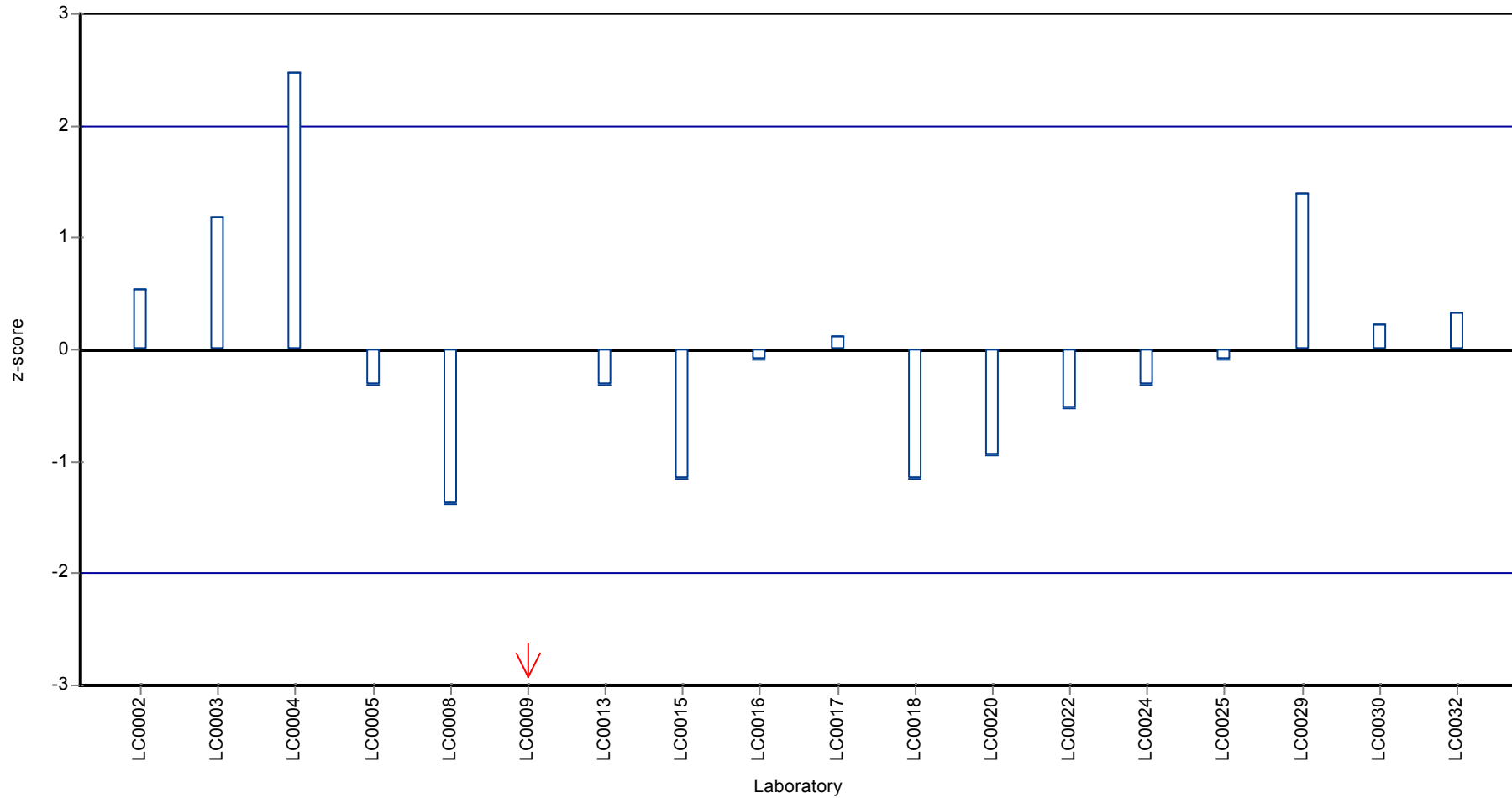
Recovery rate



Parameter oriented report Sum parameters SP02

Sample: SP02BPHE, Parameter: Phenol Index

Z-score



## 8 Laboratory oriented report

The laboratory oriented report is sorted by laboratory code.

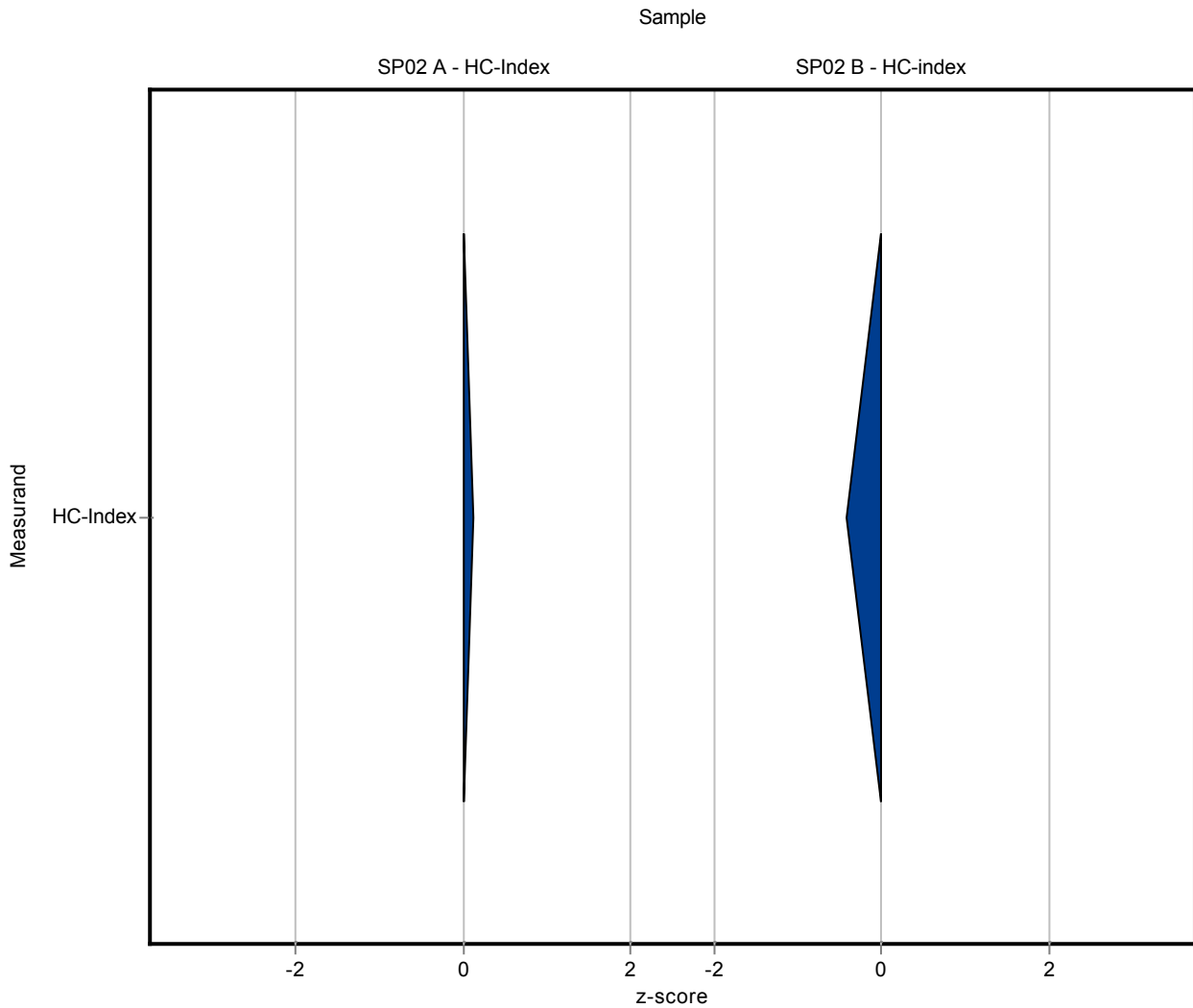
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	1.1	0.22	0.357	104	0.11

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.23	0.05	0.119	82.4	-0.41





The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.39	0.21	0.357	131	0.93

Sample: SP02APHE

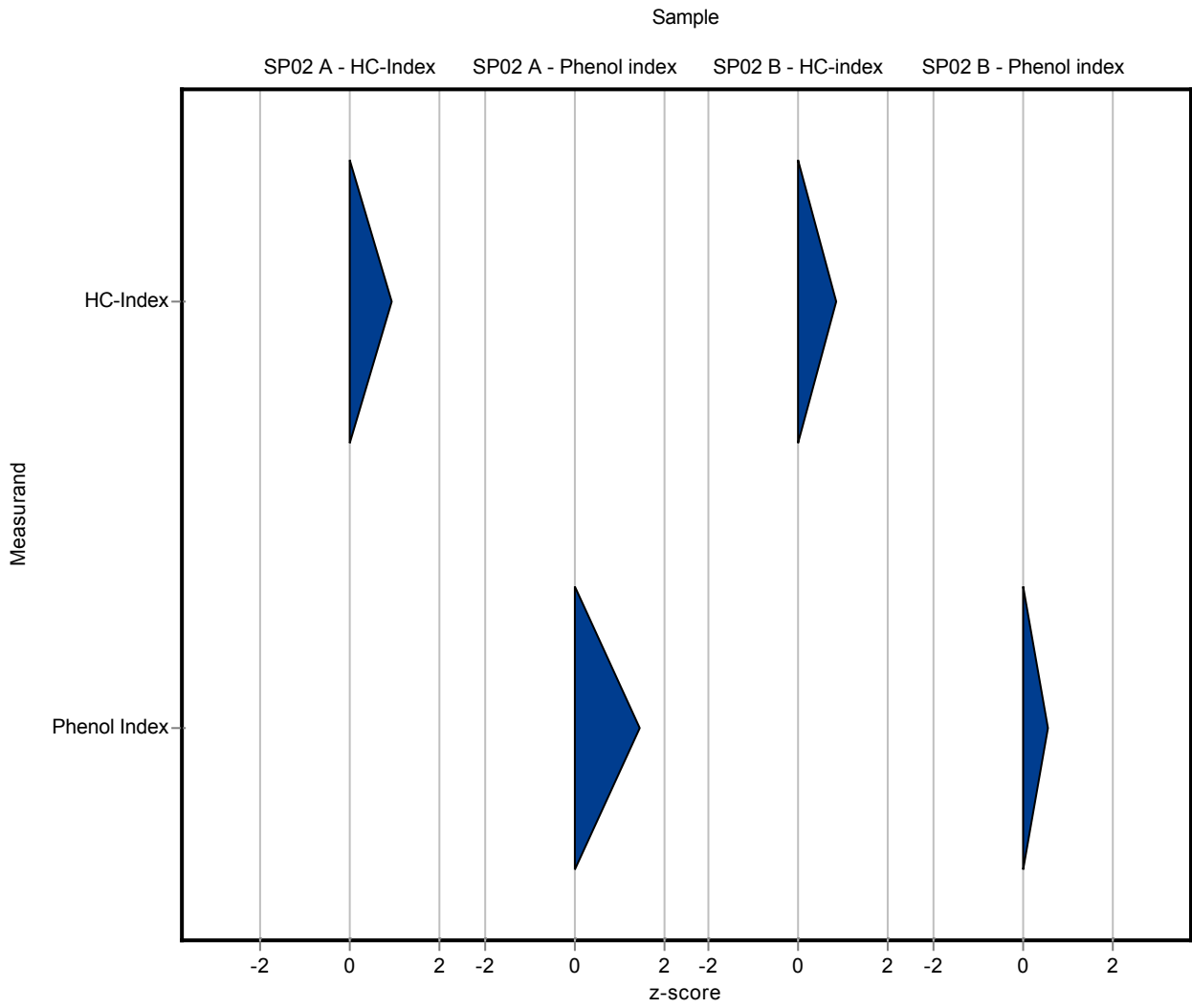
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.163	0.016	0.00504	105	1.46

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.38	0.057	0.119	136	0.85

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.069	0.007	0.00468	104	0.55



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.85	-	0.357	80.2	-0.59

Sample: SP02APHE

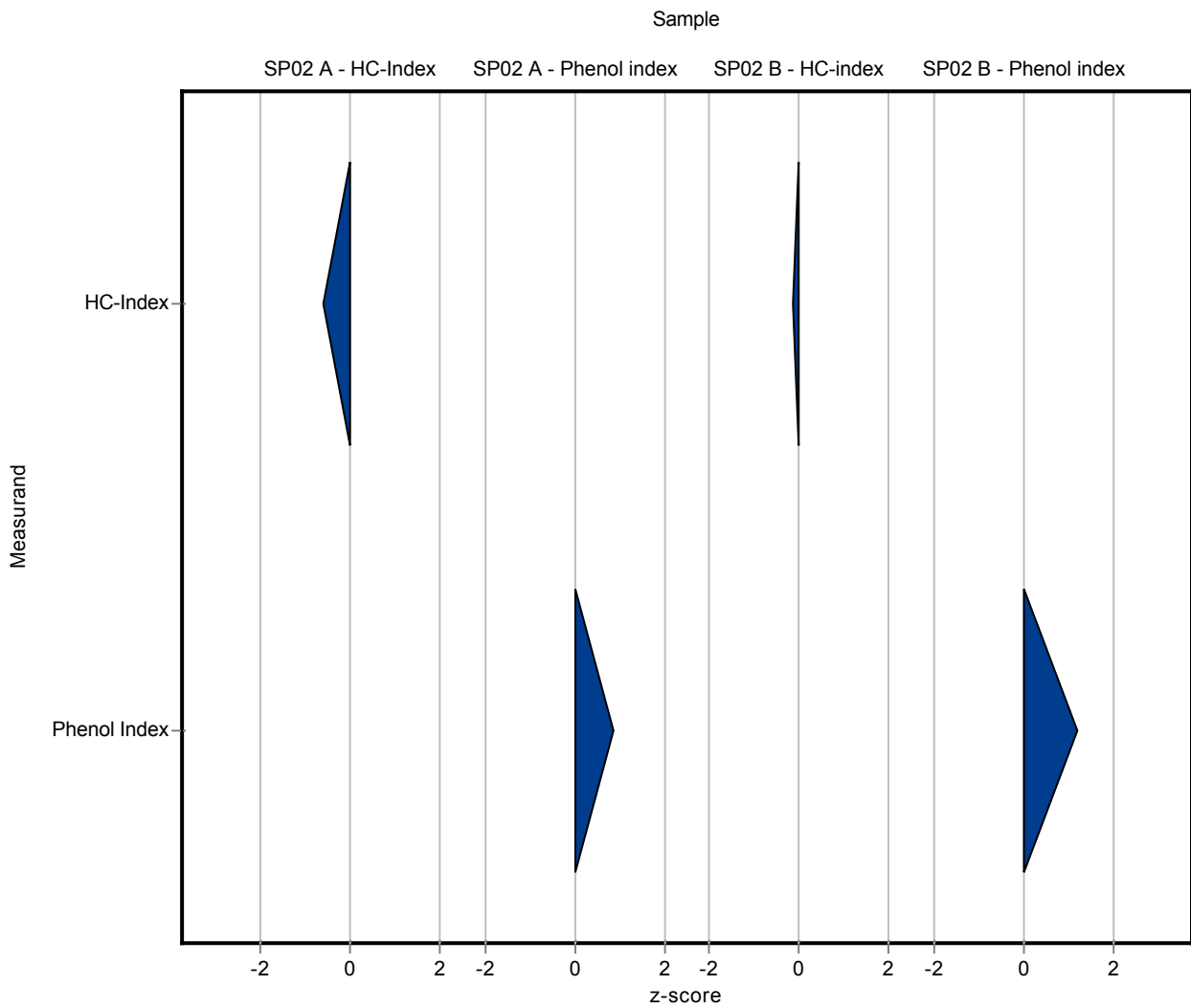
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.16	-	0.00504	103	0.86

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.26	-	0.119	93.2	-0.16

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.072	-	0.00468	108	1.19



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.31	0.13	0.357	124	0.7

Sample: SP02APHE

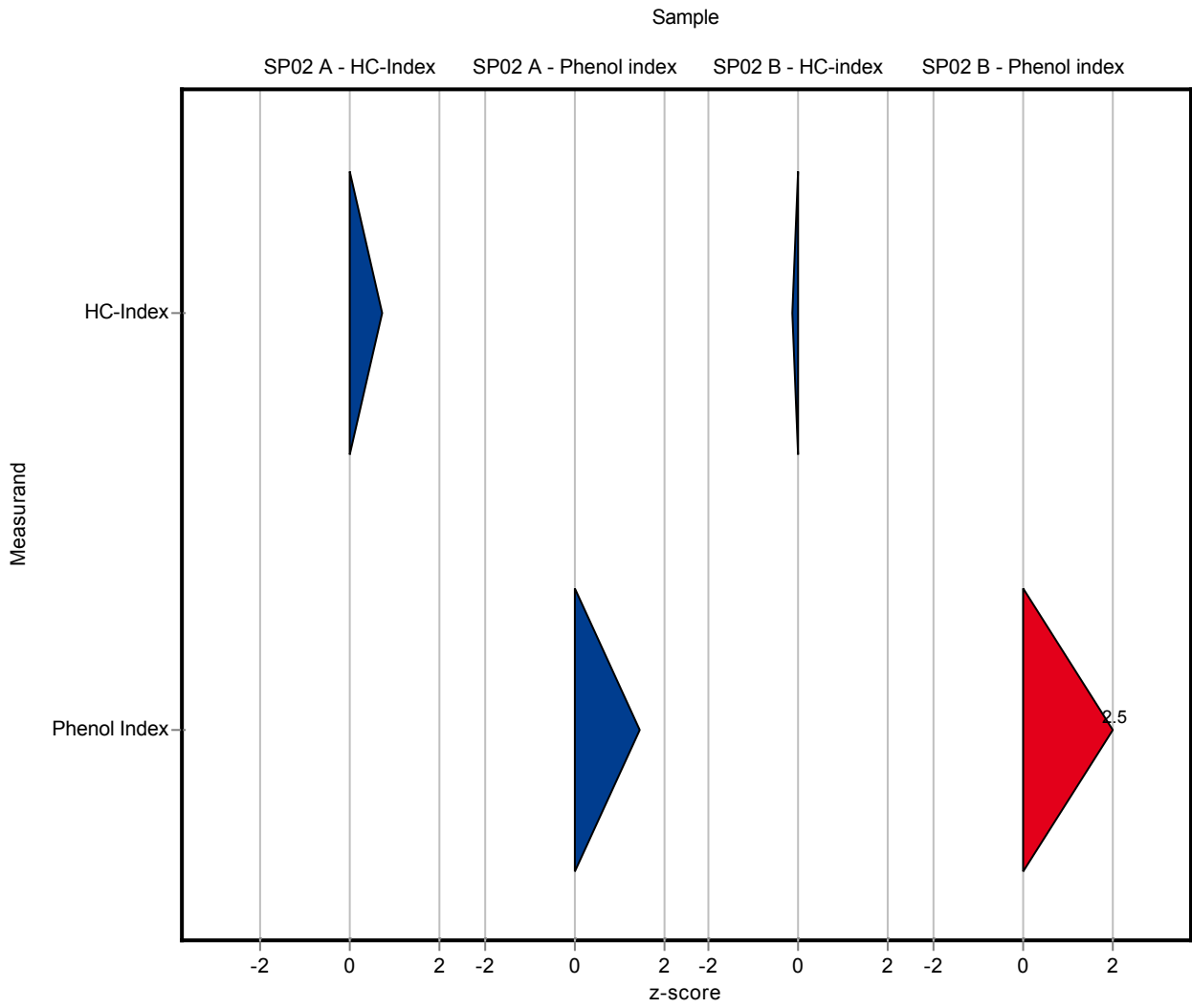
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.163	0.016	0.00504	105	1.46

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.26	0.03	0.119	93.2	-0.16

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.078	0.008	0.00468	117	2.47



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	-	-	0.357	-	-

Sample: SP02APHE

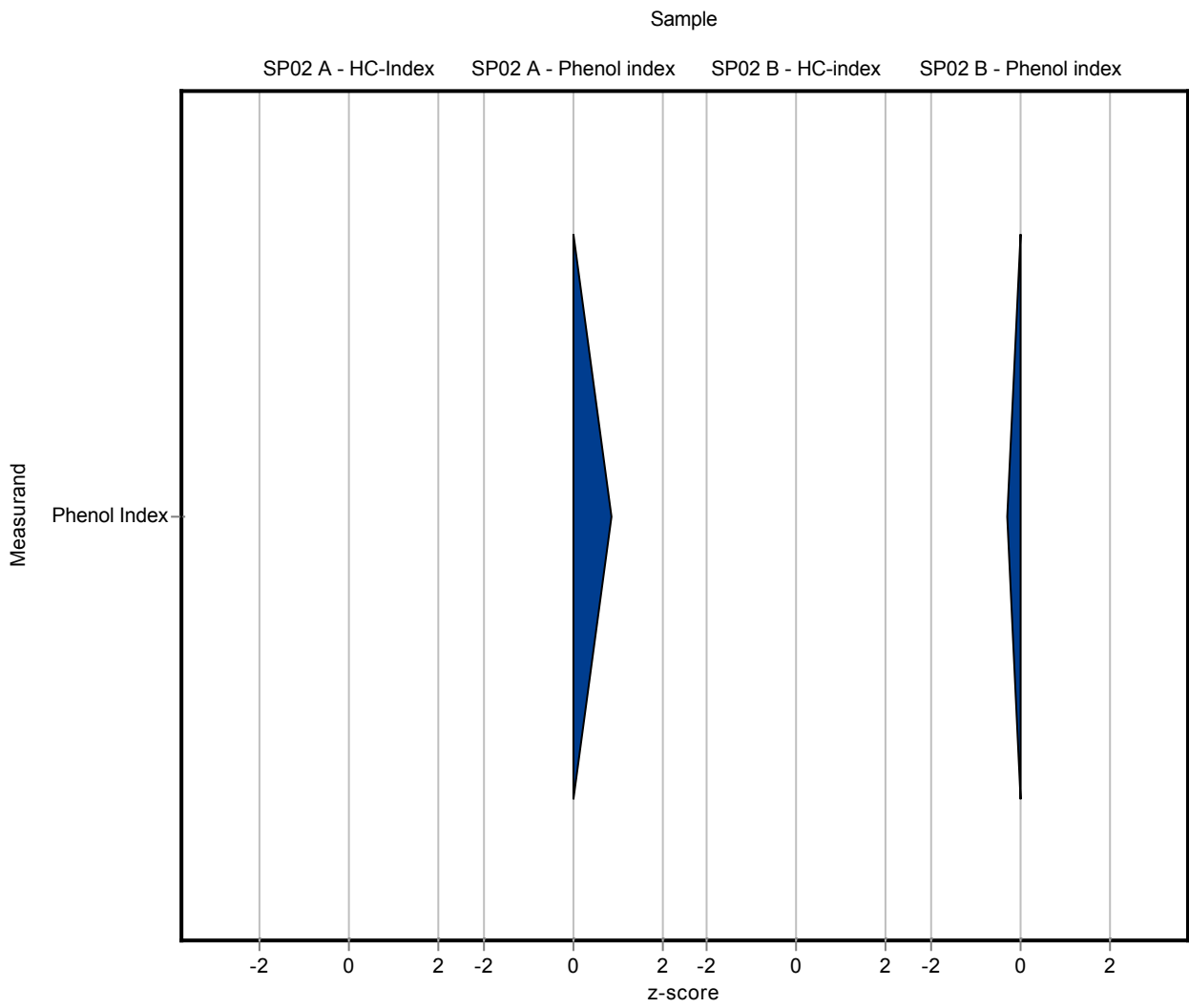
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.16	0.016	0.00504	103	0.86

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	-	-	0.119	-	-

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.065	0.007	0.00468	97.8	-0.31





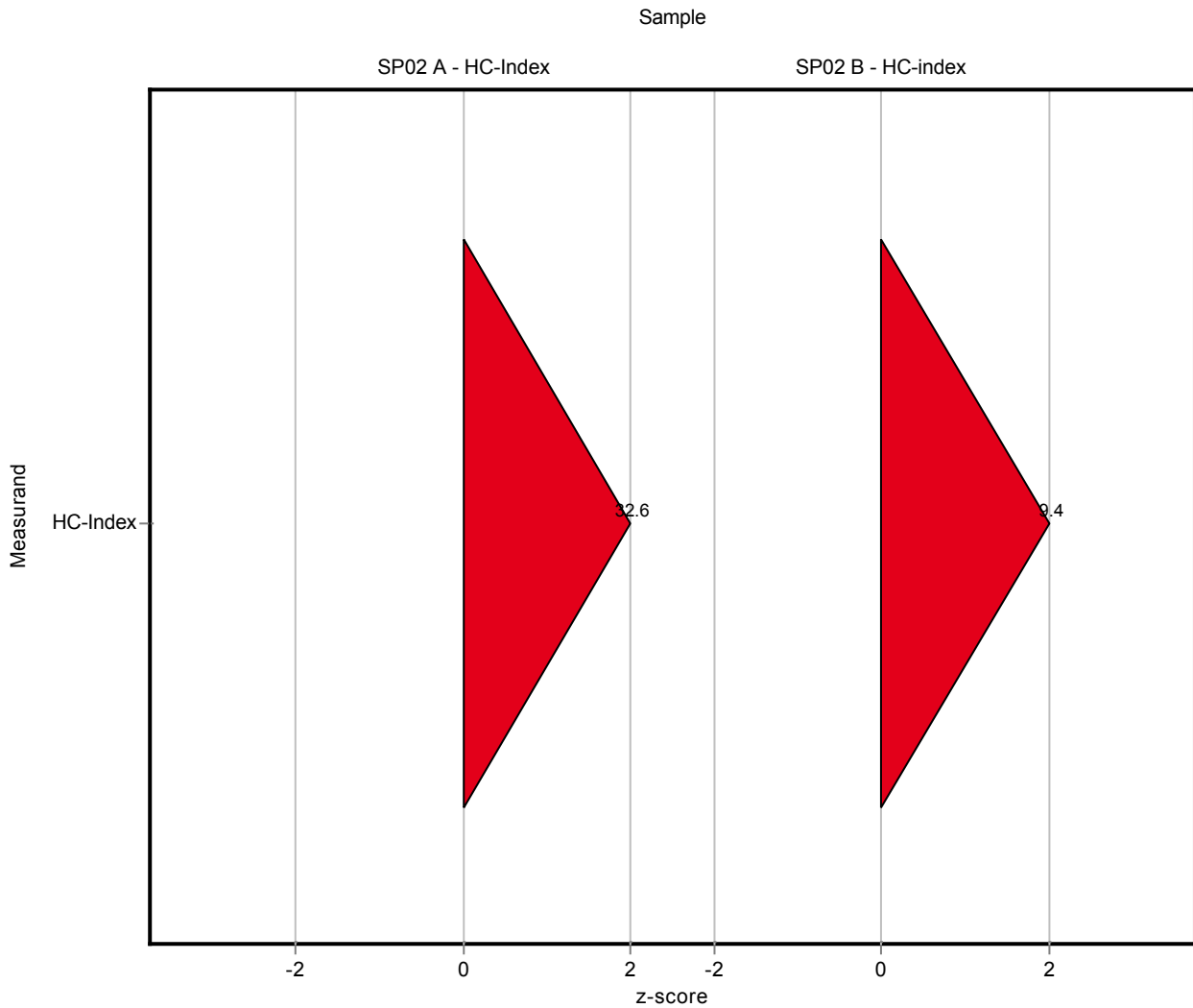
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	12.7	0.7	0.357	1200	32.6

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	1.4	0.5	0.119	502	9.41



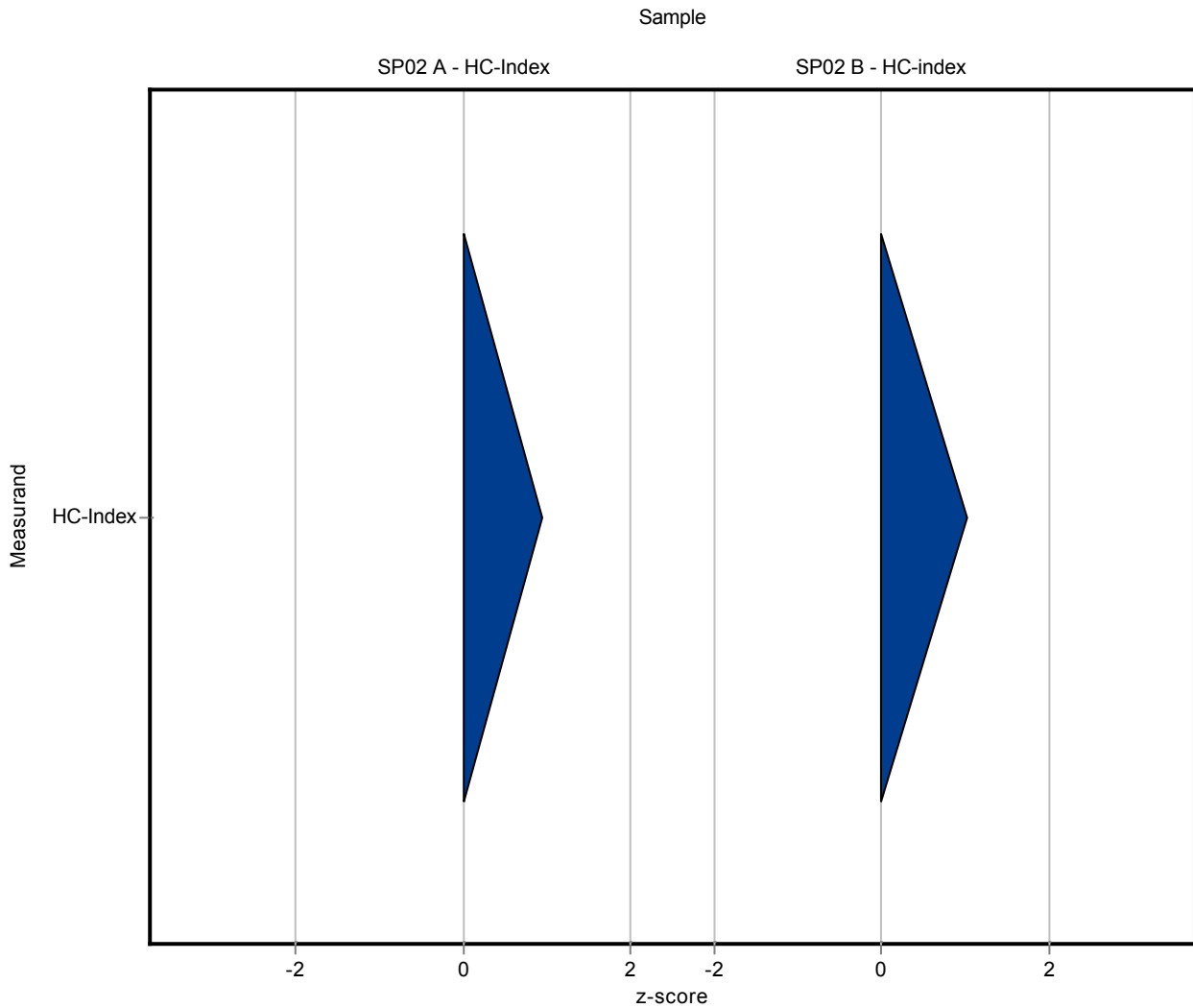
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	1.4	0.067	0.357	132	0.95

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.4	0.038	0.119	143	1.02



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.965	0.289	0.357	91.1	-0.26

Sample: SP02APHE

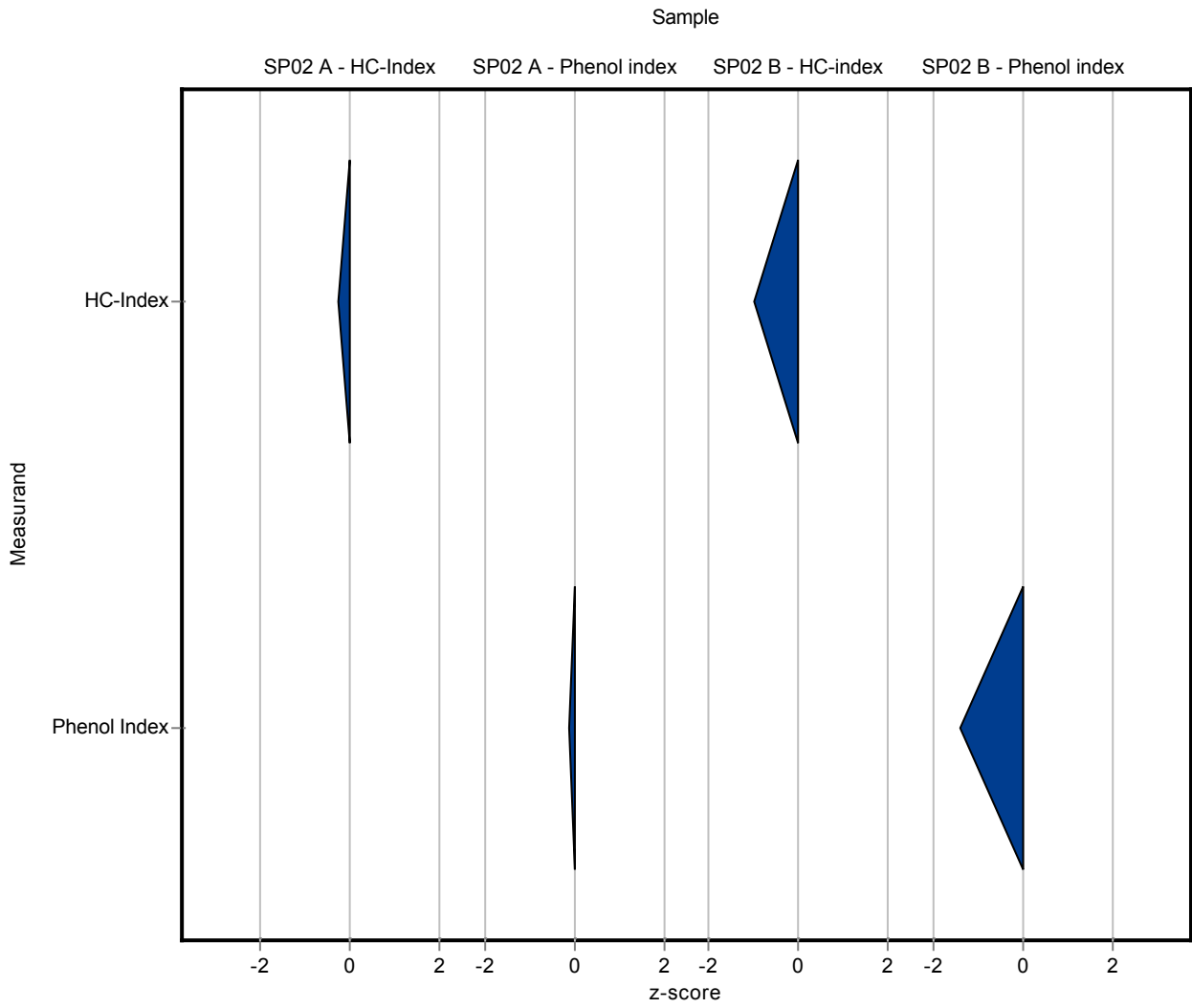
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.155	0.023	0.00504	99.6	-0.13

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.16	0.048	0.119	57.3	-1

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.06	0.01	0.00468	90.3	-1.38



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.091	0.2182	0.357	103	0.09

Sample: SP02APHE

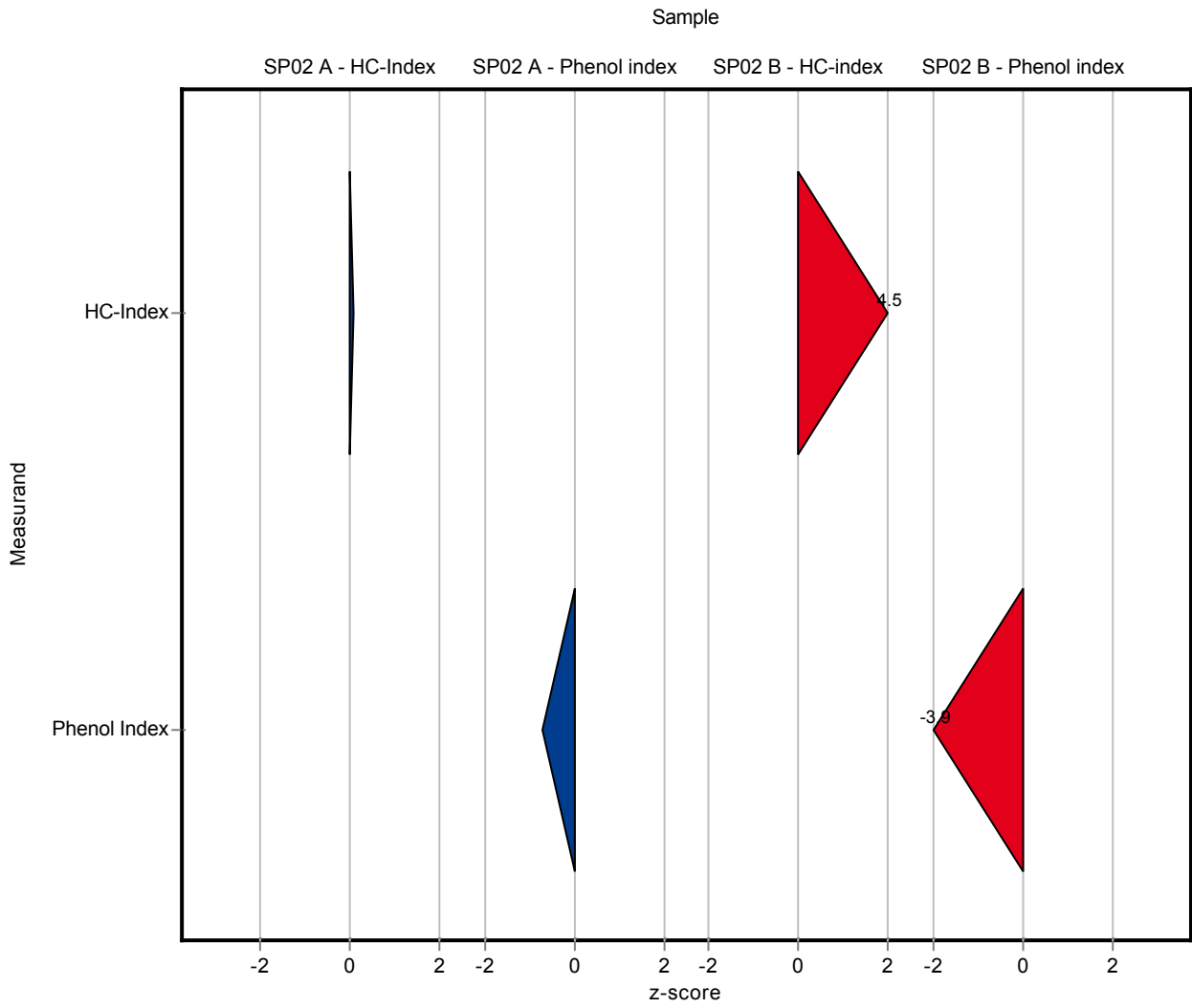
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.152	0.0152	0.00504	97.6	-0.73

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.812	0.1624	0.119	291	4.47

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.048	0.0048	0.00468	72.2	-3.94



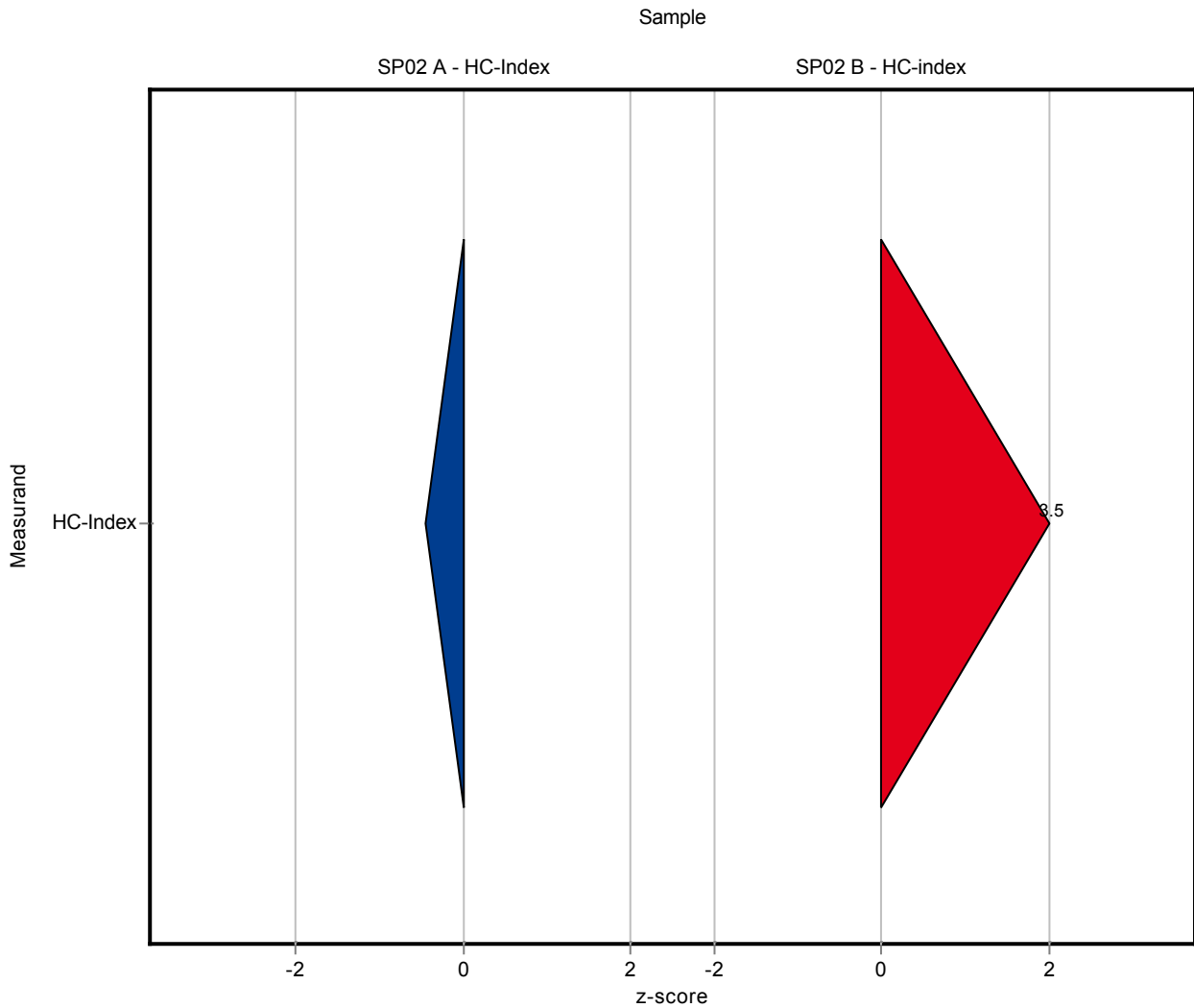
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	0.899	-	0.357	84.9	-0.45

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.7	-	0.119	251	3.53



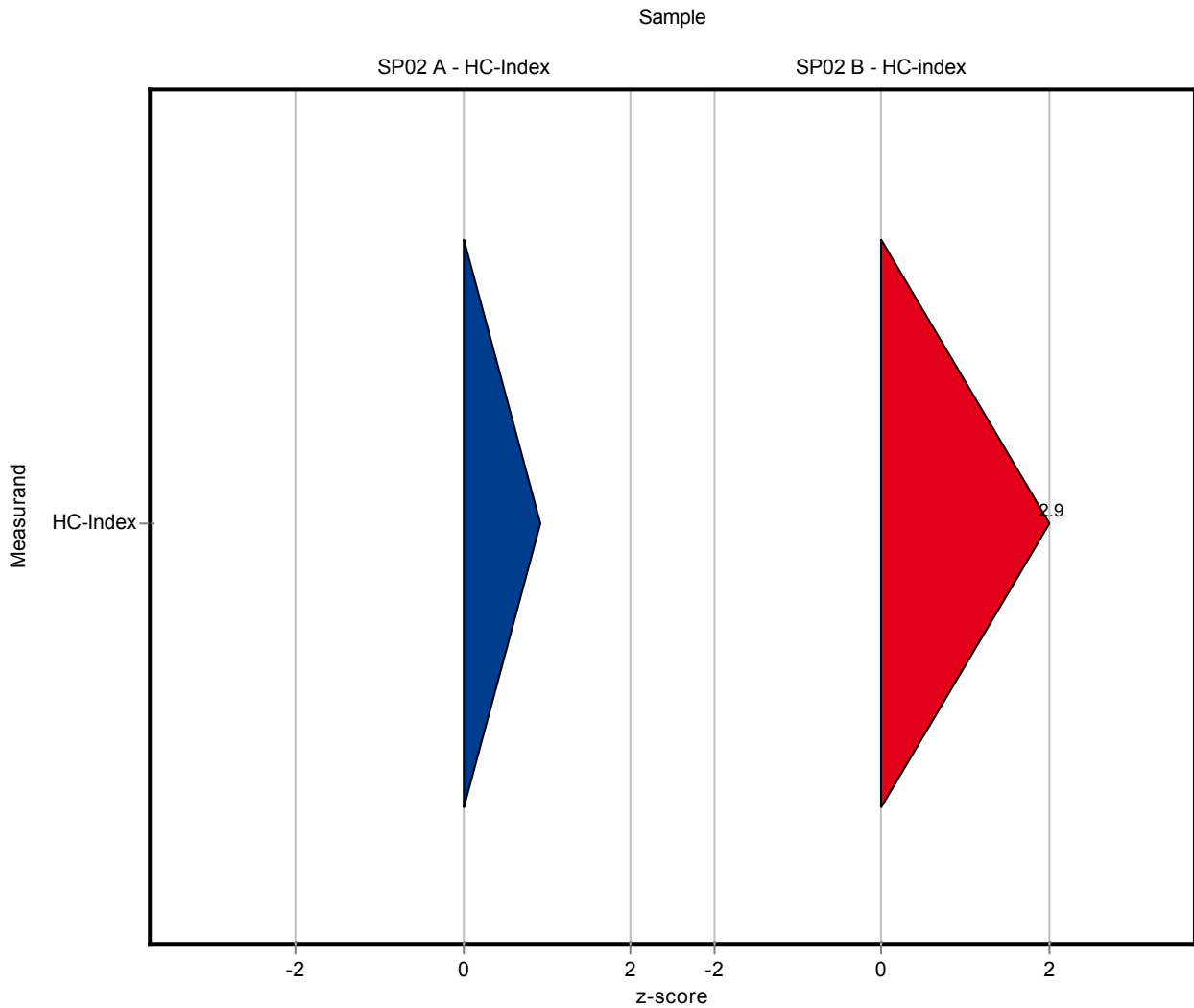
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	1.39	0.05	0.357	131	0.93

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.63	0.03	0.119	226	2.95





The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.821	0.1	0.357	172	2.13

Sample: SP02APHE

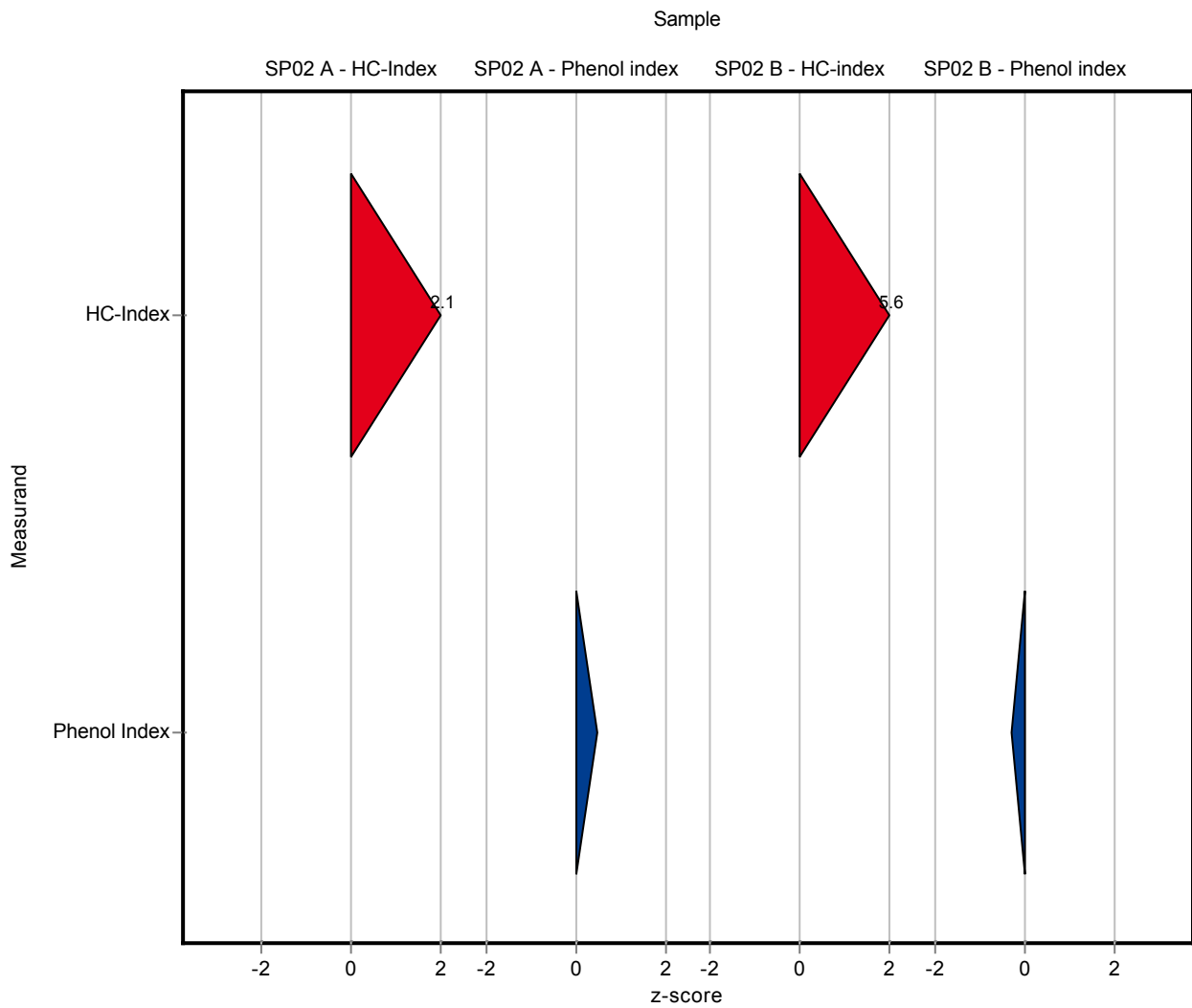
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.158	0.004	0.00504	102	0.46

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.943	0.05	0.119	338	5.57

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.065	0.002	0.00468	97.8	-0.31



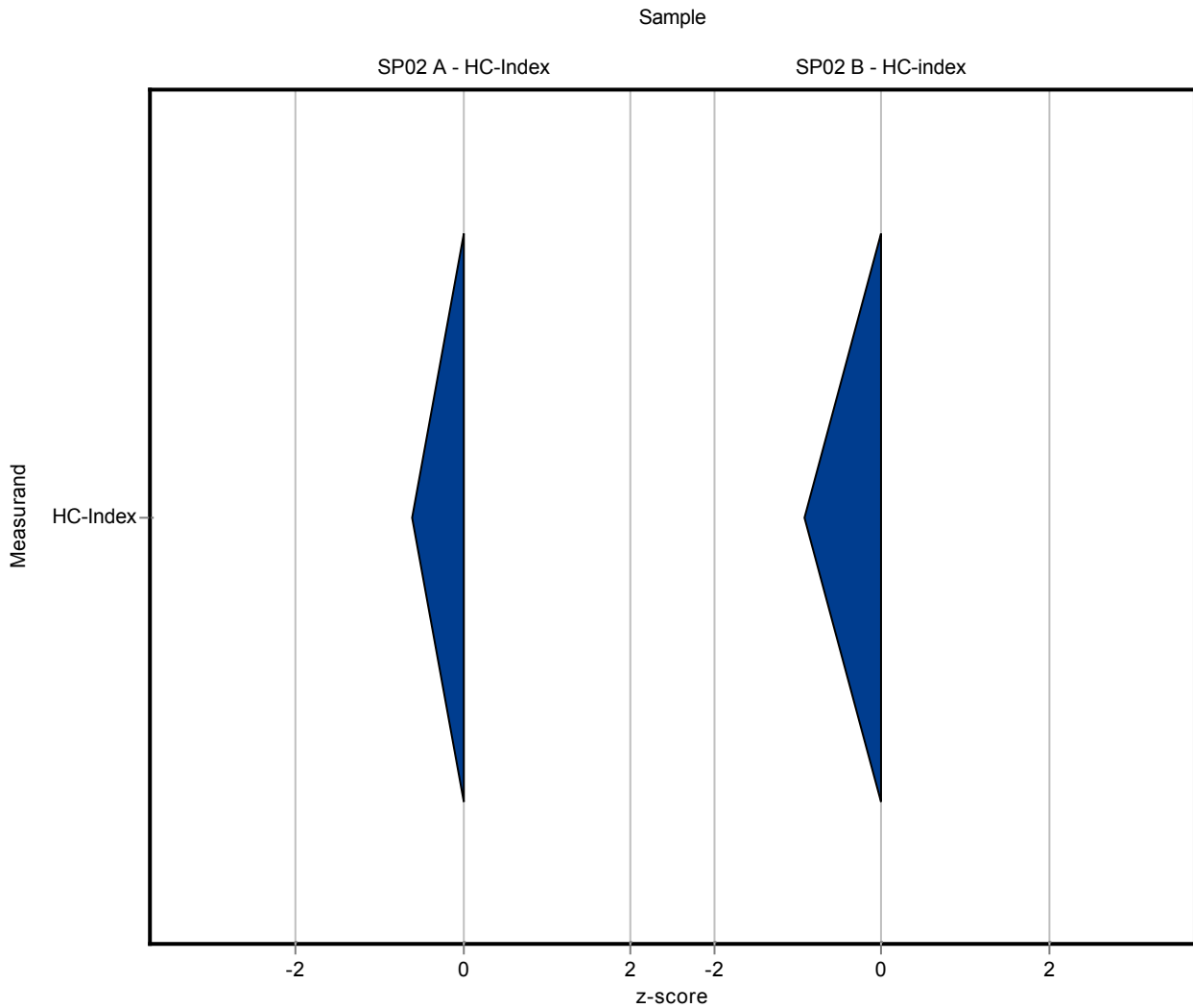
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	0.84	0.25	0.357	79.3	-0.61

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.17	0.05	0.119	60.9	-0.92



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.4615	0.06922	0.357	43.6	-1.67

Sample: SP02APHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.147	0.022	0.00504	94.4	-1.72

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.0899	0.01349	0.119	32.2	-1.59

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.061	0.0092	0.00468	91.8	-1.16



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.51	0.1	0.357	48.1	-1.54

Sample: SP02APHE

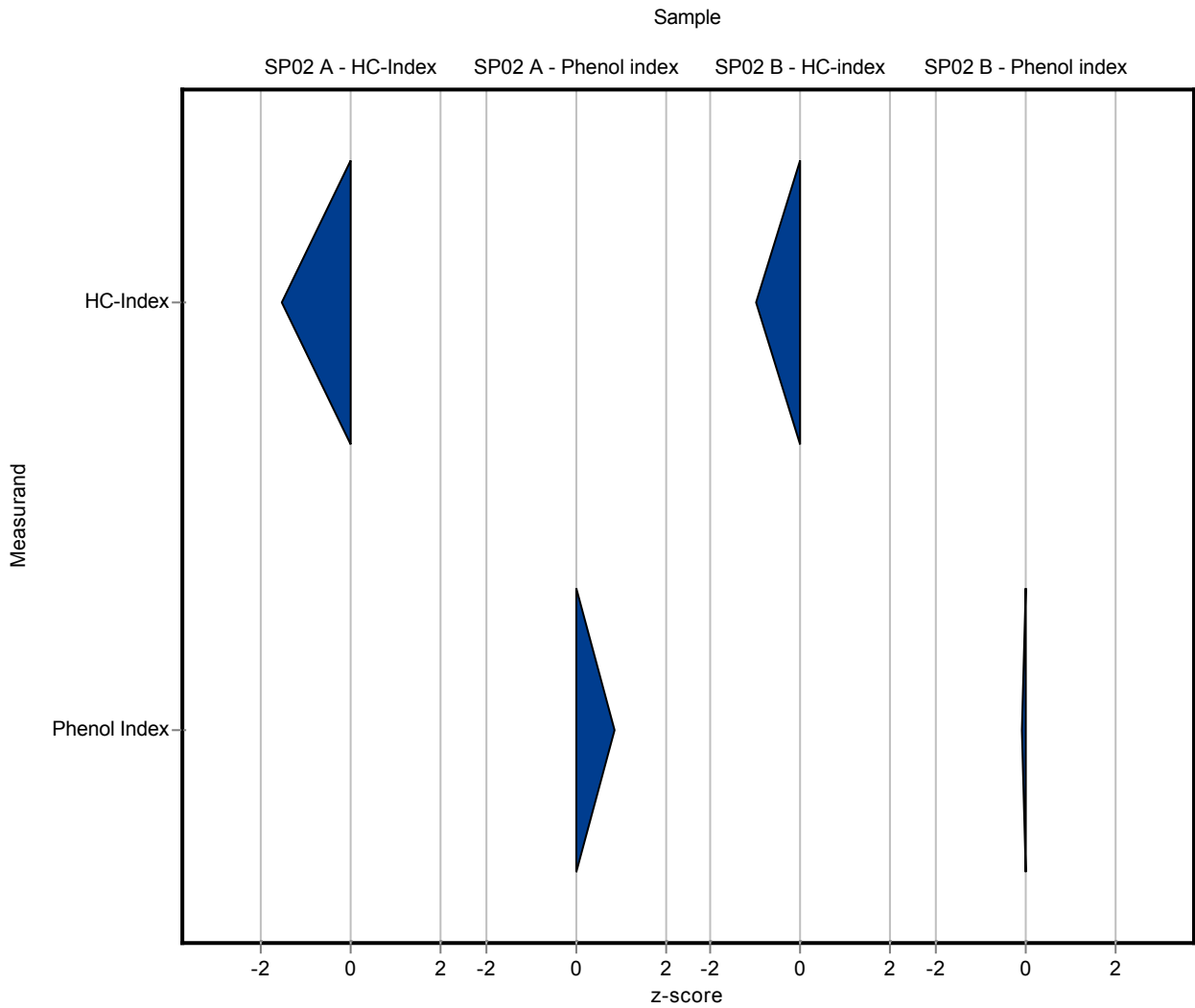
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.16	0.02	0.00504	103	0.86

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.16	0.03	0.119	57.3	-1

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.066	0.007	0.00468	99.3	-0.09



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.13	0.3	0.357	107	0.2

Sample: SP02APHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.15	0.02	0.00504	96.4	-1.12

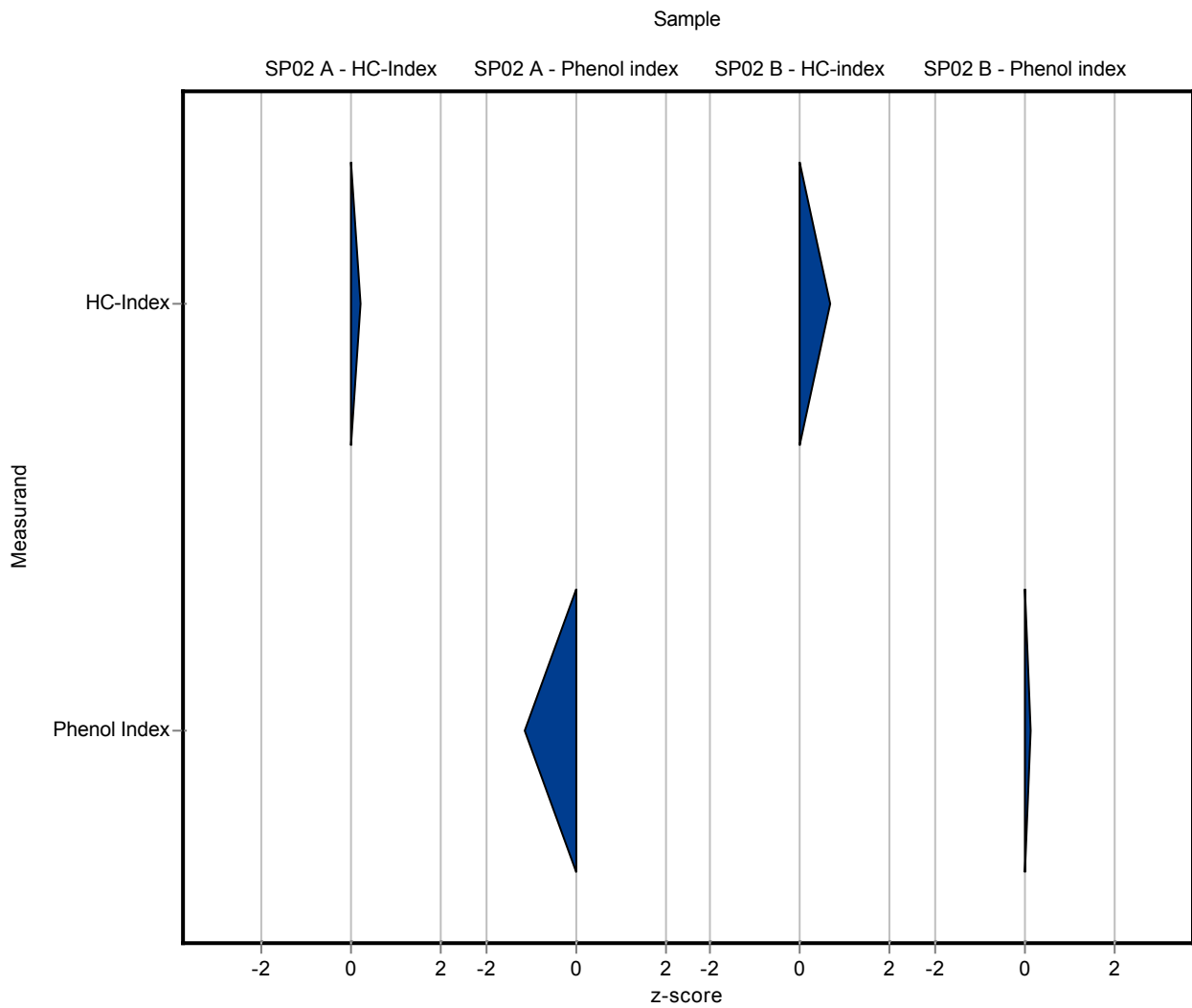
Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.36	0.1	0.119	129	0.68

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.067	0.01	0.00468	101	0.12





The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	-	-	0.357	-	-

Sample: SP02APHE

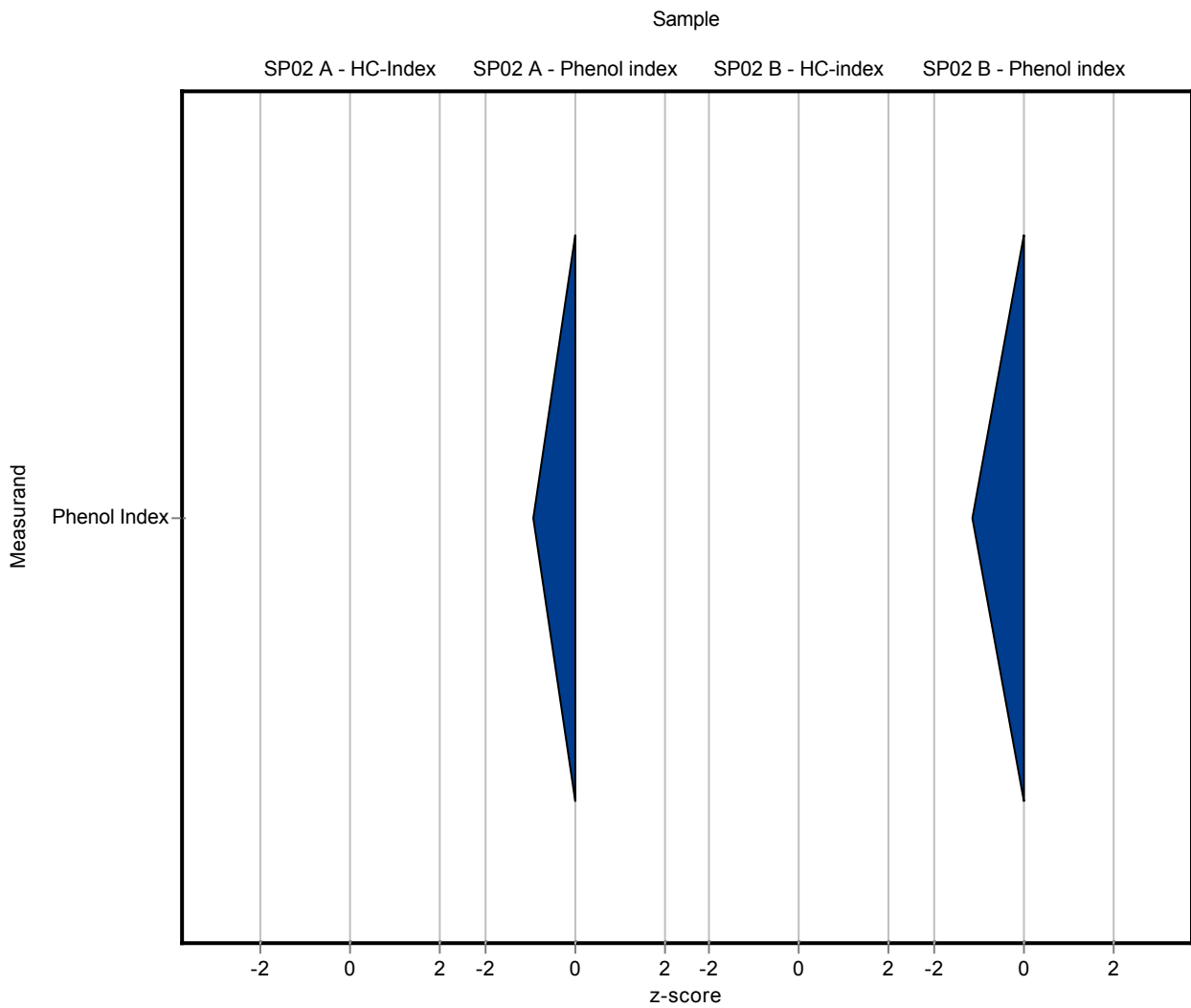
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.151	0.03	0.00504	97	-0.93

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	-	-	0.119	-	-

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.061	0.012	0.00468	91.8	-1.16



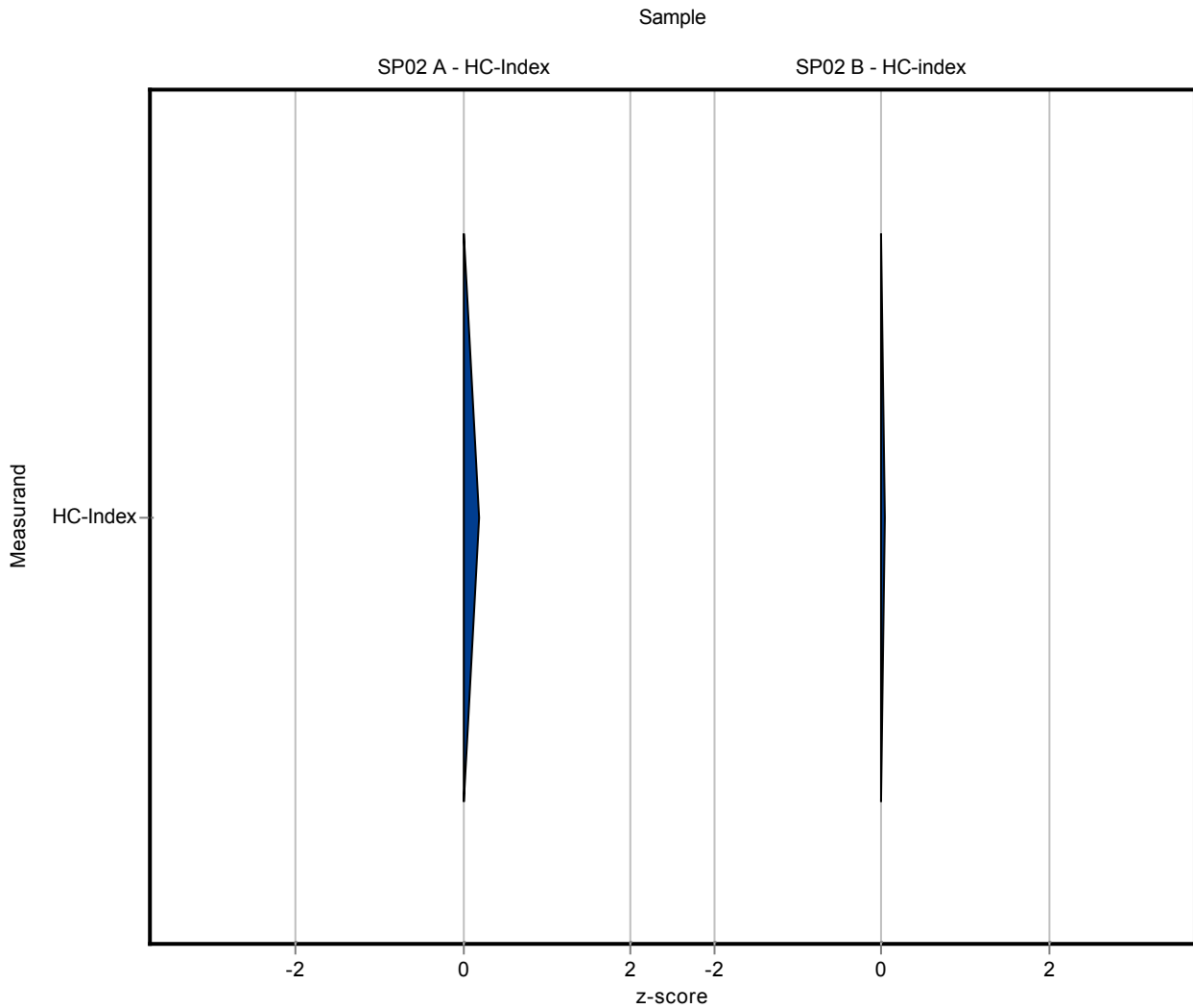
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	1.13	0.2	0.357	107	0.2

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.284	0.04	0.119	102	0.04



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.63	0.06	0.357	59.5	-1.2

Sample: SP02APHE

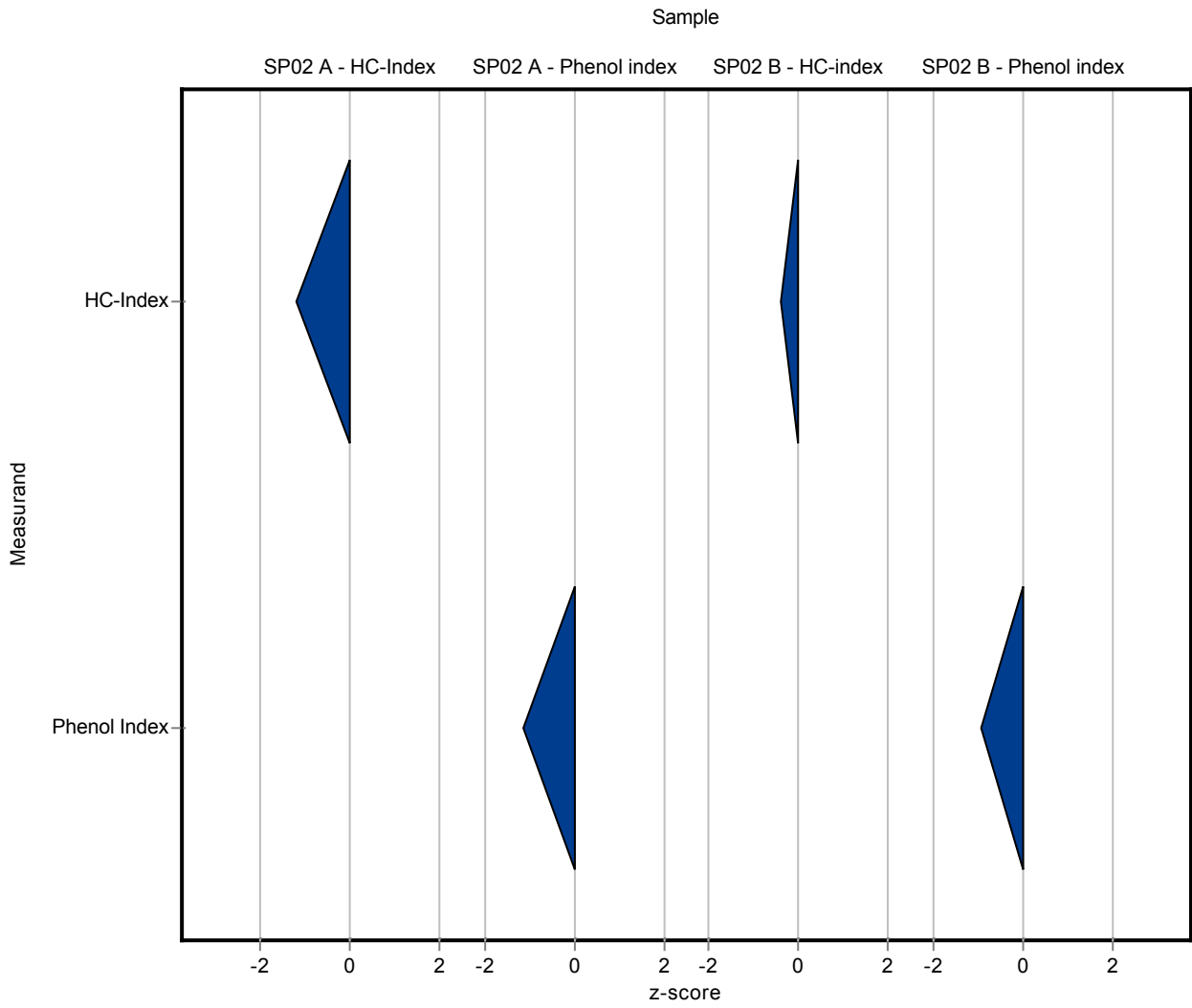
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.15	0.01	0.00504	96.4	-1.12

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.23	0.02	0.119	82.4	-0.41

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.062	0.006	0.00468	93.3	-0.95



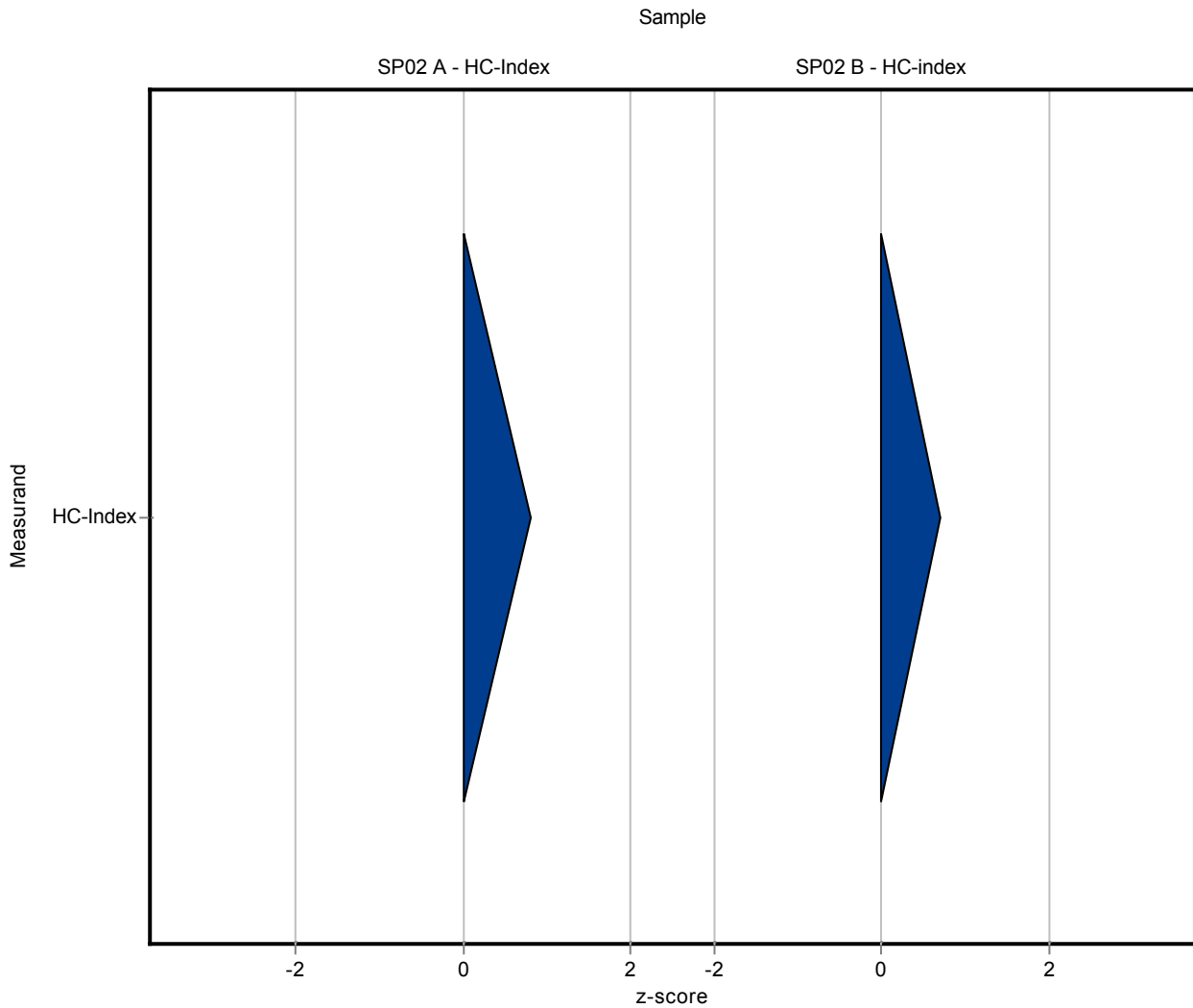
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	1.35	0.02	0.357	127	0.81

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.363	0.016	0.119	130	0.7



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.46	0.52	0.357	138	1.12

Sample: SP02APHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.153	0.015	0.00504	98.3	-0.53

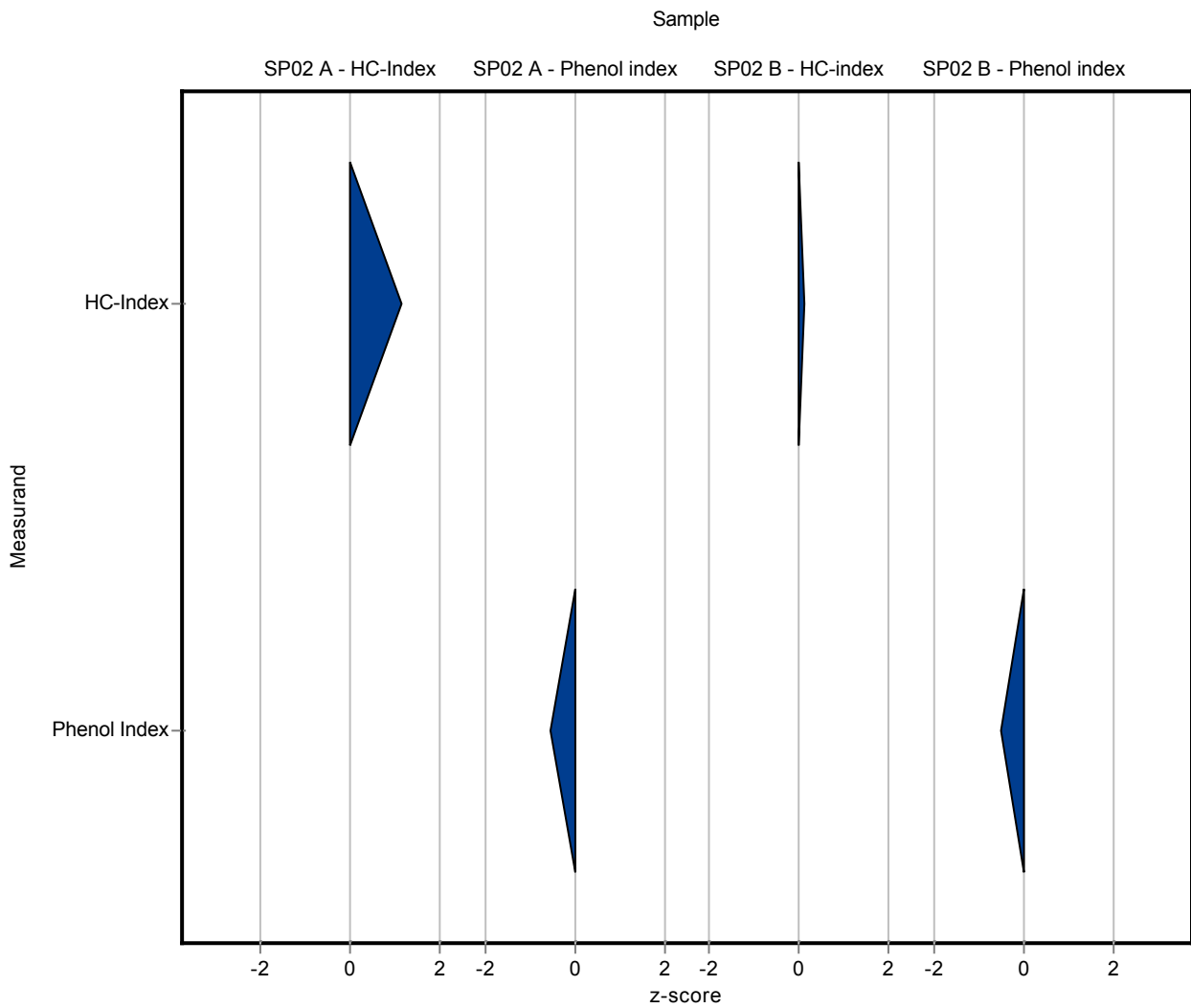
Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.292	0.104	0.119	105	0.11

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.064	0.006	0.00468	96.3	-0.52





The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.44	-	0.357	136	1.07

Sample: SP02APHE

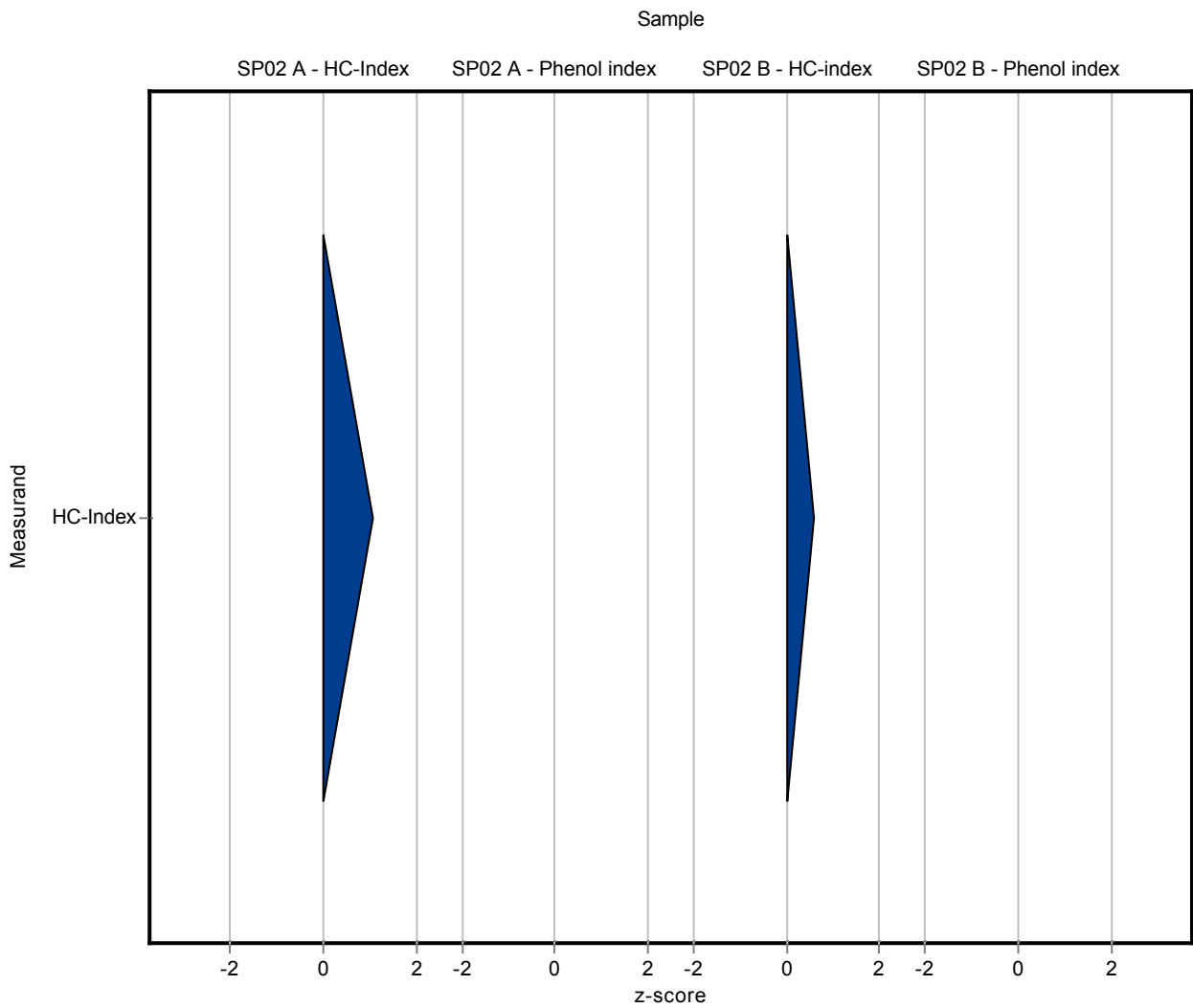
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	-	-	0.00504	-	-

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.35	-	0.119	125	0.6

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	-	-	0.00468	-	-



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.71	0.1633	0.357	67	-0.98

Sample: SP02APHE

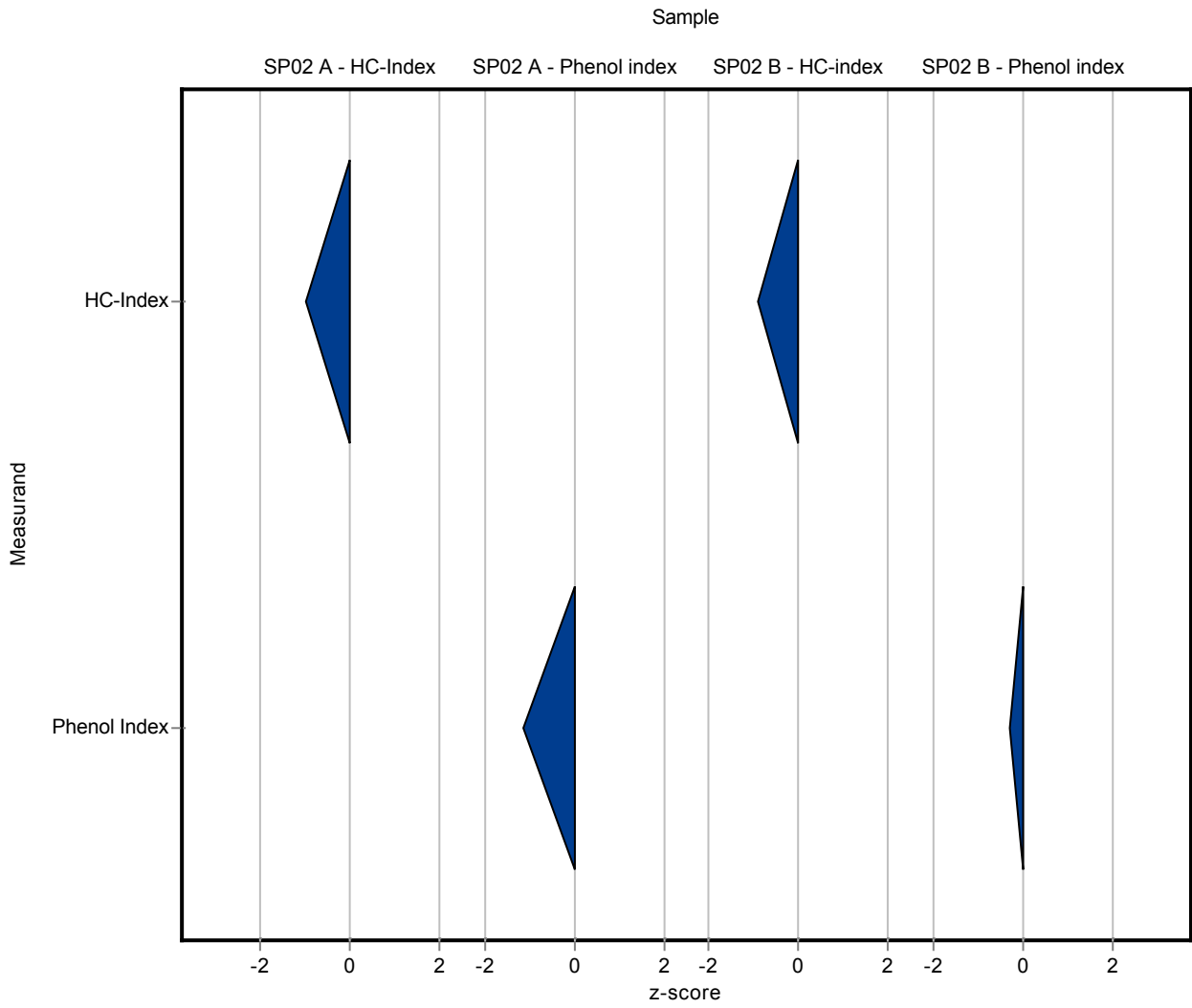
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.15	0.0144	0.00504	96.4	-1.12

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.17	0.0391	0.119	60.9	-0.92

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.065	0.00624	0.00468	97.8	-0.31



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.13	-	0.357	107	0.2

Sample: SP02APHE

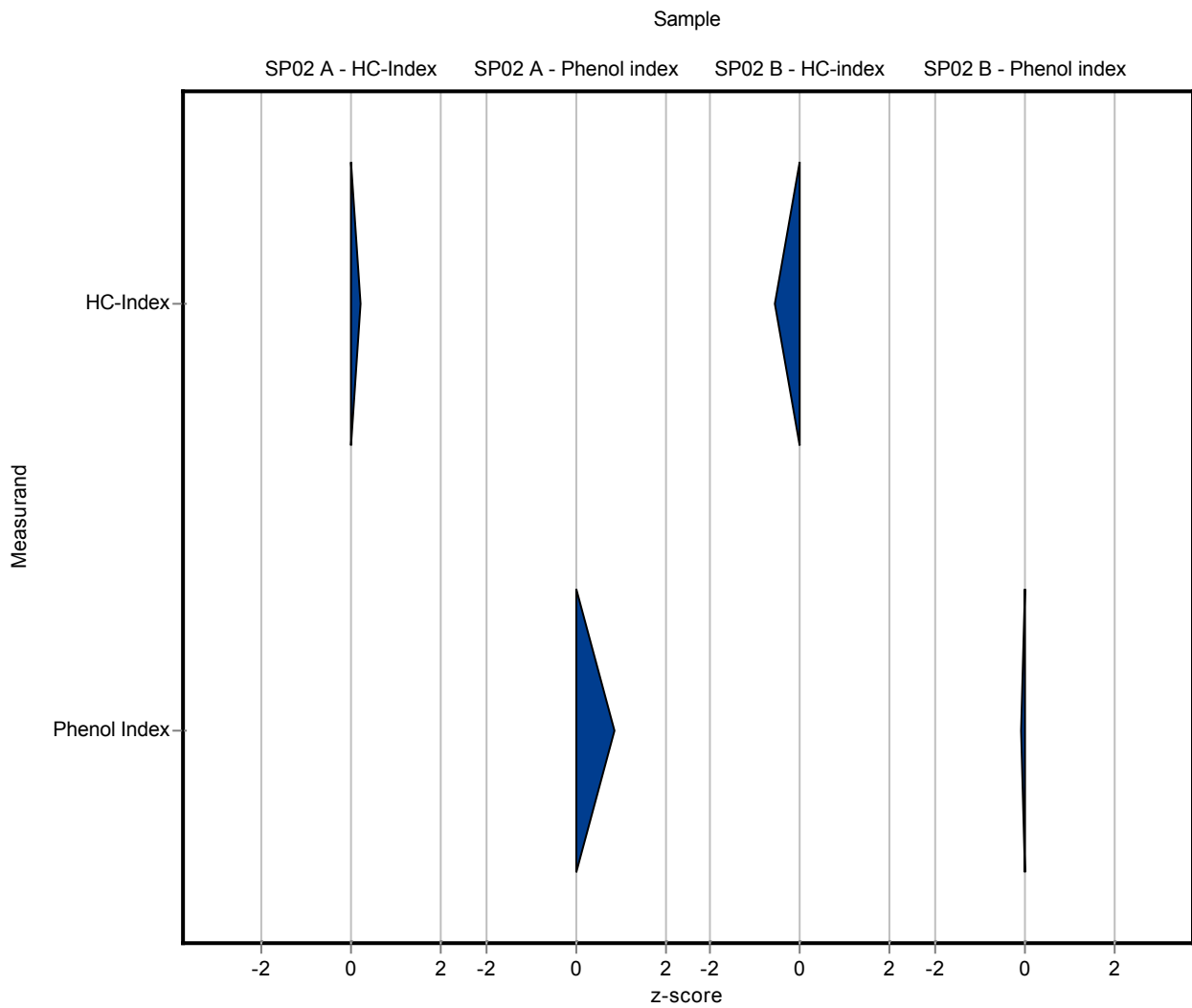
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.16	-	0.00504	103	0.86

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.21	-	0.119	75.3	-0.58

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.066	-	0.00468	99.3	-0.09



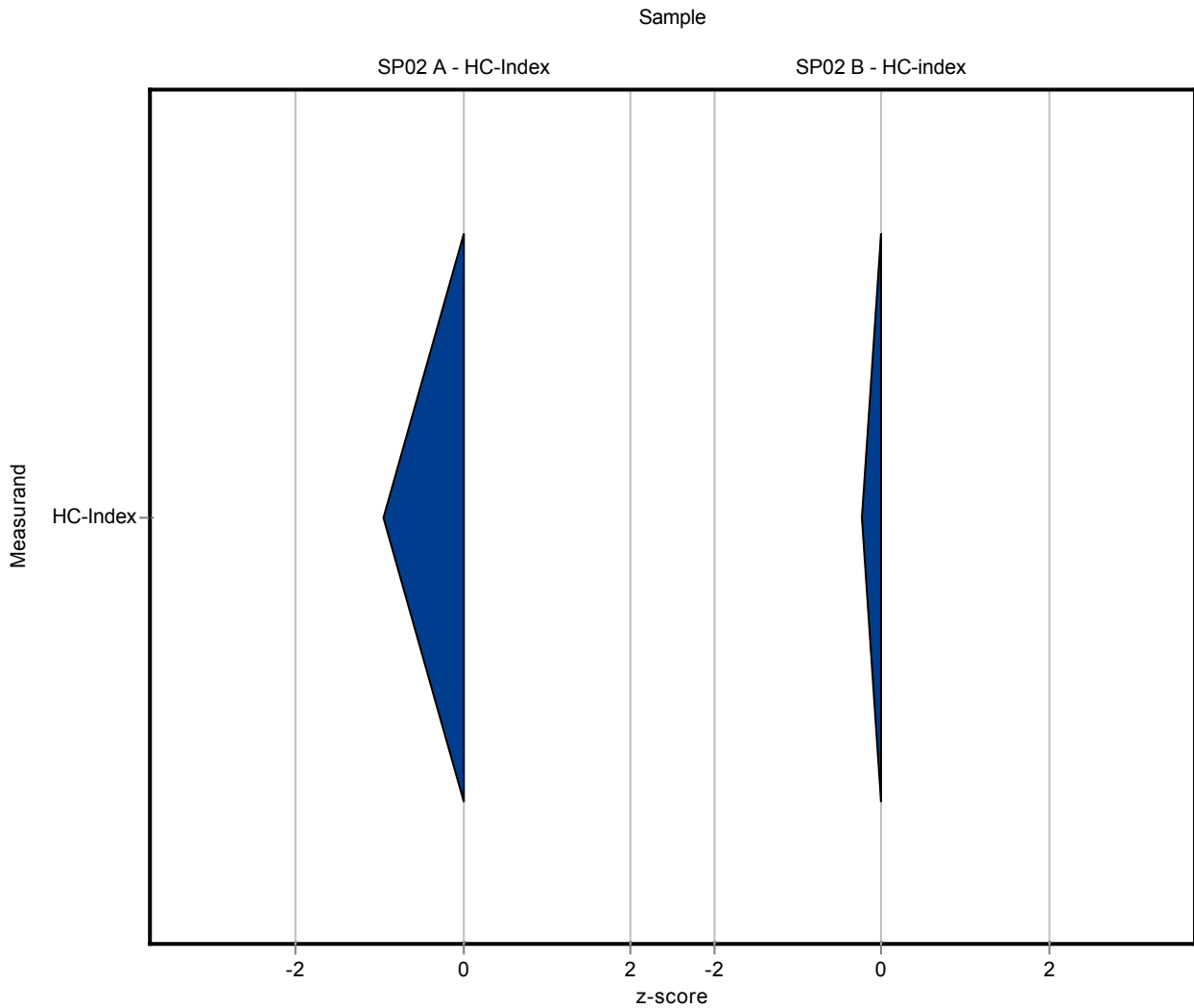
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	0.72	0.09	0.357	68	-0.95

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.25	0.03	0.119	89.6	-0.24





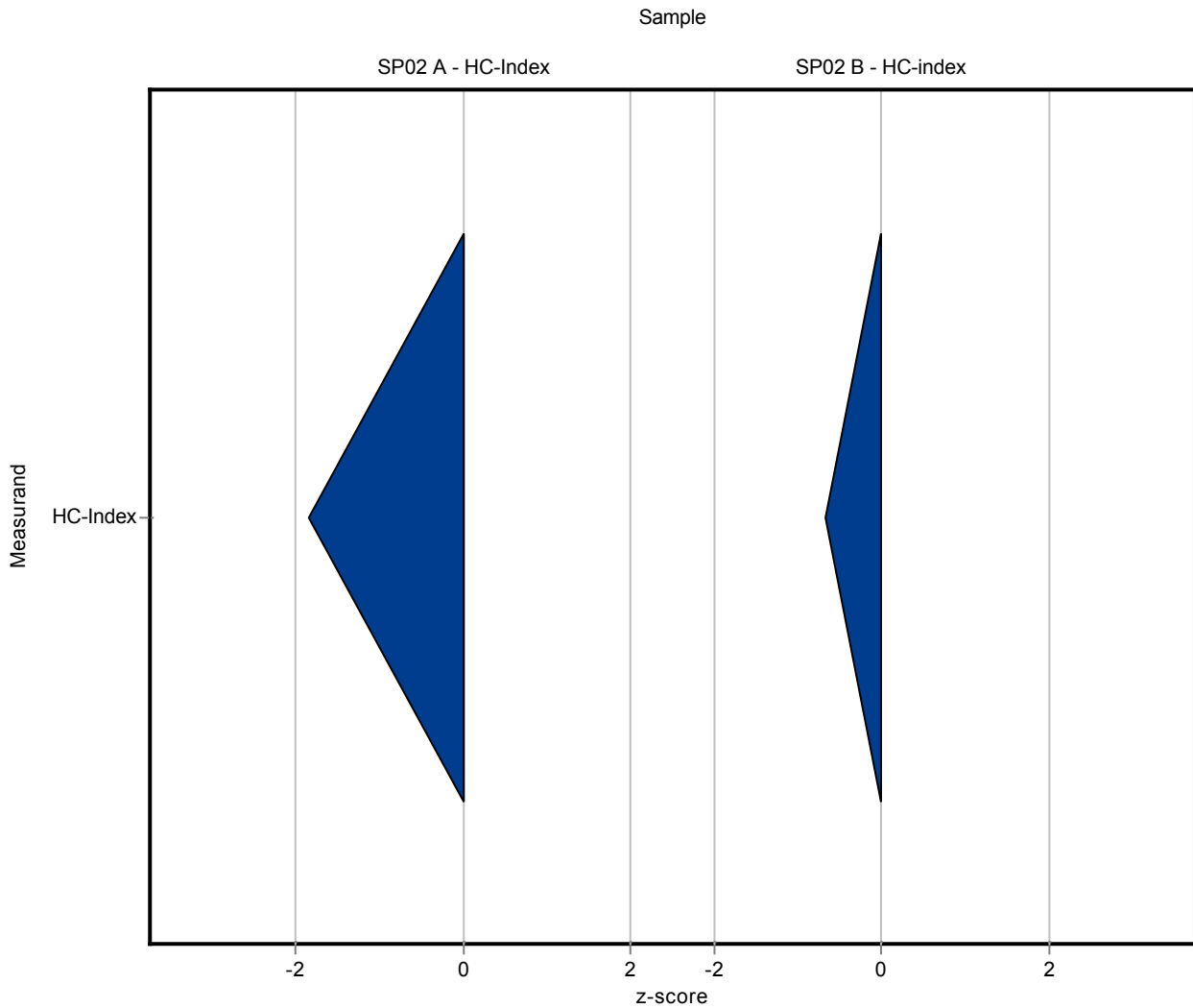
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	0.4	0.2	0.357	37.8	-1.85

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.2	0.1	0.119	71.7	-0.66



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	1.23	0.06	0.357	116	0.48

Sample: SP02APHE

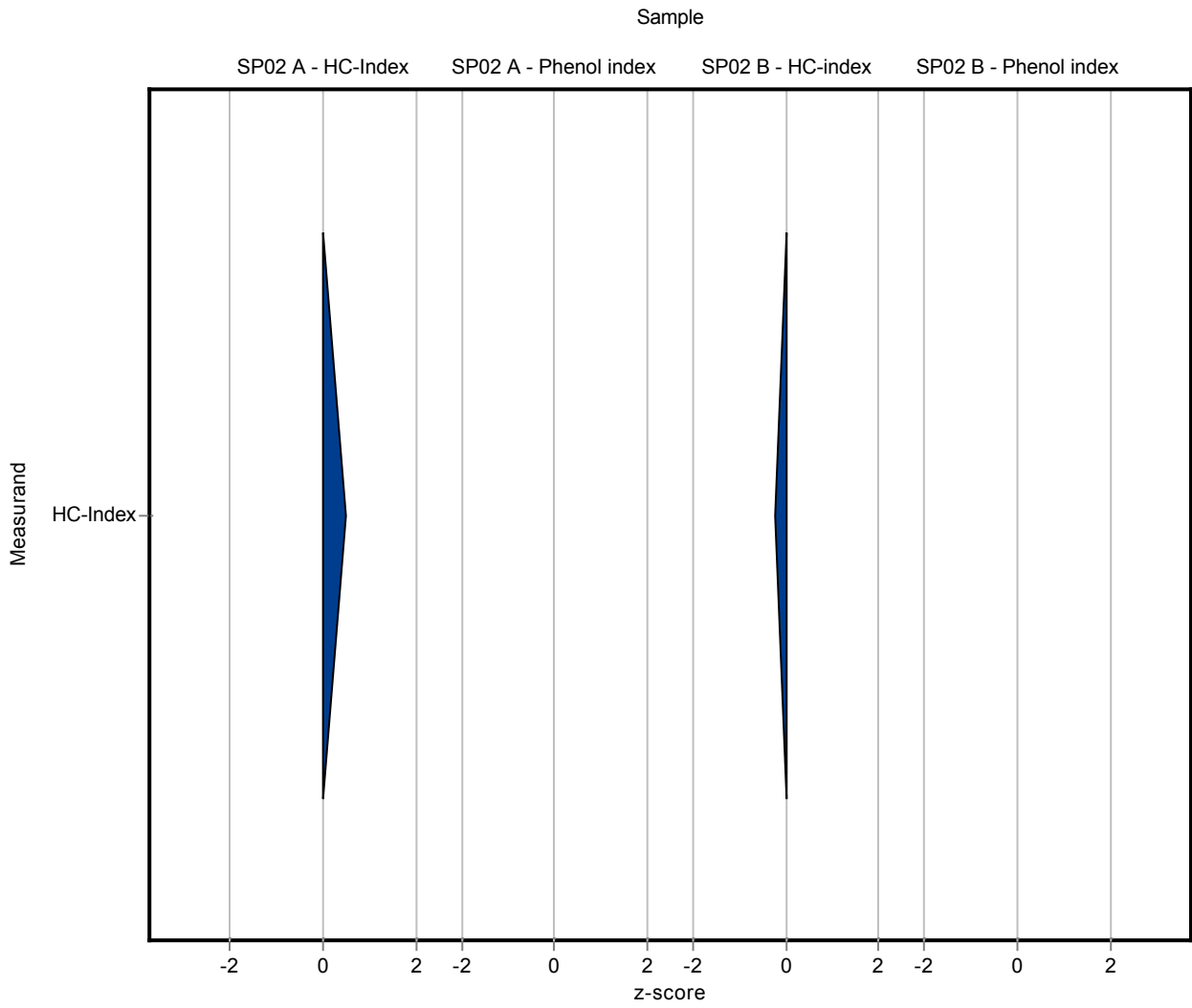
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	-	-	0.00504	-	-

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.25	0.012	0.119	89.6	-0.24

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	-	-	0.00468	-	-



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.86	0.097	0.357	81.2	-0.56

Sample: SP02APHE

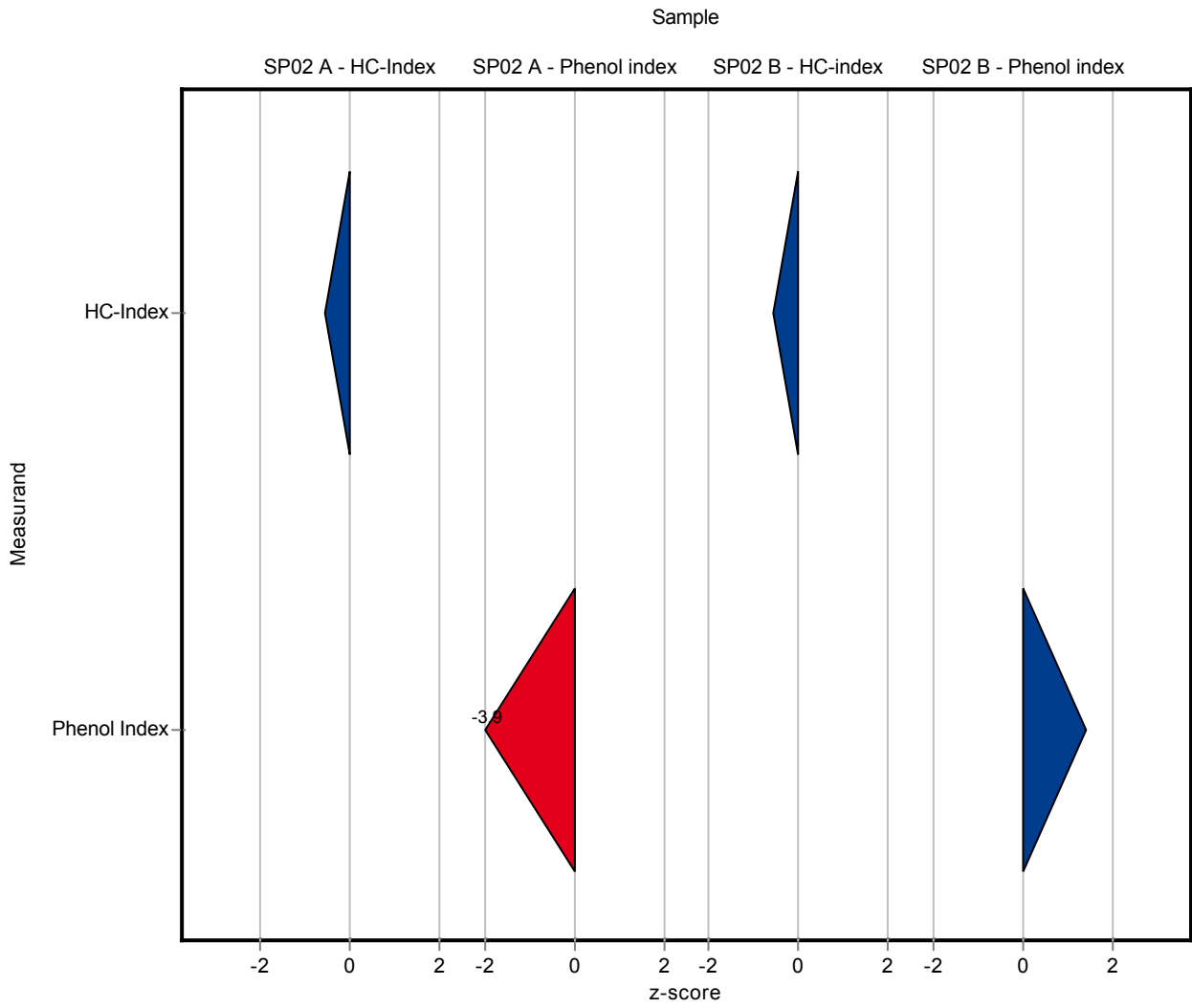
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.136	0.018	0.00504	87.4	-3.9

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.21	0.024	0.119	75.3	-0.58

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.073	0.01	0.00468	110	1.4



The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	0.8855	0.09	0.357	83.6	-0.49

Sample: SP02APHE

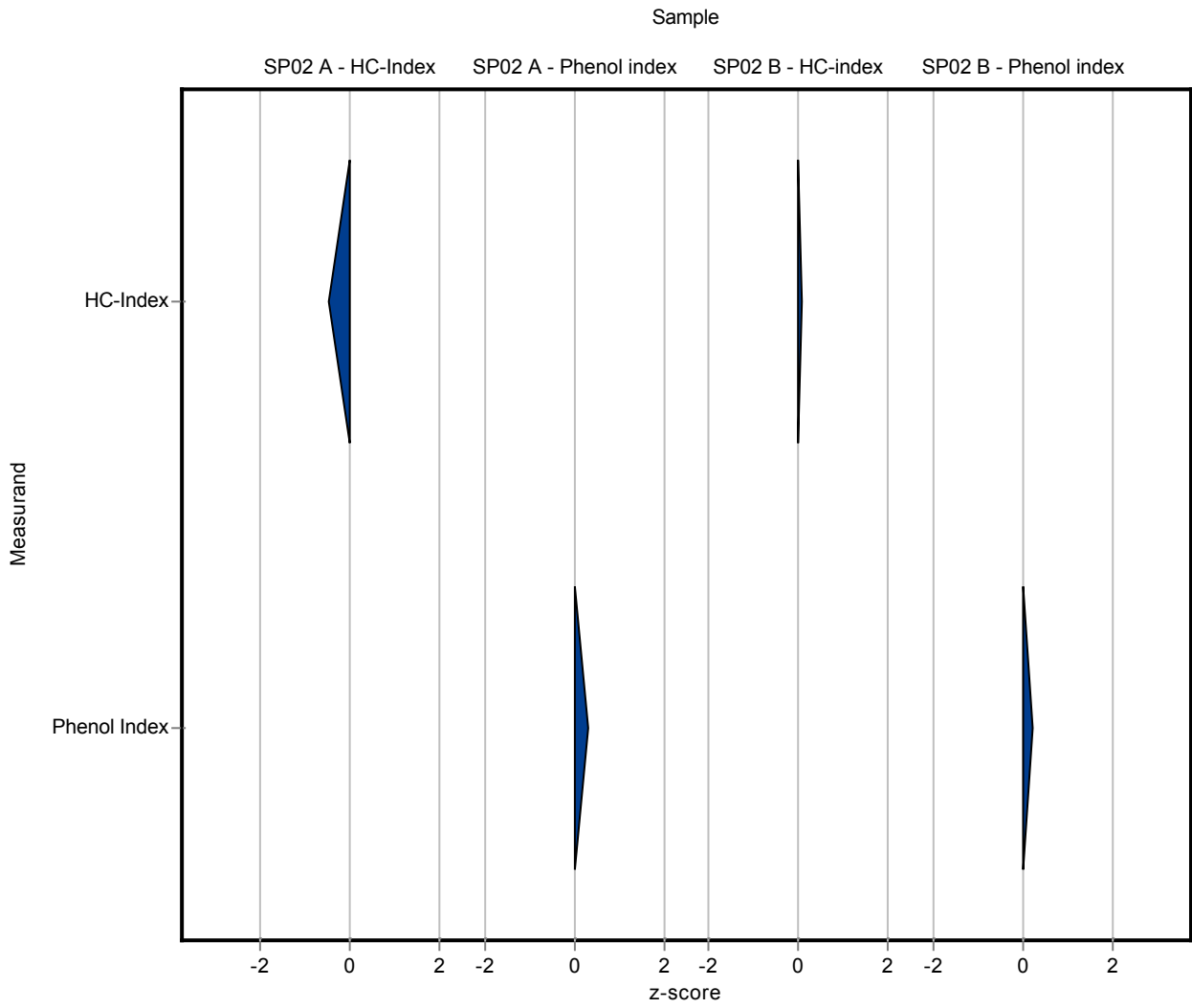
Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.15727	0.02	0.00504	101	0.32

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	0.287	0.03	0.119	103	0.07

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.06751	0.007	0.00468	102	0.23



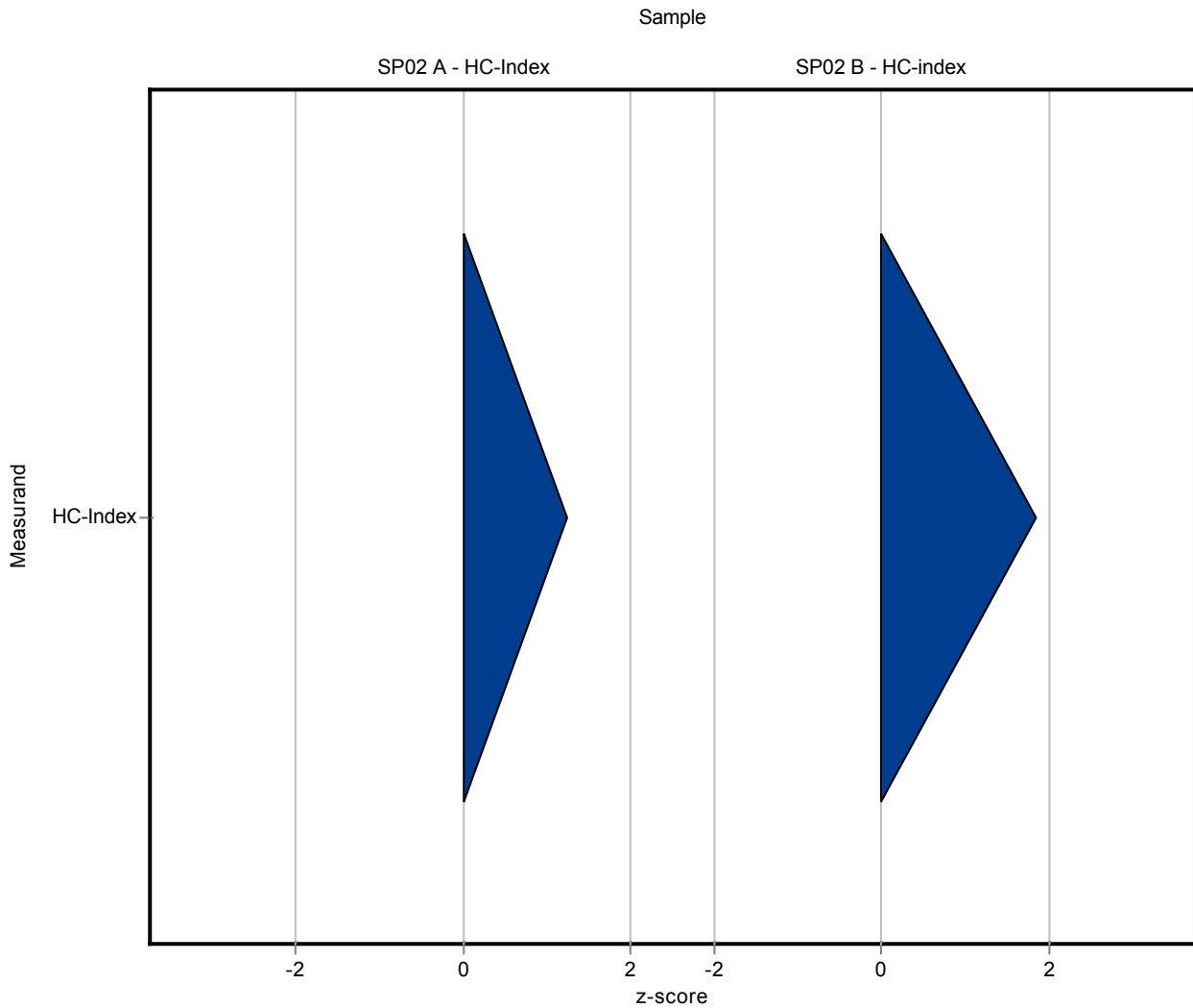
The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06 ± 0.206	1.5	0.25	0.357	142	1.23

Sample: SP02BKWI

Parameter	Unit	Target ± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279 ± 0.073	0.5	0.15	0.119	179	1.85





The following results were achieved:

Sample: SP02AKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	1.06	± 0.206	-	-	0.357	-	-

Sample: SP02APHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.156	± 0.00367	0.157	0.018	0.00504	101	0.27

Sample: SP02BKWI

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
HC-Index	mg/l	0.279	± 0.073	-	-	0.119	-	-

Sample: SP02BPHE

Parameter	Unit	Target	± CI(99%)	Result	± U	Criteria	Recovery	z-score
Phenol Index	mg/l	0.0664	± 0.00341	0.068	0.0078	0.00468	102	0.33

