



REF: 812/02/02/1/591

DATE: 18 SEPTEMBER 2006

ATTENTION: LAB MANAGER

SUBJECT: 144<sup>th</sup> INTER-LABORATORY PROFICIENCY TESTING PROGRAM

We are pleased to present the results of the 144<sup>th</sup> Inter-laboratory Proficiency Testing Program involving the determination of Chloride and Sulphate Content of Sand. As in previous programs, we have assigned code numbers to participating laboratories in order to protect their identities. For this particular program please contact Dr. Yaser (Tel. No. 3027074) or Mrs. Raniah (Tel. No. 3027069) to inform you which code number has been assigned to you. You are also requested to pay to Dubai Accreditation Centre (DAC), an amount of (Dhs 418) in return for your participation in the Inter-laboratory Proficiency Testing Program (please note that the governmental laboratories are exempted from participation fees). We would like to draw your attention that payment can be made through DCLD counter- ground floor by credit card. Should you intend to pay by cheque please address the cheque to Dubai Municipality. After payment, please submit a copy of the invoice to the Accreditation Center (Eng. Raniah Ed Dili in the administration building on the second floor office no. 314B). You are kindly requested to pay the amount within one month from the date in which the result is posted on our website.

We thank you for your participation and we would welcome any comments or suggestions on this and on future programs. Please do not hesitate to contact us if you need any clarification on the report.

*Kind Regards*

Eng. Lina Qudah

Head of Accreditation Decisions Section-DAC

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Our Vision : To create an excellent city that provides the essence of success and comfort of living



## DUBAI ACCREDITATION CENTER

### Report on 144<sup>th</sup> Inter-Laboratory Proficiency Testing Determination of Chloride and Sulphate Content of Aggregate

28 September 2006

#### 1. INTRODUCTION

This document presents the results of the 144<sup>th</sup> inter-laboratory proficiency-testing program conducted during the months of August and September 2006, according to BS 812:1988 part 117 & 118.

This program is part of the Interlaboratory Comparison Programs organized by the Accreditation Center of DM for monitoring the validity of test results of laboratories operating in Dubai as a requirement of the Local Order 52/1990 and ISO/IEC 17011: 2004.

#### 2. EXPERIMENTAL DESIGN

##### 2.1 Participants:

A total of fifteen laboratories participated in this program.

##### 2.2 Samples tested:

The samples consisted of two stockpiles of sand, with one stockpile having slightly different expected chloride and Sulphate content from the other stockpile.

From one stockpile, 30 samples were randomly selected and similarly from the other stockpile, another 30 samples were also selected. These samples were randomly distributed to the fifteen participating laboratories with each participant receiving four test samples, two from each set. The test samples were designated as samples 1, 2, 3 and 4 with a unique identification number marked on each sample.

#### 3. CONFIDENTIALITY

Each laboratory is given a code number to maintain confidentiality of results and to protect their identities. Only the concerned laboratory knows its code number.

#### 4. TEST METHOD

Instructions were given to the participants to test the samples for:

1. Acid Soluble Chloride content of sand as per BS 812:1988 Part 117.
2. Acid Soluble Sulphate content of sand as per BS 812:1988 Part 118.



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### 5. TEST RESULTS

Test results submitted by the participating laboratories are presented in Appendix A. The numbers in the column headings of the table represent the code numbers of the participating laboratories.

### 6. EVALUATION OF RESULTS

#### 6.1 METHOD OF ANALYSIS

Please refer to the document **DAC-G3-03** Robust Z-Score Analysis for the methodologies of analysis.

#### 6.2 CALCULATIONS OF Z-SCORES

Appendix B gives the details of the calculation of the Z-Score from the raw data. The Z Score analysis is based on an internationally accepted procedure being used by accreditation bodies implementing Interlaboratory comparison programs.

#### 6.3 OUTLIER RESULTS

After evaluating the Z-score, the following results were considered outliers:

Test Parameter	Labs with outlier results	Type of Outlier
Acid Soluble Chloride Content %	Lab 13-1	Between Labs
	Lab 13-2	
	Lab 13-1	Within Labs
	Lab 13-2	

The test results provided by the above mentioned laboratory are outside the Z score limits of  $\pm 3$ , but according to the repeatability limits of the test as per the Internal document “Quality Control – Frequency and Control Limits” no.: RLP-13-02(EM), established by Engineering Materials Section in DCLD which states that the repeatability limits equal the value of the median  $\pm 0.01$ , hence the “between labs” results for the abovementioned laboratory are acceptable.

However, the above mentioned laboratory is requested to investigate the root cause of the “within labs” outlier results, implement corrective action and email a report within 2 weeks to Accreditation Decisions Section of Dubai Accreditation Center to the following address [lmqudah@dm.gov.ae](mailto:lmqudah@dm.gov.ae)

### 7. APPENDICES

7.1 Appendix A: Raw Data

7.2 Appendix B: Calculation of Z-Scores and other statistics

7.3 Appendix C: Charts

**Table 1: Chloride content, %**

Lab#	1	2	3	4
Lab1	0.02	0.02	0.43	0.43
Lab2	0.02	0.02	0.47	0.45
Lab3	0.02	0.02	0.43	0.42
Lab4	0.02	0.02	0.45	0.44
Lab5	0.02	0.02	0.46	0.44
Lab6	0.02	0.02	0.47	0.48
Lab7	0.02	0.02	0.45	0.44
Lab8	0.01	0.02	0.45	0.42
Lab9	0.02	0.02	0.45	0.44
Lab10	0.02	0.02	0.5	0.5
Lab11	0.02	0.03	0.48	0.49
Lab12	0.02	0.02	0.49	0.47
Lab13	0.02	0.02	0.56	0.56
Lab14	0.01	0.01	0.45	0.43
Lab15	0.02	0.02	0.46	0.47

**Table 2 : Sulphate content, %**

Lab#	1	2	3	4
Lab1	0.05	0.05	0.55	0.55
Lab2	0.05	0.04	0.55	0.51
Lab3	0.10	0.09	0.54	0.52
Lab4	0.04	0.04	0.49	0.51
Lab5	0.05	0.04	0.57	0.53
Lab6	0.03	0.03	0.58	0.59
Lab7	0.04	0.04	0.52	0.5
Lab8	0.05	0.06	0.48	0.46
Lab9	0.04	0.04	0.51	0.52
Lab10	0.02	0.01	0.61	0.62
Lab11	0.03	0.03	0.58	0.59
Lab12	0.04	0.05	0.55	0.54
Lab13	0.04	0.04	0.7	0.7
Lab14	0.05	0.06	0.55	0.49
Lab15	0.05	0.06	0.58	0.53

Appendix B: Calculation of z-scores and other statistics

Acid Soluble Chloride Content %

Result#	S1 S2	S3 S4	S1+S3 S2+S4	S1-S3 S2-S4	Between Labs z- score	Within Labs z- score
Lab1-1	0.02	0.43	0.45	-0.41	-0.72	1.08
Lab1-2	0.02	0.43	0.45	-0.41	-0.72	1.08
Lab2-1	0.02	0.47	0.49	-0.45	0.72	-0.36
Lab2-2	0.02	0.45	0.47	-0.43	0.00	0.36
Lab3-1	0.02	0.43	0.45	-0.41	-0.72	1.08
Lab3-2	0.02	0.42	0.44	-0.40	-1.08	1.44
Lab4-1	0.02	0.45	0.47	-0.43	0.00	0.36
Lab4-2	0.02	0.44	0.46	-0.42	-0.36	0.72
Lab5-1	0.02	0.46	0.48	-0.44	0.36	0.00
Lab5-2	0.02	0.44	0.46	-0.42	-0.36	0.72
Lab6-1	0.02	0.47	0.49	-0.45	0.72	-0.36
Lab6-2	0.02	0.48	0.50	-0.46	1.08	-0.72
Lab7-1	0.02	0.45	0.47	-0.43	0.00	0.36
Lab7-2	0.02	0.44	0.46	-0.42	-0.36	0.72
Lab8-1	0.01	0.45	0.46	-0.44	-0.36	0.00
Lab8-2	0.02	0.42	0.44	-0.40	-1.08	1.44
Lab9-1	0.02	0.45	0.47	-0.43	0.00	0.36
Lab9-2	0.02	0.44	0.46	-0.42	-0.36	0.72
Lab10-1	0.02	0.5	0.52	-0.48	1.80	-1.44
Lab10-2	0.02	0.5	0.52	-0.48	1.80	-1.44
Lab11-1	0.02	0.48	0.50	-0.46	1.08	-0.72
Lab11-2	0.03	0.49	0.52	-0.46	1.80	-0.72
Lab12-1	0.02	0.49	0.51	-0.47	1.44	-1.08
Lab12-2	0.02	0.47	0.49	-0.45	0.72	-0.36
lab13-1	0.02	0.56	0.58	-0.54	3.96	-3.60
lab13-2	0.02	0.56	0.58	-0.54	3.96	-3.60
lab14-1	0.01	0.45	0.46	-0.44	-0.36	0.00
lab14-2	0.01	0.43	0.44	-0.42	-1.08	0.72
Lab15-1	0.02	0.46	0.48	-0.44	0.36	0.00
Lab15-2	0.02	0.47	0.49	-0.45	0.72	-0.36

No. of Results	30	30	30	30
Median	0.02	0.45	0.47	-0.44
Q 1	0.02	0.44	0.46	-0.46
Q 3	0.02	0.48	0.50	-0.42
Inter Q Range	0.00	0.04	0.04	0.04
Normalzd IQR	0.00	0.03	0.03	0.03
Robust CV,%	0.00	6.18	5.91	-6.32
Minimum	0.01	0.42	0.44	-0.54
Maximum	0.03	0.56	0.58	-0.40
Range	0.02	0.14	0.14	0.14

Appendix B: Calculation of z-scores and other statistics

Acid Soluble Sulphate Content %

Result#	S1 S2	S3 S4	S1+S3 S2+S4	S1-S3 S2-S4	Between Labs z- score	Within Labs z- score
Lab1-1	0.05	0.55	0.60	-0.50	0.00	-0.09
Lab1-2	0.05	0.55	0.60	-0.50	0.00	-0.09
Lab2-1	0.05	0.55	0.60	-0.50	0.00	-0.09
Lab2-2	0.04	0.51	0.55	-0.47	-1.00	0.45
Lab3-1	0.10	0.54	0.64	-0.44	0.80	0.99
Lab3-2	0.09	0.52	0.61	-0.43	0.20	1.17
Lab4-1	0.04	0.49	0.53	-0.45	-1.40	0.81
Lab4-2	0.04	0.51	0.55	-0.47	-1.00	0.45
Lab5-1	0.05	0.57	0.62	-0.52	0.40	-0.45
Lab5-2	0.04	0.53	0.57	-0.49	-0.60	0.09
Lab6-1	0.03	0.58	0.61	-0.55	0.20	-0.99
Lab6-2	0.03	0.59	0.62	-0.56	0.40	-1.17
Lab7-1	0.04	0.52	0.56	-0.48	-0.80	0.27
Lab7-2	0.04	0.5	0.54	-0.46	-1.20	0.63
Lab8-1	0.05	0.48	0.53	-0.43	-1.40	1.17
Lab8-2	0.06	0.46	0.52	-0.40	-1.60	1.71
Lab9-1	0.04	0.51	0.55	-0.47	-1.00	0.45
Lab9-2	0.04	0.52	0.56	-0.48	-0.80	0.27
Lab10-1	0.02	0.61	0.63	-0.59	0.60	-1.71
Lab10-2	0.01	0.62	0.63	-0.61	0.60	-2.07
Lab11-1	0.03	0.58	0.61	-0.55	0.20	-0.99
Lab11-2	0.03	0.59	0.62	-0.56	0.40	-1.17
Lab12-1	0.04	0.55	0.59	-0.51	-0.20	-0.27
Lab12-2	0.05	0.54	0.59	-0.49	-0.20	0.09
Lab13-1	0.04	0.7	0.74	-0.66	2.80	-2.97
Lab13-2	0.04	0.7	0.74	-0.66	2.80	-2.97
Lab14-1	0.05	0.55	0.60	-0.50	0.00	-0.09
Lab14-2	0.06	0.49	0.55	-0.43	-1.00	1.17
Lab15-1	0.05	0.58	0.63	-0.53	0.60	-0.63
Lab15-2	0.06	0.53	0.59	-0.47	-0.20	0.45
No. of Results	30	30	30	30		
Median	0.04	0.55	0.60	-0.50		
Q 1	0.04	0.51	0.55	-0.55		
Q 3	0.05	0.58	0.62	-0.47		
Inter Q Range	0.01	0.07	0.07	0.07		
Normalzd IQR	0.01	0.05	0.05	0.06		
Robust CV,%	18.53	9.18	8.34	-11.23		
Minimum	0.01	0.46	0.52	-0.66		
Maximum	0.10	0.70	0.74	-0.40		
Range	0.09	0.24	0.22	0.26		



