August 17, 2015

Boston Chemical Data

MVL Project #: 8934
Report Analyst: Audra Chaput
Sample Medium: Bulk Dust

Scope of Work:

This report covers the methods and findings of the analysis that MicroVision Laboratories, Inc. conducted on one (1) sample of bulk dust from Boston Chemical Data. The purpose of the analysis was to determine the absence or presence of uranium, thorium, radium, and lead by use of SEM/EDS/BSE.

Equipment:

Scanning Electron Microscopy (SEM)

Energy Dispersive X-Ray Spectroscopy (EDS)

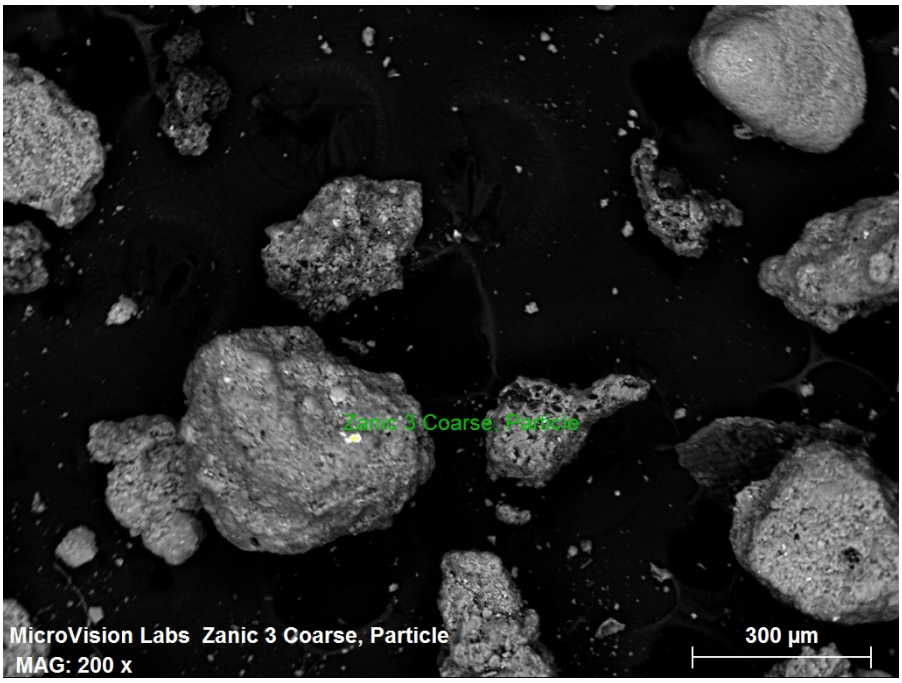
Back-Scattered Electron Spectroscopy (BSE)

Methods:

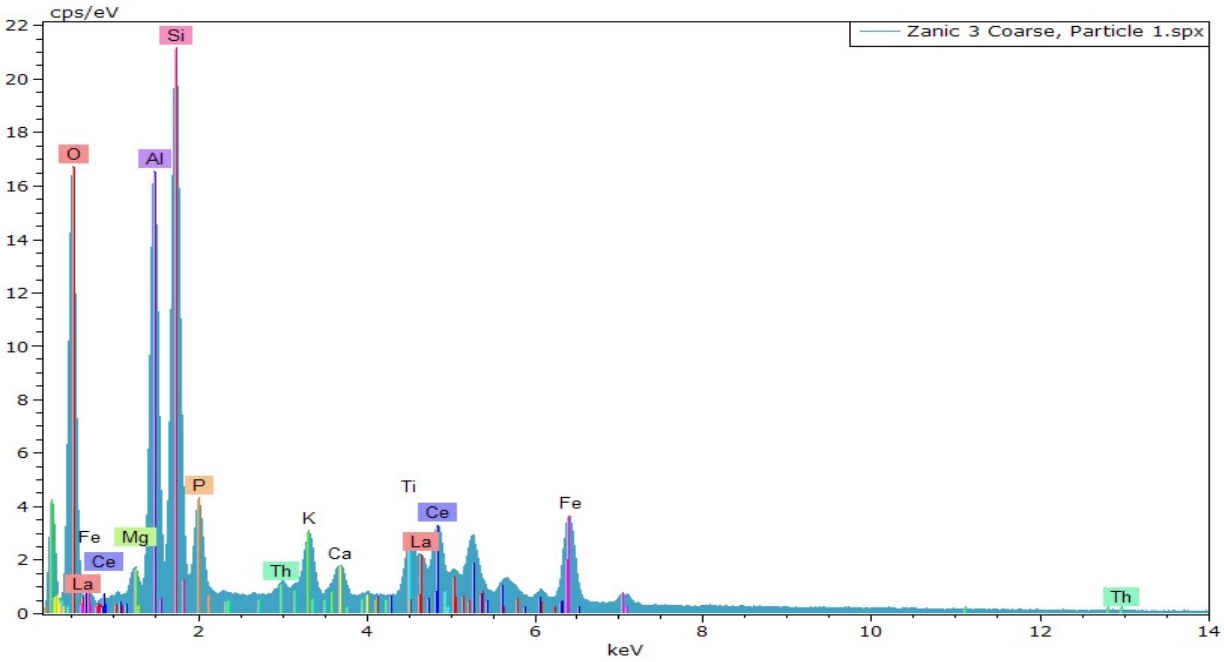
A representative portion of the sample was removed and placed on an aluminum analysis stub using double sided adhesive tape and then coated with evaporated graphite for the EDS work. The sample was examined using scanning electron microscopy, energy dispersive x-ray spectroscopy and back-scattered electron spectroscopy (SEM/EDS/BSE) and digital images were taken.

SEM/EDS Spectra Findings

Sample ID: Zanic 3 Coarse



Particle 1, SEM Image



Particle 1, EDS Spectra

MicroVision Laboratories, Inc. 187 Billerica Road, Chelmsford, MA 01824
Phone: (978) 250-9909 Fax: (978) 250-9901 Email: Sales@MicroVisionLabs.com
www.MicroVisionLabs.com

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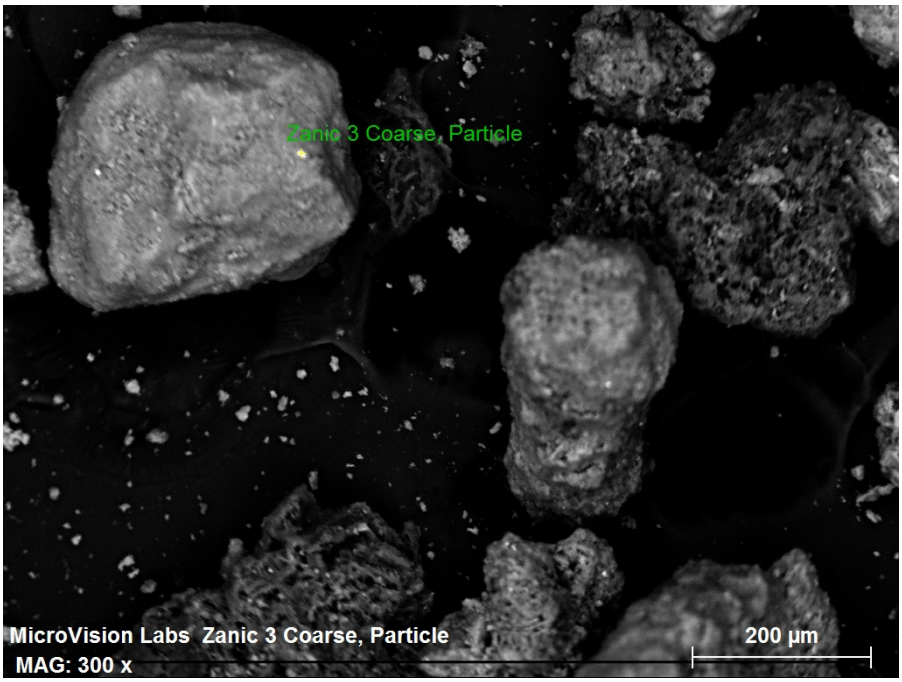
Quantax, Elemental Percent Table

Results Zanic 3 Coarse, Particle 1.spx
Date: 8/14/2015

Element	AN	series	[wt.%]	[norm. wt.%]	[norm. at.%]
Oxygen	8	K-series	52.4079794	44.64472778	65.66831931
Silicon	14	K-series	18.61774186	15.85987528	13.28945058
Aluminium	13	K-series	15.23031489	12.9742316	11.31629682
Cerium	58	L-series	7.786359032	6.632957106	1.114028954
Lanthanum	57	L-series	7.009681355	5.971329548	1.011674995
Iron	26	K-series	4.746426812	4.043333389	1.703841225
Phosphorus	15	K-series	3.6702916	3.126607269	2.375575418
Thorium	90	L-series	2.029969123	1.729267565	0.175384946
Titanium	22	K-series	1.896055267	1.615190515	0.793887625
Magnesium	12	K-series	1.64884901	1.404603193	1.36002673
Potassium	19	K-series	1.465398624	1.248327514	0.751380789
Calcium	20	K-series	0.879888019	0.749549239	0.440132608
		Sum:	117.388955	100	100

Particle 1, Quantification Table



Particle 2, SEM Image

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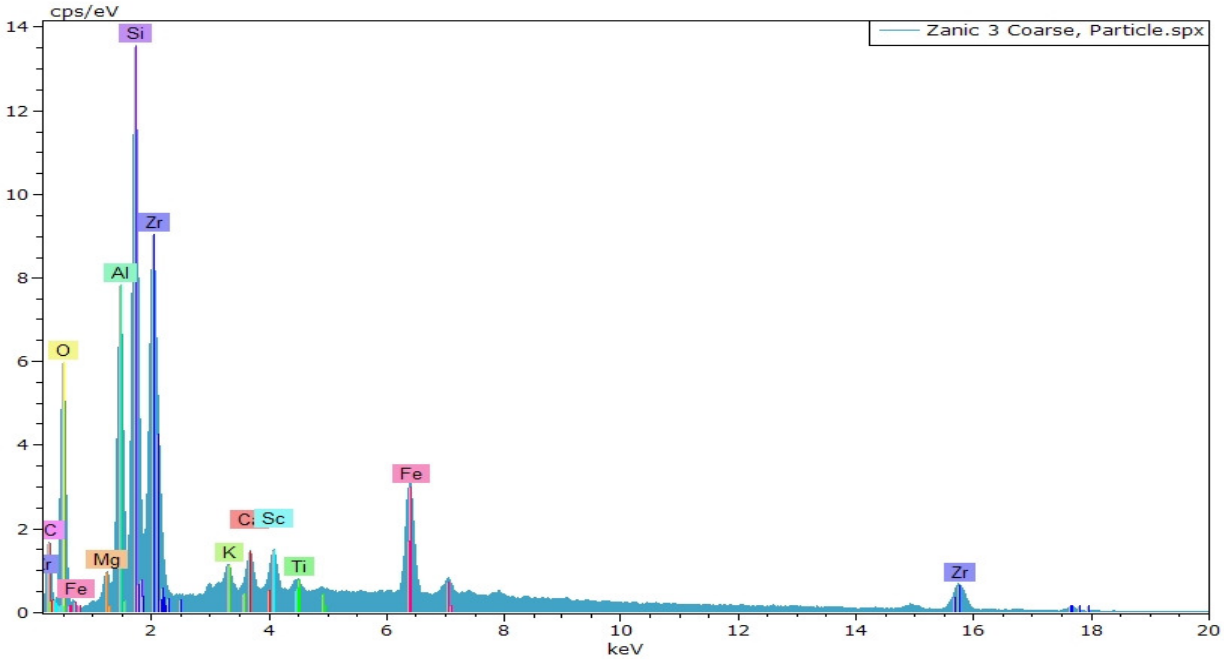


Particle 2, EDS Spectra

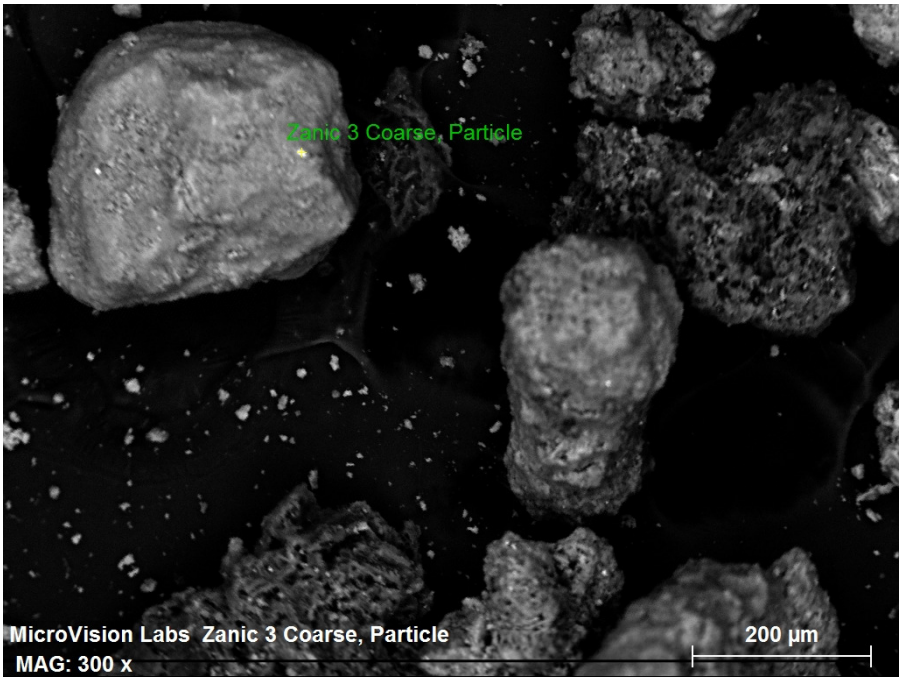
MicroVision Labs, Inc.

Quantax, Elemental Percent Table

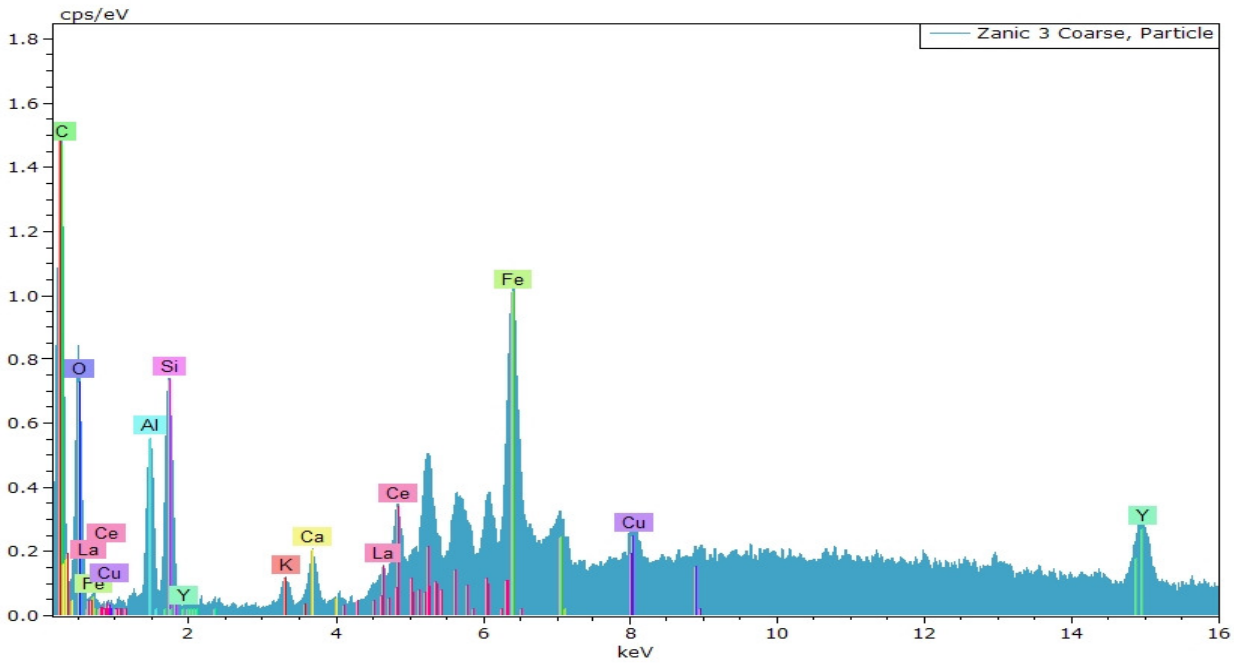
Results Zanic 3 Coarse, Particle 2.spx
Date: 8/14/2015

Element	AN	series	[wt.%]	[norm. wt.%]	[norm. at.%]
Oxygen	8	K-series	25.46800039	39.58372141	56.87844397
Zirconium	40	K-series	15.49246282	24.0792101	6.068312068
Silicon	14	K-series	7.357884094	11.43601499	9.361109765
Carbon	6	K-series	5.900281056	9.170530784	17.55294887
Aluminium	13	K-series	4.649913319	7.227142713	6.157929019
Iron	26	K-series	3.503348089	5.445090021	2.241506473
Scandium	21	K-series	0.713650948	1.109194278	0.567225446
Calcium	20	K-series	0.601698052	0.93519113	0.53644984
Potassium	19	K-series	0.301828798	0.469118379	0.275841341
Titanium	22	K-series	0.214228515	0.332965358	0.159874681
Magnesium	12	K-series	0.136284635	0.211820832	0.200358525
		Sum:	64.33958072	100	100

Particle 2, Quantification Table



Particle 3, SEM Image



Particle 3, EDS Spectra

MicroVision Labs, Inc.

Quantax, Elemental Percent Table

Results Zanic 3 Coarse, Particle 3.spx
Date: 8/14/2015

Element	AN	series	[wt.%]	[norm. wt.%]	[norm. at.%]
Oxygen	8	K-series	27.474794	25.1542351	48.01555044
Silicon	14	K-series	19.020297	17.4138166	18.93591512
Lanthanum	57	L-series	17.8284863	16.3226678	3.588774696
Aluminium	13	K-series	15.5735471	14.2581839	16.13882712
Cerium	58	L-series	14.1891404	12.990706	2.831438413
Iron	26	K-series	5.48074503	5.01783376	2.744043008
Yttrium	39	K-series	3.89048669	3.56189083	1.22355787
Calcium	20	K-series	2.06617792	1.89166569	1.441493998
Potassium	19	K-series	1.60621185	1.47054899	1.148672212
Carbon	6	K-series	1.59418669	1.45953949	3.711172802
Copper	29	K-series	0.50124795	0.45891186	0.220554313
		Sum:	109.225321	100	100

Particle 3, Quantification Table

Conclusion:

Using the BSE detector, particles containing heavy elements were identified and analyzed with EDS. A small number of particles contained lanthanum, cerium, scandium, zirconium, copper, yttrium, and/or thorium were detected in the sample. No uranium, radium or lead was found in the particles analyzed.

Please let us know if you have any questions about this analysis or if there is anything else we can do for you.

Sincerely,

Denise W. Bergstrom
Analytical Microscopist

Audra Chaput
Lab Technician

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