ASSESSMENT REPORT TITLE PAGE AND SUMMARY

TITLE OF REPORT: ZMM® Canada Minerals Corp. Exploration and Development Assessment Report

TOTAL COST: $9,930.93

AUTHOR(S): LuVerne E.W. Hogg
SIGNATURE(S):

NOTICE OF WORK PERMIT NUMBER(S)/DATE(S):
5626141 – November 16, 2016; 5626276 – November 17, 2016

YEAR OF WORK: 2016
PROPERTY NAME: ZMM TransCanada Zeolite
CLAIM NAME(S) (on which work was done):
#1040047, #1041085 and #1041086

COMMODITIES SOUGHT: Zeolite/Basalt

MINERAL INVENTORY MINFILE NUMBER(S),IF KNOWN:

MINING DIVISION: Kamloops
NTS / BCGS:
LATITUDE: 50° 37' N"
LONGITUDE: 119° 54' W" (at centre of work)
UTM Zone: EASTING: NORTHING:

OWNER(S): ZMM® Canada Minerals Corp.

MAILING ADDRESS: 6459 Mack Road, Peachland, BC V0H 1X8

OPERATOR(S) [who paid for the work]: ZMM® Canada Minerals Corp.

MAILING ADDRESS: 6459 Mack Road, Peachland, BC V0H 1X8

REPORT KEYWORDS (lithology, age, stratigraphy, structure, alteration, mineralization, size and attitude. Do not use abbreviations or codes)
Zeolites, volcanic flow rocks, vugs, orthoclase, diopside, anorthite, Kamloops group, stage grinding, magnetic separation, X-Ray Diffraction, Scanning Electron Microscope, Inductively Coupled Plasma Mass Spectrometry, Energy Dispersive X-Ray Analysis, whole rock, Eocene, surficial deposits

REFERENCES TO PREVIOUS ASSESSMENT WORK AND ASSESSMENT REPORT NUMBERS: N/A

TYPE OF WORK IN THIS REPORT	EXTENT OF WORK (in metric units)	ON WHICH CLAIMS	PROJECT COSTS APPORTIONED (incl. support)
GEOLOGICAL (scale, area)			
Ground, mapping			
Photo interpretation			
GEOPHYSICAL (line-kilometres)			
Ground			
Magnetic			
Electromagnetic			
Induced Polarization			
Radiometric			
Seismic			
Other			
Airborne			
GEOCHEMICAL (number of samples analysed for …)			
Soil			
Silt			
Rock			
Other			
DRILLING (total metres, number of holes, size, storage location)			

Non-core			
RELATED TECHNICAL			
Sampling / Assaying/ Sampling Preparation	250 kg, 40 samples from stock piles and eastern trench; sample weights 1kg – 10kg – crushing to -10mesh, screening, magnetic separation, water retention	#1040047, #1041085 and #1041086	$242.96
Petrographic	Ocular examination on all samples	#1040047, #1041085 and #1041086	$600.00
Mineralographic	N/A		
Metallurgic	250 kg, 40 samples from stock piles and eastern trench; sample weights 1kg – 10kg – crushing to -10mesh, screening, magnetic separation, water retention, XRD, SEM, EDX, ICP	#1040047, #1041085 and #1041086	$4,184.27
PROSPECTING (scale/area)			
PREPATORY / PHYSICAL			
Line/grid (km)			
Topo/Photogrammetric (scale, area)			
Legal Surveys (scale, area)			
Road, local access (km)/trail			
Trench (number/metres)			
Underground development (metres)			
Other	Field work; transportation; meals		3163.70
		TOTAL COST	8190.83

ZMM® Canada Minerals Corp.

Exploration and Development Assessment Report

TransCanada Zeolite Claims

1040047, #1041085 and #1041086

February 14, 2017

Prepared by LuVerne E.W. Hogg

Member of the Canadian Institute of Mining, Metallurgy and Petroleum #148963

LuVerne E.W. Hogg

Contents

Introduction

Historically zeolites were known to exist in the Kamloops Group of Eocene age, but only in amounts of interest to mineral collectors. There were no references to crystalline zeolite contained in basalt flow rock in any government geological surveys.

In 2000, C_2C Zeolite Corporation discovered high percentage zeolite occurrences, as a major component of basalt flow rock, in the area of the ZMM TransCanada zeolite claims. Field examinations were conducted and samples collected. They conducted analysis and identified the zeolites by X-ray Diffraction (XRD), Scanning Electron Microscope (SEM) and Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and employed stage grinding, screening and high intensity, dry magnetic separation to produce a high purity chabazite concentrate. Ocular examination was conducted to identify zeolite and determine the crystal size of the zeolite. In 2002 C_2C dug six trenches with an excavator and created stock piles containing several tonnes from three of the trenches. The last trench created, the eastern trench, contained high percentages of chabazite zeolite in the basalt flow rock. The trenches were backfilled as per their Notice of Work. Following magnetic separation the crystalline chabazite zeolite was a very high purity, at 98%, which exhibits good economic potential. C_2C also began characterizing the physiochemical properties of the chabazite zeolite, the magnetic fraction and the -50 mesh fraction. No assessment work was filed. Information was gathered from personal files.

The property is accessible by an all weather road just off the main Kamloops - Vernon Highway (#97) and onto Duck Range Road, approximately 1.5 kilometres to a cross road onto the property, within 5 kilometres of the Trans-Canada Highway and the Canadian Pacific transcontinental rail line.

Objective & Scope of Work

Location

In November 2015, ZMM® Canada Minerals Corp. staked the property, situated on crown land. There is an existing road from the valley portion to the eastern trench. The stock piles on the valley floor still contain a few tonnes from three of the trenches, two of which were subsequently sampled.

Analysis

Since 2003, the accuracy and definition of XRDs, SEMs, Energy Dispersive X-Ray Analysis (EDX, EDS or EDAX) and ICP-MSs have improved. ZMM's program was to verify and apply the newer analytical technologies and further define the physiochemical properties of the non-magnetic fraction, the magnetic fraction and the mixed fractions below -50 mesh.

Three products will be produced from the chabazite zeolite, basalt flow rocks:

1. The high purity, non-magnetic chabazite zeolite fraction has applications as a molecular sieve in gas separation, Pressure Swing Adsorption systems for the production of enriched oxygen and argon separation, radioactive waste containment for cesium and strontium and potential for solar thermal energy harvesting and storage.
2. The magnetic fraction has use as a Supplementary Cementaceous Material in concrete, horticultural and agricultural applications. The magnetic fraction still contains approximately 5% to 10% chabazite in a microscopic form in the magnetic and para-magnetic fractions.
3. The Mixed -50 mesh fraction chabazite and basalt flow rock can be used as a Silica Fume replacement, high strength lightweight concrete, use in the manufacture of Vacuum Insulated Panels (VIPs) and used in horticultural and agricultural products.

ZMM's scope of work included determining the physiochemical characteristics of the high purity crystalline chabazite zeolite, produced as a result of stage grinding and high intensity, dry magnetic separation, for its use in the above stated applications. Since crystalline chabazite zeolites function at a molecular level, determination of the physiochemical properties requires analytical procedures to determine certain properties and these specialty analyses are not readily available in commercial analytical laboratories in Canada.

Geology

The geology of the area is well known. The basalt flow rocks of the Kamloops and Penticton Groups immediately underlie the claims group with exposures of the Mesozoic age Nicola sequence of volcanic and sediments nearby. This sequence is also believed to underlie the Kamloops Group on the property.

Although the Kamloops and Penticton Groups (Eocene Age) form a continuous sheet, 20 kilometres to 30 kilometres wide, stretching 150 kilometres from the west side of Okanagan Lake to the South Thompson River east of Kamloops, they form a unique zone at the property because of the following:

Samples representing a significant portion of the volcanic column on the property are zeolite amygdales occupying >25% of rock volume and in certain units exceed 50%. In addition, the zeolite amygdales are not generally concentrated or confined to tops of individual flows, but are distributed throughout the width of the volcanic pile.

Certain units show evidence of higher gaseous content, particularly a more reddish coloured unit, which represents a phase of volcanic activity when the magma was more charged with gaseous material, and/or associated with release of pressure due to sudden break-up of a lava dome or plug over the vent. The basalt flow rocks here consist of equal parts orthoclase, diopside, anorthite and chabazite zeolite.

Zeolites identified by xray diffraction (XRD) include minor phillipsite, thompsonite and stilbite. The chabazite is the zeolite occurring in vugs on the claims.

The volcanic rocks on the property show alteration associated with hydrothermal activity which provided the heat source for zeolitization of the volcanic column.

The target for reserves is ≥100,000 tonnes, which would result in approximately 20,000 tonnes of high purity chabazite zeolite, 25,000 tonnes of the magnetic fraction using dry high intensity magnetic separation and 55,000 tonnes of mixed -50mesh chabazite and basalt flow rock which ZMM considers an economic amount for production.

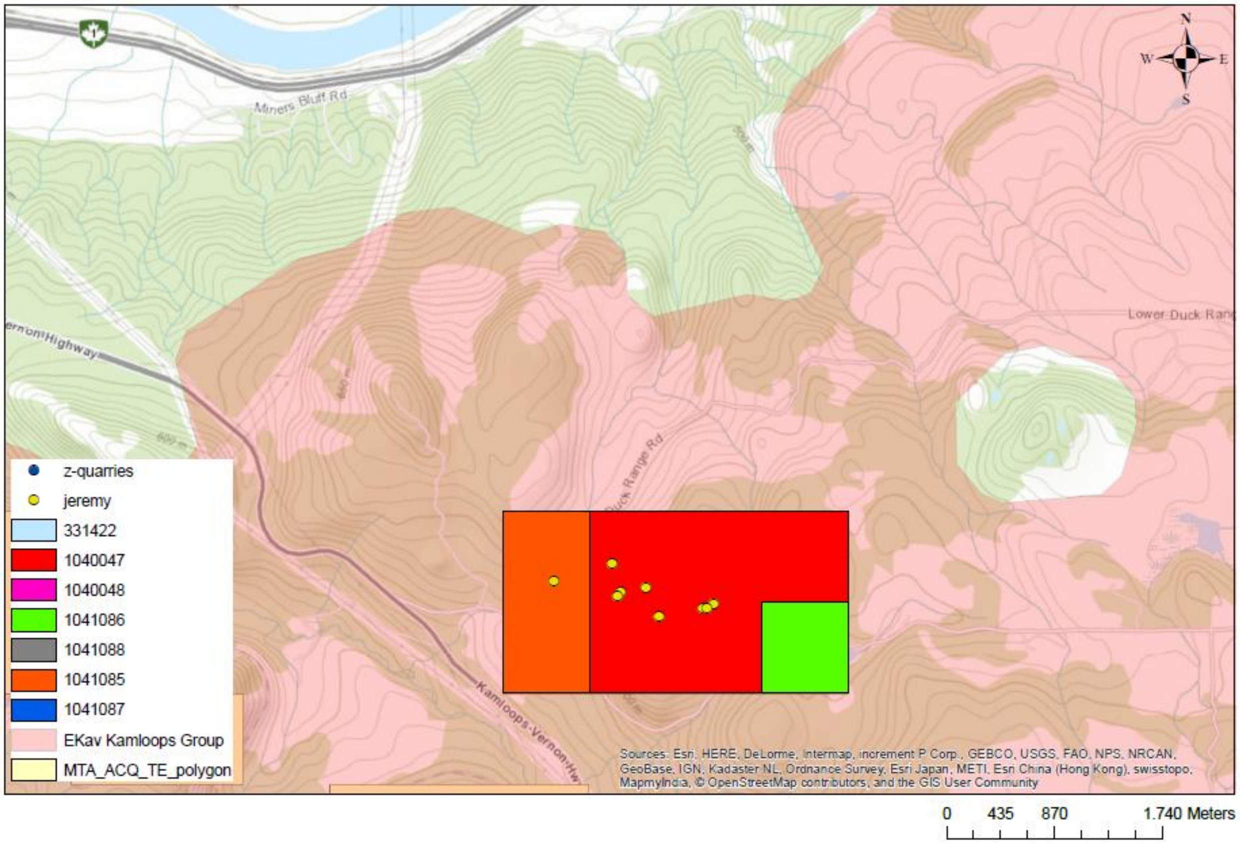
ZMM has successfully removed and additional 10% to 15% using wet high intensity magnetic separation on the -50 mesh fraction.

Conclusion

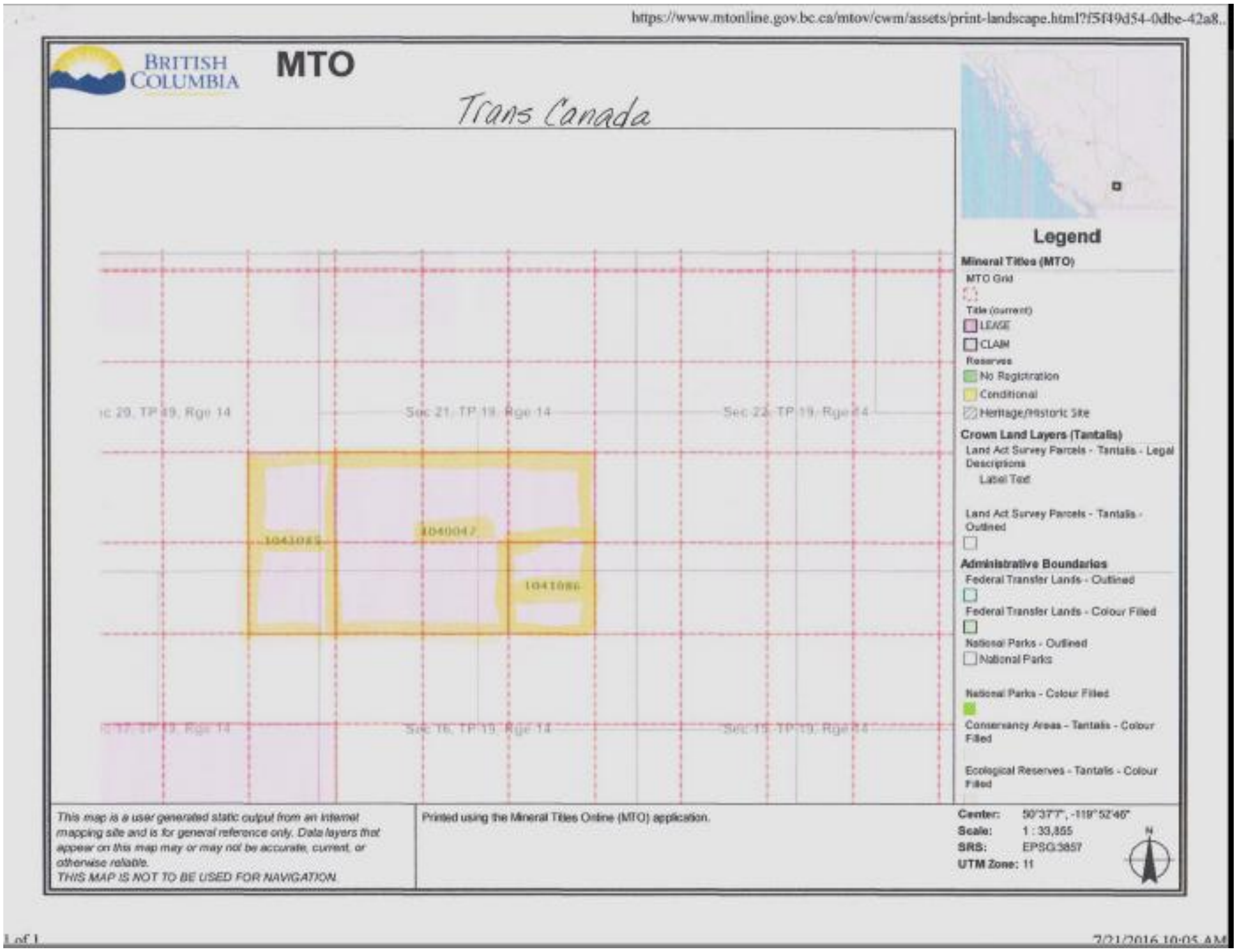
The basalt flow rocks containing chabazite zeolite as they occur are very unique, especially as they occur at surface and can be easily quarried and concentrated by dry high intensity magnetic separation. ZMM will be filing a Notice of Work to quarry a 1,000 tonne bulk sample from the eastern trench on the TransCanada Claims. ZMM is calling for tenders for road repair to the eastern trench and trenching for the bulk sample utilizing an excavator.

Appendix A – Maps

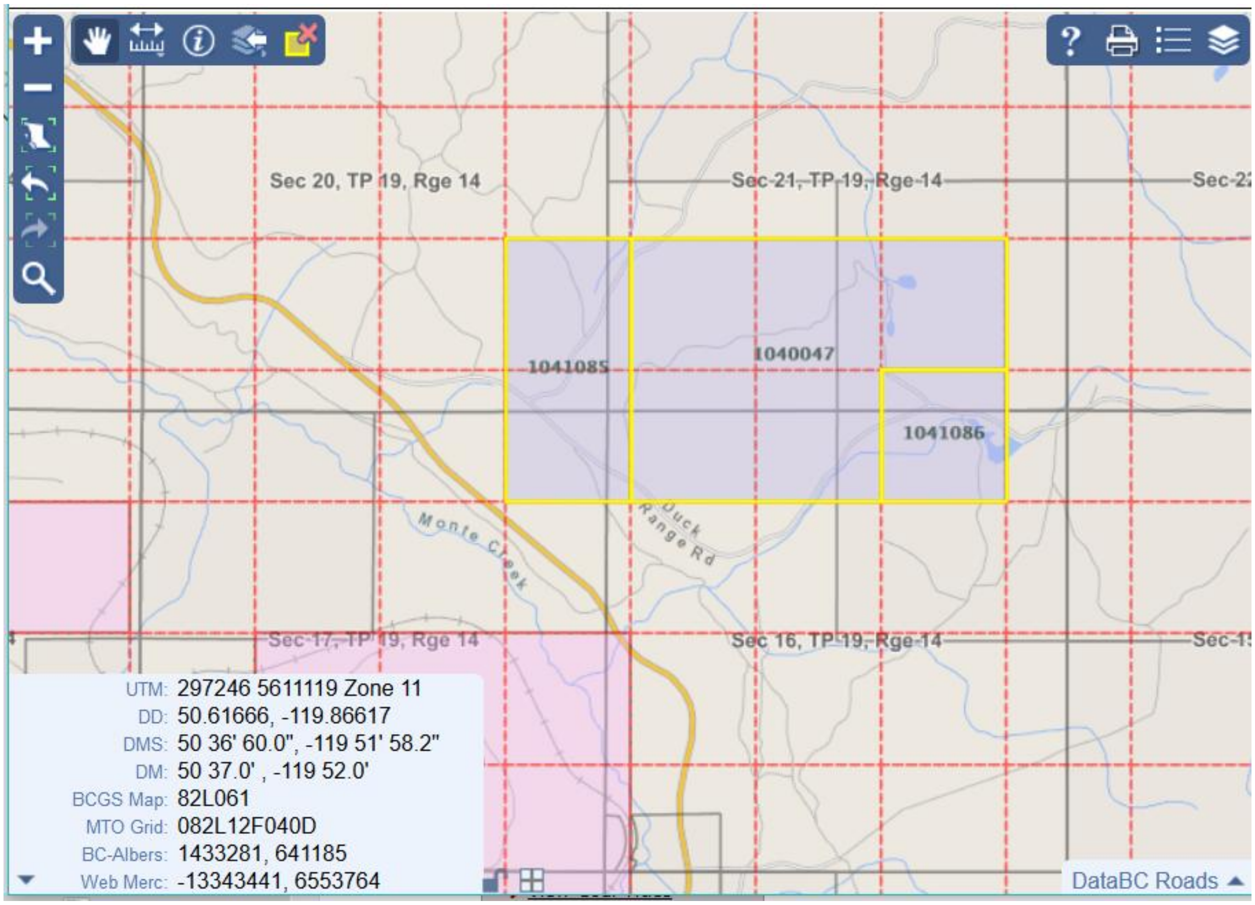
TransCanada Claims



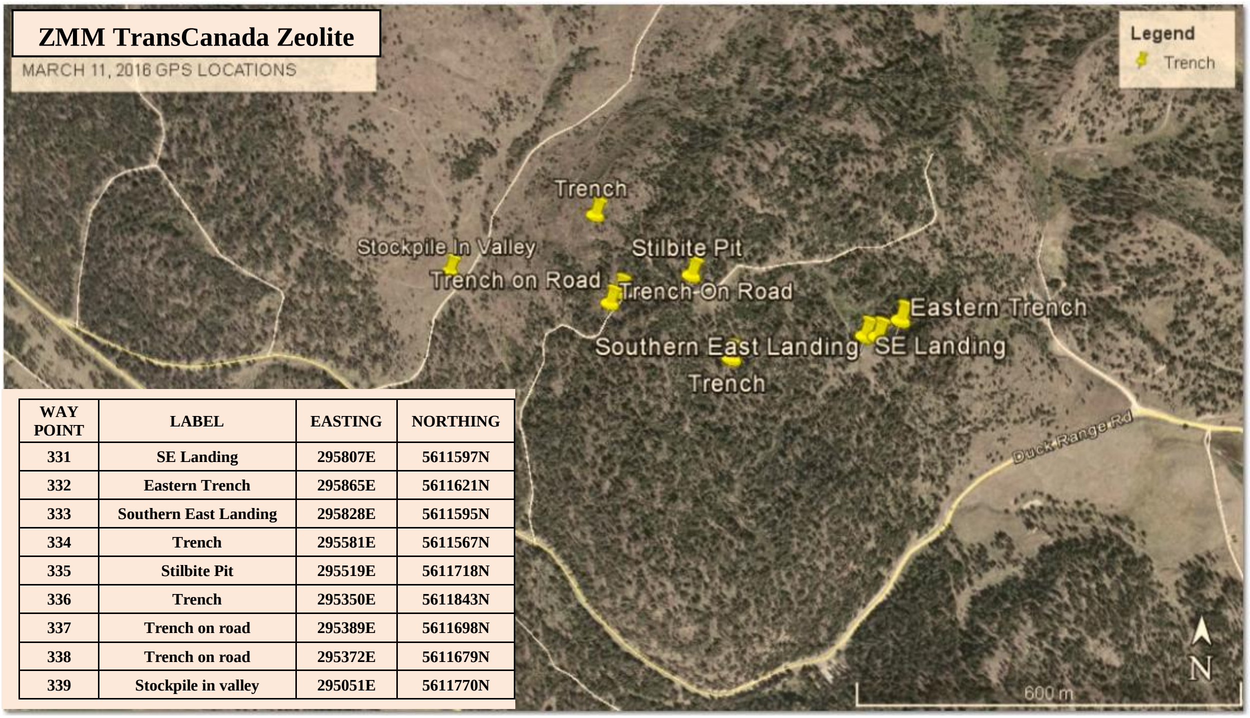
TransCanada Claims



TransCanada Claims



ZMM TransCanada Zeolite GPS Locations



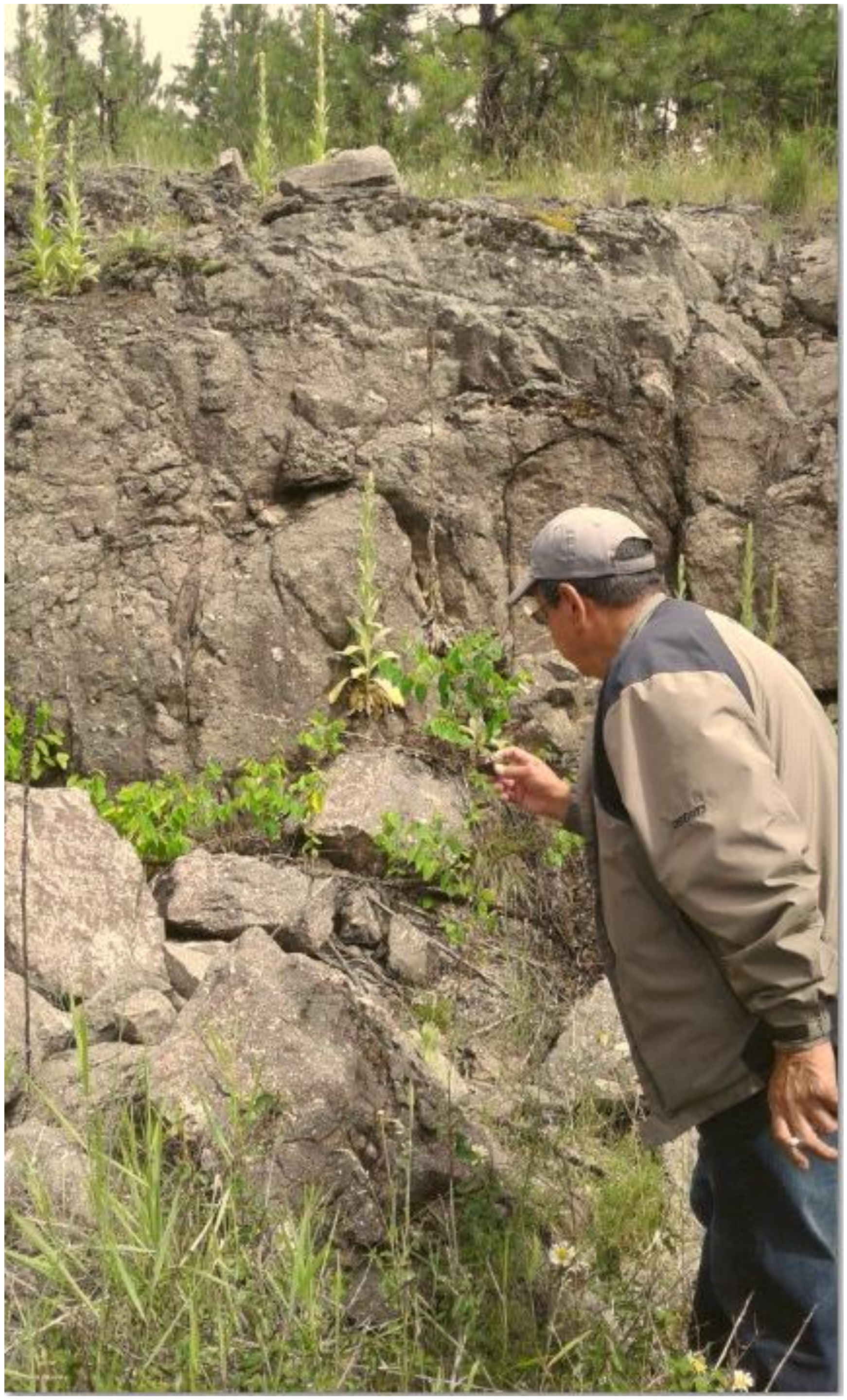
WAY POINT	LABEL	EASTING	NORTHING
331	SE Landing	295807E	5611597N
332	Eastern Trench	295865E	5611621N
333	Southern East Landing	295828E	5611595N
334	Trench	295581E	5611567N
335	Stilbite Pit	295519E	5611718N
336	Trench	295350E	5611843N
337	Trench on road	295389E	5611698N
338	Trench on road	295372E	5611679N
339	Stockpile in valley	295051E	5611770N

Appendix B – Pictures

ZMM TransCanada Zeolite Eastern Trench

ZMM TransCanada Claims West End Eastern Trench

ZMM TransCanada Zeolite Southern East Landing Outcrop
Zeolite Vesicular Basalt



Appendix C – Mine Inspection Report

July 2016

BRITISH COLUMBIA Ministry of Energy and Mines

Province of British Columbia
MINISTRY OF ENERGY AND MINES
Report of Inspector of Mines
(Issued pursuant to Section 15 of the *Mines Act*)

Inspection No.:	66176
File:	18050-02-09
Mine No.:	1620039
Permit No.:	MX-15-165
Emp/Cont:	0 / 0
Orders H&S:	0 RECL 0
Stop Work:	0

Mine Name:	Trans Canada Zeolite	**Location:**	Kamloops/Vernon Hwy / 50.621, -119.887
Owner/Operator:	Hogg, Verne	**Address:**	6459 Mack Road Peachland, BC V0H 1X8
Manager:	Verne Hogg	**Areas Inspected:**	Stockpile and trench sites
Date of Inspection:	2016/07/13	**Accompanying Inspector(s):**	

Persons Contacted

Management:	Verne Hogg
OHS Committee:	
# Workers Contacted:	0

A copy has been forwarded to the Joint Occupational and Safety Committee and the union as applicable. The Mine manager shall complete the right hand column noting specific corrective actions taken by a specified date, and return a copy to the Inspector within 15 days of receiving the report. Further the manager shall post a copy to the bulletin board, to be replaced by a copy showing the manager's response. In this document, Code means Health, Safety and Reclamation Code for Mines in British Columbia.

INSPECTION ORDERS	MANAGER'S RESPONSE:
This site visit was completed in the morning and early afternoon of July 13, 2016 by Tom Charles. Verne Hogg was present for the visit since he was the tour guide. The original coordinates in MMS placed this site 6.4 km to the south and it would have been rather difficult to find with those coordinates. The visit was brought about by a request from Verne to inspect and familiarize myself with the property since I would likely be issuing the (amended) permit. Fifteen photos were taken of the site visit. There were four separate work areas identified. The stockpile area and one trench location have not been reclaimed. The other two trenches have been reclaimed, but it appears there was never any seeding done. The vegetation has regenerated over the years, but it is patchy. The trench area will be part of the permit amendment application so the area will not require reclamation at this point. Left site at about 2:00 pm.	

Tom Charles
Inspector of Mines, Permitting

Tom Charles
Signature – Inspector of Mines

2nd Floor, 441 Columbia Street Kamloops BC V2C 2T3
Address

Signature – Manager

Copies To

Report Date: 2016/07/20

Appendix D - TransCanada Zeolite Cost Summary

Exploration Work type	Comment	Hours			Totals
Personnel (Name)* / Positio	**Field Days (list actual day**	**Hours**	**Rate**	**Subtotal***	
Verne Hogg	Nov 25, 2015; Jul 13, 2016; Sep 15, 2016; Nov 21, 2016	12.5	$125.00	$1,562.50	
Chuck Marlow	20-Nov-15	3	Cash payt	$125.00	
Jeremy Marlow	20-Nov-15	3	Cash payt	$125.00	
Tom Charles (Mines Inspector)	13-Jul-16	2.5	$0.00	$0.00	
			$0.00	$0.00	
			$0.00	$0.00	
				$1,812.50	**$1,812.50**
Office Studies	**List Personnel (note - Office only, do not include field days**				
General research			$0.00	$0.00	
Report preparation	Cheryl Hogg	7.0	$35.00	$245.00	
Report preparation	Verne Hogg	5.0	$125.00	$625.00	
Other (specify)				$870.00	
				$1,740.00	**$1,740.00**
Geochemical Surveying	**Number of Samples**	**No.**	**Rate**	**Subtotal**	
Rock			$0.00	$0.00	
Water			$0.00	$0.00	
Whole rock			$0.00	$0.00	
Metallurgic - Independent Labs	3+2+2+1+1		$0.00	$1,215.52	
Metallurgic	40 x 4 = 160	23.8	$125.00	$2,968.75	
Ocular Examination	40 x 4 = 160	40.0	$15.00	$600.00	
				$4,784.27	**$4,784.27**
Other Operations	**Clarify**	**No.**	**Rate**	**Subtotal**	
Bulk sampling			$0.00	$0.00	
Sample preparation	Merissa Billey	23.3	$10.45	$242.96	
				$242.96	**$242.96**
Transportation		**No.**	**Rate**	**Subtotal**	
kilometers		1840.00	$0.68	$1,251.20	
fuel			$0.00	$0.00	
				$1,251.20	**$1,251.20**
Accommodation & Food	**Rates per day**				
Hotel			$0.00	$0.00	
Meals		4.00	$25.00	$100.00	
				$100.00	**$100.00**
Miscellaneous					
Telephone			$0.00	$0.00	
Other (Specify)			$0.00	$0.00	
				$0.00	**$0.00**
Freight, rock samples					
				$0.00	**$0.00**
TOTAL Expenditures					**$9,930.93**

Appendix E - Independent Analysis 2016

Claims #1040047 and 1041085

Date	Type of Zeolite	Claim #	Sample #	Description of Work	Performed By	Invoice Amount
26-Jan	Chabazite	TransCanada #1040047	East Trench Stock Pile	3 samples to be crushed and screened to -10 mesh; minor elements analysis on all samples; ICP on 1 sample F-Chabazite prepared to -100+150 mesh	Activation Laboratories Ltd. (Actlabs)	$241.73
16-May	Chabazite	TransCanada #1040047	30-5, 3-16	2 samples (#30-5 & 3-16); Water holding capacity; modified water holding capacity; CEC; % base saturation for effect of CEC; water loss; SEMs and EDAZs Non Quantitative analysis	Northern Analytical Lab Services (NALS)	$566.25
22-Jun	Chabazite	TransCanada #1040047	East Trench	Water uptake measurements/curves	ZAE Beyern	$137.50
26-Jul	Chabazite	TransCanada #1040047	7G	SEM and EDX on 1 non-magnetic fraction sample	Lakehead University (LUCAS)	$175.00
14-Sep	Chabazite	TransCanada #1040047	8-16-East Trench	Whole rock analysis using ICP; 30 element ICP analysis; boron assay	Loring Labs Ltd.	$95.04
TOTAL						**$1,215.52**

Appendix F - ZMM Assessment Work 2016

Claims #1040047 and 1041085

Date	Hrs	Km	Type of Zeolite	Claim #	Location	Sample #	Description of Work	Worker	Hrly Rate	ZMM Costs	Food Accom	Mileage
20-Nov	3		Chabazite	TransCanada #1040047, #1041085	E Hwy 97, Duck Range Rd, S of Kamloops		GPS all Trenches; examine access roads	Chuck & Jeremy Marlow		$250.00		
25-Nov	2.5	460	Chabazite	TransCanada #1040047, #1041085	E Hwy 97, Duck Range Rd, S of Kamloops		Gather samples from the stockpiles	Verne Hogg	$125	$312.50	$25.00	$312.80
14-May	3	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	Stock Pile 1 & 2	Crush to -10 +20 mesh, screen, wash, weigh, magnetic separation F-Chabazite; prepare -20 mesh and -6+10 mesh samples; ocular exam; weigh	Verne Hogg	$125	$375.00		
5-Jul	5	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	Stock Pile 1	Wash and dry 25 kg sample; screen 25 kg sample (150 metre grab sample) to +1.27cm to -1.27cm; technical screening -200, -100, -50 mesh; ocular exam	Verne Hogg	$125	$625.00		
5-Jul	2	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	Stock Pile 1	Screening; magnetic separation	Merissa Billey	$10.45	$20.90		
7-Jul	2	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$20.90		
8-Jul	2	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$20.90		
13-Jul	2.5	460	Chabazite/ Stilbite	TransCanada #1040047, #1041085	E Hwy 97, Duck Range Rd, S of Kamloops		Tom Charles inspected and GPS'd the old test Trench; reviewed/examined old trenches, access; gather samples	Verne Hogg/ Tom Charles - Inspector of Mines Kamloops	$125	$312.50		$312.80
13-Jul	2		Chabazite	TransCanada #1040047, #1041085	E Hwy 97, Duck Range Rd, S of Kamloops	01 - 05	Checked Monte Creek Siding; large samples taken out of 3 trenches; samples taken TC 01 - 05	Verne Hogg	$125	$250.00	$25.00	

13-Jul	1	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$10.45		
14-Jul	2.5	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	Stock Pile 1 & 2; East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$26.13		
19-Jul	2.3	N/A	Chabazite	TransCanada #1040047	TransCanada, E Hwy 97, Duck Range Rd, S of Kamloops	TC 7G, 7C	Crush, screen, wash, dry, ocular exam, pulverize samples for Lakehead University (LUCAS) for XRD and SEM analysis; 7gm TC non-magnetic fraction, 7gm TC magnetic fraction	Verne Hogg	$125	$281.25		
20-Jul	2.5	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	30-5, 3-16	Crush, screen, wash, dry 2.27kg composite sample for adsorbency testing by NALS; ocular exam	Verne Hogg	$125	$312.50		
26-Jul	1.8	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$18.29		
27-Jul	2.5	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	30-5, 3-16	Wash/dry 4.54kg; heat treat to 244.44º C; increase temperature to 250º C; ocular examination; cool; calculate weight losses; re-heat to 246º C cool; calculate weight losses; package to send to NALS for testing/analysis	Verne Hogg	$125	$312.50		
28-Jul	1	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Review LUCAS SEM and ETA analysis; comparison of TransCanada and Juniper Creek samples	Verne Hogg	$125	$125.00		
5-Aug	3	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$31.35		
12-Aug	2	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$20.90		
18-Aug	1	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screen samples to -.64cm to -5.1cm	Verne Hogg	$125	$125.00		

18-Aug	3	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$31.35		
19-Aug	4	N/A	F-Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screen for -100 +200 mesh for testing; ocular exam; sent -200 mesh samples for soil testing to Dr. David Perron	Verne Hogg	$125	$500.00		
22-Aug	2.5	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screen samples to -100 x +150 mesh; ocular exam; prepare sample for shipping to Texas for Flocking tests	Verne Hogg	$125	$312.50		
30-Aug	2	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$20.90		
15-Sep	3	460	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops		Gather more samples from Trenches; get estimate for road repair from Duck Lake Road to proposed quarry	Verne Hogg	$125	$375.00	$25.00	$312.80
25-Oct	2	N/A	Chabazite	TransCanada #1040047	E Hwy 97, Duck Range Rd, S of Kamloops	East Trench	Screening; magnetic separation	Merissa Billey	$10.45	$20.90		
21-Nov	2.5	460	Chabazite	TransCanada #1040047, #1041085	E Hwy 97, Duck Range Rd, S of Kamloops		Gather samples from the stockpiles from 3 existing Trenches	Verne Hogg	$125	$312.50	$25.00	$312.80
Sub Total										**$5,024.21**	**$100.00**	**$1,251.20**
Ocular Examination all samples												**$600.00**
TOTAL												**$6,975.41**
TOTAL INCLUDING LAB WORK												**$8,190.93**

Appendix G - Statement of Author Qualifications

LuVerne E.W. Hogg

Since 1965, as a geologist and geochemist, Verne has been engaged in mineral exploration, development, production and marketing of precious, base metals and industrial minerals. He is an industry recognized expert in zeolites who has specialized and researched zeolite minerals, products and their applications for over 25 years in 16 countries. As an expert on zeolites, Verne has developed many agricultural, industrial, construction, consumer and environmental products. He is responsible for patents on the use of zeolite in Lightweight Zeolite Concrete products, downhole cements, radioactive and hazardous waste encapsulation and consumer products.

Experience:

2014 to Present

President and CEO of ZMM® Canada Minerals Corp., a private British Columbia company. ZMM® was created to acquire and establish the Z-1 zeolite deposit in British Columbia to produce and market the existing ZMM® intellectual and proprietary products, and to capitalize on its logistical advantages to fill a void currently existing in the marketplace.

2010 to Present

President and CEO of Arenito Minerals & Chemicals Corporation, a private international consulting firm based in British Columbia, specializing in mineral exploration, development, marketing and sales with a focus on zeolite.

1991 to 2009

Founder, President and CEO of Zeox Corporation, an Alberta public company traded on the TSX V stock exchange. Zeox was an industrial minerals research, development and production company. Grew the company into production of sodium sulphate in Saskatchewan and zeolites in British Columbia, Arizona and Nevada. Responsible for the development of advanced technological applications for zeolites. Coordinated mineral sales contracts in excess of 100 million dollars.

1984 to 1990

Founder and CEO of Ekaton Industries Inc., an Alberta public company traded on the Toronto Stock Exchange. Ekaton engaged in the exploration, development and production of industrial minerals, including kaolin, bentonite, silica sand, calcium carbonate and diatomaceous earth.

1972 to 1984

Joined the family run Alberta public corporation, Flin Flon Mines Ltd., as Vice President Exploration for base and precious metals in Canada and the British Virgin Islands. Guided the development of a gold mine and mill complex in northeast Saskatchewan.

1966 to 1972

Geological/Geophysical/Geochemical Contractor - conducted geophysical surveys, airborne and ground, including induced polarization, horizontal and vertical loop, geochemical surveys and seismic surveys. Introduced Track Etch radon surveys for uranium exploration in northern Saskatchewan/Alberta, Canada. Well site geologist and supervisor of diamond drilling programs throughout Canada. Initiated and supervised coal exploration resulting in the discovery of the Bow Valley coal deposit in north central Saskatchewan, Canada

1965 to 1966

International Nickel Company Thompson, Manitoba, Canada - Mine and Exploration Geologist throughout Northern Manitoba and the North West Territories.

Professional Affiliations and Publications

- University of Saskatchewan, Geology 1964
- Member of The Canadian Institute of Mining, Metallurgy and Petroleum #148963
- Various memberships, directorships and offices in mineral exploration companies including Canada University Industry Council on Advanced Ceramics
- Published many and varied papers on mineral exploration, research and product development including:

    - Co-authored with Dr. J. Gallant and Dr. A. Prakash, both of the University of Western Ontario, *Fluidization and Hydraulic Behaviour of Natural Zeolite Particles Used for Removal of Contaminants from Waste Water2010*
    - Co-authored with Dr. J. Gallant and Dr. A. Prakash, both of the University of Western Ontario, *Removal of Selected Radionuclides and Metal Contaminants by Natural Zeolites from Liquid Effluents 2009*
    - *Creating Shareholder Value in a Growing Market 2007*
    - *Emerging Zeolite Technologies for Environmental Remediation 2001Zeolites: Absorbents, Adsorbents 2003*
    - *Natural Zeolites: Mineral Oddity or Mineral Commodity? 1998*
    - *Zeolites, Types, Uses and Expectations 1997*

- *Evaluation of Ammonium Holding Characteristics of Zeolite and its Effectiveness in Manure Odour Control 1996*
- *Market Development Strategy for Lightweight Zeolite Concrete 1995*
- *Cache Creek Zeolite Deposits Project Development 1993*
- *Criteria for Industrial Mineral Commodities Selection and Development 1992*
- *Developing an Industrial Mineral Opportunity 1990*
- *Marketing Industrial Minerals – The Global Strategy 1985*
- *Application of the Track Etch Technique for Uranium Exploration* - *Athabasca Sandstone 1972*

Loring Laboratories Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel:403- 274-2777 Fax:403- 275-0541

ISO9001:2008 Certified

TO: ZMM Canada Minerals Corp.
6459 Mack Road
Peachland, BC V0H 1X8

FILE: 6 0 2 3 6

DATE: September 14, 2016

Attn: LuVerne E.W.Hogg

WHOLEROCK ICP ANALYSIS

Sample I.D.	Al2O3 %	BaSO4 ppm	CaO %	Cr2O3 ppm	Fe2O3 %	K2O %	MgO %	MnO %	Na2O %	Ni ppm	P2O5 %	SO3 %	SiO2 %	SrSO4 ppm	TiO2 %	V2O5 ppm	LOI@1000 %	SUM %
TCZ-8-16-Pit	16.86	1658	4.90	122	7.85	2.67	4.90	0.16	6.34	35	0.54	0.12	45.46	466	0.78	189	7.78	98.36

Sample received on August 30, 2016

0.5 gm sample digested with multi acids and finished by ICP

Certified by: ______________________

Loring Laboratories Ltd.

629 Beaverdam Road N.E.,
Calgary Alberta T2K 4W7
Tel: 403- 274-2777 Fax: 403-275-0541
loringlabs@telus.net

ISO9001:2008 Certified

TO: ZMM Canada Minerals Corp.
6459 Mack Road
Peachland, BC V0H 1X8

FILE: 6 0 2 3 6

DATE: September 14, 2016

Attn: LuVerne E.W.Hogg

30 ELEMENT ICP ANALYSIS

Sample No.	Ag ppm	Al %	As ppm	B ppm	Ba ppm	Bi ppm	Ca %	Cd ppm	Co ppm	Cr ppm	Cu ppm	Fe %	K %	La ppm	Mg %	Mn ppm	Mo ppm	Na %	Ni ppm	P %	Pb ppm	Sb ppm	Sr ppm	Th ppm	Ti %	U ppm	V ppm	W ppm	Zn ppm	Zr ppm
TCZ-8-16-Pit	<0.5	8.81	1	508	1148	16	3.43	6	33	101	1	5.36	2.27	23	2.94	1170	8	4.68	26	0.23	99	7	235	45	1.02	<1	117	2	109	126
Blank	<0.5	<0.01	<1	<1	<1	<1	<0.01	<1	<1	<1	<1	<0.01	<0.01	<1	<0.01	<1	<1	<0.01	<1	<0.01	<1	<1	<1	<1	<0.01	<1	<1	<1	<1	<1

* 0.500 Gram sample is total digested with multi acid and ICP finish.

*** Sample received on August 30, 2016**

Certified by: ____________________

LORING LABORATORIES LTD.
629 Beaverdam Road N.E. Calgary, Alberta T2K 4W7
Tel : (403) 274-2777 Fax : (403) 275-0541

ISO 9001:2008 Certified

TO: ZMM Canada Minerals Corp.
6459 Mack Road
Peachland, BC V0H 1X8

FILE: 6 0 2 3 6

DATE: September 22, 2016

Attn: LuVerne E.W.Hogg

SAMPLE ID	Boron ppm
TCZ-8-16-Pit	508

Sample received on August 30, 2016

ASSAYER

University of Northern British Columbia
Northern Analytical Laboratory Services
Report File

Analyst(s)	Erwin Rehl
NALS Director	Dr. Hossein Kazemian
Date	4-Jul-16
Client Name:	LuVerne Hogg
Client Company Name:	ZMMR Canada Minerals Corp.
Filename (Reference):	2016NALS0010
Number of Samples:	3

SEM-EDAX *Not Quantitative*		Na	Mg	Al	Si	P	S	K	Ca	Mn	Fe	Total
Sample Name	Comment	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
TCZ-30-5		5.00	3.09	22.16	45.19	1.13	0.97	2.68	13.97	0.15	5.66	100
TCZ-Fe3-16		3.19	6.48	12.37	36.68	1.68	1.07	4.18	17.62	0.41	16.33	100
ZMM-CM-1		0.34	0.00	4.79	51.89	0.80	11.31	4.87	1.15	0.24	24.61	100

University of Northern British Columbia
Northern Analytical Laboratory Services
Report File

Analyst(s)	**Erwin Rehl**
NALS Director	**Dr. Hossein Kazemian**

Date	**16-May-16**
Client Name:	**LuVerne E.W. Hogg, CEO**
Client Company Name:	**ZMM Canada Minerals Corp.**
Filename (Reference):	**2016NALS0004**
Number of Samples:	**2**

Sample Name	Comment	Water Holding Capacity (%)	Effective CEC (meq / 100g)	CEC (Ammonium Acetate, meq / 100g)	Modified Water Holding Capacity*** (%)	Water Loss (Moisture Content, %)***
Sample 1 - ZMM Clinoptilolite		**40**	23.54	**47**	**46**	**8.05**
Sample 2 -ZMM F-Chabazite		**57**	38.55	**74**	**63**	**4.92**

Percent Base Saturation for Effective CEC*								
Sample Name	Comment	Na (%)	Mg (%)	Al (%)	K (%)	Ca (%)	Mn (%)	Fe (%)
Sample 1 - ZMM Clinoptilolite		0.00	58.46	0.56	5.79	35.11	0.02	0.06
Sample 2 -ZMM F-Chabazite		85.68	1.49	0.38	6.49	5.96	0.01	0.00

Percent Base Saturation for CEC (Ammonium Acetate Method)**								
Sample Name	Comment	Na (%)	Mg (%)	Al (%)	K (%)	Ca (%)	Mn (%)	Fe (%)
Sample 1 - ZMM Clinoptilolite		17.87	36.00	0.92	11.37	33.73	0.07	0.04
Sample 2 -ZMM F-Chabazite		52.64	3.93	0.60	21.48	21.28	0.02	0.03
Reference -Clinoptilolite sample		57.59	2.56	0.22	29.98	9.60	0.04	0.006

Note:

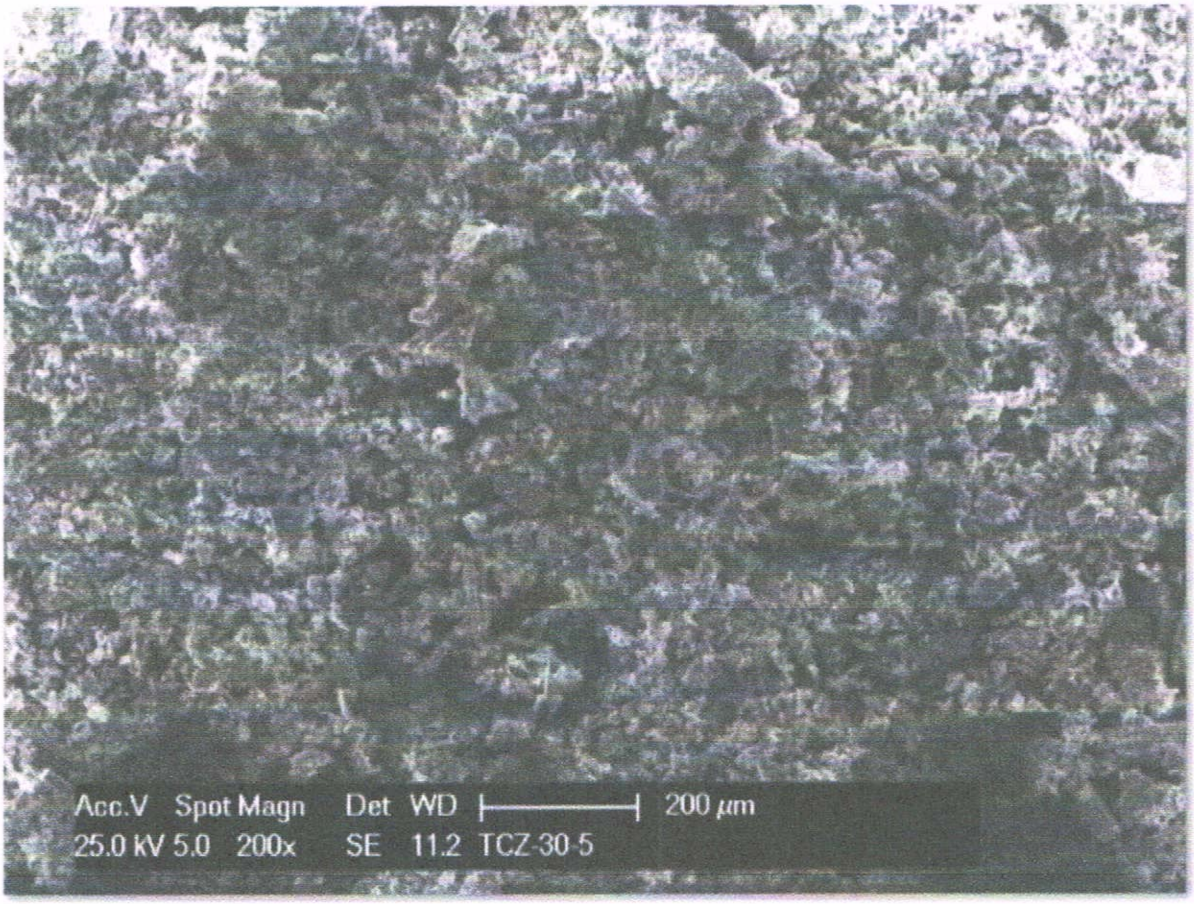
*Effective CEC based on 0.1M BaCl2 extraction (Chapman, H.D.; 1965. Cation-exchange capacity. In: C.A. Black (ed.). Methods of soil analysis – Chemical and microbiological properties. Agronomy 9: 891-901.)

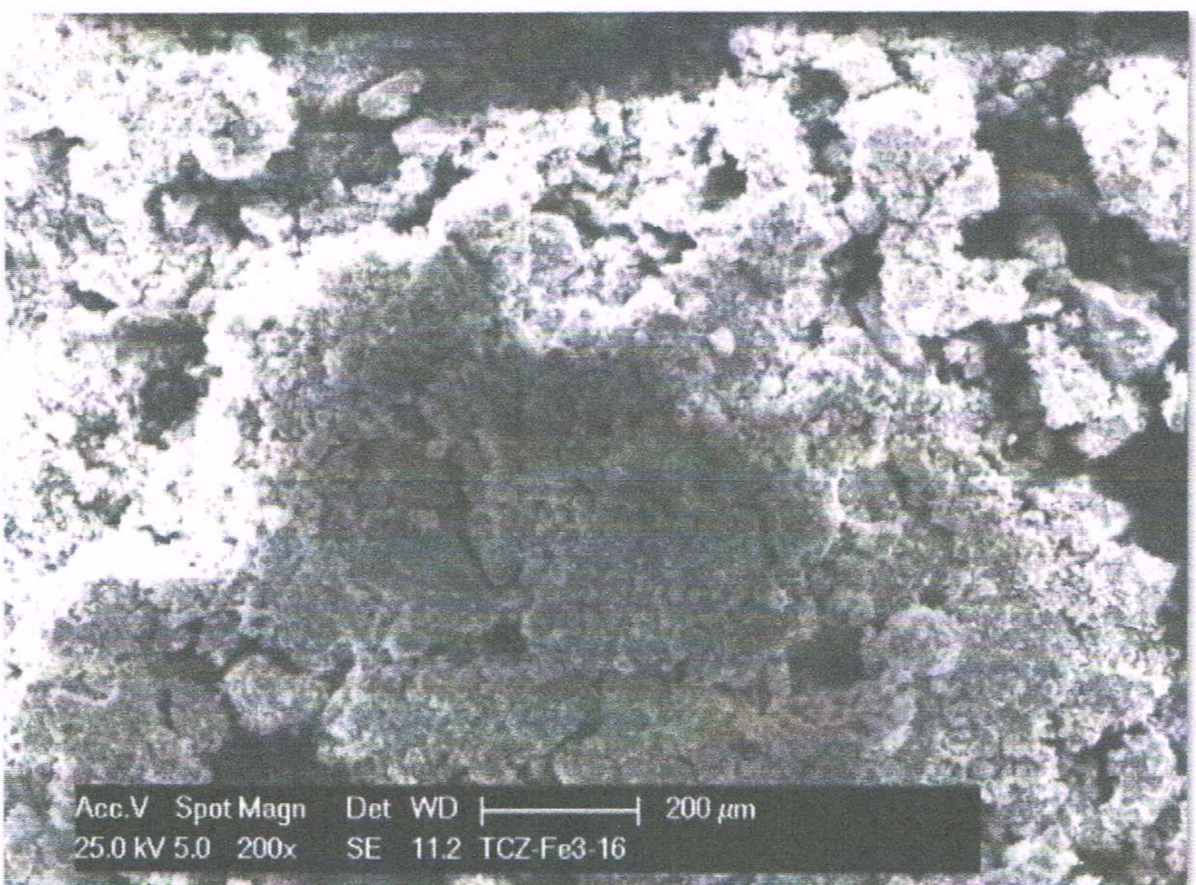
**Ammonium Acetate Method based on 1M Ammonium Acetate Extraction (Modified end equation, only sum of cations)

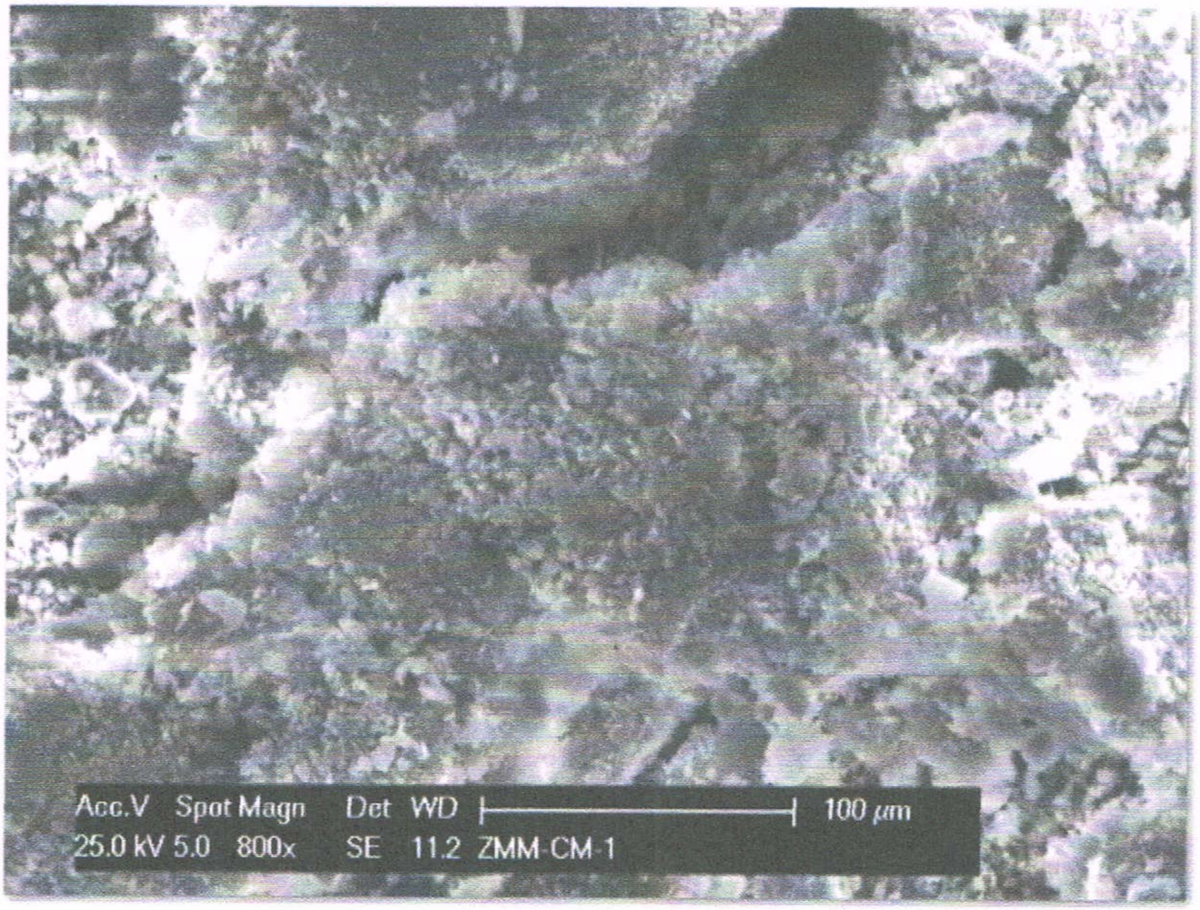
**Ammonium Acetate Method ICP-MS run Batch B01-B15, and BaCl2 Method ICP-MS run Batch A01-A15 (Internal Reference)

***Modified Water Holding Capacity as per client request (Sample was dried at 320Celsius for 15 hours prior to WHC testing), and Moisture Content based on water loss at 320Celsius for 15 hours.

SEMs for 2016NALS0010






Acc.V Spot Magn Det WD 100 μm
25.0 kV 5.0 800x SE 11.2 ZMM-CM-1

NALS

Water Holding Capacity According to ISO 11267

Water Holding Capacity

Water holding capacity of soils/materials can be determined according to ISO 11267 standard. A fine cloth (cheese cloth) or porous filter is attached to one of the two openings of a 5cmx12cm tube with a rubber band. The empty tube (with filter and rubber band) is weighed, and subsequently filled with approximately 6cm of the wet soil/material. The tubes are then submerged gradually (with cloth/filter facing downwards) until the water level was above the top of each soil/material sample for 3 hours. Tubes are then placed onto a support stand to let drain for 6 hours. The tubes are then weighed, and subsequently dried at 105°C for 24 hours. The dry weight was then determined. Water holding capacity was expressed as a percent of wet weight minus dry weight over dry weight (according to equation found in ISO 11267).

REFERENCES

Laboratory of Environmental Chemistry and Ecotoxicology; Ecole polytechnique federale de Luasanne; ENAC-ISTE Switzerland; Research in Support of the Environment Canada Soil Toxicity Test Methods: pH and Water Moisture Content Determinations. **January 2004.** ISO 11267, p12.

Analytical Report

LUCAS
Lakehead University Center for
Analytical Services

Job#: IL16-009

Client: ZMM® Canada Minerals Corp

Client #:

Date: July 26, 2016

Analysts: Dr. Guosheng Wu

INTRODUCTION

Two samples, identified as follows, were submitted for examination using Scanning Electron Microscopy and Energy Dispersive Spectroscopy (SEM/EDS) to determine general morphology and elemental composition of the samples.

Sample 1: ZMM-TZC-7-G
Sample 2: ZMM-JCC-1

EXPERIMENTAL

Sample preparation

Double-sided carbon tapes were first applied to SEM stubs, and then the two samples were loaded to the carbon tapes, finally the samples were coated with carbon.

Analytical techniques

Scanning electron microscopy was performed using Hitachi SU70 instrument equipped with Oxford Aztec energy dispersive X-ray spectrometer (SEM/EDX).

Carbon coating was carried out on a BOC Edwards carbon coater Auto 306.

RESULTS

Morphologies

SEM images showed that samples are composed of irregular shape particles, the size of the particles is not uniform; and particle size of sample ZMM-TZC-7-G is bigger than that of sample ZMM-JCC-1. (Low and high magnification SEM images of the two samples are shown in Figure 1a, b, c, d and Figure 2a, b, c, d; respectively).

Sample 1: ZMM-TZC-7-G

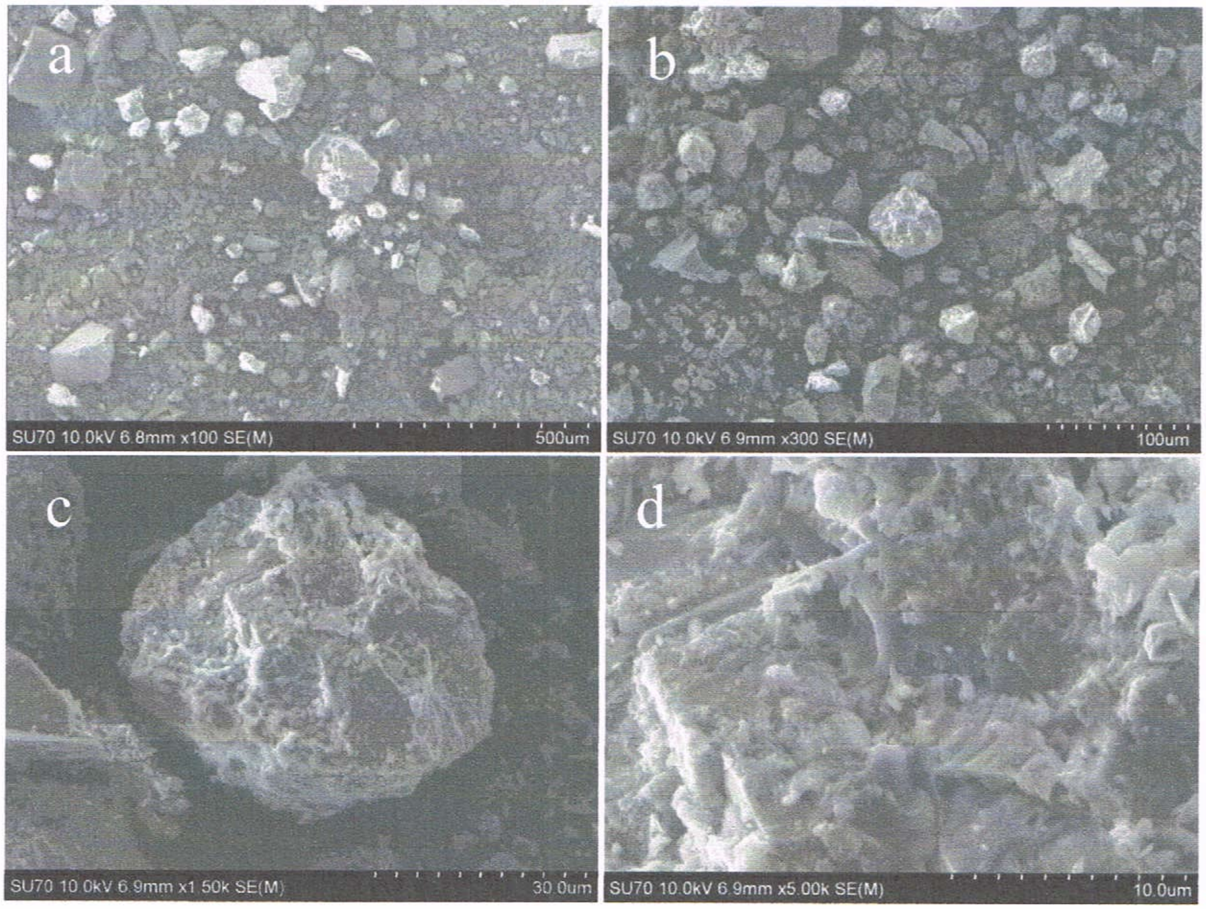
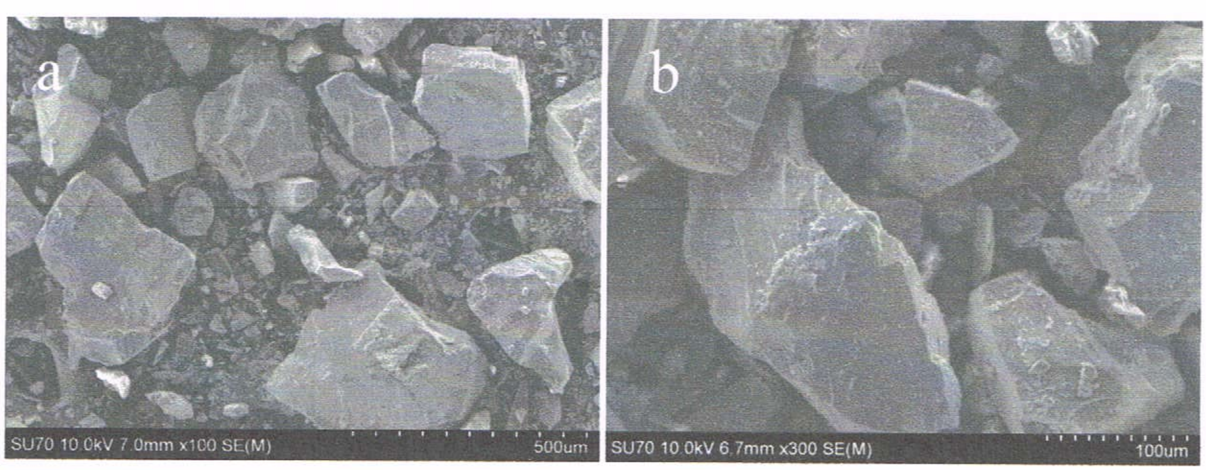


Fig. 1. Low and high magnification secondary electron images of sample ZMM-TZC-7-G

Sample 2: ZMM-JCC-1



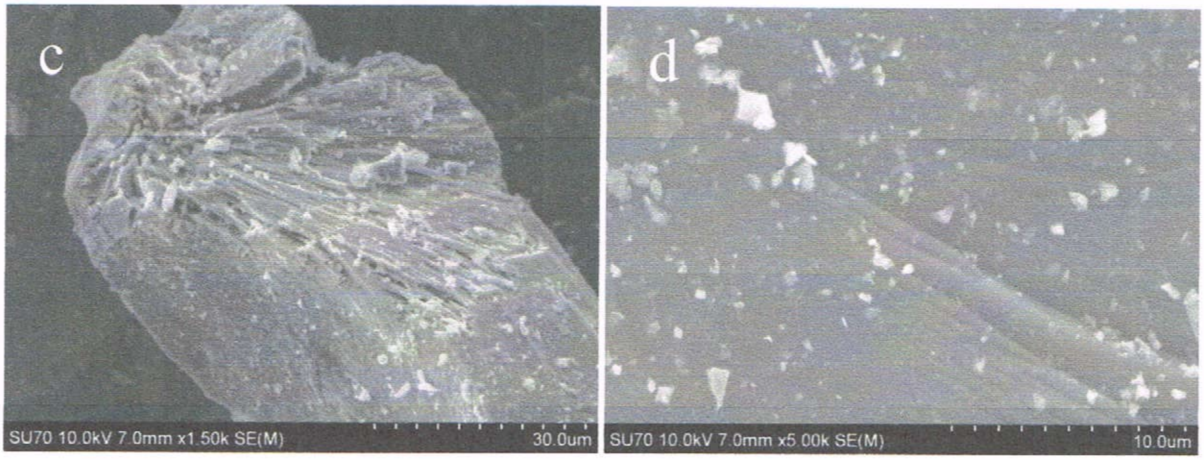


Fig. 2. Low and high magnification secondary electron images of sample ZMM-JCC-1

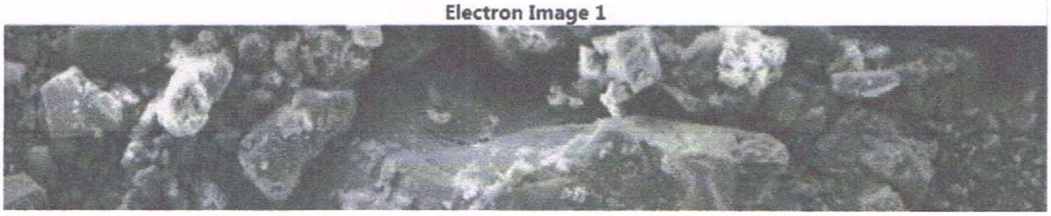
Composition analysis

EDX data was taken from four different spots from each sample.

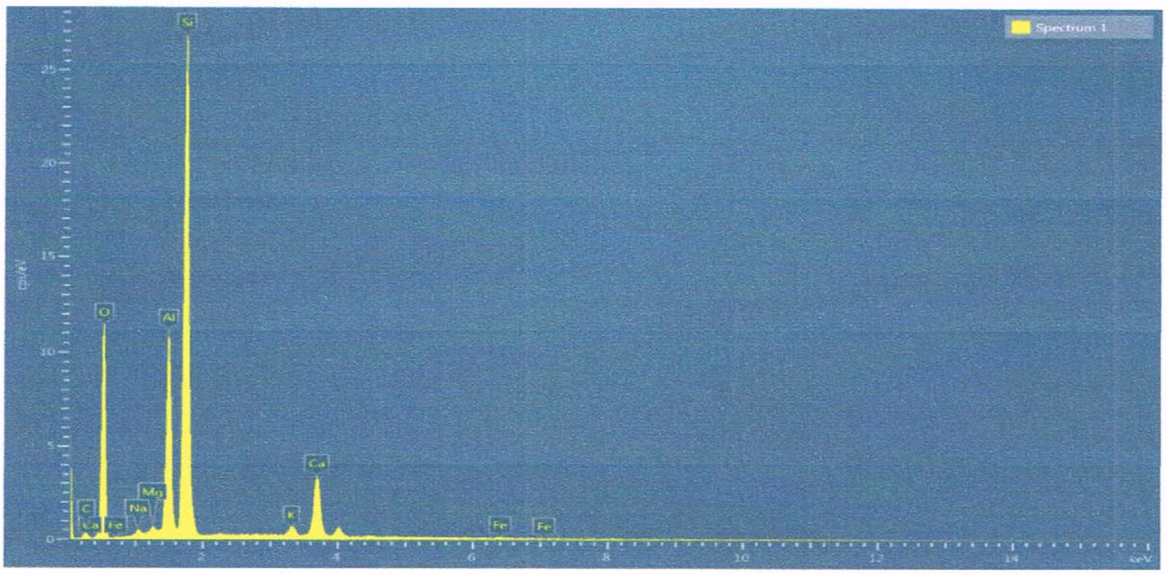
Sample 1: ZMM-TZC-7-G

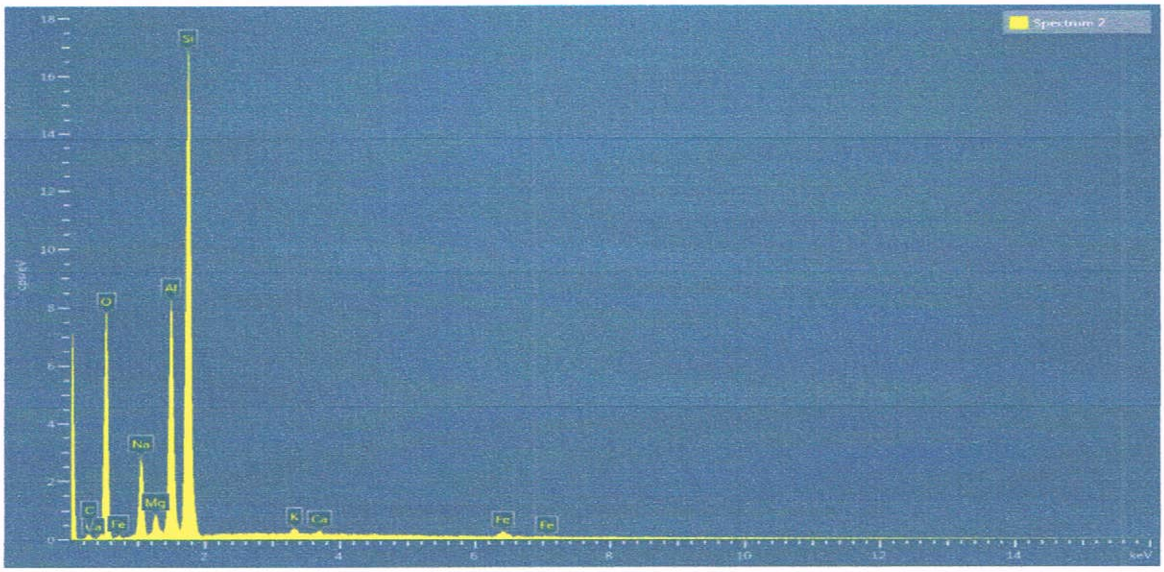
Si, Al, Ca, K and O were found in the sample ZMM-TZC-7, in addition, low concentration of Na, Mg and Fe were also detected. Very weak peaks assigned to Ti and Mn was observed in spectrum 3 as well. (Four spectra and a SEM image with locations the spectra taken from shown in Figure 3)

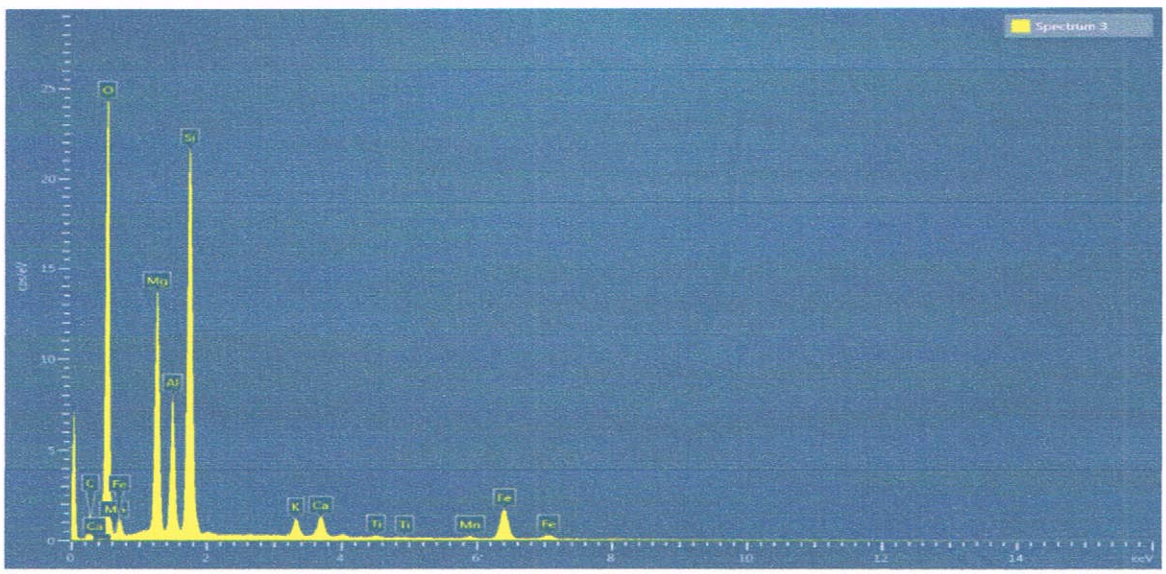
Electron Image 1




Spectrum 1
Spectrum 3
Spectrum 4
Spectrum 2
100µm


Spectrum 1
Si
O
Al
Ca
Mg
Na
C
K
Fe
Fe
keV


Spectrum 2
Si
O
Al
Na
Mg
C
Ca
Fe
K
Ca
Fe
Fe
cps/eV
keV


Spectrum 3
O
Si
Mg
Al
C
Fe
Ca
K
Ca
Ti
Ti
Mn
Fe
Fe
cps/eV
keV

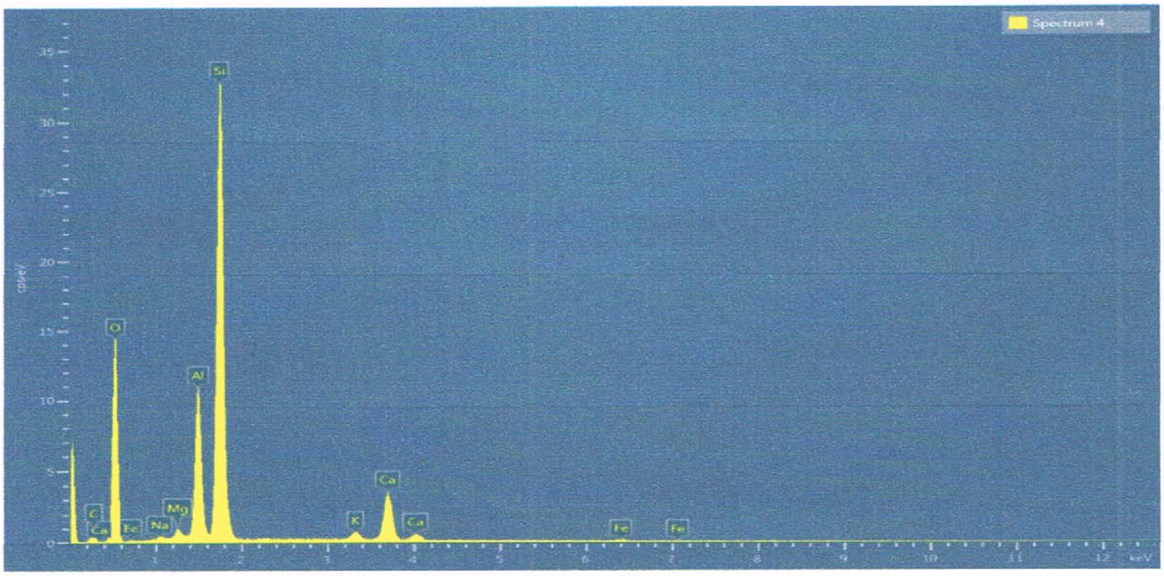
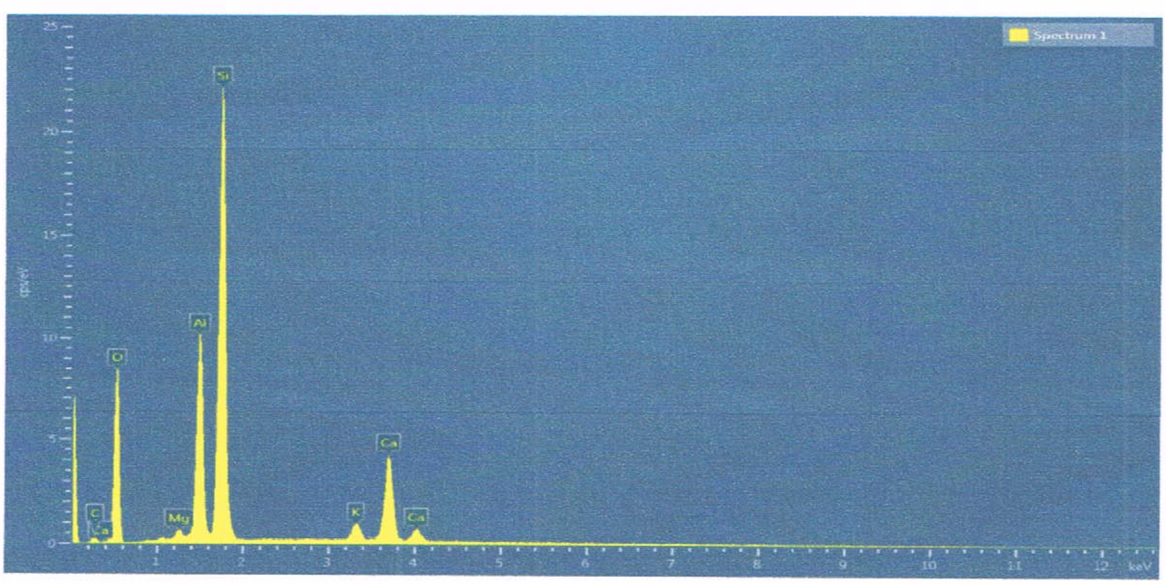
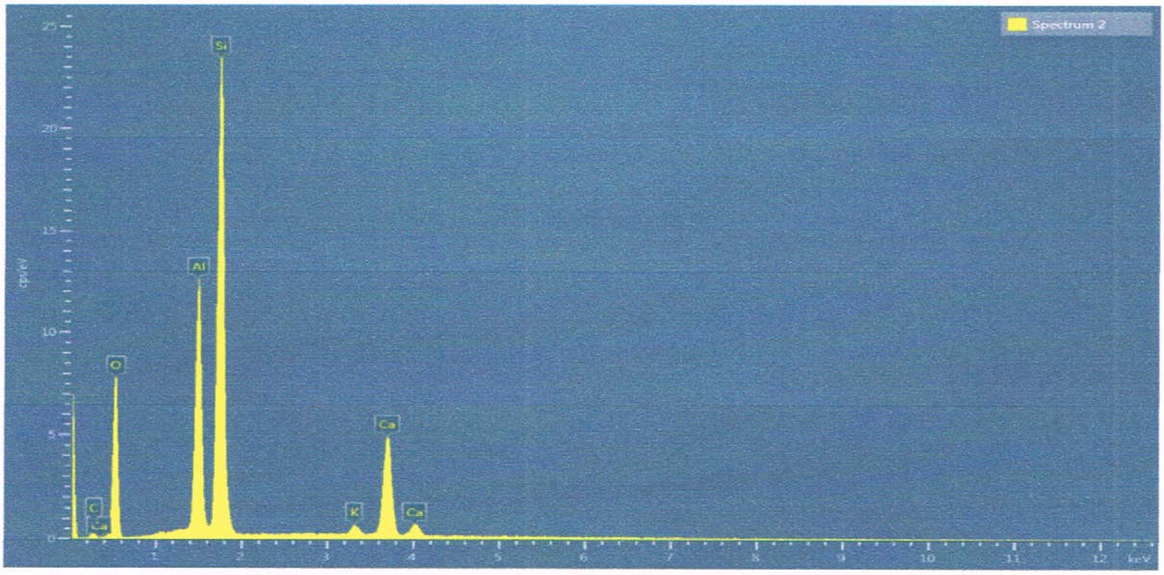


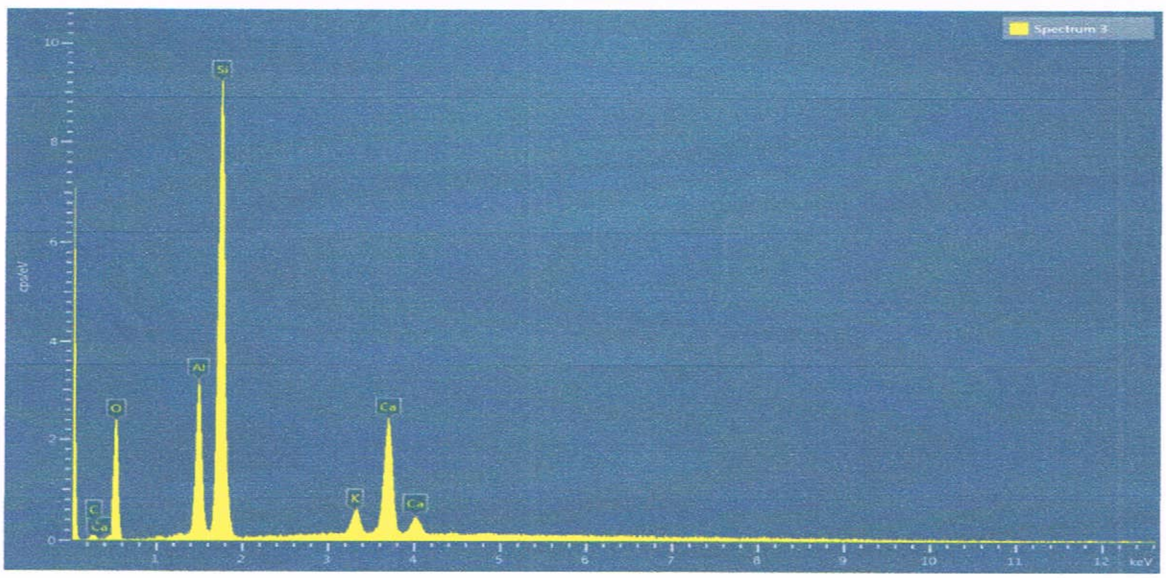
Fig. 3. SEM image and corresponding EDX spectra acquired from 4 different locations.

Sample 2: ZMM-JCC-1

Si, Al, Ca, K and O were found in the sample ZMM-JCC-1, in addition, low concentration of Na, Mg were also detected in spectrum 4. There is no Fe peak observed. (Four spectra and a SEM image with locations the spectra taken from shown in Figure 4)




Spectrum 2
cps/eV
Si
Al
O
C
Ca
K
Ca
Ca
keV


Spectrum 3
cps/eV
Si
Al
O
C
Ca
K
Ca
Ca
keV

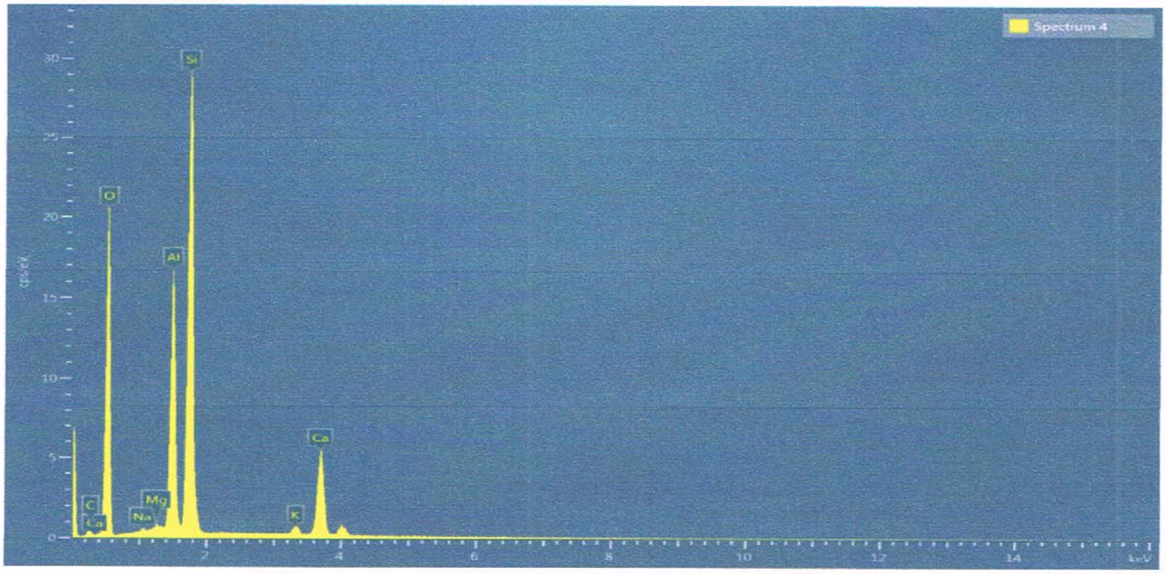


Fig. 4. (a) SEM image and the corresponding EDX spectra taken from 4 different locations.

Verne Hogg

From: Verne Hogg [vernehogg@shaw.ca]
Sent: Saturday, February 11, 2017 2:23 PM
To: 'Cheryl Hogg'
Subject: FW: Emailing: Water Uptakes on ZMM F-CHA and CHA
Attachments: water uptake on natural chabazites ZMM.docx

-----Original Message-----
From: Ristic, Alenka [mailto:Alenka.Ristic@zae-bayern.de]
Sent: Wednesday, June 22, 2016 5:16 AM
To: Verne Hogg; jtgallo@t-online.de
Subject: RE: Emailing: Water Uptakes on ZMM F-CHA and CHA

Hi Verne,
I have some results on water uptakes on both samples. Both materials are too hydrophobic for the use in heat transformation applications. F-CHA is more hydrophobic than CHA. Measurements were done at 25C, and the materials were pretreated at 350C for 8 h under vaccum before water adsorption. Max. water uptake for CHA is 0.097 g/ 1g of zeolite, while for the F-CHA is 0.072 g/ 1g of zeolite. I prepared also composite by adding 10 wt% of hygroscopic salt ($CaCl_2$) on the F-CHA which shows better water uptake 0.29 g/ 1g of zeolite at p/po of 0.5 (50% RH), while the uptake in the range, which is suitable for heat storage, is still too low. According to these results these materials can be more suitable for the adsorption of VOCs (volatile organic compounds) like toluene, for air cleaning. Water uptake curves are attached.

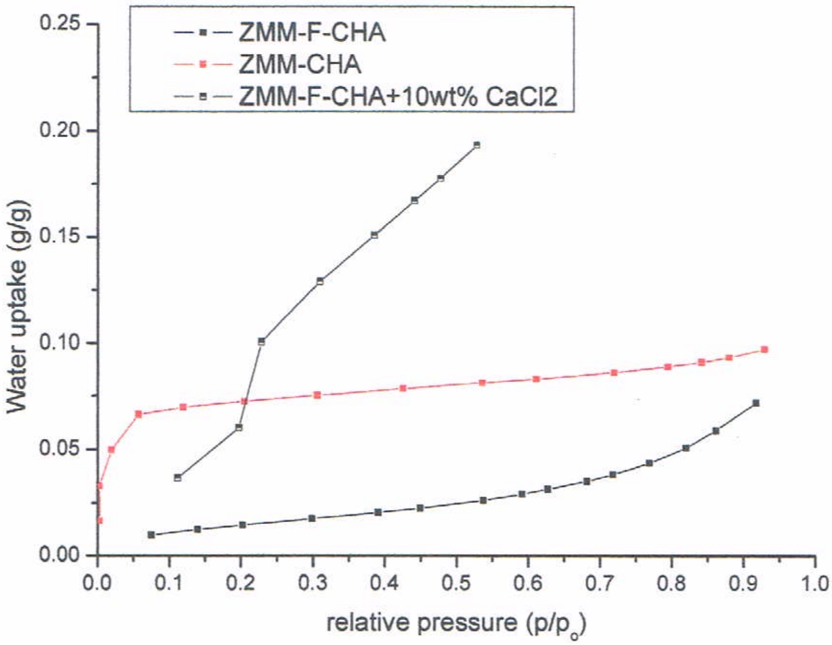
Kind regards,
Alenka

ZAE Bayern
Dr. Alenka Ristic
Thermische Energiespeicher/Thermal Energy Storage Walther-Meißner-Str. 6
85748 Garching

Tel.: +49 89 329442-38
Fax: +49 89 329442-12
alenka.ristic@zae-bayern.de
http://www.zae-bayern.de

ZMM® Canada Minerals Corp.

Chabazite & F-Chabazite



Verne Hogg

From: Finora, Sally [smf@mining.ubc.ca]
Sent: Tuesday, May 17, 2016 11:33 AM
To: Verne Hogg
Subject: Re: sample/2
Attachments: graph_Isotherm _ Linear_ SF-CHABAZITE-130-MAY11-2016.pdf; graph_DFT _ Area Histogram_ SF-CHABAZITE-130-MAY11-2016.pdf; graph_DFT _ Volume Histogram_ SF-CHABAZITE-130-MAY11-2016.pdf; tab_Multi-Point BET_ SF-CHABAZITE-130-MAY11-2016.pdf; graph_Multi-Point BET Plot_ SF-CHABAZITE-130-MAY11-2016.pdf

UBC Mining Engineering

Hi again Verne,

After heating to 130 degrees and removing a lot of the material from the sample tube (since the surface area was much higher after heating, much water must have been removed from the pores) to allow it to complete testing before it ran out of liquid nitrogen, the surface area is 95.9 m2/g now. I've attached the printouts for the pore volume and pore surface area histograms, as well as the isotherm.

These printouts look a bit different from the previous ones I sent since we have a newer program for data analysis, just loaded it, and it gives the fit to the models more easily.

I hope this is OK, let me know what more you might like to see on this,
Cheers,
Sally

--
Sally Finora
Norman B. Keevil Institute of Mining Engineering
Rm. 517 - 6350 Stores Rd
Frank Forward Bldg.
University of British Columbia
Vancouver, B.C. V6T 1Z4, Canada
Ph: Office:604-827-0335, Lab 604-822-4292; Fax: 604-822-5599
(work days Tuesday to Thursday)

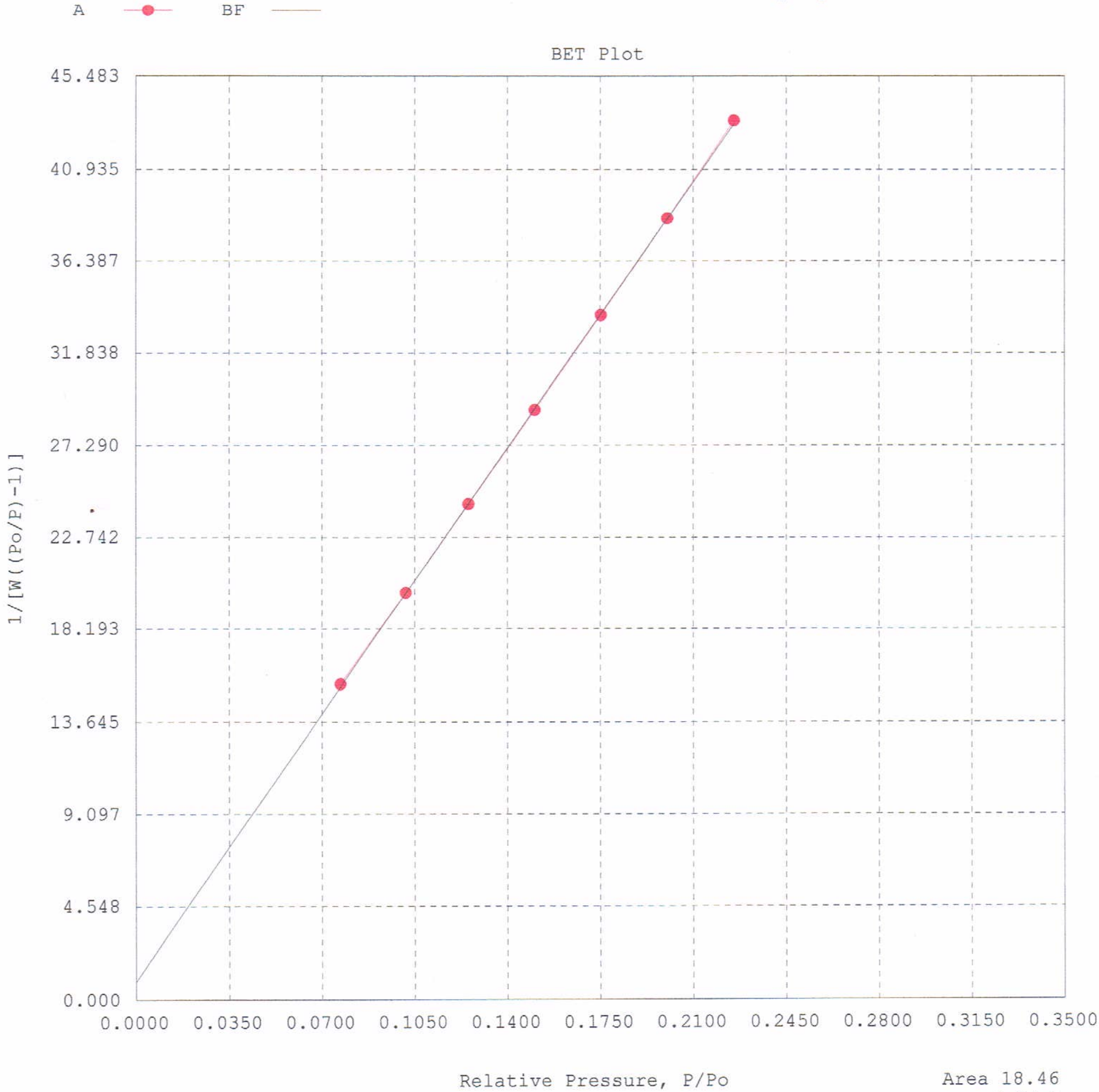
On 5/9/2016 2:10 PM, Verne Hogg wrote:

> He Sally
> No worries.
> You take care of yourself.
> Yes the surface area should be immense.
> Best Regards
> Verne
> LuVerne E.W. Hogg, CEO
> ZMM® Canada Minerals Corp.
> http://zmmcanadamineralscorp.com/
> 6459 Mack Road
> Peachland, BC V0H 1X8
> Ph: 250 767-6788
> Fx: 250 767-6134
>
> **From:** Finora, Sally [mailto:smf@mining.ubc.ca]
> **Sent:** Monday, May 09, 2016 1:48 PM
> **To:** Verne Hogg
> **Subject:** sample

04/26/2016

Quantachrome Instruments
Quantachrome Autosorb Automated Gas Sorption System Report
Autosorb 1 for Windows 1.52

File name:	C:\QCdata\PhysData\SF-CHABAZITE-RT-APRIL21-2016.raw				
Sample ID:	SF-CHABAZITE-RT-APRI	**Description:**	small bulb 6 mm cell		
Comments:					
Operator:	SF	**Sample weight:**	0.2887 g		
Analysis gas:	Nitrogen	**X sect. area:**	16.2 Å²/molec	**Non-ideality:**	6.58e-05
Adsbate (DRP):	Nitrogen	**Bath Temp.:**	77.30		
Outgas Temp:	23.0 °C	**Outgas Time:**	20.0 hrs	**Analysis Time:**	3255.2 min
P/Po tolerance:	0	**Equil. time:**	9	**End of run:**	04/23/2016 19:00
Station #:	1	**PC sw. version:**	1.52	**TempComp:**	On



Area 18.46 (m²/g)

04/26/2016

Quantachrome Instruments
Quantachrome Autosorb Automated Gas Sorption System Report
Autosorb 1 for Windows 1.52

File name:	C:\QCdata\PhysData\SF-CHABAZITE-RT-APRIL21-2016.raw				
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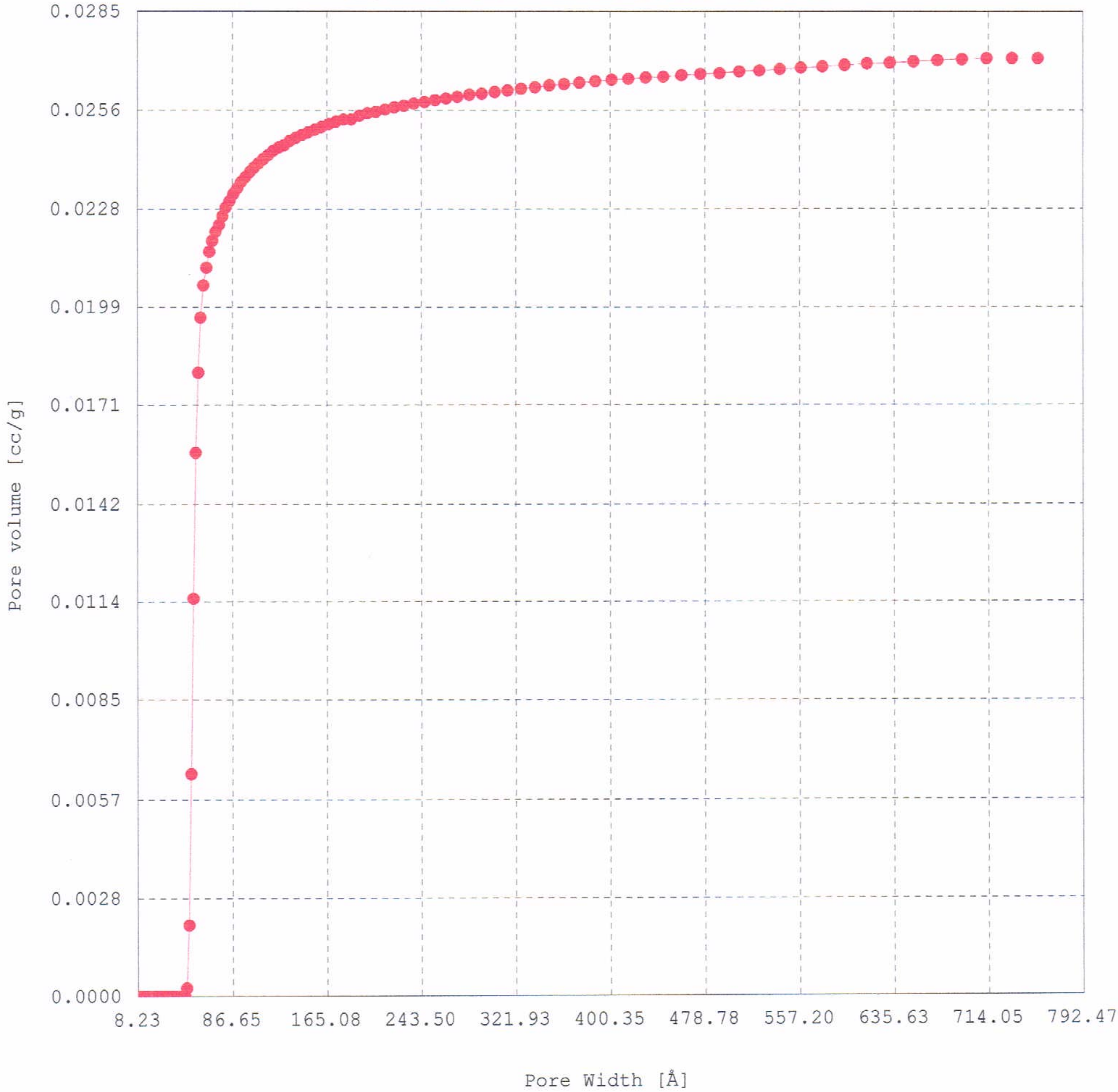
Comments:					
Operator:	SF	**Sample weight:**	0.2887 g		
Analysis gas:	Nitrogen	**X sect. area:**	16.2 Å²/molec	**Non-ideality:**	6.58e-05
Adsbate (DRP):	Nitrogen	**Bath Temp.:**	77.30		
Outgas Temp:	23.0 °C	**Outgas Time:**	20.0 hrs	**Analysis Time:**	3255.2 min
P/Po tolerance:	0	**Equil. time:**	9	**End of run:**	04/23/2016 19:00
Station #:	1	**PC sw. version:**	1.52	**TempComp:**	On

DFT/Monte-Carlo Cumulative Pore Volume Plot

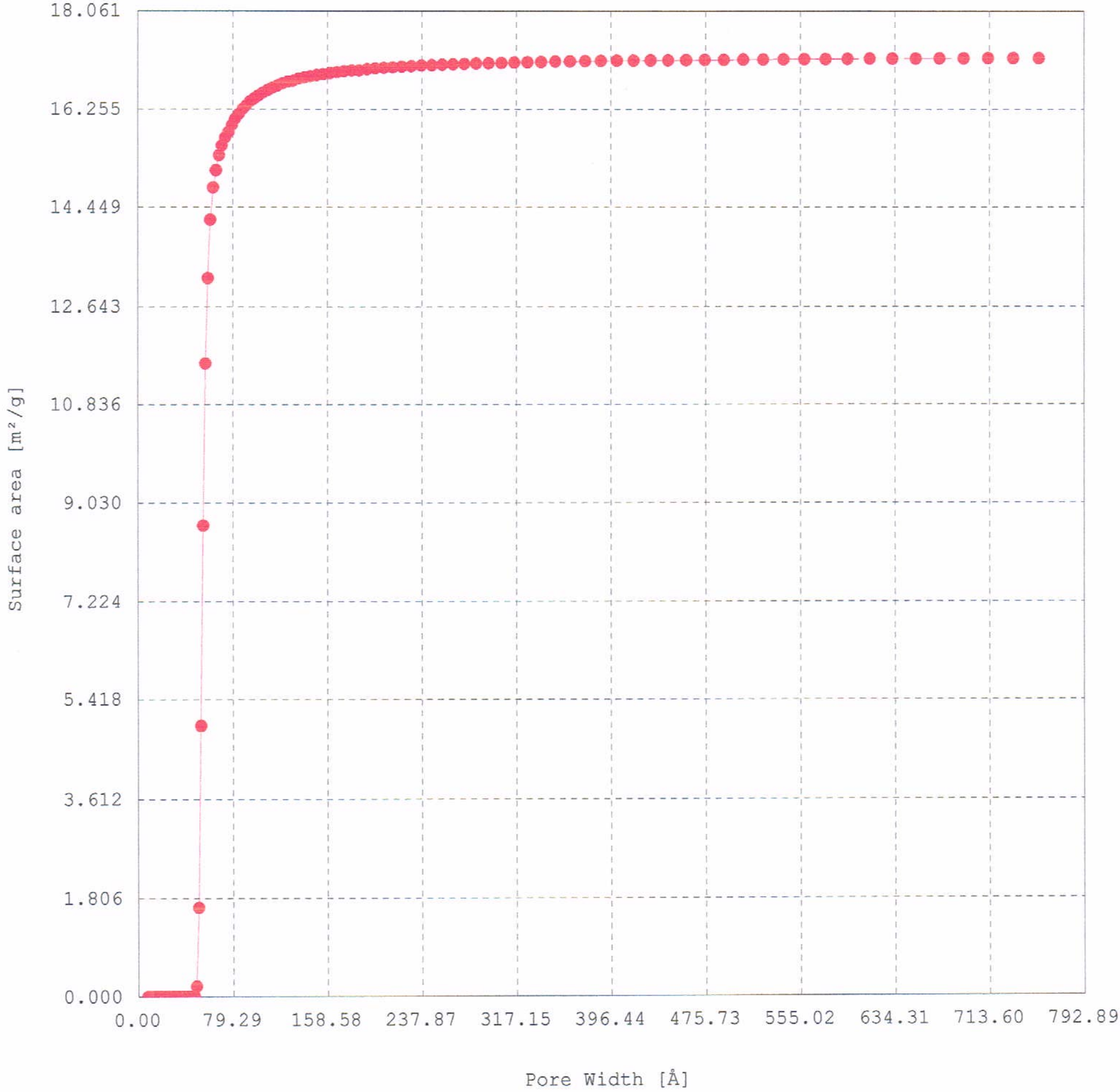


04/26/2016

Quantachrome Instruments
Quantachrome Autosorb Automated Gas Sorption System Report
Autosorb 1 for Windows 1.52

File name: C:\QCdata\PhysData\SF-CHABAZITE-RT-APRIL21-2016.raw
Sample ID: SF-CHABAZITE-RT-APRI **Description:** small bulb 6 mm cell
Comments:
Operator: SF **Sample weight:** 0.2887 g
Analysis gas: Nitrogen **X sect. area:** 16.2 Å²/molec **Non-ideality:** 6.58e-05
Adsbate (DRP): Nitrogen **Bath Temp.:** 77.30
Outgas Temp: 23.0 °C **Outgas Time:** 20.0 hrs **Analysis Time:** 3255.2 min
P/Po tolerance: 0 **Equil. time:** 9 **End of run:** 04/23/2016 19:00
Station #: 1 **PC sw. version:** 1.52 **TempComp:** On

DFT/Monte-Carlo Cumulative Surface Area Plot

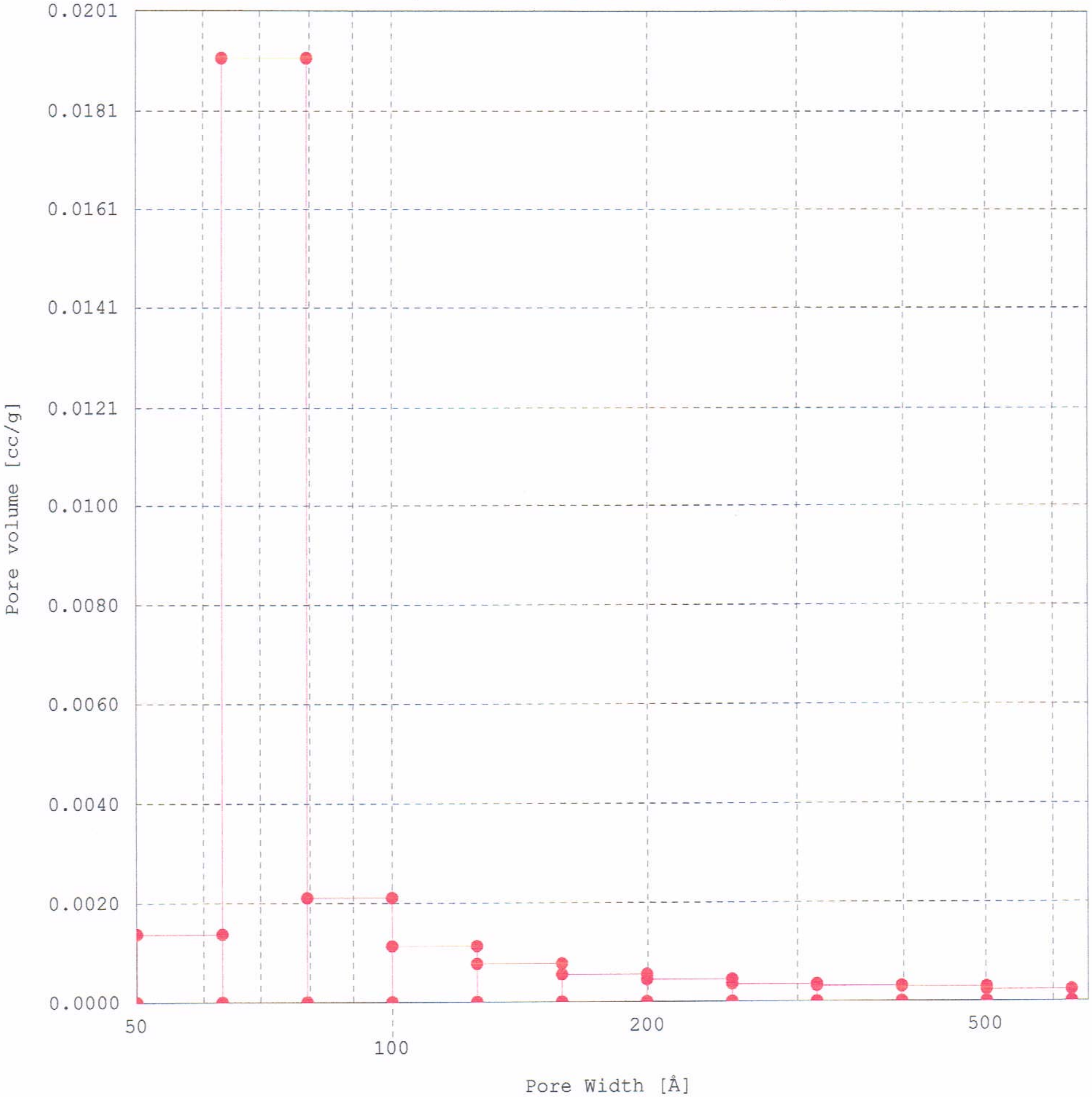


04/26/2016

Quantachrome Instruments
Quantachrome Autosorb Automated Gas Sorption System Report
Autosorb 1 for Windows 1.52

File name:	C:\QCdata\PhysData\SF-CHABAZITE-RT-APRIL21-2016.raw				
Sample ID:	SF-CHABAZITE-RT-APRI	**Description:**	small bulb 6 mm cell		
Comments:					
Operator:	SF	**Sample weight:**	0.2887 g		
Analysis gas:	Nitrogen	**X sect. area:**	16.2 Å²/molec	**Non-ideality:**	6.58e-05
Adsbate (DRP):	Nitrogen	**Bath Temp.:**	77.30		
Outgas Temp:	23.0 °C	**Outgas Time:**	20.0 hrs	**Analysis Time:**	3255.2 min
P/Po tolerance:	0	**Equil. time:**	9	**End of run:**	04/23/2016 19:00
Station #:	1	**PC sw. version:**	1.52	**TempComp:**	On

DFT/Monte-Carlo Pore Volume Histogram



Quantachrome Instruments
Quantachrome Autosorb Automated Gas Sorption System Report
Autosorb 1 for Windows 1.52

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Sample ID:	SF-CHABAZITE-RT-APRIL	**Description:**	small bulb 6 mm cell		
Comments:					
Operator:	SF	**Sample weight:**	0.2887 g		
Analysis gas:	Nitrogen	**X sect. area:**	16.2 Å²/molec	**Non-ideality:**	6.58e-05
Adsbate (DRP):	Nitrogen	**Bath Temp.:**	77.30		
Outgas Temp:	23.0 °C	**Outgas Time:**	20.0 hrs	**Analysis Time:**	3255.2 min
P/Po tolerance:	0	**Equil. time:**	9	**End of run:**	04/23/2016 19:00
Station #:	1	**PC sw. version:**	1.52	**TempComp:**	On

MULTIPOINT BET

P/Po	Volume [cc/g] STP	1/(W((Po/P)-1))
7.7086e-02	4.3213	1.546E+01
1.0171e-01	4.5339	1.998E+01
1.2541e-01	4.7044	2.439E+01
1.5034e-01	4.8798	2.901E+01
1.7531e-01	5.0467	3.370E+01
2.0034e-01	5.2089	3.848E+01
2.2530e-01	5.3718	4.332E+01

Area = 1.846E+01 m²/g

Slope = 1.877E+02

Y - Intercept = 8.837E-01

Correlation Coefficient = 0.999958

C = 2.135E+02

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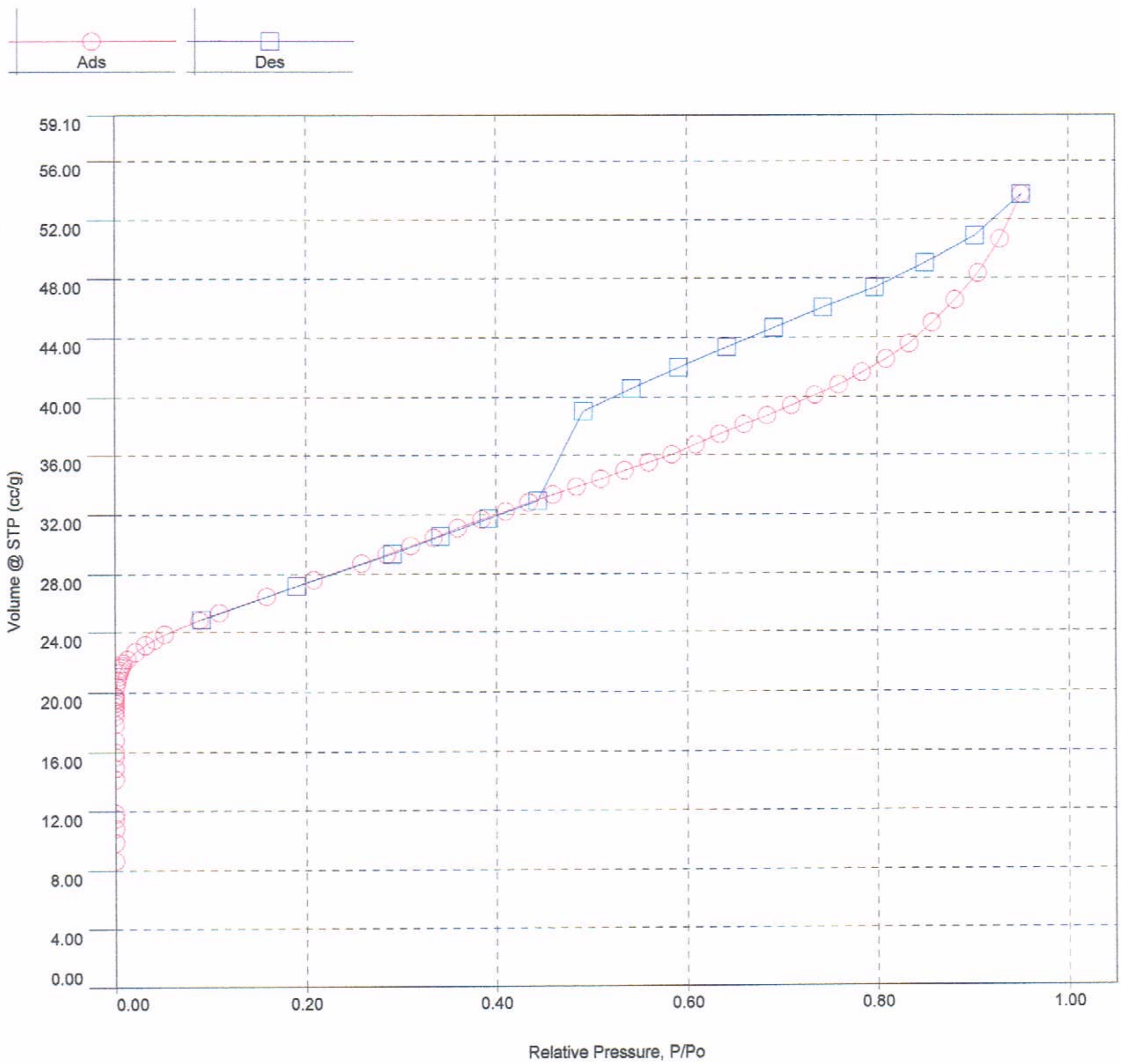
Quantachrome INSTRUMENTS
Optimizing particle performance

Analysis		**Report**			
Operator:SF	**Date:**Fri May 13 21:15:47 2016	**Operator:**sally		**Date:**5/17/2016	
Sample ID:	: SF-Chabazite-130-May11-2016	**Filename:**	D:\Contract\2016\Autosorb\Chabazite-April-2016\SF-CHABAZITE-130-MAY11-2016.ra		
Sample Desc:	small weight, 9 mm tube	**Comment:**			
Outgas Time:	3.0 hrs	**Outgas Temp:**	130.0 °C	**Sample Weight:**	0.0605 g
Analysis gas:	Nitrogen	**Molec. Wt:**	28.0134 g	**Non-ideality:**	6.58e-05 1/mmHg
Analysis Time:	3096.2 min	**Instrument:**	Autosorb Station 1	**Bath temp.:**	77.3 K

Isotherm * Linear

Data Reduction Parameters

Adsorbate	**Thermal Transpiration:** on	**Eff. mol. diameter (D):** 4.0000 Å	**Eff. cell stem diam. (d):** 1.0000 mm
	Nitrogen	**Temperature** 77.350K	
	Molec. Wt.: 28.013 g	**Cross Section:** 16.200 Å²	**Liquid Density:** 0.808 g/cc



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Quantachrome INSTRUMENTS
Optimizing particle performance

Analysis
Operator:SF **Date:**Fri May 13 21:15:47 2016

Report
Operator:sally **Date:**5/17/2016

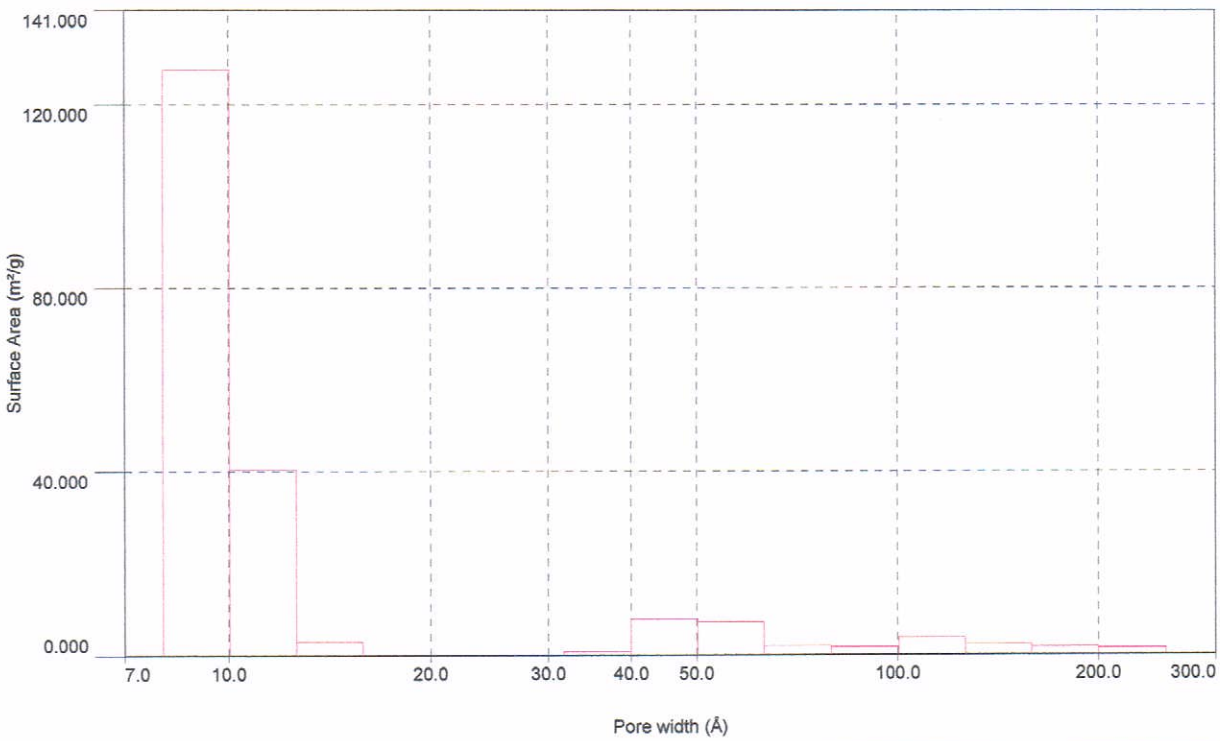
Sample ID:	: SF-Chabazite-130-May11-2016	**Filename:**	D:\Contract\2016\Autosorb\Chabazite-April-2016\SF-CHABAZITE-130-MAY11-2016.ra		
Sample Desc:	small weight, 9 mm tube	**Comment:**			
Outgas Time:	3.0 hrs	**Outgas Temp:**	130.0 °C	**Sample Weight:**	0.0605 g
Analysis gas:	Nitrogen	**Molec. Wt:**	28.0134 g	**Non-ideality:**	6.58e-05 1/mmHg
Analysis Time:	3096.2 min	**Instrument:**	Autosorb Station 1	**Bath temp.:**	77.3 K

DFT * Area Histogram

Data Reduction Parameters

DFT method
Thermal Transpiration: on **Eff. mol. diameter (D):** 4.0000 Å **Eff. cell stem diam. (d):** 1.0000 mm
Calc. Model: N2 at 77K on silica (cylindr./sphere. pore, NLDFT ads. Model) **Rel. press. range:** 0.0000 - 1.0000
Moving pt. avg: off

Adsorbate
Nitrogen **Temperature** 77.350K
Molec. Wt.: 28.013 g **Cross Section:** 16.200 $Å^2$ **Liquid Density:** 0.808 g/cc



DFT method summary

Pore volume =	0.077 cc/g
Lower confidence limit =	7.830 Å
Fitting error =	0.751 %
Pore width (Mode) =	9.820 Å
Moving point average :	off

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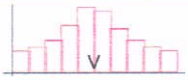
Analysis			**Report**		
Operator:SF		**Date:**Fri May 13 21:15:47 2016	**Operator:**sally		**Date:**5/17/2016
Sample ID:	: SF-Chabazite-130-May11-2016	**Filename:**	D:\Contract\2016\Autosorb\Chabazite-April-2016\SF-CHABAZITE-130-MAY11-2016.ra		
Sample Desc:	small weight, 9 mm tube	**Comment:**			
Outgas Time:	3.0 hrs	**Outgas Temp:**	130.0 °C	**Sample Weight:**	0.0605 g
Analysis gas:	Nitrogen	**Molec. Wt:**	28.0134 g	**Non-ideality:**	6.58e-05 1/mmHg
Analysis Time:	3096.2 min	**Instrument:**	Autosorb Station 1	**Bath temp.:**	77.3 K

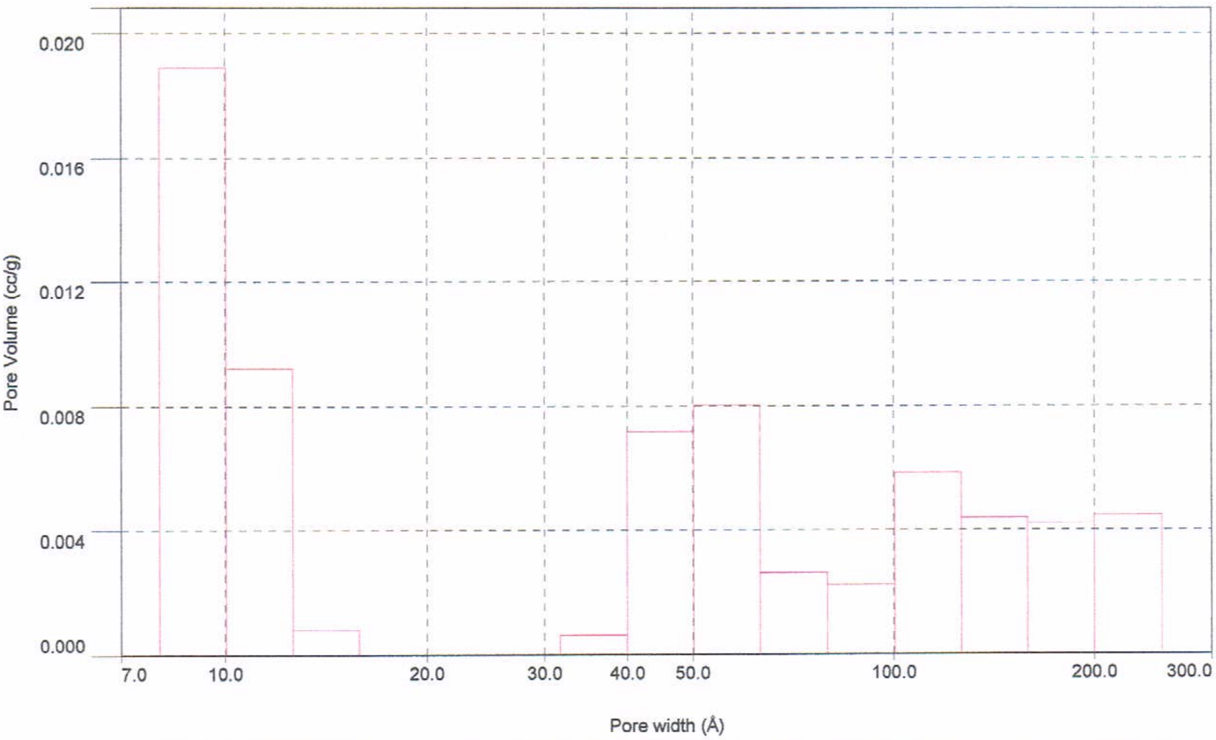
DFT * Volume Histogram

Data Reduction Parameters

DFT method — **Thermal Transpiration:** on **Eff. mol. diameter (D):** 4.0000 Å **Eff. cell stem diam. (d):** 1.0000 mm
Calc. Model: N2 at 77K on silica (cylindr./sphere. pore, NLDFT ads. Model) **Rel. press. range:** 0.0000 - 1.0000
Moving pt. avg: off

Adsorbate — **Nitrogen** **Temperature** 77.350K
Molec. Wt.: 28.013 g **Cross Section:** 16.200 Å² **Liquid Density:** 0.808 g/cc





DFT method summary

Pore volume =	0.077 cc/g
Lower confidence limit =	7.830 Å
Fitting error =	0.751 %
Pore width (Mode) =	9.820 Å
Moving point average :	off

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Quantachrome INSTRUMENTS
Optimizing particle performance

Analysis		**Report**			
Operator: SF	**Date:** Fri May 13 21:15:47 2016	**Operator:** sally		**Date:** 5/17/2016	
Sample ID:	: SF-Chabazite-130-May11-2016	**Filename:**	D:\Contract\2016\Autosorb\Chabazite-April-2016\SF-CHABAZITE-130-MAY11-2016.ra		
Sample Desc:	small weight, 9 mm tube	**Comment:**			
Outgas Time:	3.0 hrs	**Outgas Temp:**	130.0 °C	**Sample Weight:**	0.0605 g
Analysis gas:	Nitrogen	**Molec. Wt:**	28.0134 g	**Non-ideality:**	6.58e-05 1/mmHg
Analysis Time:	3096.2 min	**Instrument:**	Autosorb Station 1	**Bath temp.:**	77.3 K

Multi-Point BET

Data Reduction Parameters Data

Adsorbate	**Thermal Transpiration:** on	**Eff. mol. diameter (D):** 4.0000 Å	**Eff. cell stem diam. (d):** 1.0000 mm
	Nitrogen	**Temperature** 77.350K	
	Molec. Wt.: 28.013 g	**Cross Section:** 16.200 Å²	**Liquid Density:** 0.808 g/cc

Multi-Point BET Data

Relative Pressure [P/Po]	Volume @ STP [cc/g]	1 / [W((Po/P) - 1)]	Relative Pressure [P/Po]	Volume @ STP [cc/g]	1 / [W((Po/P) - 1)]
7.09155e-03	21.6536	2.6391e-01	3.16111e-02	23.1157	1.1299e+00
8.17809e-03	21.8031	3.0259e-01	1.10101e-01	25.3456	3.9057e+00
9.26535e-03	21.9369	3.4110e-01	1.58578e-01	26.4656	5.6977e+00
1.29367e-02	22.2076	4.7220e-01	2.08483e-01	27.5759	7.6424e+00
2.15081e-02	22.6531	7.7637e-01			

BET summary

Slope =	36.313
Intercept =	-9.457e-03
Correlation coefficient, r =	0.999862
C constant=	-3838.652
Surface Area =	95.927 m²/g

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Quantachrome INSTRUMENTS
Optimizing particle performance

Analysis
Operator:SF **Date:**Fri May 13 21:15:47 2016

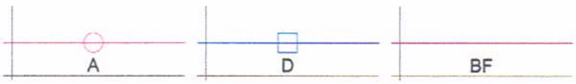
Report
Operator:sally **Date:**5/17/2016

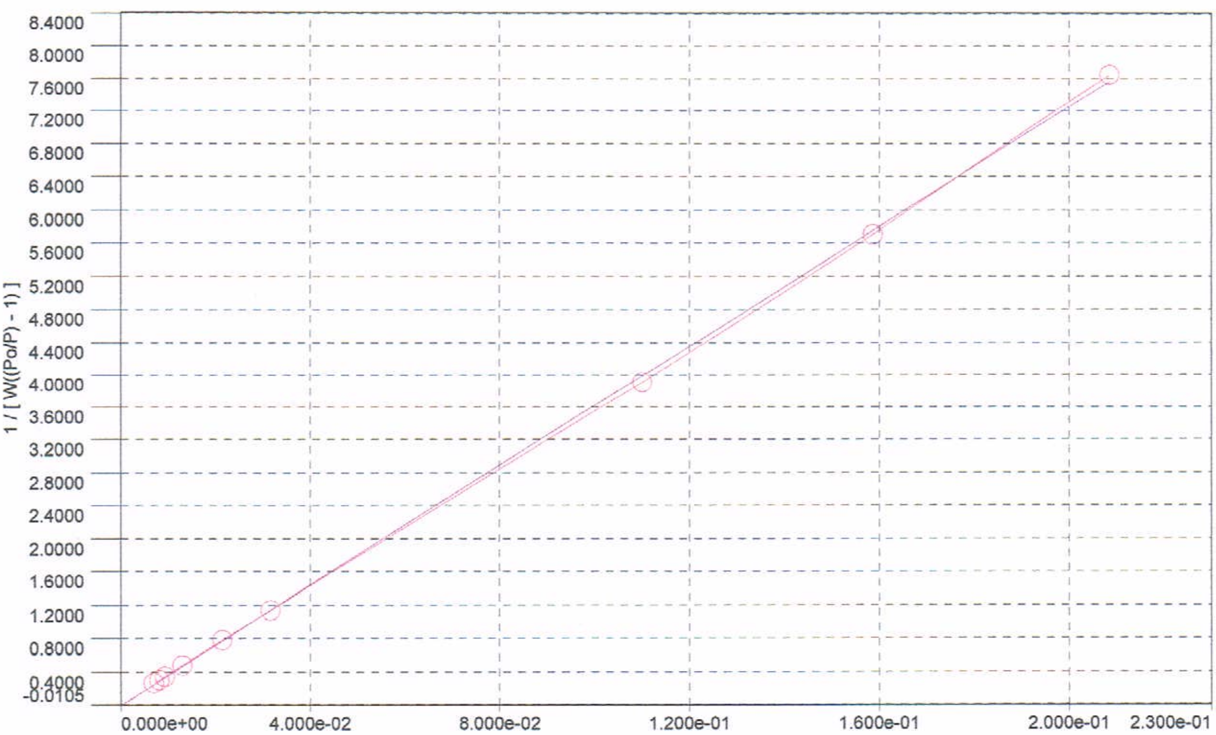
Sample ID:	: SF-Chabazite-130-May11-2016	**Filename:**	D:\Contract\2016\Autosorb\Chabazite-April-2016\SF-CHABAZITE-130-MAY11-2016.ra		
Sample Desc:	small weight, 9 mm tube	**Comment:**			
Outgas Time:	3.0 hrs	**Outgas Temp:**	130.0 °C	**Sample Weight:**	0.0605 g
Analysis gas:	Nitrogen	**Molec. Wt:**	28.0134 g	**Non-ideality:**	6.58e-05 1/mmHg
Analysis Time:	3096.2 min	**Instrument:**	Autosorb Station 1	**Bath temp.:**	77.3 K

Multi-Point BET Plot

Data Reduction Parameters

Adsorbate
Thermal Transpiration: on
Nitrogen
Molec. Wt.: 28.013 g
Eff. mol. diameter (D): 4.0000 A
Temperature 77.350K
Cross Section: 16.200 A²
Eff. cell stem diam. (d): 1.0000 mm
Liquid Density: 0.808 g/cc





BET summary

Slope =	36.313
Intercept =	-9.457e-03
Correlation coefficient, r =	0.999862
C constant=	-3838.652
Surface Area =	95.927 m²/g

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Quantachrome INSTRUMENTS
Optimizing particle performance

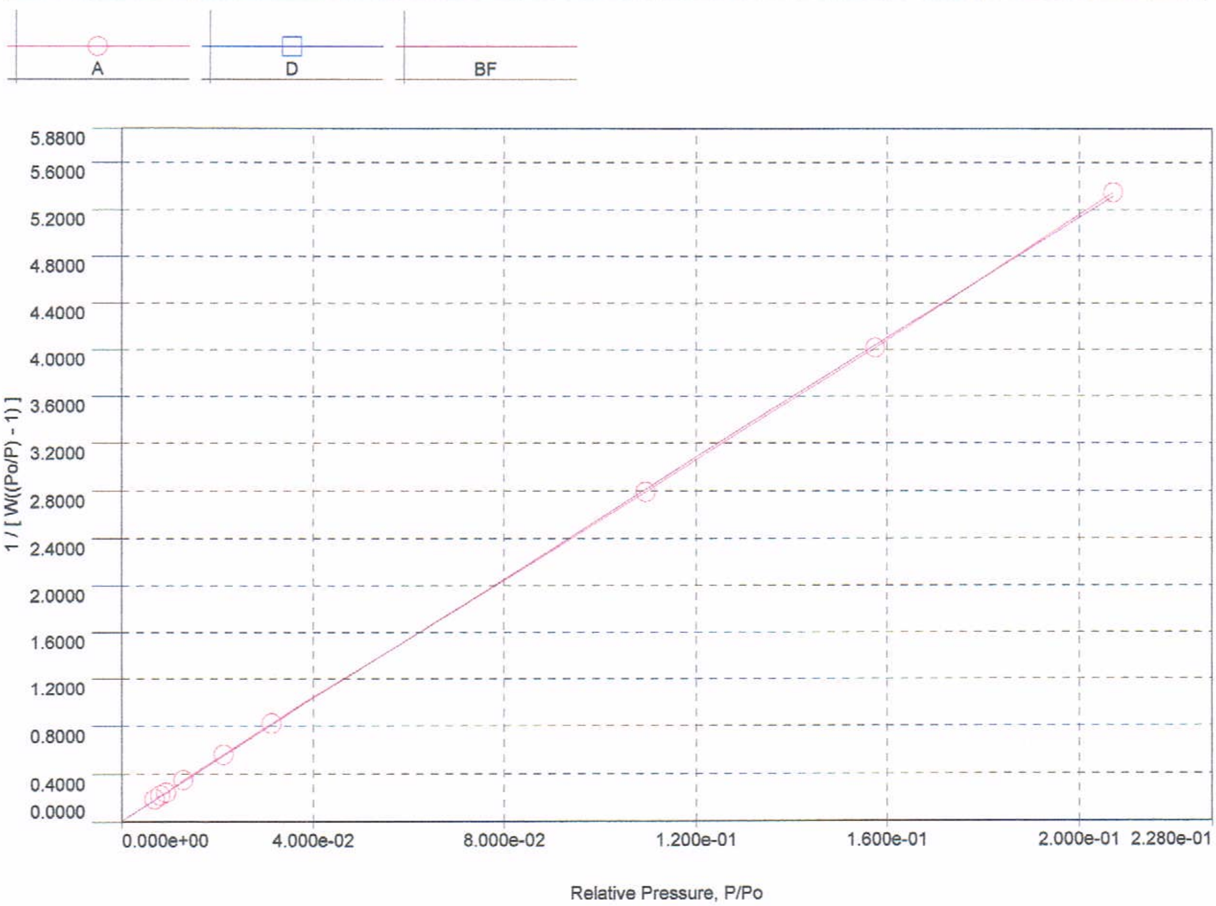
Analysis
Operator:SF **Date:**Wed Jun 22 19:16:10 2016
Sample ID: : SF-Chabazite-300-June21-2016
Sample Desc: Sample outgassed 140+ hrs, then 2 hrs at 300 deg.,
Outgas Time: 2.0 hrs
Analysis gas: Nitrogen
Analysis Time: 1645.3 min

Report
Operator:sally **Date:**6/23/2016
Filename: D:\Autodata\Results-2016\SF-CHABAZITE-300-JUNE21-2016.raw
Comment:
Outgas Temp: 300.0 °C **Sample Weight:** 0.0578 g
Molec. Wt: 28.0134 g **Non-ideality:** 6.58e-05 1/mmHg
Instrument: Autosorb Station 1 **Bath temp.:** 77.3 K

Multi-Point BET Plot

Data Reduction Parameters

Adsorbate	**Thermal Transpiration:** on **Nitrogen** **Molec. Wt.:** 28.013 g	**Eff. mol. diameter (D):** 4.0000 Å **Temperature** 77.350K **Cross Section:** 16.200 Å²	**Eff. cell stem diam. (d):** 1.0000 mm **Liquid Density:** 0.808 g/cc



BET summary

Slope =	25.587
Intercept =	1.112e-02
Correlation coefficient, r =	0.999963
C constant=	2302.069
Surface Area =	136.044 m²/g

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Quantachrome INSTRUMENTS
Optimizing particle performance

Analysis		**Report**	
Operator:SF	**Date:**Wed Jun 22 19:16:10 2016	**Operator:**sally	**Date:**6/23/2016

Sample ID: : SF-Chabazite-300-June21-2016 **Filename:** D:\Autodata\Results-2016\SF-CHABAZITE-300-JUNE21-2016.raw
Sample Desc: Sample outgassed 140+ hrs, then 2 hrs at 300 deg., **Comment:**

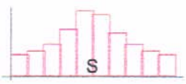
Outgas Time:	2.0 hrs	**Outgas Temp:**	300.0 °C	**Sample Weight:**	0.0578 g
Analysis gas:	Nitrogen	**Molec. Wt:**	28.0134 g	**Non-ideality:**	6.58e-05 1/mmHg
Analysis Time:	1645.3 min	**Instrument:**	Autosorb Station 1	**Bath temp.:**	77.3 K

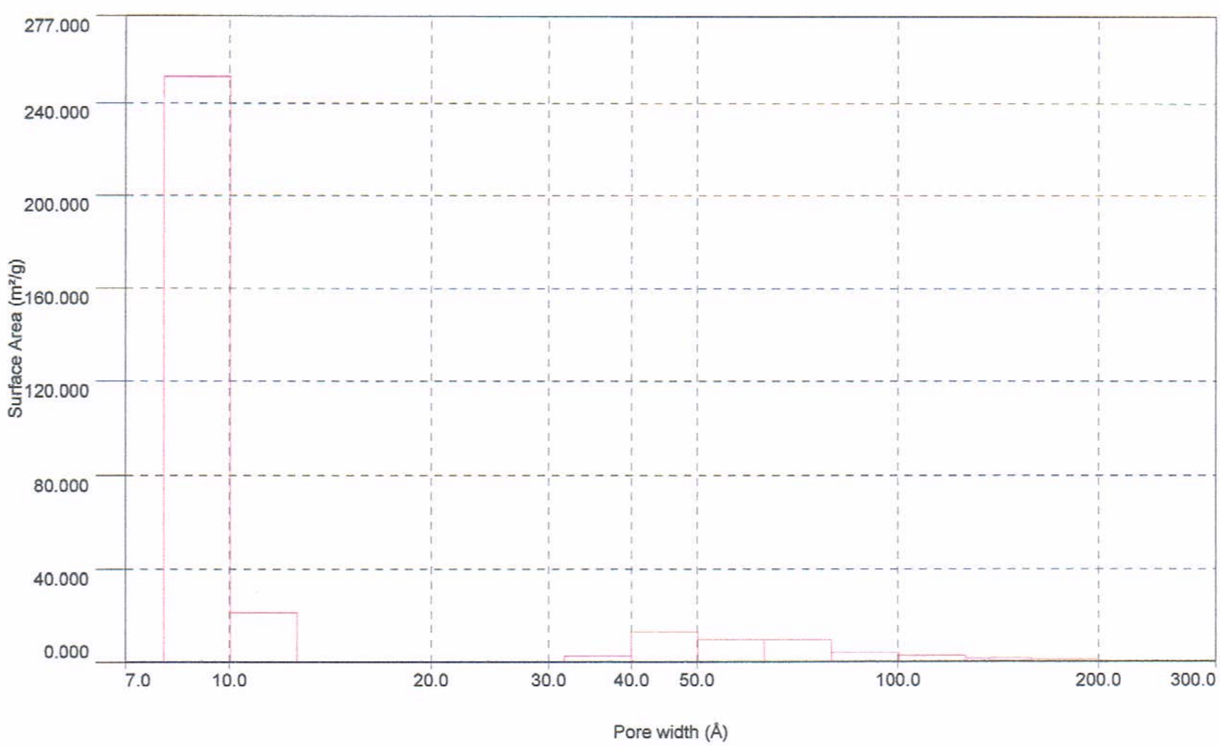
DFT * Area Histogram

Data Reduction Parameters

DFT method
Thermal Transpiration: on **Eff. mol. diameter (D):** 4.0000 Å **Eff. cell stem diam. (d):** 1.0000 mm
Calc. Model: N2 at 77 K on silica (cylindr. pore, NLDFT equilibrium model) **Rel. press. range:** 0.0000 - 1.0000
Moving pt. avg: off

Adsorbate
Nitrogen **Temperature** 77.350K
Molec. Wt.: 28.013 g **Cross Section:** 16.200 Å² **Liquid Density:** 0.808 g/cc





DFT method summary

Pore volume =	0.104 cc/g
Lower confidence limit =	7.830 Å
Fitting error =	1.187 %
Pore width (Mode) =	7.830 Å
Moving point average :	off

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Quantachrome INSTRUMENTS
Optimizing particle performance

Analysis | **Report**

Operator:SF **Date:**Wed Jun 22 19:16:10 2016 **Operator:**sally **Date:**6/23/2016
Sample ID: : SF-Chabazite-300-June21-2016 **Filename:** D:\Autodata\Results-2016\SF-CHABAZITE-300-JUNE21-2016.raw
Sample Desc: Sample outgassed 140+ hrs, then 2 hrs at 300 deg., **Comment:**

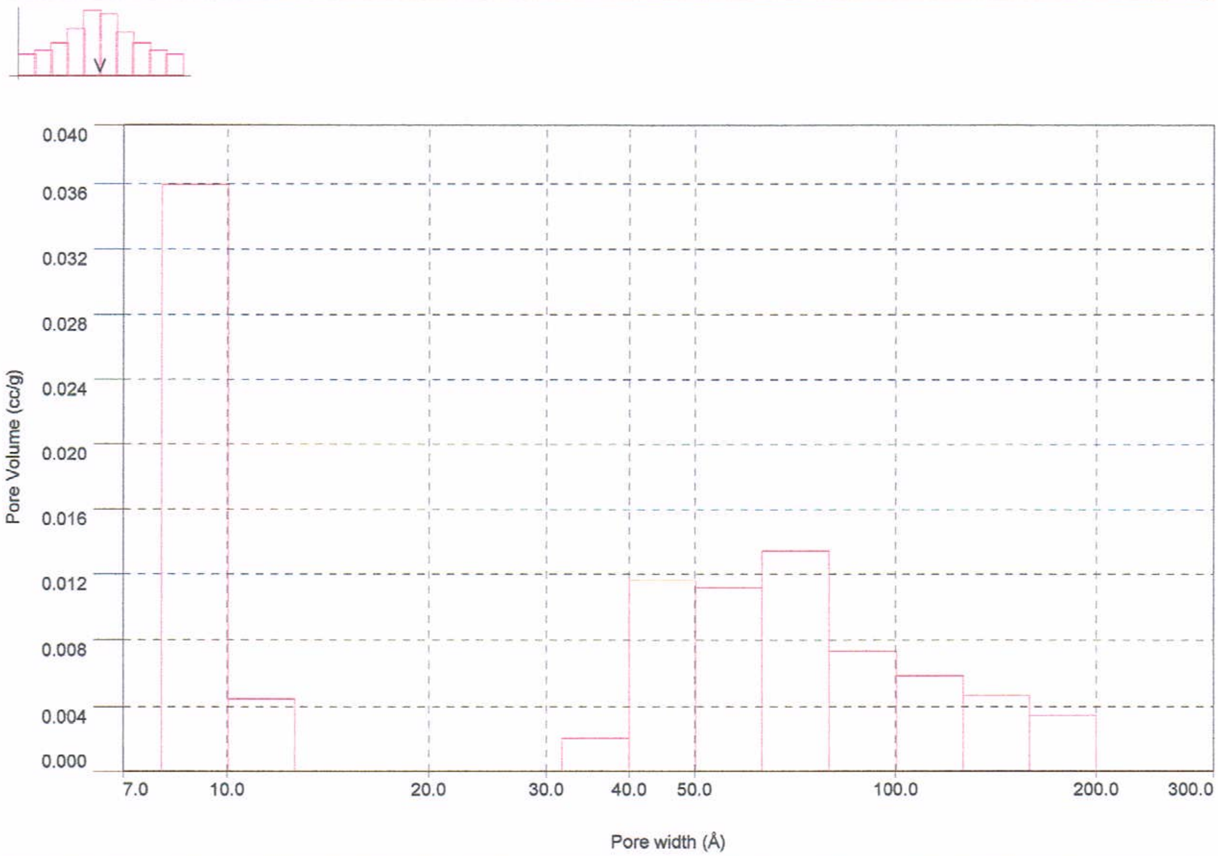
Outgas Time:	2.0 hrs	**Outgas Temp:**	300.0 °C	**Sample Weight:**	0.0578 g
Analysis gas:	Nitrogen	**Molec. Wt:**	28.0134 g	**Non-ideality:**	6.58e-05 1/mmHg
Analysis Time:	1645.3 min	**Instrument:**	Autosorb Station 1	**Bath temp.:**	77.3 K

DFT * Volume Histogram

Data Reduction Parameters

DFT method
Thermal Transpiration: on **Eff. mol. diameter (D):** 4.0000 Å **Eff. cell stem diam. (d):** 1.0000 mm
Calc. Model: N2 at 77 K on silica (cylindr. pore, NLDFT equilibrium model) **Rel. press. range:** 0.0000 - 1.0000
Moving pt. avg: off

Adsorbate
Nitrogen **Temperature** 77.350K
Molec. Wt.: 28.013 g **Cross Section:** 16.200 Å² **Liquid Density:** 0.808 g/cc



DFT method summary

Pore volume =	0.104 cc/g
Lower confidence limit =	7.830 Å
Fitting error =	1.187 %
Pore width (Mode) =	7.830 Å
Moving point average :	off