Mineral Resources Tasmania

Laboratory Report
LJN2019-101

MINERALOGICAL / ASBESTOS ANALYSES, EAST RENISON DDH

An unpublished Mineral Resources Tasmania Report for:

S Newett, MRT

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Date: 30 September 2021

Mineral Resources Tasmania
Department of State Growth

Tasmanian Government

SUMMARY

A drillcore (RBE42) from East Renison was sampled in several places and tested for potential asbestos.

G407535 shows veins of coarsely fibrous to asbestiform, pale green chrysotile and brucite in green serpentine.

G407536 shows veins of coarsely fibrous to asbestiform, white chrysotile and brucite in green serpentine mixed with other minerals including hydrotalcite, palygorskite etc.

G407537 shows fine grained, non-asbestiform magnesite in veins cutting a brown carbonate-goethite-opal-altered serpentine.

G407538 is non-asbestiform and shows irregular patches and networks of white magnesite in green serpentine, with richly disseminated, fine-grained black magnetite.

G407539 is an air filter and the fibre count was <0.04 fibres/mL. This is under Safe work Australia's exposure standards for asbestiform materials of 0.1 fibres/ml.

INTRODUCTION

A drillcore from East Renison (ID # 8763) contained abundant fibrous minerals and so was sampled and analysed to check for potential asbestos, with sample details shown in Table 1.

Table 1: Sample Details

Reg. No	Drillhole details	Location	Process	Description
G407535	RBE42, 104.5	Renison East	rock	Asbestos in serpentine
G407536	RBE42, 157.5	Renison East	rock	Asbestos in serpentine
G407537	RBE42, 179	Renison East	rock	White veins in brown carbonate altered serpentine
G407538	RBE42, 176	Renison East	rock	Asbestos? in white carbonate altered serpentine
G407539	RBE42	Renison East	Dust	Filter paper- Air monitoring

SAMPLE DESCRIPTIONS

The samples are varied but all quite broken and variably friable pieces of drillcore ~50mm diameter.

G407535 shows veins of coarsely fibrous to asbestiform, pale green to white minerals in green serpentine (Figs 1).

G407536 shows veins of coarsely fibrous to asbestiform, white minerals in green serpentine (Figs 2).

G407537 shows fine grained, weakly fibrous white minerals in veins cutting a brown carbonate altered serpentine (Figs 3).

G407538 shows irregular patches and networks of coarsely fibrous to asbestiform, white minerals in green serpentine, with white carbonate alteration, and richly disseminated fine grained black magnetite (Figs 4).

G407539 is an asbestos sampling filter.

Under polarised microscopy sample G407535 shows abundant coarse to fine chrysotile fibres (Figs. 5 - 8). G407536 shows lesser amounts of chrysotile fibres (Fig. 9). Samples G407537 and G407538 exhibit no detectable asbestiform minerals (Figs. 10-11).

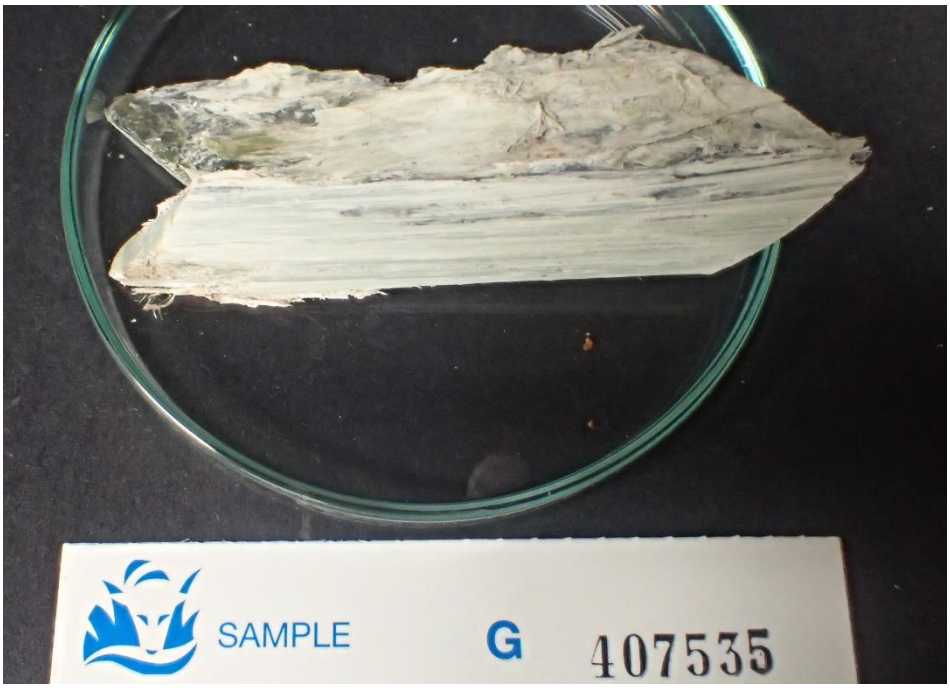

Fig. 1. Sample as submitted, showing very coarse white fibres. Sample G407535. FOV ~90mm.

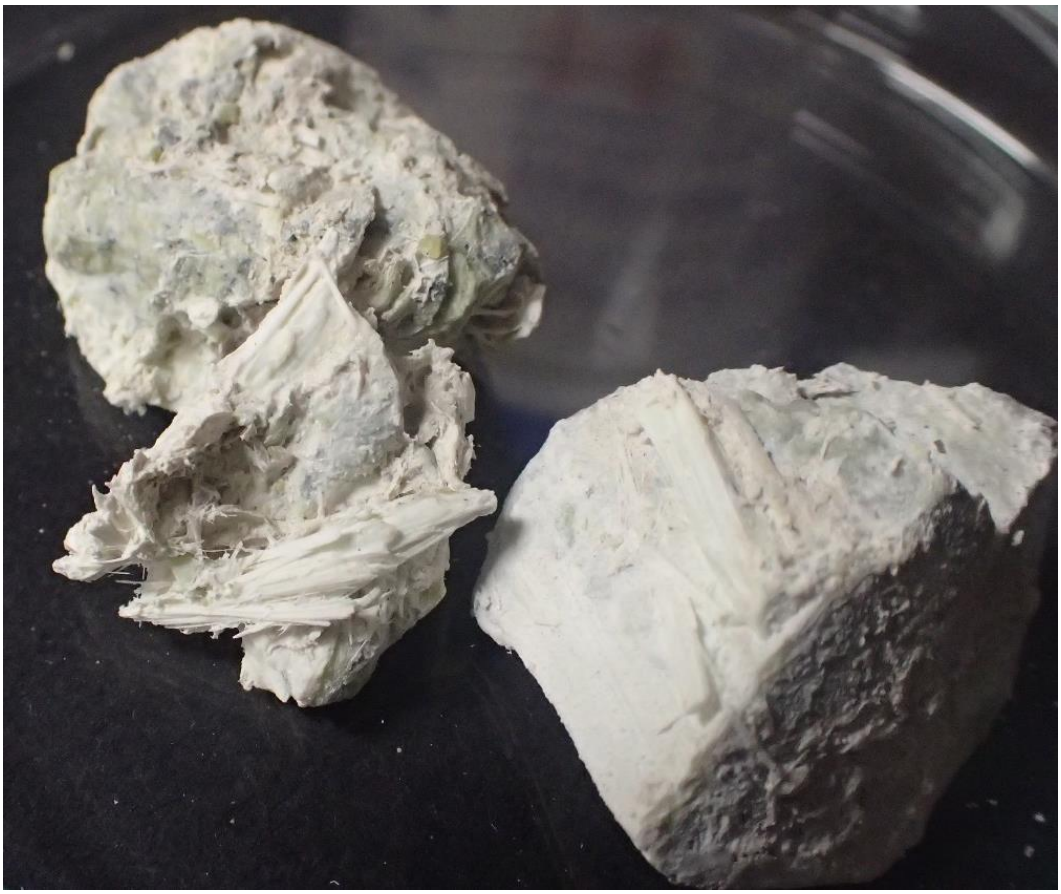

Fig. 2. Sample as submitted, showing very coarse white fibres. Sample G407536. FOV ~70mm.

Fig. 3. Sample as submitted, showing white veins in a brown matrix. Sample G407537. FOV ~60mm.

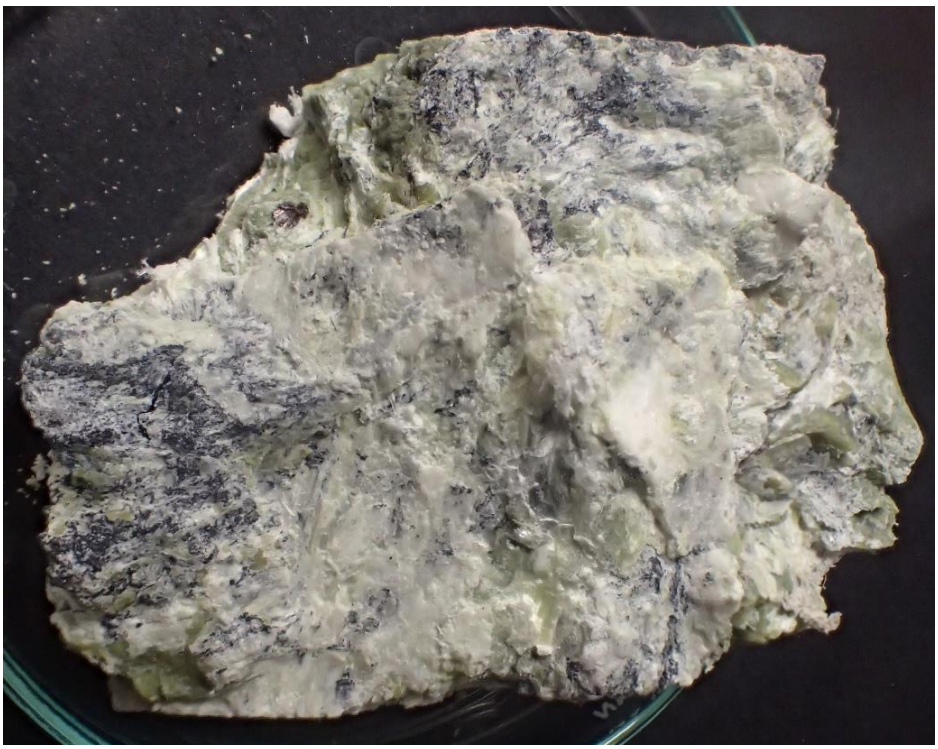

Fig. 4. Sample as submitted, showing greenish serpentine with white carbonates and fibrous minerals, and black magnetite. Sample G407538. FOV ~60mm.

XRD ANALYSES

The samples were prepared, examined and analysed in the MRT laboratories, Rosny Park, Tasmania. They were run on a Rigaku Miniflex 600 X-Ray Diffractometer system: a 600W generator 150mm goniometer with a Cu tube; 40kV/15mA, sample spinner and a Scintillation counter (SC) with Be window, -3^{o} to 145^{o} 2Ø scanning range and 2^{o} - 145^{o} 2Ø measuring range, with a scanning speed of 0.01 to 100^{o}/min, a graphite counter monochromator and a Kß Ni- filter. The analysis software used is the PDXL2 using the ICCD database.

The results are shown in Appendix 1 and Table 2. They indicate mostly serpentine, brucite, palygorskite, magnetite and hydrotalcite. No sulphides, sulphates or other deleterious constituents were detected.

Table 2: XRD summary (wt.%)

Phase name	G407535	G407536	G407537	G407538
Serpentine	Major	Accessory		Accessory
Brucite	Major	Major		
Palygorskite	Very minor	Trace		
Hydrotalcite	Very minor	Accessory		
Smectite	Very minor			
Magnetite		Trace	Trace	Accessory
Hydromagnesite	Very minor	Trace		
Dolomite		Faint Trace	Trace	Trace
Quartz			Very minor	
Goethite			Very minor	
Magnesite			Dominant	Major
Opal			Minor	
Mixed-Layer		Trace		

FIBRE EXAMINATION AND COUNTING

The samples were prepared and examined by low to high power plain and polarised light in the MRT laboratories, Rosny Park, Tasmania. This examination revealed that some contain asbestiform fibrous material (Table 3).

An area of the filter greater than 0.75 mm^2 was examined by fibre counting, using the methods recommended in NOHSC (2005). The sampling details, counting data and results are summarised in Appendix 2.

The examination of the filter paper contained less than the detectable limit of respirable fibre (<0.04 fibres/mL). This is under Safe work Australia's exposure standards for asbestiform materials of 0.1 fibres/ml (Safe Work Australia, 2019).

Table 3: Fibre Examination and Counting

Reg. No.	Location	*Observation*
G407535	Renison East	Chrysotile asbestos
G407536	Renison East	Chrysotile asbestos
G407537	Renison East	No asbestos fibres
G407538	Renison East	No asbestos fibres
G407539	Renison East	<0.04 fibres per mL

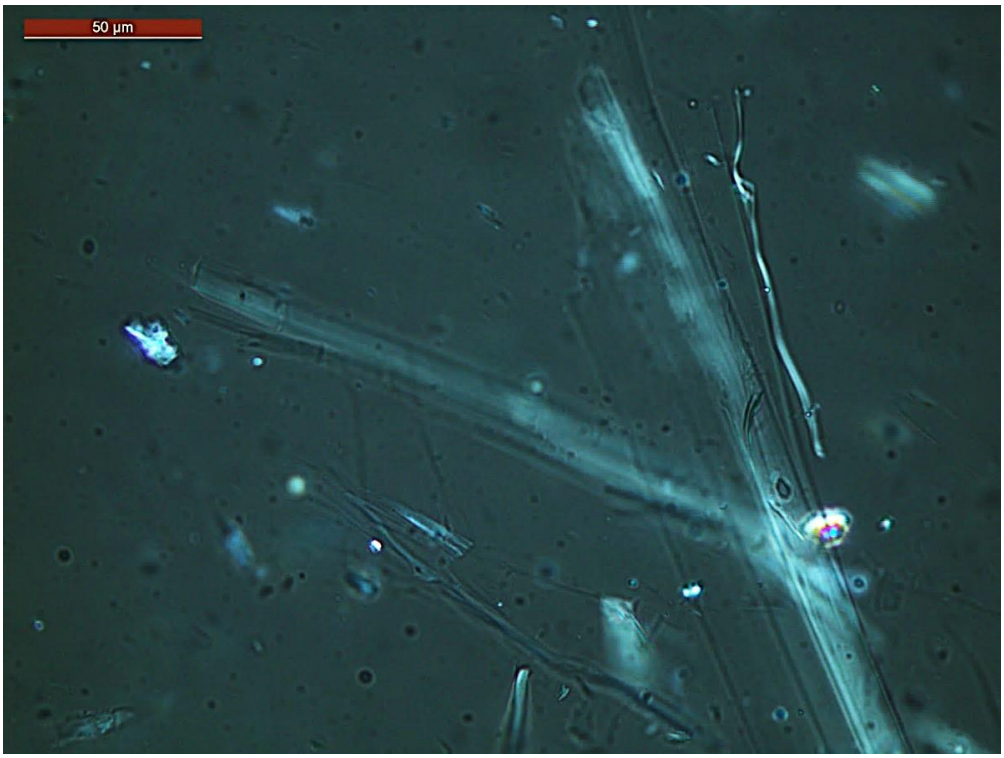

Fig. 5. Sample G407535, showing fibrous to asbestiform chrysotile. Cross polarised transmitted light.

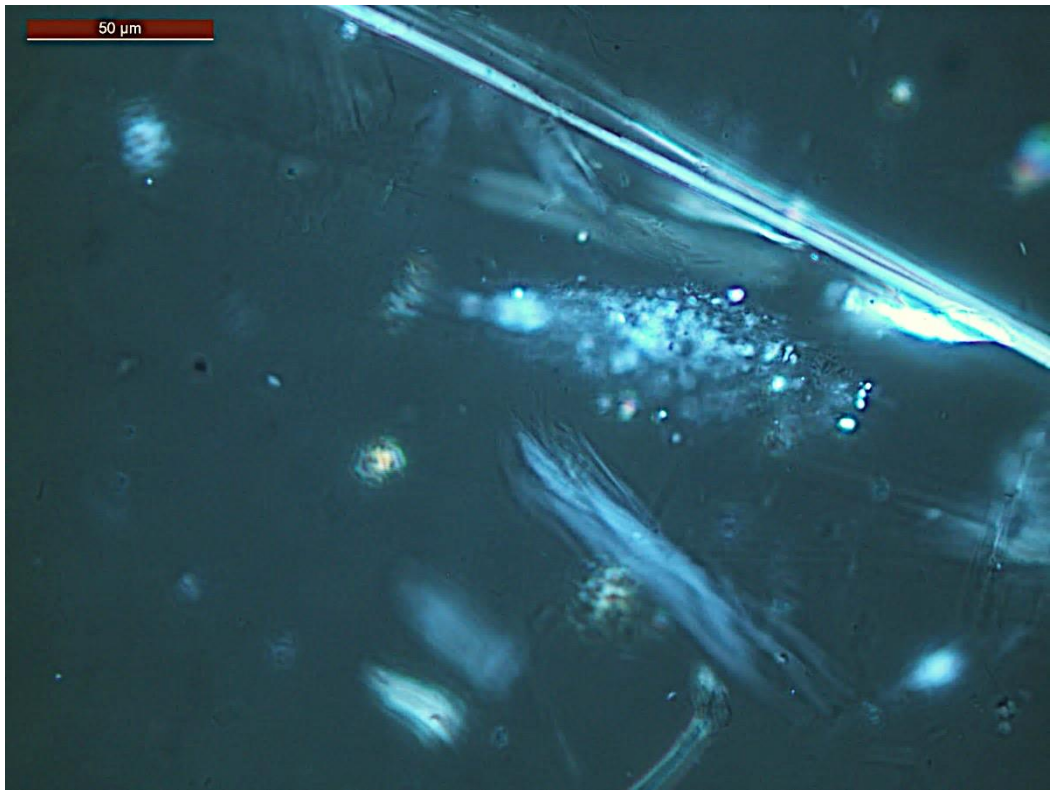

Fig. 6. Sample G407535, showing fibrous to asbestiform chrysotile and fine grained lizardite. Cross polarised transmitted light.

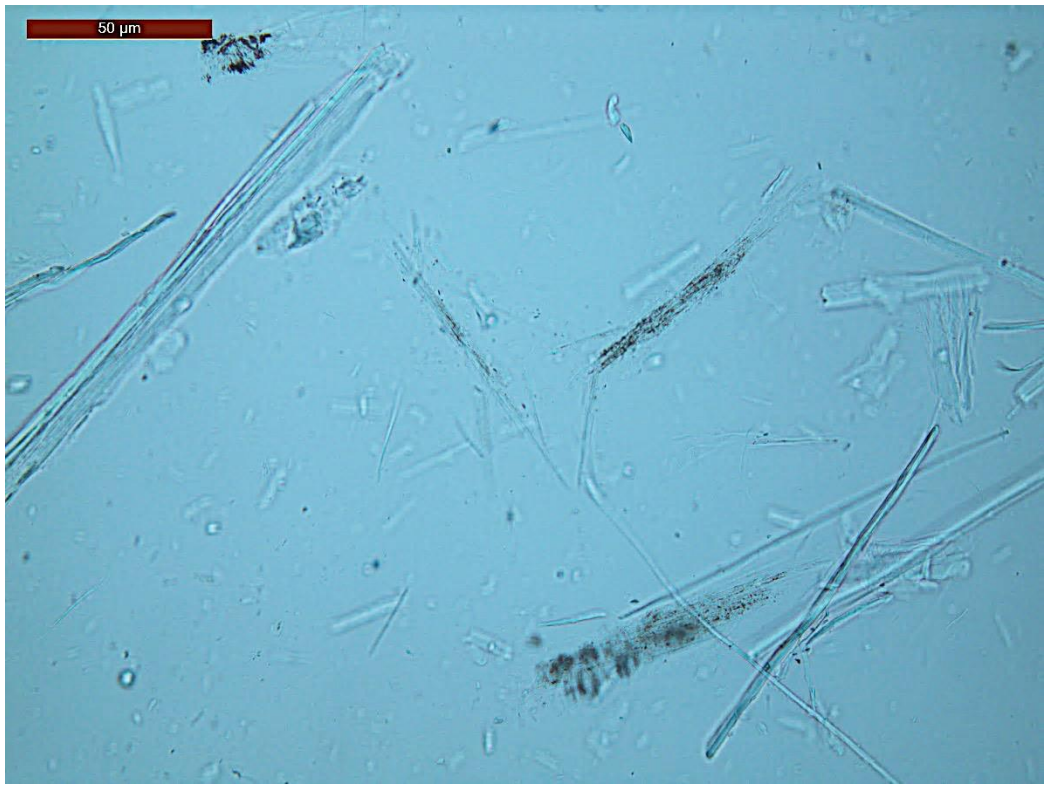

Fig. 7. Sample G407535, showing fibrous to asbestiform chrysotile. Plane polarised transmitted light.

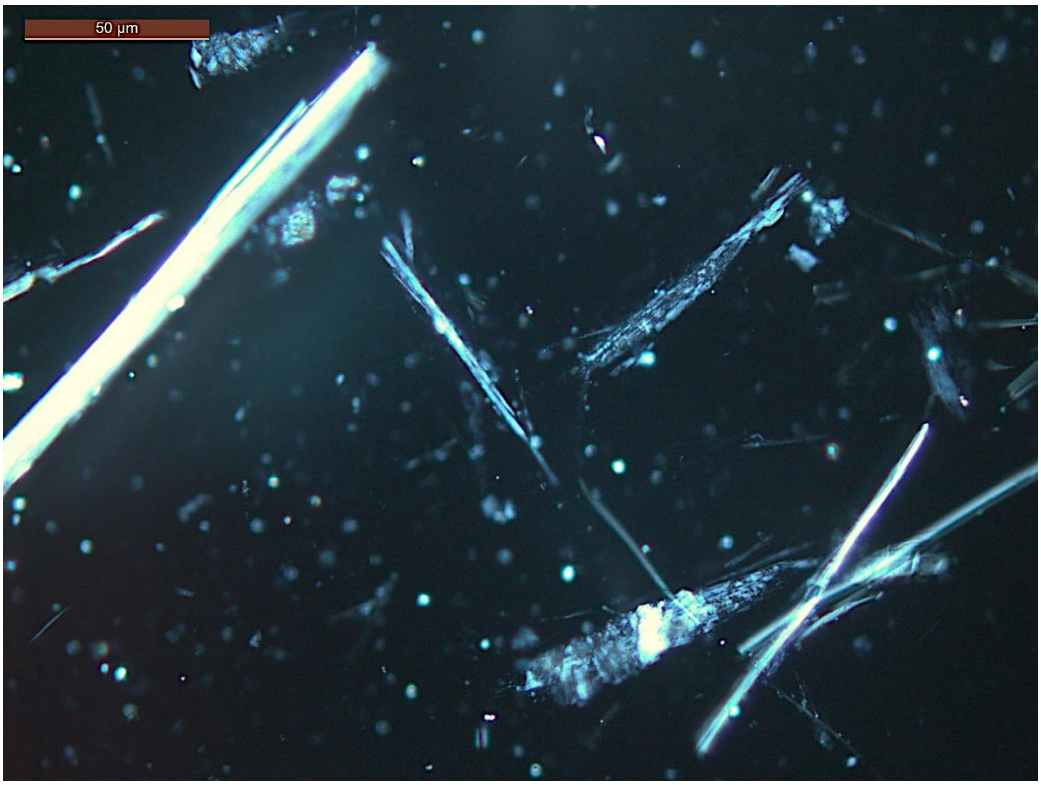

Fig. 8 Sample G407535, showing fibrous to asbestiform chrysotile. Cross polarised transmitted light.

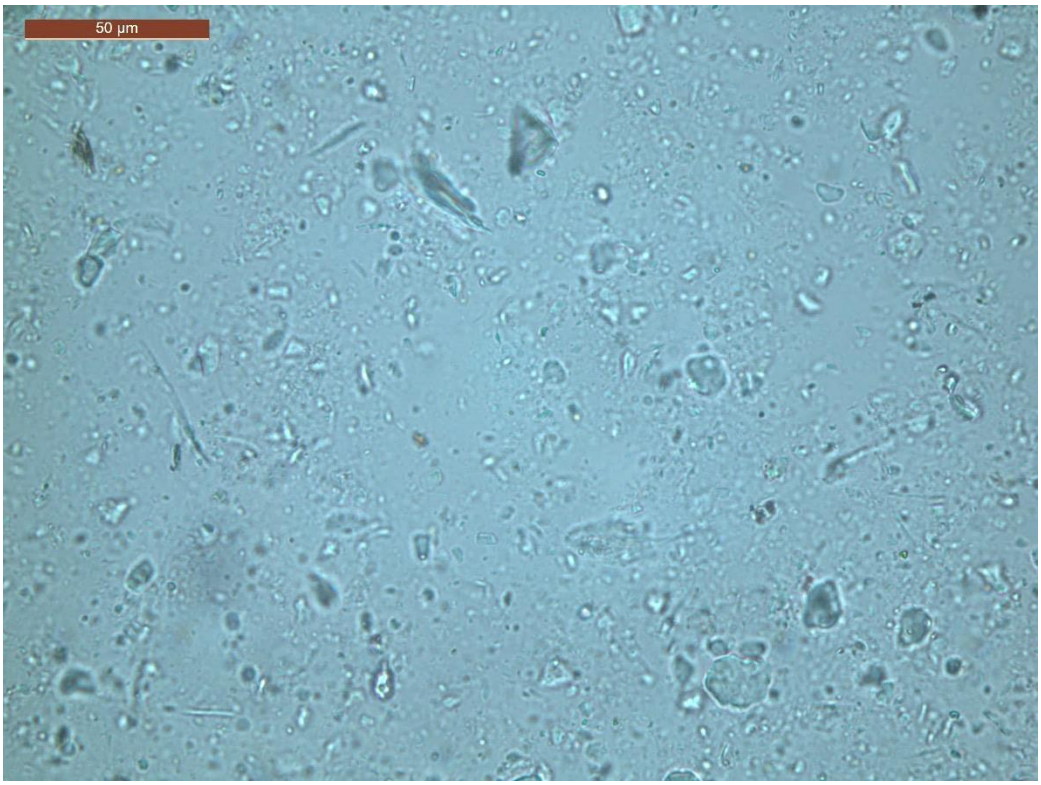

Fig. 9. Sample G407536, showing sparse fibrous to asbestiform chrysotile. Plane polarised transmitted light.

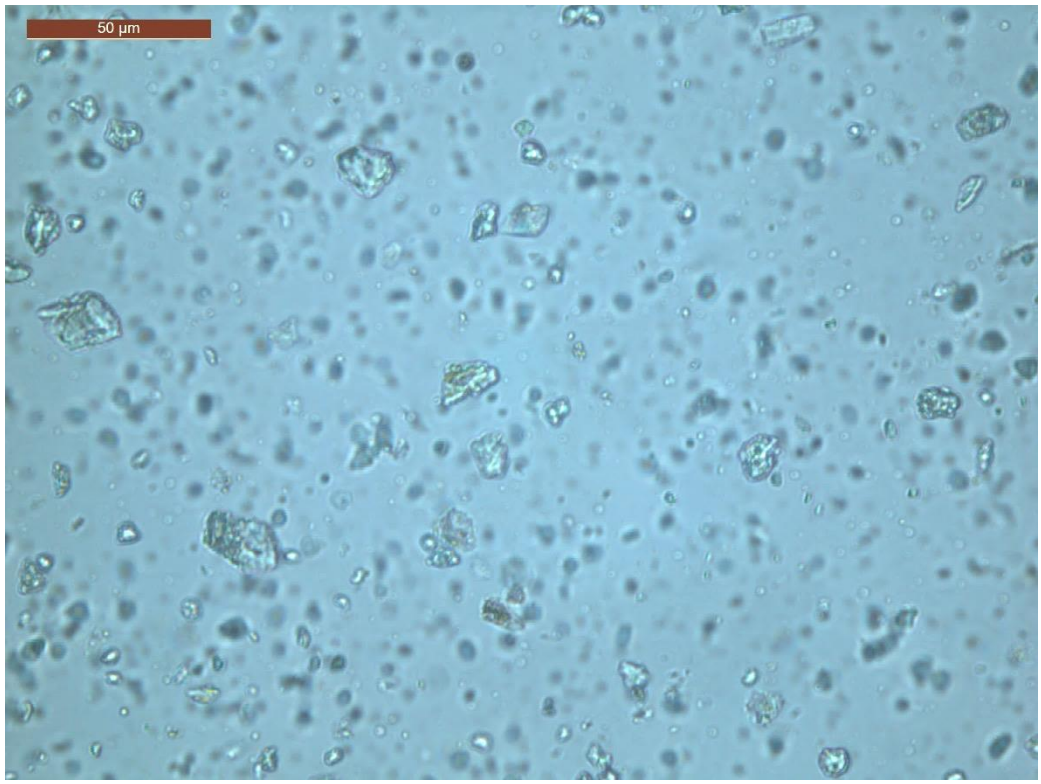

Fig. 10. Sample G407537 showing no asbestiform minerals. Plane polarised transmitted light.

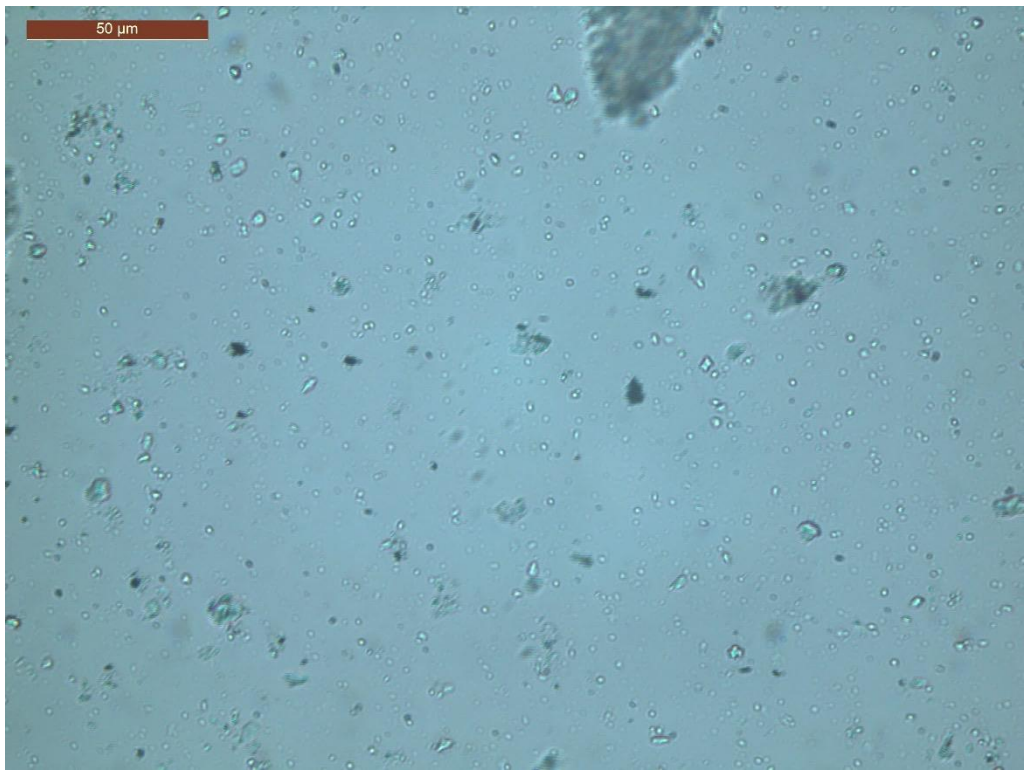

Fig. 11. Sample G407538 showing no asbestiform minerals. Plane polarised transmitted light.

DISCUSSION

There is abundant fibrous to asbestiform chrysotile in two of the drill core samples examined, and much of this is rather friable and is capable of producing abundant respirable asbestiform fibre when crushed. Some of it, however, is compact and relatively non-friable.

G407535 shows veins of coarsely fibrous to asbestiform, pale green chrysotile and brucite in green serpentine.

G407536 shows veins of coarsely fibrous to asbestiform, white chrysotile and brucite in green serpentine mixed with other minerals including hydrotalcite, palygorskite etc.

G407537 shows fine grained, non-asbestiform magnesite in veins cutting a brown carbonate-goethite-opal-altered serpentine.

G407538 is non-asbestiform and shows irregular patches and networks of white magnesite in green serpentine, with richly disseminated, fine-grained black magnetite.

G407539 is an air filter and the fibre count was <0.04 fibres/mL. This is under Safe work Australia's exposure standards for asbestiform materials of 0.1 fibres/ml.

From brief examination, fibre-bearing vein material like G407535 and G407536 is widespread in the core, particularly in the interval from 100-150m, containing highly veined serpentinites. Much of the fibrous material is brucite but fibrous to asbestiform chrysotile is still abundant. The brown and white carbonate altered serpentinites like G407537 and G407538 do not appear to contain much chrysotile, but should be still treated with caution. Other similar drill cores in the area held in our store contain similar asbestiform material, and some have been separately sampled for testing.

CONCLUSIONS

The core contains some fibrous to asbestiform chrysotile over a large section of the core. On light crushing it produces fine fibres, a small proportion being classifiable as respirable fibre which is considered by NOHSC (2005) and NIOSH to be a potential occupational carcinogen, causing lung cancer on inhalation of significant amounts (http://www.cdc.gov/niosh/npg/npgd0041.html). Some of the asbestos is quite friable material, which could constitute a significant danger with casual handling, but most of the core is quite solid and would only constitute a danger if crushed and pulverized. The core should all be treated with caution, so as not to generate any atmospheric dust, and handled using appropriate PPE. Friable zones should be treated by spray sealing with our standard MRT methods.

REFERENCES

Klinger, Patricia A., Nicholson, Keith R., Hearl, Frank J., and Jankovic, John T., 1994. *ASBESTOS (bulk) by PLM. Method 9002, Issue 2:* In: NIOSH Manual of Analytical Methods (NMAM), Fourth Edition, 8/15/94

Langley, C., 2006. *Mineral Resources Tasmania - Review of Laboratory procedures & Safety inspection* May 2006. IPM. Injury Prevention & Management, Unpublished report.

NOHSC (National Occupational Health and Safety Commission), 2005, *Guidance note on the membrane filter method for estimating airborne asbestos fibres 2nd edition [nohsc: 3003(2005)],* Australian Government.

Safe Work Australia, 2019, *Workplace exposure standards for airborne contaminants*. Australian Government.

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These analyses collected in the MRT laboratories, along with some other data on the samples submitted, may enter the MRT databases but every attempt will be made to ensure the data remains closed file and not be available externally, except at your request.

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Appendix 1: MRT Laboratory Report

Client: MRT
Sample Location: E Renison
Job Number: LJN2019-101
Analyses: Approximate Mineralogy
Methods: XRD
Analyst: T Coyte
Lab Manager: R Bottrill
Date: 23/7/2019

XRD Results – G407535

General Information

Measurement date:	11/09/2019	**Interpretative date:**	23/7/2020
Job Number/Client:	LJN2019-101 SN	**XRD**	Rigaku Miniflex 600
Registration Number:	G407535	**Analyst:**	T Coyte
Quantitative Method:	XPlot	**Process Medium:**	Whole Rock
Sample Holder:	Glass plate	**Speed (deg/min):**	0.5
Comment:	Sample not completely representative of whole hand specimen. Run without Spin		

Analysis Results

Phase name	Content - Estimate	Formula
Serpentine	Major	$Mg_3(Si_2O_5)(OH)_4$
Brucite	Major	$Mg(OH)_2$
Smectite	Very minor	$Ca_{0.2}Mg_3(Si,Al)_4O_{10}(OH)_2 \cdot 4H_2O$
Palygorskite	Very minor	$(Mg,Al)_5(Si,Al)_8O_{20}(OH)_2 \cdot 8H_2O$
Hydrotalcite (Pyroaurite)	Very minor	$Mg_6Fe_2CO_3(OH)_{16} \cdot 4H_2O$
Hydromagnesite	Very minor	$Mg_5(CO_3)_4(OH)_2(H_2O)_4$

Notes
Peak overlap may interfere with identifications and quantitative calculations.
Amorphous minerals and minerals present in trace amounts may not be detected.

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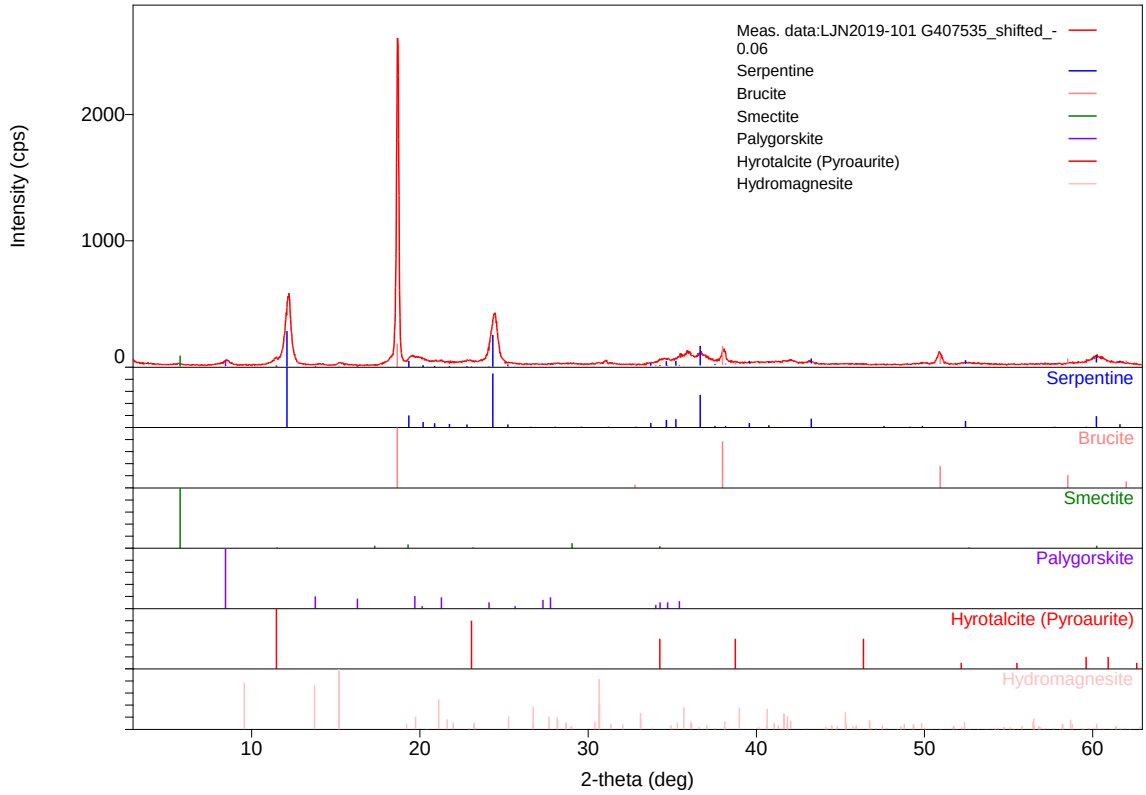
Phase Data Pattern



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XRD Results – G407536

General Information

Measurement date:	11/9/2019	**Interpretative date:**	23/7/2020
Job Number/Client:	LJN2019-101 SN	**XRD**	Rigaku Miniflex 600
Registration Number:	G407536	**Analyst:**	T Coyte
Quantitative Method:	XPlot	**Process Medium:**	Whole Rock
Sample Holder:	Glass Plate	**Speed (deg/min):**	0.5
Comment:	Sample not completely representative of whole hand specimen. Run without Spin.		

Analysis Results

Phase name	Content - Estimate	Formula
Brucite	Major	$Mg(OH)_2$
Serpentine (Chrysotile)	Accessory	$Mg_3(Si_2O_5)(OH)_4$
Hydrotalcite	Accessory	$Mg_6Al_2(CO_3)(OH)_{16}\ 4H_2O$
Palygorskite	Trace	$Mg_5(Si,Al)_8O_{20}(OH)_2{\cdot}8H_2O$
Hydromagnesite	Trace	$Mg_5(CO_3)_4(OH)_2(H_2O)_4$
Magnetite	Trace	$Fe^{+2}Fe_2^{+3}O_4$
Mixed-Layer Related to Hydrotalcite/Dypingite	Trace	Mix of Hydroxyl Carbonates
Dolomite	Faint Trace	$CaMg(CO_3)_2$

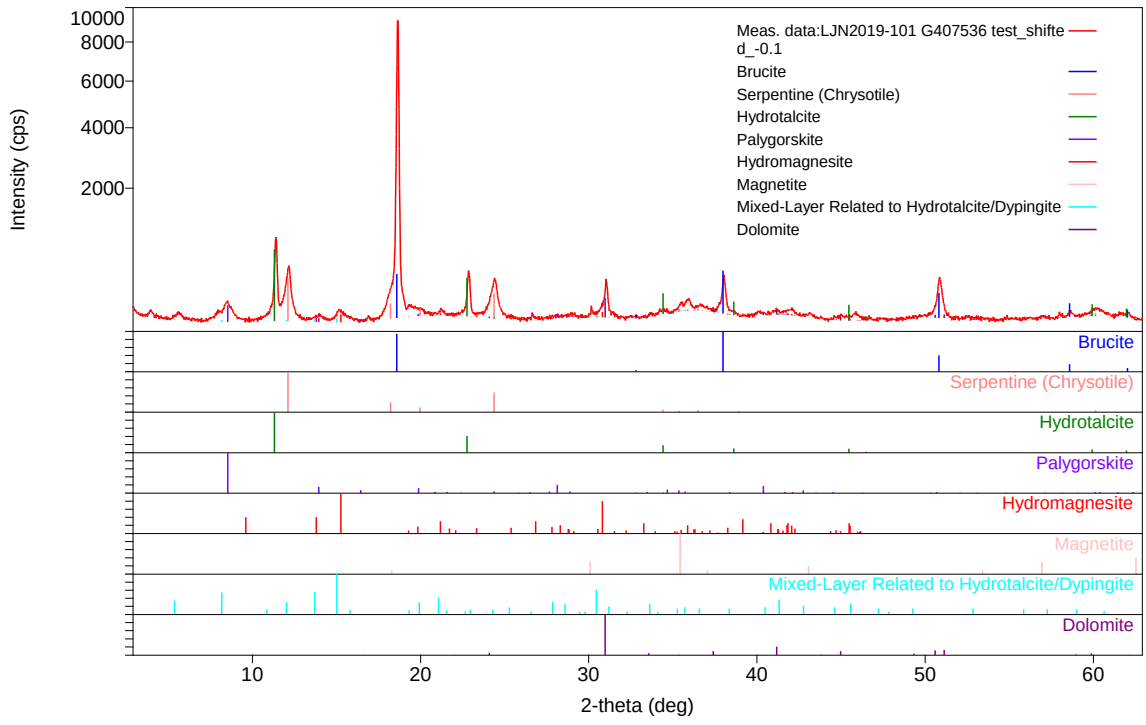
Notes

Unknowns are attributed to a possible Mixed-Layer mineral present – Probably related to the Hydrotalcite group minerals.

Peak overlap may interfere with identifications and quantitative calculations.

Amorphous minerals and minerals present in trace amounts may not be detected.

Phase Data Pattern



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XRD Results – G407537

General Information

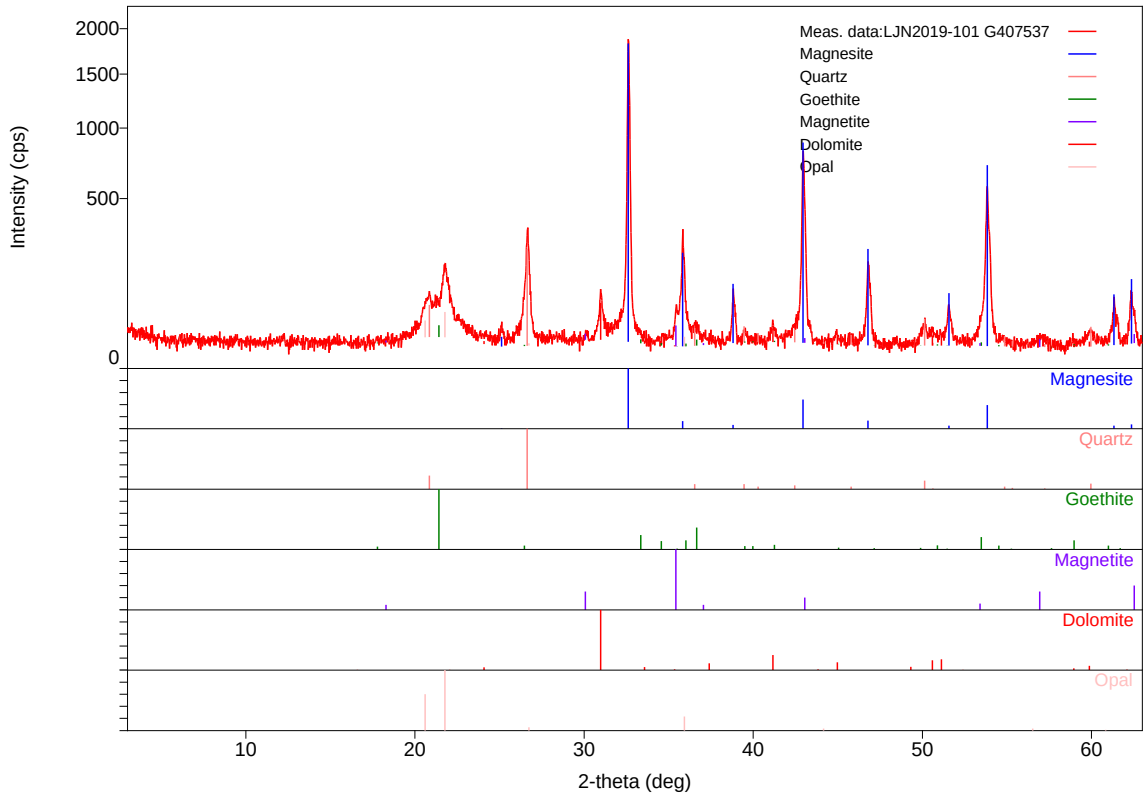
Measurement date:	11/09/2019	**Interpretative date:**	23/7/2020
Job Number/Client:	LJN2019-101 SN	**XRD**	Rigaku Miniflex 600
Registration Number:	G407537	**Analyst:**	T Coyte
Quantitative Method:	XPlot	**Process Medium:**	Whole Rock
Sample Holder:	Glass plate	**Speed (deg/min):**	0.5
Comment:	Sample not completely representative of whole hand specimen. Run without Spin		

Analysis Results

Phase name	Content - Estimate	Formula
Magnesite	Dominant	$MgCO_3$
Opal	Minor	$SiO_2.xH_2O$
Quartz	Very minor	SiO_2
Goethite	Very minor	$FeO(OH)$
Magnetite	Trace	$Fe^{+2}Fe_2^{+3}O_4$
Dolomite	Trace	$CaMg(CO_3)_2$

Notes
Peak overlap may interfere with identifications and quantitative calculations.
Amorphous minerals and minerals present in trace amounts may not be detected.

Phase Data Pattern



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XRD Results – G407538

General Information

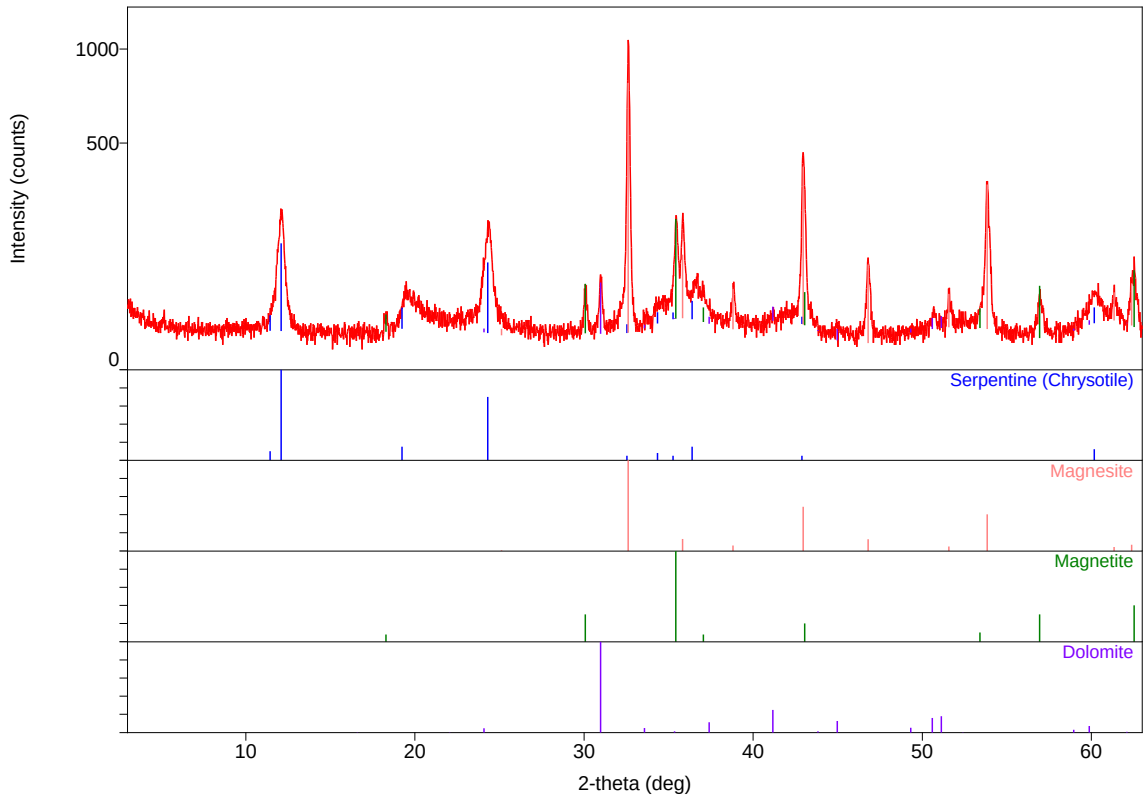
Measurement date:	11/09/2019	**Interpretative date:**	23/7/2020
Job Number/Client:	LJN2019-101 SN	**XRD**	Rigaku Miniflex 600
Registration Number:	G407538	**Analyst:**	T Coyte
Quantitative Method:	XPlot	**Process Medium:**	Whole Rock
Sample Holder:	Glass plate	**Speed (deg/min):**	0.5
Comment:	Sample not completely representative of whole hand specimen. Run without Spin		

Analysis Results

Phase name	Content - Estimate	Formula
Magnesite	Major	$Mg(CO_3)$
Serpentine (Chrysotile)	Accessory	$Mg_3Si_2O_5(OH)_4$
Magnetite	Accessory	$Fe^{+2}Fe_2^{+3}O_4$
Dolomite	Trace	$CaMg(CO_3)_2$

Notes
Peak overlap may interfere with identifications and quantitative calculations.
Amorphous minerals and minerals present in trace amounts may not be detected.

Phase Data Pattern



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Appendix 2: Asbestos Exposure Monitoring Record & Calculation

Client: MRT
Job Number: LJN2019-101
Sample Location: Mornington Core Library
Analyses: Estimating airborne respirable fibres
Methods: Membrane Filter Method

Sample Registration No.:	G407539	
Sample Taken by:	Ross King	
Location:	Mornington Core Store	
Brief description of working process:	Handling core with Asbestos Present	
Working conditions:	-	
Material/Source:	East Renison	
Airflow:	-	
Methods of dust control:	-	
Number of employees for which the measuring value is representative:	-	
Personal protection (yes/no) type:	-	
Pump ID:	Buck "Libra" Air Sampler, Model No. L-4, Ser.No. L407285	
Filter Type:	225-326 SKC Preloaded Cassette - 25mm	
Filter Size:	25	mm
Flow Rate (r):	2000	mL/min

Times:

Date	Time on	Time Off	Total Time
27/08/2019	12:00:00	1:15:00	1:15

Time (t):	75	minutes	Total (Hours) :	1:15

Effective Filter Area (A):	397.6	mm^2
Projected eyepiece graticule area (a):	0.00785	mm^2
Number of Graticule areas observed (n):	199	

Fibres	**Count**	**Concentration**	
Organic		0.000	fibres per mL
Asbestos		0.000	fibres per mL
Unknown	12	0.020	fibres per mL
Total number of fibres counted (N)	12	0.020	fibres per mL

Note- The result is below the detection limit of 10 fibres per 100 graticules