Occupational Cancer Research Centre

SUPPLEMENTAL TABLES

FOR

**INVESTIGATION OF MCINTYRE POWDER EXPOSURE
AND NEUROLOGICAL OUTCOMES
IN THE MINING MASTER FILE COHORT:
FINAL REPORT**

March 12, 2020

Contents

Acronyms

DAD   Discharge Abstract Database

ICD   International Classification of Diseases

LCL   Lower Confidence Limit

MP   McIntyre Powder

NACRS   National Ambulatory Care Records System

OCRC   Occupational Cancer Research Centre

OHIP   Ontario Health Insurance Plan

RR   Incidence rate ratio

UCL   Upper Confidence Limit

Section 1: Alzheimer's disease (definition 1)

1.1 Risk of Alzheimer's disease for ever and cumulative exposure to MP comparing to those never exposed to MP by first and second assessment approaches (source data for Table 4-7 of the report).

Exposure metrics			N	Case count	Cumulative person years	RR	LCL	UCL
MP exposure	First assessment approach	Never exposed to MP	27277	728	528645	1.00	–	–
		Ever exposed to MP	9548	334	157465	0.96	0.85	1.10
		Ever exposed only before 1956	853	49	8616	0.91	0.68	1.22
		Ever exposed ever after 1956	8695	285	148849	0.97	0.85	1.12
		Ever exposed only after 1956	6459	164	123211	0.96	0.81	1.14
	Second assessment approach	Never exposed to MP	22998	663	437669	1.00	–	–
		Ever exposed to MP	13827	399	248440	1.01	0.90	1.15
		Ever exposed only before 1956	966	60	9440	1.04	0.79	1.36
		Ever exposed ever after 1956	12861	339	239000	1.01	0.89	1.15
		Ever exposed only after 1956	10187	209	206763	1.05	0.90	1.24
Cumulative MP exposure duration	First assessment approach	Never exposed to MP	27278	728	528645	1.00	–	–
		> 0-1 year	2296	53	41938	0.77	0.59	1.02
		> 1-5 years	3833	121	68025	0.98	0.81	1.19
		> 5-10 years	1655	68	25640	1.04	0.81	1.34
		> 10 years	1764	92	21861	1.04	0.83	1.29
	Second assessment approach	Never exposed to MP	22999	663	437669	1.00	–	–
		> 0-1 year	4507	85	91827	1.10	0.88	1.38
		> 1-5 years	4503	115	85683	1.00	0.82	1.22
		> 5-10 years	2432	83	39413	0.93	0.74	1.16
		> 10 years	2384	116	31517	1.04	0.85	1.27

Alzheimer's disease (definition 1): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 331) within 12 months; MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; Reference group: Mining industry workers never exposed to MP.

1.2 Risk of Alzheimer's disease (definition1) by ore type (No assessment of MP exposure, source data for Table 8 of the report).

Ore type mined		N	Case counts	Cumulative person years	RR	LCL	UCL
	Never worked as a gold miner	24228	620	480640	1.00	–	–
Gold	Ever worked as a gold miner	12598	442	205469	0.97	0.85	1.09
	Only worked as a gold miner	2679	106	37627	0.84	0.68	1.04
	Never worked as a nickel-copper miner	17864	512	332568	1.00	–	–
Nickel-copper	Ever worked as a nickel-copper miner	18962	550	353542	0.96	0.85	1.08
	Only worked as a nickel-copper miner	8487	294	156902	0.98	0.85	1.13
	Never worked as an uranium miner	22239	754	392349	1.00	–	–
Uranium	Ever worked as an uranium miner	14587	308	293760	1.14	0.99	1.31
	Only worked as an uranium miner	5129	76	111542	1.22	0.96	1.56

Alzheimer's disease (definition 1): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 331) within 12 months; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

1.3 Risk of Alzheimer's disease (definition1) by duration of employment by ore mined (No assessment of MP exposure, source data for Table 9 of the report).

Duration of employment		N	Case counts	Cumulative person years	RR	LCL	UCL
Ever worked as a gold miner	> 0-1 year	2626	77	48532	1.11	0.87	1.41
	> 1-5 years	3704	101	65338	0.84	0.68	1.04
	> 5-10 years	3106	122	49924	1.02	0.84	1.25
	> 10 years	3162	142	41674	0.95	0.79	1.15
Only worked as a gold miner	> 0-1 year	179	12	2318	1.31	0.74	2.32
	> 1-5 years	152	<6	1966	0.65	0.27	1.56
	> 5-10 years	1128	45	17446	0.93	0.68	1.26
	> 10 years	1220	44	15897	0.73	0.53	0.99
Ever worked as a nickel-copper miner	> 0-1 year	2355	44	45274	0.87	0.64	1.18
	> 1-5 years	3598	75	68038	0.92	0.72	1.18
	> 5-10 years	3562	87	69306	0.94	0.75	1.18
	> 10 years	9447	344	170923	0.98	0.86	1.13
Only worked as a nickel-copper miner	> 0-1 year	47	0	748	0.00	−	−
	> 1-5 years	127	<6	2010	1.00	0.41	2.41
	> 5-10 years	1671	40	32570	0.90	0.65	1.24
	> 10 years	6672	249	121575	1.01	0.87	1.17
Ever worked as an uranium miner	> 0-1 year	5450	116	111710	**1.28**	**1.05**	**1.57**
	> 1-5 years	4700	103	91633	1.02	0.83	1.26
	> 5-10 years	3135	45	66303	1.03	0.76	1.39
	> 10 years	1302	44	24113	1.25	0.92	1.69
Only worked as an uranium miner	> 0-1 year	1780	24	39113	1.38	0.92	2.09
	> 1-5 years	1499	23	31595	1.00	0.66	1.53
	> 5-10 years	1341	15	30339	1.27	0.76	2.12
	> 10 years	509	14	10495	1.41	0.83	2.39

Alzheimer's disease (definition 1): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 331) within 12 months; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;
Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

1.4 Risk of Alzheimer's disease (definition1) for ore type mined stratified by MP exposure using first and second assessment approaches.

Ore types mined		MP exposure	First assessment approach						Second assessment approach					
			N	Case counts	Peryrs	RR	LCL	UCL	N	Case counts	Peryrs	RR	LCL	UCL
Gold (AU)	Ever an AU miner	Ever	7137	285	108339	0.98	0.80	1.19	8526	312	136779	1.10	0.89	1.35
		Never	5460	157	97130	1.00	–	–	4071	130	68689	1.00	–	–
	Only an AU miner	Ever	1843	68	25391	**0.66**	**0.44**	**0.99**	1971	65	28394	**0.64**	**0.42**	**0.95**
		Never	836	38	12236	1.00	–	–	708	41	9234	1.00	–	–
	Never a AU miner	Ever	2411	49	49126	0.96	0.72	1.29	5301	87	111661	1.00	0.79	1.25
		Never	21817	571	431515	1.00	–	–	18927	533	368980	1.00	–	–
Nickel-copper (NC)	Ever a NC miner	Ever	3331	103	56932	1.02	0.82	1.26	5487	135	101931	1.02	0.84	1.24
		Never	15630	447	296609	1.00	–	–	13474	415	251611	1.00	–	–
	Only a NC miner	Ever	0	0	0	0.00	–	–	0	0	0	0.00	–	–
		Never	8487	294	156902	1.00	–	–	8487	294	156902	1.00	–	–
	Never a NC miner	Ever	6217	231	100532	0.91	0.76	1.08	8340	264	146510	0.99	0.83	1.18
		Never	11647	281	232035	1.00	–	–	9524	248	186058	1.00	–	–
Uranium (U)	Ever an U miner	Ever	5024	154	91962	1.11	0.88	1.39	8891	215	173556	1.11	0.87	1.41
		Never	9563	154	201798	1.00	–	–	5696	93	120205	1.00	–	–
	Only an U miner	Ever	1107	22	23608	0.98	0.59	1.60	2388	35	52079	0.98	0.62	1.54
		Never	4022	54	87934	1.00	–	–	2741	41	59463	1.00	–	–
	Never an U miner	Ever	4524	180	65503	0.85	0.72	1.01	4936	184	74885	0.90	0.77	1.07
		Never	17714	574	326846	1.00	–	–	17302	570	317464	1.00	–	–

Alzheimer's disease (definition 1): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 331) within 12 months;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

"Ever a NC miner" workers were exposed through employment in other mines.

1.5 **Risk of Alzheimer's disease (definition1) by duration of MP exposure using first and second assessment approaches by types of ore mined (source data for Table 10 of the report).**

Ore types mined	Cumulative MP duration	First assessment approach						Second assessment approach					
		N	Case count	Peryrs	RR	LCL	UCL	N	Case count	Peryrs	RR	LCL	UCL
Ever gold	Never exposed	5460	157	97130	1.00	–	–	4071	130	68689	1.00	–	–
	> 0-1 year	1426	36	24150	0.71	0.50	1.03	1587	47	28824	1.35	0.96	1.88
	> 1-5 years	2682	102	44012	1.01	0.79	1.30	2627	79	46425	1.03	0.78	1.37
	> 5-10 years	1430	62	21259	1.04	0.77	1.39	2118	77	33321	1.00	0.75	1.33
	> 10 years	1599	85	18918	1.06	0.81	1.38	2194	109	28209	1.13	0.87	1.45
Only gold *	Never exposed	836	38	12236	1.00	–	–	708	41	9234	1.00	–	–
	> 0-1 year	273	6	4385	**0.37**	**0.16**	**0.89**	172	7	2614	0.98	0.44	2.18
	> 1-5 years	642	30	9493	0.91	0.55	1.50	352	6	5840	0.39	0.17	0.92
	> 5-10 years	383	17	5512	0.84	0.47	1.51	673	28	10359	0.85	0.51	1.41
	> 10 years	545	15	6001	**0.45**	**0.25**	**0.83**	774	24	9580	0.52	0.31	0.88
Ever uranium	Never exposed	9563	154	201798	1.00	–	–	5696	93	120205	1.00	–	–
	> 0-1 year	1510	33	29097	0.90	0.62	1.32	3855	62	80514	1.01	0.73	1.39
	> 1-5 years	2227	55	42729	0.96	0.71	1.31	3346	82	66162	1.09	0.81	1.47
	> 5-10 years	724	28	11954	1.25	0.83	1.87	972	28	16431	0.93	0.61	1.43
	> 10 years	563	38	8182	1.73	1.20	2.49	718	43	10449	1.60	1.11	2.32
Only uranium *	Never exposed	4022	54	87934	1.00	–	–	2741	41	59463	1.00	–	–
	> 0-1 year	348	7	7340	1.09	0.50	2.40	1320	15	29253	0.97	0.54	1.76
	> 1-5 years	592	11	12907	0.94	0.49	1.81	880	16	19010	1.06	0.59	1.89
	> 5-10 years	104	<6	2181	1.17	0.36	3.73	115	<6	2408	1.00	0.31	3.23
	> 10 years	63	<6	1179	0.53	0.07	3.85	73	<6	1407	0.44	0.06	3.23

Alzheimer's disease (definition 1): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 331) within 12 months;
MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;
N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;
All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; * Workers in these groups were employed and exposed to MP only in gold or only in uranium mines; Reference group: Mining industry workers with no MP exposure within the same ore type.

1.6 Risk of Alzheimer's disease (definition1) by time since last MP exposure, overall and by ore type, using first and second assessment approaches.

	Time since last exposure	First assessment approach					Second assessment approach				
		Case counts	Peryrs	RR	LCL	UCL	Case counts	Peryrs	RR	LCL	UCL
Full cohort	Never exposed to MP	728	528629	1.00	–	–	663	437594	1.00	–	–
	> = 10-30 years	61	63354	0.92	0.70	1.20	64	115704	0.86	0.66	1.12
	> = 30-40 years	98	54225	1.00	0.81	1.23	119	83609	1.02	0.84	1.24
	> = 40-50 years	106	30228	0.95	0.78	1.17	125	37162	1.01	0.84	1.23
	> = 50 years	69	9673	0.99	0.76	1.27	91	12041	1.15	0.92	1.44
Miners ever worked in gold	Never exposed to MP	157	97130	1.00	–	–	130	68689	1.00	–	–
	> = 10-30 years	54	39893	0.98	0.71	1.35	51	56512	0.94	0.67	1.32
	> = 30-40 years	80	36994	1.02	0.78	1.34	88	45921	1.11	0.85	1.47
	> = 40-50 years	93	23686	0.96	0.74	1.25	104	25911	1.11	0.86	1.45
	> = 50 years	58	7766	0.95	0.69	1.30	69	8435	1.19	0.87	1.61
Miners only worked in gold	Never exposed to MP	38	12236	1.00	–	–	41	9234	1.00	–	–
	> = 10-30 years	15	9481	0.65	0.35	1.19	11	11621	**0.49**	**0.25**	**0.97**
	> = 30-40 years	15	8071	0.58	0.31	1.06	17	9078	0.64	0.36	1.15
	> = 40-50 years	18	5751	0.57	0.32	1.01	19	5733	0.60	0.34	1.04
	> = 50 years	20	2088	0.88	0.48	1.59	18	1962	0.86	0.47	1.56
Miners ever worked in uranium	Never exposed to MP	154	201798	1.00	–	–	93	120205	1.00	–	–
	> = 10-30 years	24	39220	1.13	0.72	1.78	34	85498	1.04	0.68	1.57
	> = 30-40 years	48	31962	1.16	0.83	1.61	69	58322	1.12	0.81	1.53
	> = 40-50 years	51	15625	1.14	0.83	1.57	61	22185	1.06	0.76	1.47
	> = 50 years	31	5155	0.98	0.65	1.47	51	7551	1.22	0.84	1.75
Miners only worked in uranium	Never exposed to MP	54	87934	1.00	–	–	41	59463	1.00	–	–
	> = 10-30 years	<6	12153	0.62	0.15	2.61	6	28970	1.02	0.41	2.51
	> = 30-40 years	9	8044	1.18	0.58	2.40	11	17244	0.86	0.44	1.68
	> = 40-50 years	6	2663	0.87	0.37	2.04	9	4542	0.94	0.45	1.93
	> = 50 years	<6	748	1.04	0.40	2.71	9	1324	1.20	0.56	2.57

Alzheimer's disease (definition 1): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 331) within 12 months; MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; Reference group: Mining industry workers with no MP exposure within the same ore type.

1.7 Risk of Alzheimer's disease (definition 1) for ever exposure to the MP versus never for various exposure windows.

MP Exposure 'window' (years)	First assessment approach							Second assessment approach						
	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL
> = 10-30 years ago	62	63862	1000	622247	0.93	0.71	1.21	65	116204	997	569905	0.86	0.67	1.11
> = 30-40 years ago	147	86654	915	599455	0.92	0.77	1.10	173	126615	889	559494	0.95	0.81	1.12
> = 40-50 years ago	218	66944	844	619165	0.96	0.83	1.12	255	87732	807	598377	0.99	0.86	1.14
> = 50 years ago	185	26539	877	659571	1.12	0.95	1.32	225	37538	837	648571	1.08	0.93	1.26

Alzheimer's disease (definition 1): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 331) within 12 months;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers with no MP exposure within the same exposure window;

This analysis used a rolling window of exposure and disease follow up. The risk of disease is compared among workers with and without MP exposure in various time windows prior to a given year through out follow-up. This analysis assumes that those not exposed in each time window as the 'non-exposed'. It also assumes no gaps between first and last exposure dates for all cohort members.

Section 2: Alzheimer's disease (definition 2)

2.1 Risk of Alzheimer's disease (definition2) for ever and cumulative exposure to MP comparing to those never exposed to MP by first and second assessment approaches (source data for Table 4-7 of the report).

Exposure metrics			N	Case count	Cumulative person years	RR	LCL	UCL
MP exposure	First assessment approach	Never exposed to MP	27278	589	529349	1.00	–	–
		Ever exposed to MP	9548	278	157716	0.96	0.83	1.11
		Ever exposed only before 1956	853	44	8632	0.90	0.66	1.23
		Ever exposed ever after 1956	8695	234	149084	0.97	0.83	1.13
		Ever exposed only after 1956	6459	122	123399	0.91	0.75	1.11
	Second assessment approach	Never exposed to MP	22999	554	438252	1.00	–	–
		Ever exposed to MP	13827	313	248813	0.95	0.82	1.09
		Ever exposed only before 1956	966	54	9457	1.00	0.75	1.32
		Ever exposed ever after 1956	12861	259	239356	0.94	0.81	1.09
		Ever exposed only after 1956	10187	143	207044	0.93	0.77	1.13
Cumulative MP exposure duration	First assessment approach	Never exposed to MP	27277	589	529349	1.00	–	–
		> 0-1 year	2296	39	42017	0.70	0.51	0.97
		> 1-5 years	3833	99	68117	0.97	0.79	1.21
		> 5-10 years	1655	57	25690	1.04	0.80	1.37
		> 10 years	1764	83	21892	1.06	0.84	1.34
	Second assessment approach	Never exposed to MP	22998	554	438252	1.00	–	–
		> 0-1 year	4507	57	91939	0.95	0.72	1.24
		> 1-5 years	4503	84	85811	0.89	0.71	1.12
		> 5-10 years	2433	73	39491	0.96	0.75	1.22
		> 10 years	2384	99	31572	1.00	0.80	1.23

Alzheimer's disease (definition 2): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers never exposed to MP.

2.2 Risk of Alzheimer's disease (definition2) by ore type (No assessment of MP exposure, source data for Table 8 of the report).

Ore type mined		N	Case counts	Cumulative person years	RR	LCL	UCL
Gold	Never worked as a gold miner	24228	501	481306	1.00	–	–
	Ever worked as a gold miner	12597	366	205759	0.93	0.81	1.07
	Only worked as a gold miner	2679	92	37670	0.81	0.65	1.02
Nickel-copper	Never worked as a nickel-copper miner	17864	430	332920	1.00	–	–
	Ever worked as a nickel-copper miner	18961	437	354145	0.92	0.81	1.05
	Only worked as a nickel-copper miner	8487	244	157235	0.97	0.83	1.13
Uranium	Never worked as an uranium miner	22238	640	392900	1.00	–	–
	Ever worked as an uranium miner	14587	227	294165	1.07	0.92	1.26
	Only worked as an uranium miner	5129	47	111690	1.03	0.76	1.39

Alzheimer's disease (definition 2): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

2.3 Risk of Alzheimer's disease (definition2)) by duration of employment by ore mined (No assessment of MP exposure, source data for Table 9 of the report).

Duration of employment		N	Case counts	Cumulative person years	RR	LCL	UCL
Ever worked as a gold miner	> 0-1 year	2625	60	48590	1.07	0.82	1.39
	> 1-5 years	3704	76	65440	0.76	0.59	0.96
	> 5-10 years	3106	106	50006	1.03	0.83	1.27
	> 10 years	3162	124	41724	0.94	0.77	1.15
Only worked as a gold miner	> 0-1 year	179	10	2318	1.21	0.65	2.28
	> 1-5 years	152	<6	1968	0.57	0.21	1.54
	> 5-10 years	1128	42	17462	0.97	0.70	1.33
	> 10 years	1220	36	15922	0.66	0.47	0.93
Ever worked as a nickel-copper miner	> 0-1 year	2355	36	45312	0.89	0.63	1.25
	> 1-5 years	3598	55	68155	0.85	0.64	1.12
	> 5-10 years	3562	66	69399	0.88	0.68	1.14
	> 10 years	9446	280	171278	0.95	0.82	1.11
Only worked as a nickel-copper miner	> 0-1 year	47	0	748	0.00	–	–
	> 1-5 years	127	<6	2010	1.13	0.47	2.73
	> 5-10 years	1641	33	32611	0.89	0.63	1.27
	> 10 years	6672	206	121867	0.99	0.84	1.17
Ever worked as an uranium miner	> 0-1 year	5450	86	111846	1.25	0.99	1.57
	> 1-5 years	4700	74	91796	0.92	0.72	1.17
	> 5-10 years	3135	32	66357	0.97	0.68	1.39
	> 10 years	1302	35	24166	1.23	0.87	1.73
Only worked as an uranium miner	> 0-1 year	1780	16	39165	1.31	0.79	2.16
	> 1-5 years	1499	13	31633	0.73	0.42	1.28
	> 5-10 years	1341	10	30374	1.21	0.65	2.27
	> 10 years	509	8	10518	1.05	0.52	2.12

Alzheimer's disease (definition 2): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

2.4 Risk of Alzheimer's disease (definition2) for ore type mined stratified by MP exposure using first and second assessment approaches.

Ore types mined		MP exposure	First assessment approach						Second assessment approach					
			N	Case counts	Peryrs	RR	LCL	UCL	N	Case counts	Peryrs	RR	LCL	UCL
Gold (AU)	Ever an AU miner	Ever	7137	243	108519	1.05	0.84	1.30	8526	256	137008	1.07	0.85	1.34
		Never	5461	123	97240	1.00	–	–	4072	110	68751	1.00	–	–
	Only an AU miner	Ever	1843	59	25424	0.69	0.44	1.07	1971	53	28433	**0.57**	**0.37**	**0.87**
		Never	836	33	12246	1.00	–	–	708	39	9238	1.00	–	–
	Never a AU miner	Ever	2411	35	49197	0.89	0.63	1.26	5301	57	111805	0.86	0.65	1.13
		Never	21817	466	432109	1.00	–	–	18927	444	369501	1.00	–	–
Nickel-copper (NC)	Ever a NC miner	Ever	3331	79	57065	0.97	0.76	1.24	5487	95	102125	0.91	0.72	1.14
		Never	15631	358	297080	1.00	–	–	13475	342	252020	1.00	–	–
	Only a NC miner	Ever	0	0	0	0.00	–	–	0	0	0	0.00	–	–
		Never	8487	244	157235	1.00	–	–	8487	244	157235	1.00	–	–
	Never a NC miner	Ever	6217	199	100651	0.90	0.75	1.09	8340	218	146688	0.93	0.77	1.13
		Never	11647	231	232269	1.00	–	–	9524	212	186233	1.00	–	–
Uranium (U)	Ever an U miner	Ever	5024	122	92128	1.17	0.90	1.53	8891	158	173830	1.04	0.78	1.38
		Never	9563	105	202037	1.00	–	–	5696	69	120335	1.00	–	–
	Only an U miner	Ever	1107	15	23626	1.09	0.59	2.02	2388	20	52129	0.88	0.49	1.57
		Never	4022	32	88064	1.00	–	–	2741	27	59561	1.00	–	–
	Never an U miner	Ever	4524	156	65588	0.85	0.71	1.01	4936	155	74983	0.87	0.72	1.04
		Never	17715	484	327312	1.00	–	–	17303	485	317917	1.00	–	–

Alzheimer's disease (definition 2): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

"Ever a NC miner" workers were exposed through employment in other mines.

2.5 Risk of Alzheimer's disease (definition2) by duration of MP exposure using first and second assessment approaches by types of ore mined (source data for Table 10 of the report).

Ore types mined	Cumulative MP duration	First assessment approach						Second assessment approach					
		N	Case count	Peryrs	RR	LCL	UCL	N	Case count	Peryrs	RR	LCL	UCL
Ever gold	Never exposed	5461	123	97240	1.00	–	–	4072	110	68751	1.00	–	–
	> 0-1 year	1426	27	24208	0.69	0.45	1.05	1587	34	28879	1.21	0.82	1.79
	> 1-5 years	2682	86	44065	1.09	0.82	1.44	2627	60	46478	0.95	0.70	1.31
	> 5-10 years	1430	53	21304	1.12	0.81	1.54	2118	69	33393	1.08	0.80	1.46
	> 10 years	1599	77	18942	1.15	0.86	1.53	2194	93	28258	1.10	0.83	1.45
Only gold *	Never exposed	836	33	12246	1.00	–	–	708	39	9238	1.00	–	–
	> 0-1 year	273	6	4385	0.45	0.19	1.10	172	6	2614	0.90	0.38	2.12
	> 1-5 years	642	26	9509	0.96	0.56	1.65	352	<6	5850	0.21	0.07	0.68
	> 5-10 years	383	14	5524	0.84	0.44	1.59	673	26	10370	0.91	0.53	1.54
	> 10 years	545	13	6007	**0.46**	**0.24**	**0.88**	774	18	9599	**0.43**	**0.24**	**0.76**
Ever uranium	Never exposed	9563	105	202037	1.00	–	–	5996	69	120335	1.00	–	–
	> 0-1 year	1510	24	29152	0.91	0.58	1.42	3855	41	80600	0.91	0.62	1.34
	> 1-5 years	2227	44	42779	1.05	0.74	1.50	3346	60	66268	1.03	0.73	1.45
	> 5-10 years	724	22	11992	1.29	0.81	2.05	972	23	16479	0.94	0.59	1.51
	> 10 years	563	32	8205	**1.77**	**1.18**	**2.65**	718	34	10483	1.43	0.94	2.17
Only uranium *	Never exposed	4022	32	88064	1.00	–	–	2741	27	59561	1.00	–	–
	> 0-1 year	348	<6	7343	1.28	0.50	3.29	1320	8	29278	0.88	0.40	1.93
	> 1-5 years	592	8	12914	1.15	0.53	2.50	880	10	19026	1.00	0.48	2.07
	> 5-10 years	104	<6	2184	1.27	0.30	5.32	115	<6	2411	1.03	0.24	4.33
	> 10 years	63	0	1186	0.00	–	–	73	0	1414	0.00	–	–

Alzheimer's disease (definition 2): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; * Workers in these groups were employed and exposed to MP only in gold or only in uranium mines; Reference group: Mining industry workers with no MP exposure within the same ore type.

2.6 Risk of Alzheimer's disease (definition2) by time since last MP exposure, overall and by ore type, using first and second assessment approaches.

	Time since last exposure	First assessment approach					Second assessment approach				
		Case counts	Peryrs	RR	LCL	UCL	Case counts	Peryrs	RR	LCL	UCL
Full cohort	Never exposed to MP	589	529334	1.00	–	–	554	438177	1.00	–	–
	> = 10-30 years	46	63392	0.86	0.63	1.17	43	115769	0.74	0.54	1.01
	> = 30-40 years	78	54343	1.00	0.79	1.27	89	83784	0.98	0.78	1.23
	> = 40-50 years	95	30290	0.98	0.79	1.22	105	37238	0.96	0.78	1.19
	> = 50 years	59	9706	0.95	0.72	1.25	76	12096	1.04	0.82	1.34
Miners ever worked in gold	Never exposed to MP	123	97240	1.00	–	–	110	68751	1.00	–	–
	> = 10-30 years	42	39913	0.98	0.69	1.41	36	56550	0.83	0.57	1.22
	> = 30-40 years	62	37086	1.05	0.77	1.43	69	46020	1.11	0.82	1.51
	> = 40-50 years	86	23734	1.09	0.83	1.44	89	25974	1.10	0.83	1.46
	> = 50 years	53	7787	1.02	0.73	1.43	62	8464	1.18	0.85	1.64
Miners only worked in gold	Never exposed to MP	33	12246	1.00	–	–	39	9238	1.00	–	–
	> = 10-30 years	11	9485	0.59	0.29	1.18	7	11626	**0.35**	**0.16**	**0.80**
	> = 30-40 years	11	8092	0.53	0.27	1.07	13	9100	0.56	0.30	1.08
	> = 40-50 years	18	5756	0.69	0.38	1.25	16	5743	**0.54**	**0.30**	**0.99**
	> = 50 years	19	2091	0.94	0.51	1.76	17	1964	0.83	0.45	1.54
Miners ever worked in uranium	Never exposed to MP	105	202037	1.00	–	–	69	120335	1.00	–	–
	> = 10-30 years	15	39252	1.04	0.59	1.83	18	85555	0.78	0.46	1.35
	> = 30-40 years	39	32032	1.32	0.91	1.92	50	58451	1.10	0.76	1.59
	> = 40-50 years	45	15661	1.29	0.91	1.83	52	22224	1.07	0.75	1.54
	> = 50 years	23	5182	0.93	0.58	1.49	38	7600	1.08	0.71	1.64
Miners only worked in uranium	Never exposed to MP	32	88064	1.00	–	–	27	59561	1.00	–	–
	> = 10-30 years	<6	12155	0.66	0.09	4.96	<6	28980	0.99	0.29	3.40
	> = 30-40 years	6	8053	1.41	0.59	3.40	<6	17270	0.72	0.28	1.89
	> = 40-50 years	<6	2667	0.85	0.30	2.39	6	4546	0.86	0.35	2.09
	> = 50 years	<6	751	1.23	0.42	3.64	6	1334	1.03	0.41	2.62

Alzheimer's disease (definition 2): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS;
MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; Reference group: Mining industry workers with no MP exposure within the same ore type.

2.7 Risk of Alzheimer's disease (definition 2) for ever exposure to the MP versus never for various exposure windows.

MP Exposure 'window' (years)	First assessment approach							Second assessment approach						
	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL
> = 10-30 years ago	47	63901	820	623163	0.87	0.65	1.18	43	116270	824	570794	0.74	0.54	1.01
> = 30-40 years ago	116	86794	751	600271	0.91	0.74	1.11	128	126819	739	560246	0.90	0.74	1.09
> = 40-50 years ago	189	67084	678	619981	0.97	0.82	1.14	209	87926	658	599139	0.95	0.81	1.11
> = 50 years ago	167	26620	700	660445	1.12	0.94	1.34	198	37663	669	649402	1.05	0.89	1.23

Alzheimer's disease (definition 2): 1 code (ICD-9 331.0; ICD-10 G30) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers wih no MP exposure within the same exposure window;

This analysis used a rolling window of exposure and disease follow up. The risk of disease is compared among workers with and without MP exposure in various time windows prior to a given year through out follow-up. This analysis assumes that those not exposed in each time window as the 'non-exposed'. It also assumes no gaps between first and last exposure dates for all cohort members.

Section 3: Parkinsonism

3.1 Risk of parkinsonism for ever and cumulative exposure to MP comparing to those never exposed to MP by first and second assessment approaches (source data for Table 4-7 of the report).

Exposure metrics			N	Case count	Cumulative person years	RR	LCL	UCL
MP exposure	First assessment approach	Never exposed to MP	27274	667	527379	1.00	–	–
		Ever exposed to MP	9547	364	156428	**1.19**	**1.05**	**1.36**
		Ever exposed only before 1956	852	45	8536	1.08	0.80	1.48
		Ever exposed ever after 1956	8695	319	147892	**1.21**	**1.06**	**1.38**
		Ever exposed only after 1956	6459	192	122565	1.16	0.99	1.37
	Second assessment approach	Never exposed to MP	22995	605	436469	1.00	–	–
		Ever exposed to MP	13826	426	247338	**1.18**	**1.04**	**1.33**
		Ever exposed only before 1956	965	57	9342	1.25	0.94	1.65
		Ever exposed ever after 1956	12861	369	237996	**1.17**	**1.02**	**1.33**
		Ever exposed only after 1956	10187	230	206087	1.14	0.98	1.33
Cumulative MP exposure duration	First assessment approach	Never exposed to MP	27278	667	527379	1.00	–	–
		> 0-1 year	2296	73	41706	1.17	0.92	1.49
		> 1-5 years	3833	132	67566	1.18	0.98	1.42
		> 5-10 years	1655	66	25513	1.15	0.89	1.48
		> 10 years	1764	93	21643	**1.27**	**1.02**	**1.58**
	Second assessment approach	Never exposed to MP	22999	605	436469	1.00	–	–
		> 0-1 year	4507	88	91714	1.12	0.90	1.41
		> 1-5 years	4503	124	85217	1.15	0.95	1.40
		> 5-10 years	2433	88	39206	1.09	0.87	1.36
		> 10 years	2384	126	31201	**1.32**	**1.09**	**1.61**

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;
Reference group: Mining industry workers never exposed to MP.

3.2 Risk of parkinsonism for by ore type (No assessment of MP exposure, source data for Table 8 of the report)

Ore type mined		N	Case counts	Cumulative person years	RR	LCL	UCL
Gold	Never worked as a gold miner	24228	569	479437	1.00	–	–
	Ever worked as a gold miner	12598	462	204370	**1.19**	**1.05**	**1.35**
	Only worked as a gold miner	2678	127	37331	**1.29**	**1.06**	**1.57**
Nickel-copper	Never worked as a nickel-copper miner	17864	509	331476	1.00	–	–
	Ever worked as a nickel-copper miner	18962	522	352331	0.90	0.80	1.02
	Only worked as a nickel-copper miner	8485	257	156529	0.87	0.75	1.01
Uranium	Never worked as an uranium miner	22239	738	390732	1.00	–	–
	Ever worked as an uranium miner	14587	293	293075	0.98	0.85	1.12
	Only worked as an uranium miner	5129	71	111440	0.97	0.75	1.24

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

3.3 Risk of parkinsonism by duration of employment by ore mined (No assessment of MP exposure, source data for Table 9 of the report).

Duration of employment		N	Case counts	Cumulative person years	RR	LCL	UCL
Ever worked as a gold miner	> 0-1 year	2626	71	48455	1.11	0.86	1.42
	> 1-5 years	3704	96	65061	0.91	0.74	1.13
	> 5-10 years	3106	123	49626	**1.24**	**1.02**	**1.52**
	> 10 years	3162	172	41227	**1.46**	**1.23**	**1.75**
Only worked as a gold miner	> 0-1 year	179	9	2336	1.22	0.63	2.36
	> 1-5 years	152	8	1924	1.37	0.68	2.76
	> 5-10 years	1128	48	17335	1.25	0.92	1.68
	> 10 years	1219	62	15735	**1.33**	**1.01**	**1.73**
Ever worked as a nickel-copper miner	> 0-1 year	2355	52	45102	0.97	0.73	1.30
	> 1-5 years	3598	76	67851	0.89	0.70	1.14
	> 5-10 years	3562	82	69086	0.86	0.68	1.08
	> 10 years	9447	312	170292	0.90	0.78	1.04
Only worked as a nickel-copper miner	> 0-1 year	47	<6	746	0.41	0.06	2.91
	> 1-5 years	127	<6	2015	1.04	0.43	2.51
	> 5-10 years	1640	38	32482	0.85	0.61	1.18
	> 10 years	6671	213	121286	0.87	0.75	1.03
Ever worked as an uranium miner	> 0-1 year	5450	103	111472	1.00	0.81	1.24
	> 1-5 years	4700	108	91435	0.99	0.80	1.21
	> 5-10 years	3135	46	66120	0.91	0.67	1.22
	> 10 years	1302	36	24048	0.96	0.69	1.34
Only worked as an uranium miner	> 0-1 year	1780	19	39099	0.89	0.56	1.42
	> 1-5 years	1499	23	31560	0.88	0.58	1.33
	> 5-10 years	1341	13	30326	0.89	0.51	1.55
	> 10 years	509	16	10455	1.41	0.86	2.32

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;
Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

3.4 Risk of parkinsonism for ore type mined stratified by MP exposure using first and second assessment approaches.

Ore types mined		MP exposure	First assessment approach						Second assessment approach					
			N	Case counts	Peryrs	RR	LCL	UCL	N	Case counts	Peryrs	RR	LCL	UCL
Gold (AU)	Ever an AU miner	Ever	7136	316	107472	1.19	0.97	1.45	8525	340	135942	**1.24**	**1.00**	**1.52**
		Never	5460	146	96897	1.00	–	–	4071	122	68428	1.00	–	–
	Only an AU miner	Ever	1842	100	25099	1.30	0.84	2.02	1970	99	28124	1.33	0.86	2.04
		Never	836	27	12232	1.00	–	–	708	28	9207	1.00	–	–
	Never a AU miner	Ever	2411	48	48955	0.95	0.71	1.28	5301	86	111396	0.95	0.75	1.19
		Never	21814	521	430481	1.00	–	–	18924	483	368041	1.00	–	–
Nickel-copper (NC)	Ever a NC miner	Ever	3331	94	56708	0.97	0.77	1.21	5487	131	101612	0.98	0.80	1.20
		Never	15628	428	295623	1.00	–	–	13472	391	250719	1.00	–	–
	Only a NC miner	Ever	0	0	0	0.00	–	–	0	0	0	0.00	–	–
		Never	8485	257	156529	1.00	–	–	8485	257	156529	1.00	–	–
	Never a NC miner	Ever	6216	270	99720	**1.31**	**1.09**	**1.56**	8339	295	145726	**1.30**	**1.09**	**1.55**
		Never	11646	239	231756	1.00	–	–	9523	214	185750	1.00	–	–
Uranium (U)	Ever an U miner	Ever	5024	129	91660	0.92	0.73	1.17	8891	193	173120	0.94	0.74	1.20
		Never	9563	164	201414	1.00	–	–	5696	100	119954	1.00	–	–
	Only an U miner	Ever	1107	24	23504	1.27	0.77	2.07	2388	37	51962	1.27	0.79	2.02
		Never	4022	47	87936	1.00	–	–	2741	34	59478	1.00	–	–
	Never an U miner	Ever	4523	235	64768	**1.38**	**1.18**	**1.61**	4935	233	74218	**1.37**	**1.17**	**1.61**
		Never	17711	503	325964	1.00	–	–	17299	505	316514	1.00	–	–

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

"Ever a NC miner" workers were exposed through employment in other mines.

3.5 Risk of parkinsonism by duration of MP exposure using first and second assessment approaches by types of ore mined (source data for Table 10 of the report).

Ore types mined	Cumulative MP duration	First assessment approach						Second assessment approach					
		N	Case count	Peryrs	RR	LCL	UCL	N	Case count	Peryrs	RR	LCL	UCL
Ever gold	Never exposed	5460	146	96897	1.00	–	–	4071	122	68428	1.00	–	–
	> 0-1 year	1426	53	23961	1.14	0.83	1.56	1587	41	28826	1.13	0.79	1.61
	> 1-5 years	2682	115	43628	1.23	0.96	1.57	2627	96	46076	1.29	0.99	1.69
	> 5-10 years	1429	59	21176	1.07	0.79	1.45	2117	82	33124	1.10	0.83	1.46
	> 10 years	1599	89	18708	1.26	0.96	1.65	2194	121	27915	1.34	1.04	1.72
Only gold *	Never exposed	836	27	12232	1.00	–	–	708	28	9207	1.00	–	–
	> 0-1 year	273	14	4335	1.22	0.63	2.35	172	8	2616	1.61	0.73	3.53
	> 1-5 years	642	42	9369	**1.65**	**1.01**	**2.72**	352	17	5788	1.57	0.86	2.88
	> 5-10 years	382	13	5494	0.84	0.43	1.64	672	33	10268	1.28	0.76	2.17
	> 10 years	545	31	5901	1.28	0.76	2.16	774	41	9452	1.22	0.75	1.99
Ever uranium	Never exposed	9563	164	201415	1.00	–	–	5696	100	119954	1.00	–	–
	> 0-1 year	1510	42	28978	1.13	0.80	1.58	3855	71	80386	1.04	0.77	1.41
	> 1-5 years	2227	46	42580	0.79	0.57	1.10	3346	71	65908	0.89	0.66	1.21
	> 5-10 years	724	22	11936	0.97	0.62	1.52	972	26	16415	0.85	0.55	1.31
	> 10 years	563	19	8166	0.89	0.55	1.44	718	25	10411	0.93	0.59	1.45
Only uranium *	Never exposed	4022	47	87936	1.00	–	–	2741	34	59478	1.00	–	–
	> 0-1 year	348	8	7315	1.45	0.69	3.07	1320	18	29207	1.43	0.80	2.54
	> 1-5 years	592	9	12852	0.93	0.46	1.91	880	12	18963	0.97	0.50	1.87
	> 5-10 years	104	<6	2165	2.31	0.92	5.82	115	<6	2405	1.70	0.60	4.79
	> 10 years	63	<6	1172	1.20	0.29	4.95	73	<6	1387	1.60	0.49	5.23

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; * Workers in these groups were employed and exposed to MP only in gold or only in uranium mines; Reference group: Mining industry workers with no MP exposure within the same ore type.

3.6 Risk of parkinsonism by time since last MP exposure, overall and by ore type, using first and second assessment approaches

	Time since last exposure	First assessment approach					Second assessment approach				
		Case counts	Peryrs	RR	LCL	UCL	Case counts	Peryrs	RR	LCL	UCL
Full cohort	Never exposed to MP	667	527363	1.00	–	–	604	436394	1.00	–	–
	> = 10-30 years	101	63086	**1.36**	**1.10**	**1.69**	114	115382	**1.30**	**1.05**	**1.60**
	> = 30-40 years	122	53891	**1.25**	**1.03**	**1.52**	147	83213	**1.23**	**1.02**	**1.47**
	> = 40-50 years	106	29845	1.16	0.95	1.43	115	36793	1.10	0.90	1.34
	> = 50 years	35	9621	0.84	0.59	1.19	51	12025	1.04	0.77	1.39
Miners ever worked in gold	Never exposed to MP	146	96897	1.00	–	–	122	68428	1.00	–	–
	> = 10-30 years	85	39680	**1.33**	**1.00**	**1.75**	89	56295	**1.33**	**1.00**	**1.77**
	> = 30-40 years	107	36729	**1.32**	**1.02**	**1.69**	111	45628	**1.30**	**1.00**	**1.68**
	> = 40-50 years	95	23351	1.15	0.89	1.50	102	25604	1.22	0.93	1.59
	> = 50 years	29	7713	0.77	0.51	1.16	38	8416	0.99	0.68	1.45
Miners only worked in gold	Never exposed to MP	27	12232	1.00	–	–	28	9207	1.00	–	–
	> = 10-30 years	24	9422	1.10	0.63	1.94	25	11558	1.22	0.70	2.13
	> = 30-40 years	32	7966	1.50	0.89	2.55	30	8985	1.42	0.83	2.42
	> = 40-50 years	32	5624	1.42	0.84	2.41	34	5618	1.51	0.90	2.53
	> = 50 years	12	2087	1.14	0.55	2.35	10	1963	0.98	0.46	2.09
Miners ever worked in uranium	Never exposed to MP	164	201415	1.00	–	–	100	119954	1.00	–	–
	> = 10-30 years	32	39123	1.09	0.74	1.63	48	85341	1.01	0.70	1.45
	> = 30-40 years	51	31869	1.07	0.78	1.47	74	58171	1.01	0.74	1.36
	> = 40-50 years	34	15518	0.82	0.57	1.20	43	22043	0.77	0.54	1.11
	> = 50 years	12	5151	0.57	0.31	1.04	28	7564	0.97	0.62	1.52
Miners only worked in uranium	Never exposed to MP	47	87936	1.00	–	–	34	59478	1.00	–	–
	> = 10-30 years	9	12119	**2.65**	**1.24**	**5.64**	10	28937	1.64	0.78	3.46
	> = 30-40 years	9	8003	1.31	0.64	2.68	17	17191	1.61	0.89	2.91
	> = 40-50 years	<6	2641	0.53	0.16	1.71	<6	4517	0.65	0.25	1.66
	> = 50 years	<6	741	0.94	0.28	3.17	<6	1317	1.05	0.39	2.83

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; Reference group: Mining industry workers with no MP exposure within the same ore type.

3.7 Risk of parkinsonism for ever exposure to the MP versus never for various exposure windows.

MP Exposure 'window' (years)	First assessment approach							Second assessment approach						
	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL
> = 10-30 years ago	102	63593	929	620214	**1.30**	**1.05**	**1.61**	114	115882	917	567925	**1.23**	**1.00**	**1.51**
> = 30-40 years ago	215	86091	816	597715	**1.31**	**1.13**	**1.53**	238	125966	793	557840	**1.22**	**1.05**	**1.42**
> = 40-50 years ago	241	66215	790	617591	**1.21**	**1.04**	**1.40**	269	86952	762	596854	1.12	0.97	1.29
> = 50 years ago	126	26286	905	657520	1.10	0.90	1.34	164	37199	867	646608	1.08	0.90	1.28

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers wih no MP exposure within the same exposure window;

This analysis used a rolling window of exposure and disease follow up. The risk of disease is compared among workers with and without MP exposure in various time windows prior to a given year through out follow-up. This analysis assumes that those not exposed in each time window as the 'non-exposed'. It also assumes no gaps between first and last exposure dates for all cohort members.

Section 4: Parkinson's disease

4.1 Risk of Parkinson's disease for ever and cumulative exposure to MP comparing to those never exposed to MP by first and second assessment approaches (source data for Table 4-7 of the report).

Exposure metrics			N	Case count	Cumulative person years	RR	LCL	UCL
MP exposure	First assessment approach	Never exposed to MP	27278	393	529698	1.00	−	−
		Ever exposed to MP	9548	251	157671	**1.34**	**1.14**	**1.57**
		Ever exposed only before 1956	853	34	8634	1.18	0.83	1.69
		Ever exposed ever after 1956	8695	217	149037	**1.36**	**1.16**	**1.61**
		Ever exposed only after 1956	6459	125	123325	**1.34**	**1.09**	**1.64**
	Second assessment approach	Never exposed to MP	22999	360	438584	1.00	−	−
		Ever exposed to MP	13827	284	248785	**1.32**	**1.13**	**1.54**
		Ever exposed only before 1956	966	39	9499	1.22	0.87	1.71
		Ever exposed ever after 1956	12861	245	239286	**1.34**	**1.14**	**1.57**
		Ever exposed only after 1956	10187	143	206963	**1.33**	**1.09**	**1.62**
Cumulative MP exposure duration	First assessment approach	Never exposed to MP	27274	393	529698	1.00	−	−
		> 0-1 year	2296	50	41960	**1.36**	**1.01**	**1.82**
		> 1-5 years	3833	90	68090	**1.34**	**1.07**	**1.69**
		> 5-10 years	1654	48	25693	**1.35**	**1.00**	**1.83**
		> 10 years	1764	63	21928	1.30	0.99	1.71
	Second assessment approach	Never exposed to MP	22995	360	438584	1.00	−	−
		> 0-1 year	4507	52	91987	1.23	0.92	1.65
		> 1-5 years	4503	80	85742	**1.28**	**1.01**	**1.63**
		> 5-10 years	2432	65	39465	**1.32**	**1.02**	**1.73**
		> 10 years	2384	87	31591	**1.42**	**1.12**	**1.80**

Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers never exposed to MP.

4.2 Risk of Parkinson's disease by ore type (No assessment of MP exposure, source data for Table 8 of the report).

Ore type mined		N	Case counts	Cumulative person years	RR	LCL	UCL
Gold	Never worked as a gold miner	24225	332	481603.8	1.00	–	–
	Ever worked as a gold miner	12596	312	205765.34	**1.29**	**1.10**	**1.51**
	Only worked as a gold miner	2679	82	37677.87	1.25	0.97	1.61
Nickel-copper	Never worked as a nickel-copper miner	17862	322	333123.5	1.00	–	–
	Ever worked as a nickel-copper miner	18959	322	354245.63	0.89	0.76	1.04
	Only worked as a nickel-copper miner	8487	157	157421.12	0.83	0.69	1.01
Uranium	Never worked as an uranium miner	22234	463	393168.2	1.00	–	–
	Ever worked as an uranium miner	14587	181	294200.94	1.08	0.91	1.30
	Only worked as an uranium miner	5129	39	111684.45	1.03	0.74	1.44

Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

4.3 Risk of Parkinson's disease duration of employment by ore mined (No assessment of MP exposure, source data for Table 9 of the report).

Duration of employment		N	Case counts	Cumulative person years	RR	LCL	UCL
Ever worked as a gold miner	> 0-1 year	2626	43	48658	1.15	0.84	1.58
	> 1-5 years	3704	70	65375	1.10	0.85	1.42
	> 5-10 years	3106	84	50020	**1.34**	**1.05**	**1.71**
	> 10 years	3160	115	41714	**1.49**	**1.19**	**1.85**
Only worked as a gold miner	> 0-1 year	179	<6	2358	1.02	0.42	2.46
	> 1-5 years	152	7	1948	1.77	0.84	3.76
	> 5-10 years	1128	35	17457	1.38	0.97	1.96
	> 10 years	1220	35	15915	1.12	0.78	1.59
Ever worked as a nickel-copper miner	> 0-1 year	2355	31	45276	0.98	0.68	1.42
	> 1-5 years	3598	53	68116	1.05	0.79	1.41
	> 5-10 years	3561	46	69408	0.79	0.58	1.08
	> 10 years	9445	192	171446	0.87	0.73	1.04
Only worked as a nickel-copper miner	> 0-1 year	47	<6	746	0.60	0.08	4.28
	> 1-5 years	127	<6	2020	0.62	0.15	2.49
	> 5-10 years	1641	21	32623	0.75	0.48	1.17
	> 10 years	6672	133	122033	0.85	0.70	1.05
Ever worked as an uranium miner	> 0-1 year	5450	64	111866	1.15	0.88	1.50
	> 1-5 years	4700	67	91807	1.07	0.83	1.39
	> 5-10 years	3135	30	66323	1.12	0.77	1.63
	> 10 years	1302	20	24204	0.91	0.58	1.43
Only worked as an uranium miner	> 0-1 year	1780	11	39169	1.05	0.57	1.91
	> 1-5 years	1499	13	31636	0.92	0.53	1.60
	> 5-10 years	1341	8	30368	1.14	0.56	2.30
	> 10 years	509	7	10512	1.14	0.54	2.40

Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

4.4 Risk of Parkinson's disease for ore type mined stratified by MP exposure using first and second assessment approaches.

Ore types mined		MP exposure	First assessment approach						Second assessment approach					
			N	Case counts	Peryrs	RR	LCL	UCL	N	Case counts	Peryrs	RR	LCL	UCL
Gold (AU)	Ever an AU miner	Ever	7137	221	108514	**1.30**	**1.02**	**1.66**	8526	233	137024	**1.33**	**1.03**	**1.72**
		Never	5461	91	97251	1.00	–	–	4072	79	68741	1.00	–	–
	Only an AU miner	Ever	1843	67	25403	1.69	0.95	3.00	1971	62	28425	1.25	0.74	2.10
		Never	836	15	12275	1.00	–	–	708	20	9253	1.00	–	–
	Never a AU miner	Ever	2411	30	49157	1.10	0.75	1.60	5301	51	111761	1.09	0.80	1.47
		Never	21817	302	432447	1.00	–	–	18927	281	369843	1.00	–	–
Nickel-copper (NC)	Ever a NC miner	Ever	3331	66	57055	1.13	0.86	1.49	5487	87	102090	1.15	0.90	1.47
		Never	15631	256	297191	1.00	–	–	13475	235	252155	1.00	–	–
	Only a NC miner	Ever	0	0	0	0.00	–	–	0	0	0	0.00	–	–
		Never	8487	157	157421	1.00	–	–	8487	157	157421	1.00	–	–
	Never a NC miner	Ever	6217	185	100616	**1.47**	**1.17**	**1.83**	8340	197	146695	**1.44**	**1.15**	**1.81**
		Never	11647	137	232507	1.00	–	–	9524	125	186428	1.00	–	–
Uranium (U)	Ever an U miner	Ever	5024	85	92201	0.96	0.71	1.29	8891	121	173902	0.94	0.69	1.29
		Never	9563	96	202000	1.00	–	–	5696	60	120299	1.00	–	–
	Only an U miner	Ever	1107	12	23605	1.05	0.53	2.07	2388	20	52096	1.27	0.67	2.38
		Never	4022	27	88080	1.00	–	–	2741	19	59589	1.00	–	–
	Never an U miner	Ever	4524	166	65471	**1.54**	**1.27**	**1.87**	4936	163	74883	**1.53**	**1.26**	**1.86**
		Never	17715	297	327698	1.00	–	–	17303	300	318285	1.00	–	–

Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

"Ever a NC miner" workers were exposed through employment in other mines.

4.5 Risk of Parkinson's disease by duration of MP exposure using first and second assessment approaches by types of ore mined (source data for Table 10 of the report).

Ore types mined	Cumulative MP duration	First assessment approach						Second assessment approach					
		N	Case count	Peryrs	RR	LCL	UCL	N	Case count	Peryrs	RR	LCL	UCL
Ever gold	Never exposed	5461	91	97251	1.00	–	–	4072	79	68741	1.00	–	–
	> 0-1 year	1426	39	24163	1.35	0.92	1.96	1587	25	28940	1.15	0.73	1.81
	> 1-5 years	2682	77	44068	1.31	0.97	1.78	2627	62	46455	1.34	0.96	1.87
	> 5-10 years	1430	45	21316	1.29	0.90	1.84	2118	62	33364	1.32	0.94	1.85
	> 10 years	1599	60	18967	1.26	0.91	1.75	2194	84	28265	**1.40**	**1.03**	**1.90**
Only gold *	Never exposed	836	15	12275	1.00	–	–	708	20	9253	1.00	–	–
	> 0-1 year	273	11	4376	1.88	0.85	4.14	172	<6	2632	0.86	0.26	2.91
	> 1-5 years	642	29	9509	**2.30**	**1.21**	**4.38**	352	11	5844	1.49	0.71	3.12
	> 5-10 years	383	9	5525	1.17	0.51	2.72	673	24	10366	1.54	0.82	2.88
	> 10 years	545	18	5993	1.38	0.69	2.76	774	24	9584	1.08	0.59	1.97
Ever uranium	Never exposed	9563	96	202000	1.00	–	–	5696	60	120299	1.00	–	–
	> 0-1 year	1510	24	29140	1.04	0.66	1.62	3855	42	80629	1.04	0.70	1.55
	> 1-5 years	2227	34	42796	0.93	0.63	1.38	3346	44	66252	0.89	0.60	1.31
	> 5-10 years	724	15	12009	1.03	0.60	1.79	972	17	16503	0.85	0.49	1.46
	> 10 years	563	12	8255	0.82	0.45	1.51	718	18	10519	0.98	0.57	1.67
Only uranium *	Never exposed	4022	27	88080	1.00	–	–	2741	19	59589	1.00	–	–
	> 0-1 year	348	<6	7332	1.24	0.43	3.55	1320	11	29260	1.68	0.80	3.55
	> 1-5 years	592	6	12904	1.01	0.42	2.47	880	7	19012	1.03	0.43	2.44
	> 5-10 years	104	<6	2188	0.78	0.11	5.75	115	<6	2415	0.74	0.10	5.55
	> 10 years	63	<6	1181	0.98	0.13	7.22	73	<6	1409	0.92	0.12	6.92

Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; * Workers in these groups were employed and exposed to MP only in gold or only in uranium mines; Reference group: Mining industry workers with no MP exposure within the same ore type.

4.6 Risk of Parkinson's disease by time since last MP exposure, overall and by ore type, using first and second assessment approaches

	Time since last exposure	First assessment approach					Second assessment approach				
		Case counts	Peryrs	RR	LCL	UCL	Case counts	Peryrs	RR	LCL	UCL
Full cohort	Never exposed to MP	393	529683	1.00	–	–	359	438509	1.00	–	–
	> = 10-30 years	52	63381	**1.38**	**1.02**	**1.86**	55	115753	1.32	0.98	1.77
	> = 30-40 years	76	54305	**1.40**	**1.09**	**1.79**	95	83713	**1.48**	**1.18**	**1.86**
	> = 40-50 years	88	30225	**1.45**	**1.15**	**1.83**	89	37190	**1.31**	**1.03**	**1.65**
	> = 50 years	35	9775	1.01	0.71	1.44	46	12205	1.14	0.83	1.56
Miners ever worked in gold	Never exposed to MP	91	97251	1.00	–	–	79	68741	1.00	–	–
	> = 10-30 years	44	39910	1.27	0.88	1.85	44	56548	1.26	0.86	1.84
	> = 30-40 years	70	37070	**1.49**	**1.09**	**2.04**	76	45982	**1.55**	**1.13**	**2.13**
	> = 40-50 years	74	23685	1.32	0.97	1.80	75	25932	1.31	0.95	1.80
	> = 50 years	33	7850	1.02	0.67	1.55	38	8562	1.14	0.76	1.71
Miners only worked in gold	Never exposed to MP	15	12275	1.00	–	–	20	9253	1.00	–	–
	> = 10-30 years	9	9479	0.91	0.39	2.11	8	11616	0.68	0.29	1.56
	> = 30-40 years	16	8087	1.63	0.79	3.35	19	9095	1.51	0.79	2.88
	> = 40-50 years	30	5719	**2.51**	**1.32**	**4.75**	24	5721	1.53	0.83	2.82
	> = 50 years	12	2117	1.68	0.75	3.79	11	1993	1.25	0.57	2.73
Miners ever worked in uranium	Never exposed to MP	96	202000	1.00	–	–	60	120299	1.00	–	–
	> = 10-30 years	18	39249	1.35	0.79	2.30	24	85548	1.15	0.70	1.90
	> = 30-40 years	27	32031	1.01	0.65	1.56	42	58428	1.02	0.68	1.52
	> = 40-50 years	27	15691	0.94	0.61	1.44	30	22254	0.77	0.49	1.19
	> = 50 years	13	5230	0.68	0.37	1.24	25	7672	0.92	0.56	1.52
Miners only worked in uranium	Never exposed to MP	27	88080	1.00	–	–	19	59589	1.00	–	–
	> = 10-30 years	<6	12142	**3.41**	**1.22**	**9.55**	<6	28969	1.50	0.49	4.62
	> = 30-40 years	<6	8046	0.54	0.13	2.26	8	17256	1.52	0.66	3.50
	> = 40-50 years	<6	2662	1.08	0.38	3.10	<6	4539	0.88	0.30	2.61
	> = 50 years	<6	755	0.38	0.05	2.88	<6	1331	1.20	0.38	3.74

Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;
MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; Reference group: Mining industry workers with no MP exposure within the same ore type.

4.7 Risk of Parkinson's disease for ever exposure to the MP versus never for various exposure windows.

MP Exposure 'window' (years)	First assessment approach							Second assessment approach						
	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL
> = 10-30 years ago	53	63890	591	623479	1.27	0.95	1.69	55	116255	589	571114	1.18	0.88	1.57
> = 30-40 years ago	128	86747	516	600622	**1.37**	**1.13**	**1.68**	144	126731	500	560638	**1.37**	**1.13**	**1.65**
> = 40-50 years ago	175	67015	469	620354	**1.35**	**1.13**	**1.61**	190	87857	454	599512	**1.26**	**1.06**	**1.50**
> = 50 years ago	117	26721	527	660648	**1.28**	**1.04**	**1.59**	148	37778	496	649591	**1.27**	**1.05**	**1.55**

Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers wih no MP exposure within the same exposure window;

This analysis used a rolling window of exposure and disease follow up. The risk of disease is compared among workers with and without MP exposure in various time windows prior to a given year through out follow-up. This analysis assumes that those not exposed in each time window as the 'non-exposed'. It also assumes no gaps between first and last exposure dates for all cohort members.

4.8 Risk of Parkinsonism and Parkinson's disease for miners with never exposure to the MP stratified by gold work using first and second assessment approaches (source data for Table 11 of the report).

Condition	No MP Exposure	Gold work	N	Case count	Cumulative person years	RR	LCL	UCL
Parkinsonism	First assessment approach	Never a gold miner	21814	521	430481	1.00	–	–
		Ever a gold miner	5460	146	96897	1.05	0.87	1.27
		Only a gold miner	836	27	12232	1.05	0.71	1.57
	Second assessment approach	Never a gold miner	18924	483	368041	1.00	–	–
		Ever a gold miner	4071	122	68428	1.01	0.82	1.23
		Only a gold miner	708	28	9207	1.02	0.69	1.52
Parkinson's disease	First assessment approach	Never a gold miner	21817	302	432447	1.00	–	–
		Ever a gold miner	5461	91	97251	1.07	0.85	1.36
		Only a gold miner	836	15	12275	0.85	0.50	1.44
	Second assessment approach	Never a gold miner	18927	281	369843	1.00	–	–
		Ever a gold miner	4072	79	68741	1.03	0.80	1.33
		Only a gold miner	708	20	9253	1.04	0.65	1.66

Parkinsonism: 1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months; Parkinson's disease: 1 code (ICD-9 332.0; ICD-10 G20) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in ore mines other than gold.

4.9 Risk of Parkinsonism and Other Parkinsonism but not Parkinson's disease for miners with and without exposure to the MP, by first and second assessment approaches (source data for the third paragraph on Page 16 of the report).

Conditions	Case definition	MP exposure		Case count	Cumulative person years	RR	LCL	UCL
Parkinsonism	1 code (ICD-9 332.0, 332.1; ICD-10 G20, G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS	First assessment approach	Ever	255	157443	**1.32**	**1.13**	**1.54**
			Never	406	529346	1.00	_	_
		Second assessment approach	Ever	289	248543	**1.30**	**1.11**	**1.51**
			Never	372	438246	1.00	_	_
Other parkinsonism, but not Parkinson's disease	1 code (ICD-9 332.1; ICD-10 G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS	First assessment approach	Ever	4	158259	0.75	0.24	2.34
			Never	13	530616	1.00	_	_
		Second assessment approach	Ever	5	249450	0.71	0.25	2.01
			Never	12	439425	1.00	_	_
Other parkinsonism, but not comfirmed Parkinson's disease	1 code (ICD-9 332.1; ICD-10 G21.0-0.4, G21.8-9, G22, F02.3) in any diagnostic field in DAD/NACRS or 2 physician codes (OHIP code 332) within 12 months;	First assessment approach	Ever	360	156449	1.20	1.06	1.37
			Never	654	527432	1.00	_	_
		Second assessment approach	Ever	593	247363	1.19	1.05	1.34
			Never	421	436518	1.00	_	_

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers never exposed to MP.

Section 5: Motor neuron disease

5.1 Risk of motor neuron disease for ever and cumulative exposure to MP comparing to those never exposed to MP by first and second assessment approaches (source data for Table 4-7 of the report).

Exposure metrics			N	Case count	Cumulative person years	RR	LCL	UCL
MP exposure	First assessment approach	Never exposed to MP	27278	61	530544	1.00	–	–
		Ever exposed to MP	9548	20	158244	0.82	0.49	1.37
		Ever exposed only before 1956	853	0	8718	–	–	–
		Ever exposed ever after 1956	8695	20	149526	0.90	0.54	1.50
		Ever exposed only after 1956	6459	16	123654	1.01	0.58	1.76
	Second assessment approach	Never exposed to MP	22999	55	439363	1.00	–	–
		Ever exposed to MP	13827	26	249425	0.80	0.50	1.28
		Ever exposed only before 1956	966	0	9573	–	–	–
		Ever exposed ever after 1956	12861	26	239852	0.88	0.55	1.40
		Ever exposed only after 1956	10187	21	207347	0.97	0.58	1.61
Cumulative MP exposure duration	First assessment approach	Never exposed to MP	27278	61	530544	1.00	–	–
		> 0-1 year	2296	9	42089	1.62	0.81	3.27
		> 1-5 years	3833	<6	68310	0.31	0.10	1.00
		> 5-10 years	1655	<6	25805	0.68	0.21	2.16
		> 10 years	1764	<6	22040	1.05	0.41	2.68
	Second assessment approach	Never exposed to MP	22999	55	439363	1.00	–	–
		> 0-1 year	4507	10	92096	1.16	0.59	2.29
		> 1-5 years	4503	6	85947	0.58	0.25	1.35
		> 5-10 years	2433	<6	39617	0.45	0.14	1.44
		> 10 years	2384	7	31765	1.05	0.48	2.34

Motor neuron disease: 1 code (ICD-9 335.2; ICD-10 G12.2) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers never exposed to MP.

5.2 Risk of motor neuron disease by ore type (No assessment of MP exposure, source data for Table 8 of the report).

Ore type mined		N	Case counts	Cumulative person years	RR	LCL	UCL
Gold	Never worked as a gold miner	24228	50	482325	1.00	–	–
	Ever worked as a gold miner	12598	31	206463	1.11	0.70	1.76
	Only worked as a gold miner	2679	8	37808	1.35	0.62	2.92
Nickel-copper	Never worked as a nickel-copper miner	17864	45	333794	1.00	–	–
	Ever worked as a nickel-copper miner	18962	36	354994	0.68	0.44	1.06
	Only worked as a nickel-copper miner	8487	21	157728	0.82	0.49	1.38
Uranium	Never worked as an uranium miner	22239	56	394120	1.00	–	–
	Ever worked as an uranium miner	14587	25	294668	0.84	0.52	1.36
	Only worked as an uranium miner	5129	10	111764	1.18	0.59	2.38

Motor neuron disease: 1 code (ICD-9 335.2; ICD-10 G12.2) in any diagnostic field in DAD/NACRS;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

5.3 Risk of motor neuron disease duration of employment by ore mined (No assessment of MP exposure, source data for Table 9 of the report).

Duration of employment		N	Case counts	Cumulative person years	RR	LCL	UCL
Ever worked as a gold miner	> 0-1 year	2626	7	48765	1.28	0.58	2.83
	> 1-5 years	3704	8	65578	0.97	0.46	2.05
	> 5-10 years	3106	8	50186	1.15	0.54	2.44
	> 10 years	3162	8	41934	1.10	0.51	2.37
Only worked as a gold miner	> 0-1 year	179	0	2359	0.00	−	−
	> 1-5 years	152	0	1970	0.00	−	−
	> 5-10 years	1128	<6	17511	2.06	0.81	5.24
	> 10 years	1220	<6	15967	1.09	0.33	3.57
Ever worked as a nickel-copper miner	> 0-1 year	2355	<6	45385	0.56	0.17	1.80
	> 1-5 years	3598	<6	68266	0.47	0.17	1.32
	> 5-10 years	3562	10	69491	1.09	0.55	2.16
	> 10 years	9447	19	171852	0.64	0.37	1.10
Only worked as a nickel-copper miner	> 0-1 year	47	0	748	0.00	−	−
	> 1-5 years	127	0	2023	0.00	−	−
	> 5-10 years	1641	6	32664	1.43	0.61	3.35
	> 10 years	6672	15	122292	0.72	0.40	1.29
Ever worked as an uranium miner	> 0-1 year	5450	10	112025	0.93	0.47	1.85
	> 1-5 years	4700	9	91976	0.89	0.44	1.81
	> 5-10 years	3135	<6	66425	0.71	0.25	1.98
	> 10 years	1302	<6	24243	0.61	0.15	2.52
Only worked as an uranium miner	> 0-1 year	1780	<6	39189	1.12	0.34	3.65
	> 1-5 years	1499	<6	31658	1.10	0.34	3.54
	> 5-10 years	1341	<6	30396	1.04	0.25	4.36
	> 10 years	509	<6	10521	1.74	0.42	7.16

Motor neuron disease: 1 code (ICD-9 335.2; ICD-10 G12.2) in any diagnostic field in DAD/NACRS;

N: total number of miners in the analysis group; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

5.4 Risk of motor neuron disease for ore type mined stratified by MP exposure using first and second assessment approaches.

Ore types mined		MP exposure	First assessment approach						Second assessment approach					
			N	Case counts	Peryrs	RR	LCL	UCL	N	Case counts	Peryrs	RR	LCL	UCL
Gold (AU)	Ever an AU miner	Ever	7137	16	108983	0.60	0.30	1.23	8526	20	137505	0.77	0.37	1.60
		Never	5461	15	97480	1.00	–	–	4072	11	68958	1.00	–	–
	Only an AU miner	Ever	1843	<6	25522	0.49	0.11	2.11	1971	6	28528	0.95	0.19	4.86
		Never	836	<6	12285	1.00	–	–	708	<6	9280	1.00	–	–
	Never a AU miner	Ever	2411	<6	49261	0.81	0.29	2.24	5301	6	111920	0.57	0.24	1.35
		Never	21817	46	433064	1.00	–	–	18927	44	370405	1.00	–	–
Nickel-copper (NC)	Ever a NC miner	Ever	3331	<6	57226	0.59	0.21	1.68	5487	<6	102334	0.44	0.17	1.12
		Never	15631	32	297768	1.00	–	–	13475	31	252661	1.00	–	–
	Only a NC miner	Ever	0	0	0	0.00	–	–	0	0	0	0.00	–	–
		Never	8487	21	157728	1.00	–	–	8487	21	157728	1.00	–	–
	Never a NC miner	Ever	6217	16	101018	0.75	0.40	1.41	8340	21	147091	0.89	0.49	1.61
		Never	11647	29	232776	1.00	–	–	9524	24	186702	1.00	–	–
Uranium (U)	Ever an U miner	Ever	5024	7	92417	0.61	0.25	1.50	8891	12	174190	0.53	0.24	1.17
		Never	9563	18	202250	1.00	–	–	5696	13	120478	1.00	–	–
	Only an U miner	Ever	1107	<6	23646	1.18	0.30	4.62	2388	<6	52152	0.75	0.21	2.65
		Never	4022	7	88117	1.00	–	–	2741	6	59612	1.00	–	–
	Never an U miner	Ever	4524	13	65827	1.05	0.55	1.97	4936	14	75235	1.14	0.61	2.10
		Never	17715	43	328294	1.00	–	–	17303	42	318885	1.00	–	–

Motor neuron disease: 1 code (ICD-9 335.2; ICD-10 G12.2) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers employed in all other ore mines; Workers may appear in multiple ore type groups.

"Ever a NC miner" workers were exposed through employment in other mines.

5.5 Risk of motor neuron disease by duration of MP exposure using first and second assessment approaches by types of ore mined (source data for Table 10 of the report).

Ore types mined	Cumulative MP duration	First assessment approach						Second assessment approach					
		N	Case count	Peryrs	RR	LCL	UCL	N	Case count	Peryrs	RR	LCL	UCL
Ever gold	Never exposed	5461	15	97480	1.00	–	–	4072	11	68958	1.00	–	–
	> 0-1 year	1426	<6	24272	1.00	0.36	2.75	1587	7	28980	1.84	0.71	4.78
	> 1-5 years	2682	<6	44233	0.30	0.09	1.04	2627	<6	46586	0.40	0.11	1.43
	> 5-10 years	1430	<6	21412	0.54	0.16	1.89	2118	<6	33513	0.41	0.11	1.48
	> 10 years	1599	<6	19066	0.84	0.29	2.38	2194	7	28426	0.93	0.36	2.44
Only gold *	Never exposed	836	<6	12285	1.00	–	–	708	<6	9280	1.00	–	–
	> 0-1 year	273	<6	4411	0.62	0.06	6.12	172	0	2643	0.00	–	–
	> 1-5 years	642	<6	9551	0.27	0.03	2.71	352	<6	5857	1.15	0.10	12.91
	> 5-10 years	383	0	5537	0.00	–	–	673	<6	10405	0.86	0.11	6.49
	> 10 years	545	<6	6024	1.00	0.20	5.06	774	<6	9623	1.10	0.18	6.70
Ever uranium	Never exposed	9563	18	202250	1.00	–	–	5696	13	120478	1.00	–	–
	> 0-1 year	1510	<6	29194	1.48	0.54	4.04	3855	7	80712	0.78	0.31	1.95
	> 1-5 years	2227	0	42896	0.00	–	–	3346	<6	66383	0.34	0.10	1.19
	> 5-10 years	724	<6	12037	1.17	0.26	5.20	972	<6	16533	0.35	0.04	2.72
	> 10 years	563	0	8290	0.00	–	–	718	<6	10562	0.46	0.06	3.69
Only uranium *	Never exposed	4022	7	88117	1.00	–	–	2741	6	59612	1.00	–	–
	> 0-1 year	348	<6	7340	3.93	1.01	15.33	1320	<6	29289	0.79	0.16	3.93
	> 1-5 years	592	0	12932	0.00	–	–	880	<6	19033	0.92	0.19	4.56
	> 5-10 years	104	0	2189	0.00	–	–	115	0	2416	0.00	–	–
	> 10 years	63	0	1186	0.00	–	–	73	0	1414	0.00	–	–

Motor neuron disease: 1 code (ICD-9 335.2; ICD-10 G12.2) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; * Workers in these groups were employed and exposed to MP only in gold or only in uranium mines; Reference group: Mining industry workers with no MP exposure within the same ore type.

5.6 Risk of motor neuron disease by time since last MP exposure, overall and by ore type, using first and second assessment approaches.

	Time since last exposure	First assessment approach					Second assessment approach				
		Case counts	Peryrs	RR	LCL	UCL	Case counts	Peryrs	RR	LCL	UCL
Full cohort	Never exposed to MP	61	530529	1.00	–	–	55	439288	1.00	–	–
	>= 10-30 years	<6	63462	0.79	0.31	2.01	8	115846	0.94	0.44	2.04
	>= 30-40 years	9	54471	1.07	0.53	2.17	13	83928	1.11	0.61	2.04
	>= 40-50 years	<6	30340	0.59	0.21	1.63	<6	37362	0.36	0.11	1.16
	>= 50 years	<6	9797	0.69	0.16	2.95	<6	12279	0.53	0.13	2.25
Miners ever worked in gold	Never exposed to MP	15	97480	1.00	–	–	11	68958	1.00	–	–
	>= 10-30 years	<6	39975	0.47	0.13	1.70	<6	56616	0.86	0.28	2.59
	>= 30-40 years	7	37189	0.79	0.32	1.95	10	46121	1.13	0.48	2.69
	>= 40-50 years	<6	23884	0.48	0.16	1.46	<6	26122	0.37	0.10	1.33
	>= 50 years	<6	7935	0.66	0.14	3.14	<6	8647	0.62	0.13	2.98
Miners only worked in gold	Never exposed to MP	<6	12285	1.00	–	–	<6	9280	1.00	–	–
	>= 10-30 years	<6	9496	1.15	0.22	6.16	<6	11633	1.93	0.30	12.44
	>= 30-40 years	<6	8107	0.63	0.10	3.99	<6	9111	1.58	0.25	10.09
	>= 40-50 years	0	5779	0.00	–	–	0	5770	0.00	–	–
	>= 50 years	0	2140	0.00	–	–	0	2014	0.00	–	–
Miners ever worked in uranium	Never exposed to MP	18	202250	1.00	–	–	13	120478	1.00	–	–
	>= 10-30 years	<6	39286	0.69	0.15	3.16	<6	85596	0.65	0.20	2.14
	>= 30-40 years	<6	32110	0.49	0.11	2.13	6	58545	0.69	0.26	1.83
	>= 40-50 years	<6	15766	0.68	0.15	3.03	<6	22326	0.19	0.02	1.51
	>= 50 years	<6	5256	0.68	0.08	5.75	<6	7723	0.33	0.04	2.85
Miners only worked in uranium	Never exposed to MP	7	88117	1.00	–	–	6	59612	1.00	–	–
	>= 10-30 years	<6	12149	1.14	0.13	9.73	<6	28976	1.01	0.19	5.50
	>= 30-40 years	<6	8062	2.14	0.43	10.63	<6	17277	1.03	0.20	5.29
	>= 40-50 years	0	2674	0.00	–	–	0	4553	0.00	–	–
	>= 50 years	0	762	0.00	–	–	0	1346	0.00	–	–

Motor neuron disease: 1 code (ICD-9 335.2; ICD-10 G12.2) in any diagnostic field in DAD/NACRS;
MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure; N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit; All models are adjusted by age, age^2, and birth year; Age censored at 100 years old; Reference group: Mining industry workers with no MP exposure within the same ore type.

5.7 Risk of motor neuron disease for ever exposure to the MP versus never for various exposure windows.

MP Exposure 'window' (years)	First assessment approach							Second assessment approach						
	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL	Exposed No. of cases	Peryrs	Non-exposed No. of cases	Peryrs	RR	LCL	UCL
> = 10-30 years ago	<6	63974	76	624814	0.81	0.32	2.04	8	116349	73	572439	0.97	0.45	2.08
> = 30-40 years ago	12	86989	69	601799	0.95	0.51	1.76	17	127033	64	561755	1.05	0.61	1.81
> = 40-50 years ago	9	67409	72	621379	0.61	0.30	1.24	13	88264	68	600524	0.72	0.40	1.32
> = 50 years ago	6	26993	75	661795	0.83	0.34	1.99	6	38118	75	650670	0.56	0.24	1.34

Motor neuron disease: 1 code (ICD-9 335.2; ICD-10 G12.2) in any diagnostic field in DAD/NACRS;

MP: McIntyre Powder; First exposure assessment approach: self-reported MP exposure; Second exposure assessment approach: estimated MP exposure;

N: total number of miners in the analysis group; Peryrs: cumulative person years; RR: Incidence rate ratio; LCL: Lower confidence limit; UCL: Upper confidence limit;

All models are adjusted by age, age^2, and birth year; Age censored at 100 years old;

Reference group: Mining industry workers wih no MP exposure within the same exposure window;

This analysis used a rolling window of exposure and disease follow up. The risk of disease is compared among workers with and without MP exposure in various time windows prior to a given year through out follow-up. This analysis assumes that those not exposed in each time window as the 'non-exposed'. It also assumes no gaps between first and last exposure dates for all cohort members.