

 **ONTARIO**

ONTARIO UNDERGROUND DIESEL SURVEY

2002



MDEC 2003

BY: MLRC DIESEL SUBCOMMITTEE
PRESENTED BY: John Vergunst

Mining Legislative Review Committee

Terms of Reference

To provide the Minister of Labour with advice and counsel in respect to legislation and regulations relating to health and safety in the mines.

Members:

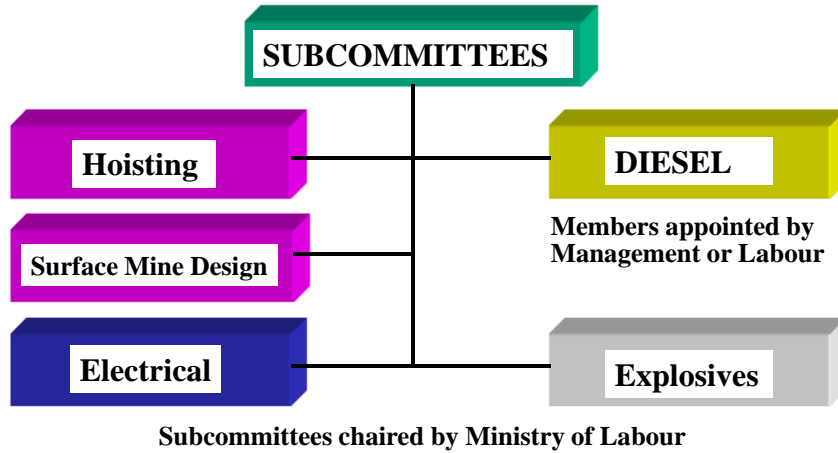
4 @ Industry Members (nominated by Ontario Mining Association)
currently: Inco, Falconbridge (Kidd), Ethier Sand & Gravel,
Sifto (Goderich Mine)

4 @ Labour Members (nominated by Ontario Federation of Labour)
currently: USWA(Inco), USWA(Dome), USWA(District 6),
Mine Mill/CAW(Falconbridge)

Neutral Chairperson: currently Northern Development and Mines

Administrative & Technical Support: Ministry of Labour

Mining Legislative Review Committee



MLRC Diesel Subcommittee

Terms of Reference

“Motion to re-direct the diesel sub-committee to look at advancing technology and how it can affect the volumes of air and testing.” (MLRC Minutes: May 25 & 26, 1993)

Members

Ron Pilon – USWA
Glenn Staskus – Mine Mill/CAW
Tom Semadeni – Falconbridge, Kidd
Joe Stachulak – Inco
Gerald Allan - MOL
John Vergunst – MOL



**MLRC DIESEL SUBCOMMITTEE
BACKGROUND WORK**

Current Discussions

- § Further reducing sulphur content in diesel fuel
- § Air quality vs quantity and engine certification
- § Review of maintenance practices & emission testing
- § Diesel particulate filters
- § Reduce DPM Limit

Ontario Diesel Survey: 2002

- § Need to evaluate regulatory impact of proposals
- § Required a summary the underground diesel fleet
- § Required a benchmark industry maintenance and sampling strategies

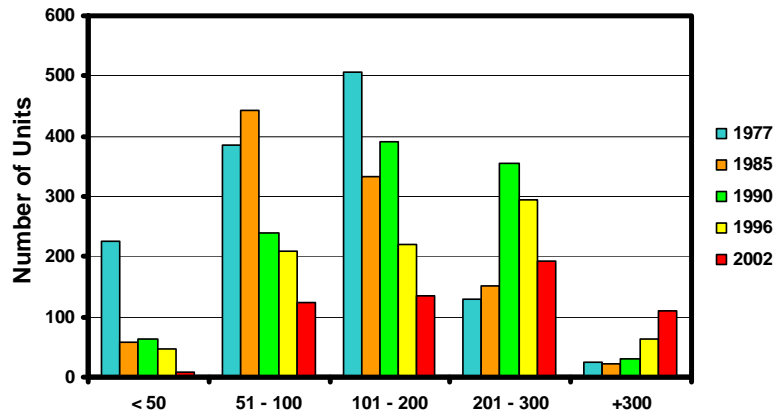
2002 DIESEL SURVEY

- § Questionnaire sent out in 2002
- § All 29 underground mines responded with fleet information
- § Only 28 mines responded to questions on maintenance
- § Only 25 mines provided sampling results
- § 2002: 1952 units – 248,033 BHP
- § 1996: 2250 units – 257,906 BHP
- § 13% decrease in units
- § 4% decrease in horsepower

Year	Number of units
1977	2092
1985	1676
1990	2660
1996	2250
2002	1952

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Heavy Duty Vehicles (LHD, Loaders, Haul Trucks)



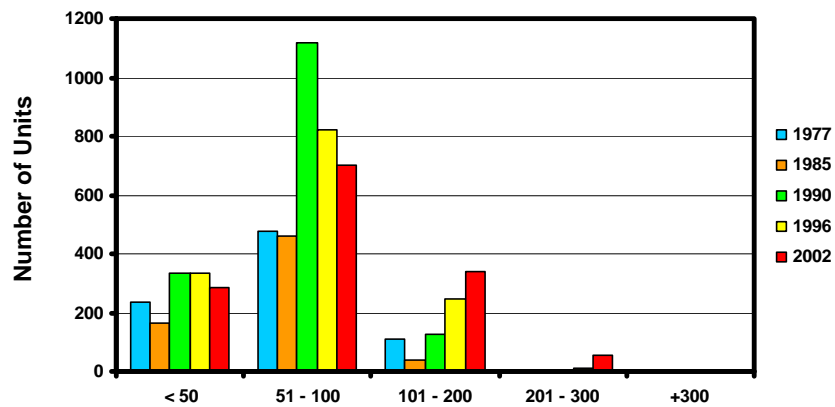
HDV: decrease of 32% in number, 10% in BHP since 1996

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Light Duty Vehicles



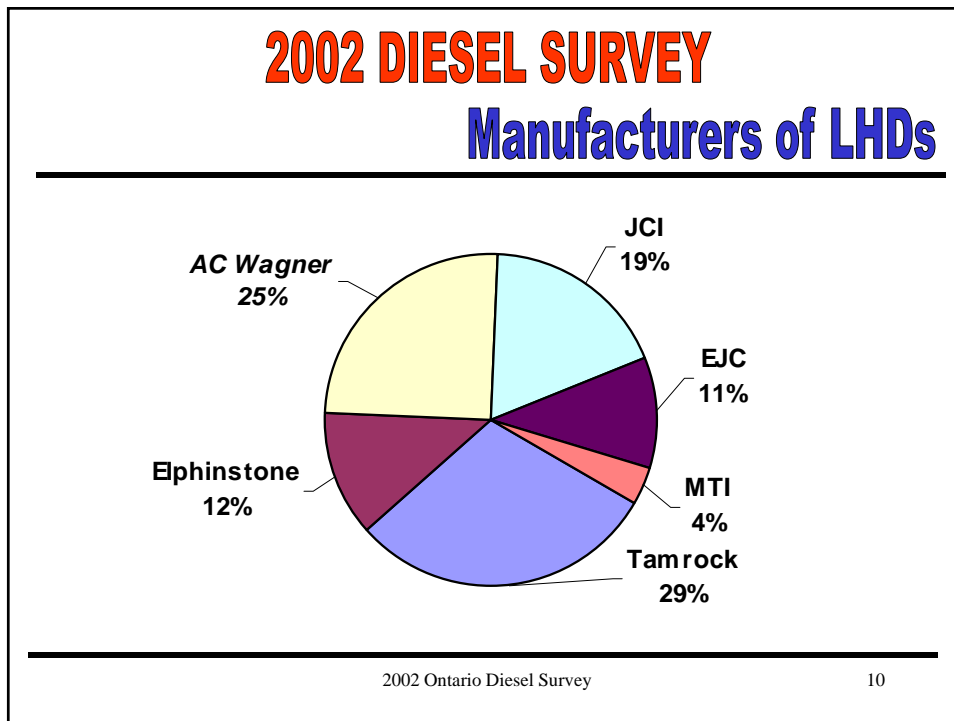
LDV: decrease of 2.3% in number, increase of 20.7% in BHP since 1996

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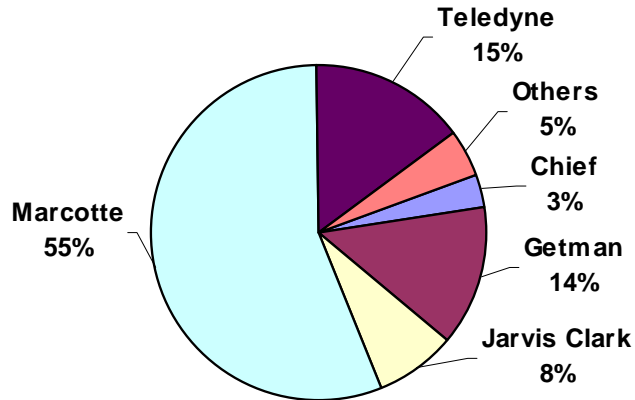
Equipment Use	Number of Underground Diesel Units by BHP					Total
	< 50	51 – 100	101 – 200	201 – 300	+ 300	
Bolters – scaler, cable		57	40	3		100
Boom Types – manlift, crane	1	31	18	9		59
Drills – all types	10	138	21			169
Excavators – backhoe, cleanup	67	24				91
Explosive Vehicles		21	10	3		34
Forklifts	63	33	4			100
Fuel & Lube Trucks		5	8	2		15
Haulage Trucks		7	17	54	37	115
Locomotives		38				38
LHDs	7	78	117	138	74	414
Personnel Carriers	98	145	161	23		427
Scissorlifts		147	20	2		169
Shotcrete Units	10	9	8	7		34
Utility Vehicles	36	94	48	8	1	187
Totals	297	827	472	249	112	1952

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Manufacturers of Scissorlifts

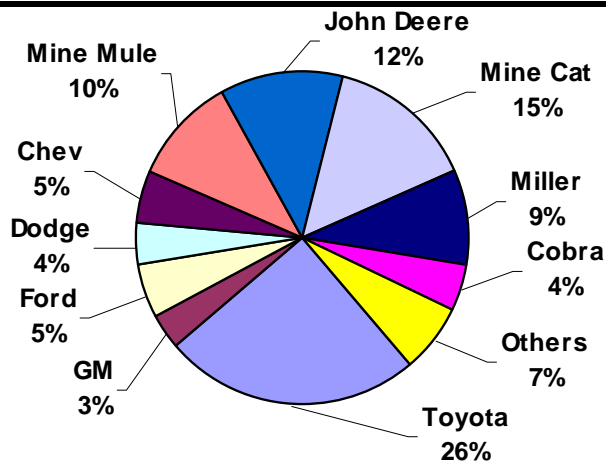


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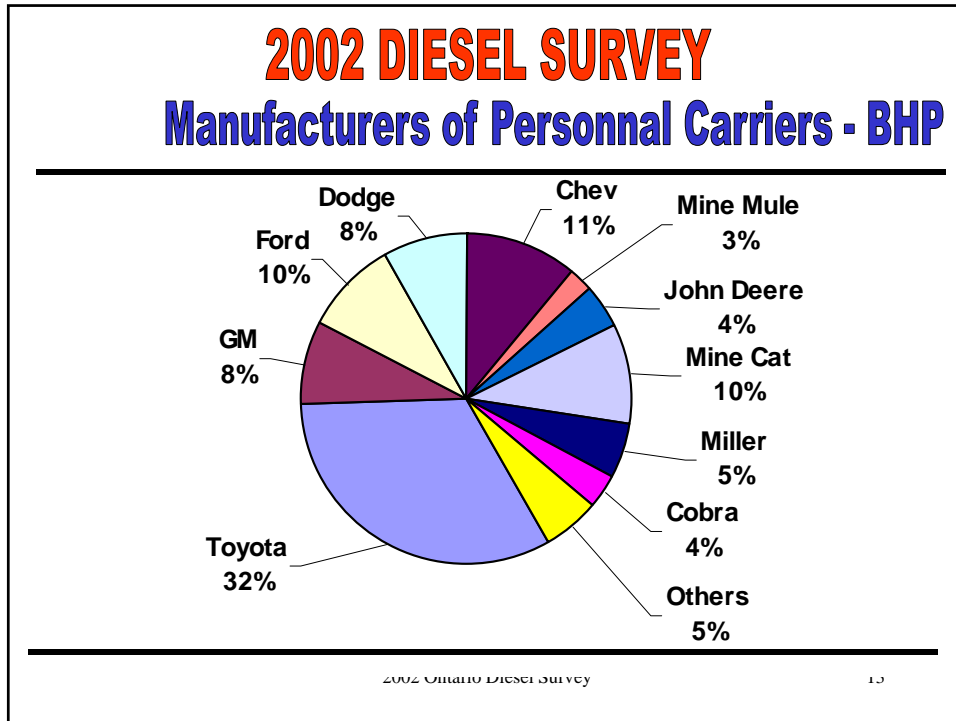
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Manufacturers of Personnal Carriers - #Units



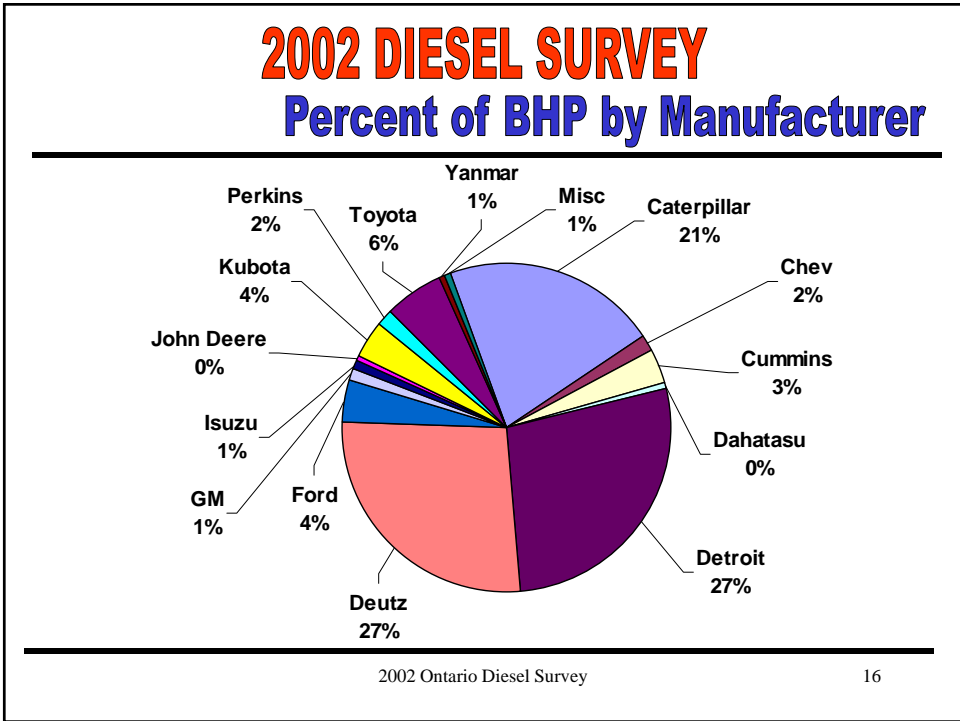
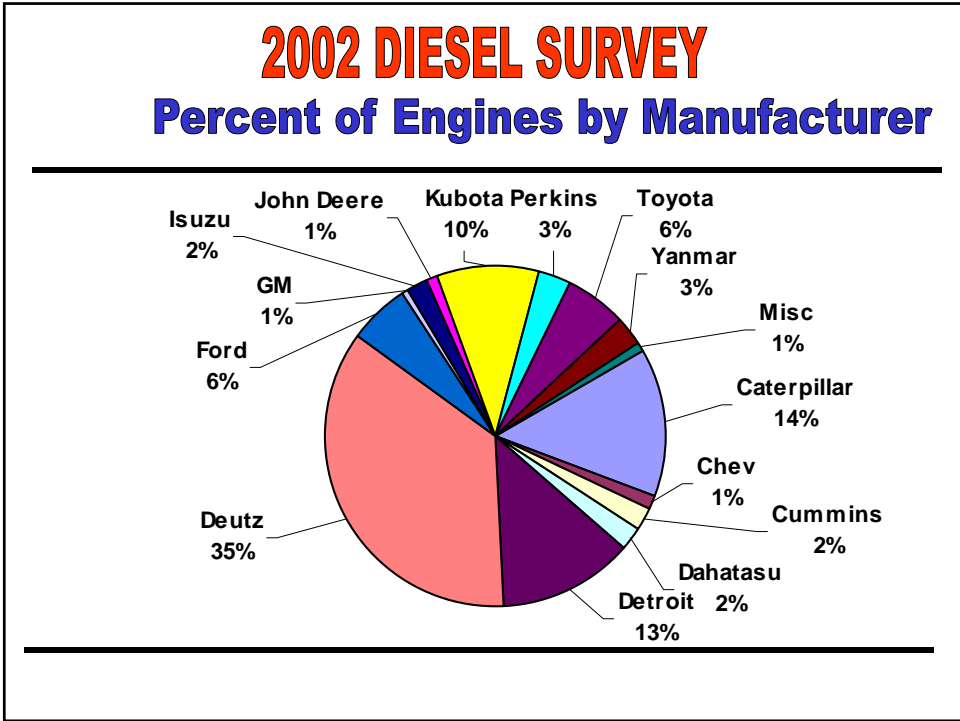
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ENGINES	Number of Diesel Engines by BHP					Total
	< 50	51 – 100	101 – 200	201 – 300	+ 300	
Caterpillar		79	84	58	56	277
Chev			21	1		22
Cummins		1	25	15	1	42
Dahatasu	43					43
Detroit		8	55	130	55	248
Deutz	22	512	145	23		702
Ford	8	79	10	15		112
General Motors			9	5		14
Isuzu	9	28	1			38
John Deere	4	14				18
Kubota	142	50				192
Perkins	17	37	5			59
Toyota		4	113			117
Yanmar	42	10				52
Miscellaneous or not coded	1	13	1	1		16

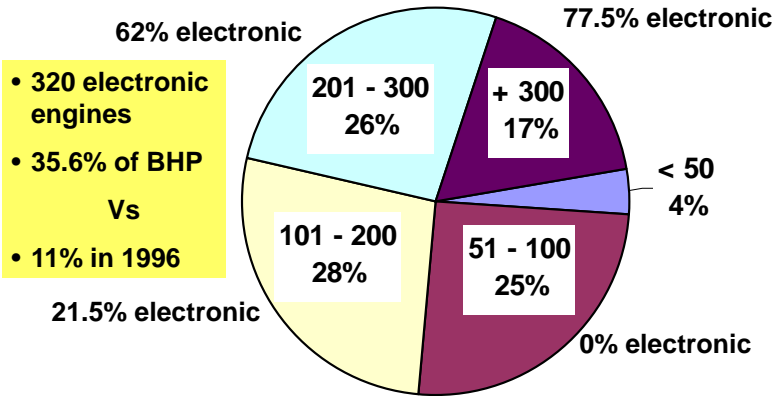
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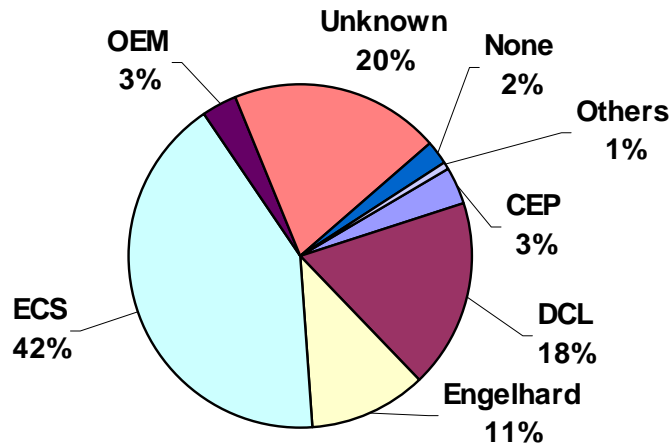
Percent of BHP by Power Range

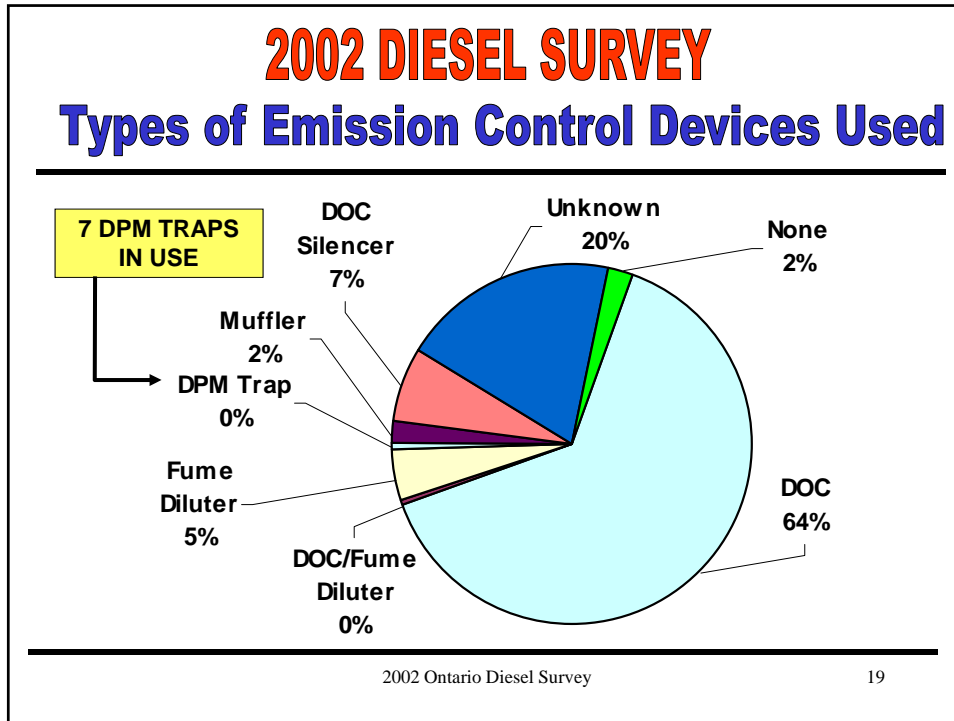
+ 200 BHP engines by BHP increased 26% over 1996



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Manufactures of Emission Control Devices





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Criteria for Engine Maintenance

Criteria for Engine Tune-up or Overhaul	Number of Mines Using Criteria to Determine:	
	Tune-ups	Overhauls
Emission (visible or tested)	14	12
Planned Maintenance (hours)	13	9
Loss of Power (low compression)	9	14
Operator Complaint	7	-
Rough Running (hard starting, knocking)	6	-
Blown Engine	1	9
Excessive Oil Consumption (blow by)	-	3
Low Oil Pressure	-	1
As required or not available	1	3

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Operator Responsibilities for Maintenance

Service	Response from Mines:		
	Yes	No	Inspect Only
Add Engine Oil	26	-	2
Change Air Filters	26	-	2
Service Oil Leaks	13	13	2
Service Exhaust Leaks	10	16	2

The last two questions may have been ambiguous
 “YES” when they meant that the operator inspected them

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Shop Responsibilities for Maintenance

Service Performed/Provided	Response from Mines:		
	Yes	No	Other
Use of licensed mechanics?	22	4	2 – mainly
Repair manuals available?	28	-	-
Oil samples analyzed?	16	9	3 – request
Adjustments made to fuel settings?	7	18	3 – request
Formal maintenance for exhaust devices?	15	13	-
Exhaust back-pressures monitored?	4	20	4 – as req'd
Exhaust system evaluated?	22	5	1 – as req'd
Regular service of fuel injection?	15	9	4 – as req'd
Check of cooling pressure & temperature?	21	7	-
Cooling system routinely inspected?	27	1	-

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Mechanic's Tailpipe Test

Test Description	Response from Mines:	
	Yes	Comment
Set Brakes	1	
Set unit in neutral	2	
Bring unit up to "operating temperature"	10	Warm to hot
Engine load: half to full throttle	8	Half throttle – max
torque/hydraulic stall	2	
Testing Equipment: colorimetric tubes	7	CO
ECOM unit	4	Includes smoke
Smoke Testing	4	Visual test

NOTE: only 12 mines described their procedure

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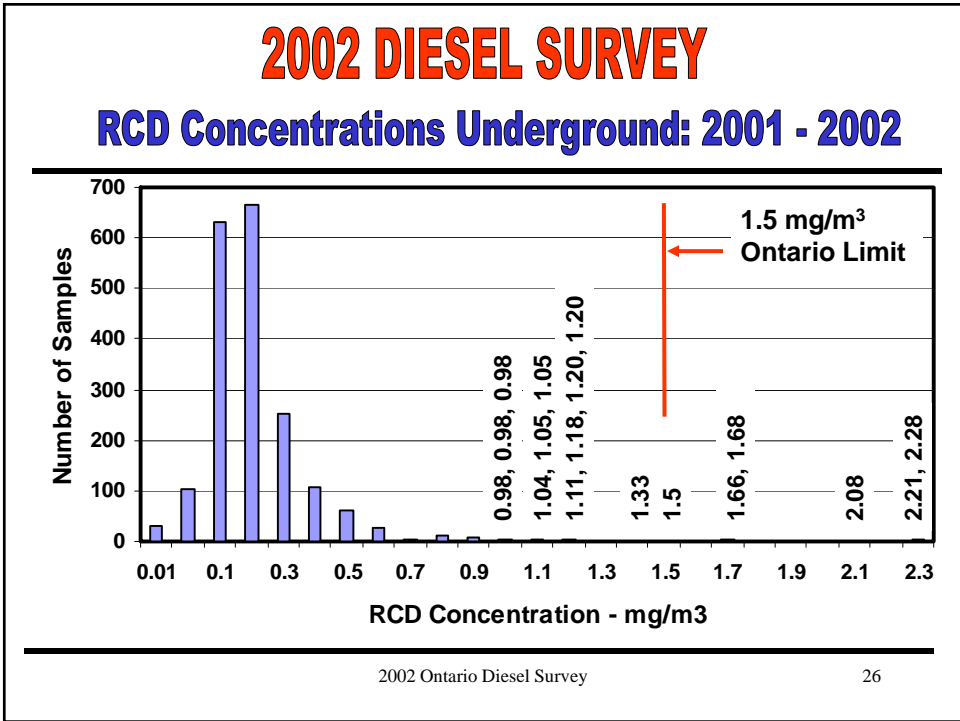
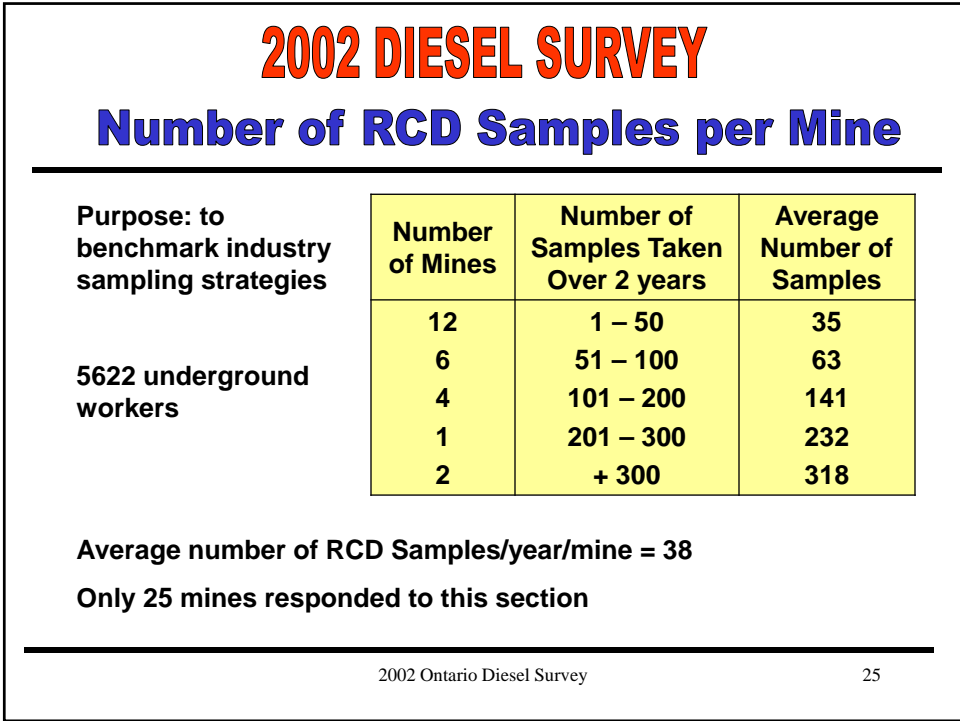
Diesel Tests Taken Upon Request of a Worker

§183.2(1)3. Requires tests for air volume, carbon monoxide, nitrogen dioxide, formaldehyde or respirable combustible dust at the request of a worker

Purpose: to benchmark industry sampling strategies

5622 underground workers

Average Number of Tests	Tests per Year
0	5
1 – 5	11
6 – 10	4
11 – 15	5
16 – 20	1
+20	1



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RCD Samples Exceeding

Purpose: to benchmark industry sampling strategies

- 2232 samples
 - 257 area samples
 - 52 surface samples
 - 1923 U/G samples
- 5622 underground workers

Based on all U/G samples

RCD Level	Percent Samples Exceeding	Number of samples
1.5	0.3	5
1.0	0.8	14
0.6	2.0	39
0.5	3.5	67
0.4	6.7	129
0.2	25.4	488

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RCD Concentrations Underground: 2001 - 2002

Task or Job	Number	Number of Samples of RCD Concentrations – mg/m ³ .										
		0 to 0.2	0.2 to 0.4	0.4 to 0.5	0.5 to 0.6	0.6 to 0.7	0.7 to 0.8	0.8 to 0.9	0.9 to 1.0	1.0 to 1.5	+ 1.5	Avg
Backfill	53	41	11				1					0.16
Blasting	50	46	3			1						0.13
Bolting	103	80	14	2	1	2		1	1	2		0.21
Crushing	83	82	1									0.09
Diamond Drilling	22	21	1									0.12
Drill – Develop	207	149	46	8	3					1		0.18
Drill – Production	105	80	16	4	3			1		1		0.18
Drill – Raise Bore	7	5	1	1								0.17
Electrician	39	34	5									0.13
Equip Operator	51	40	8	2							1	0.16
Haulage	239	196	35	4	3		1					0.16

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RCD Concentrations Underground: 2001 - 2002

Task or Job	Number	Number of Samples of RCD Concentrations – mg/m ³ .										Avg	
		0 to 0.2	0.2 to 0.4	0.4 to 0.5	0.5 to 0.6	0.6 to 0.7	0.7 to 0.8	0.8 to 0.9	0.9 to 1.0	1.0 to 1.5	+ 1.5		
Mechanic	192	185	5	1			1						0.16
Mucking	369	174	126	33	11	4	6	5	2	6	2		0.28
Other Tasks	68	54	14										0.15
Rockbreaker	29	18	10	1									0.20
Scaling	14	10	4										0.17
Service Crew	146	117	28	1									0.13
Shaft Services	32	32											0.07
Shotcreting	35	8	17	4	6								0.30
Staff	39	27	12										0.15
Supervision	40	36	2	1	1								0.13
TOTALS	1923	1435	359	62	28	5	11	5	4	9	5		

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Concentration vs Exposure

Purpose: to benchmark industry sampling strategies

All concentrations

Standard practice is to post results with a "factored" RCD level to highlight possible over exposure.

$1.5 \times 0.8 = 1.2$ or

$1.5 \times 0.57 = 0.86$

Shift Length	Number of Mines	Factor for Shift length RCD x a	Factor for Shift & 7 days/week RCD x b
8	8	1	0.71
9	1	0.89	0.63
10	4	0.80	0.57
10.5	7	0.76	0.54
11	2	0.73	0.52
11.5	1	0.70	0.50
12	5	0.67	0.48

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2002 DIESEL SURVEY SUMMARY

- § Increase of personnel vehicles – but some smaller units being introduced – gators, mine mules, etc
- § Larger horsepower vehicles for LHDs & trucks
- § Large increase in electronic engines
- § Mines used 30.6 mL of diesel fuel up from 29 mL in 1996
- § Most mines have well established monitoring programs
- § Some mines are using the ECOM systems for maintenance

OUR THANKS TO ALL THE MINES THAT PARTICIPATED
