




**Freeport-McMoRan  
Copper & Gold**

## Henderson Operations History

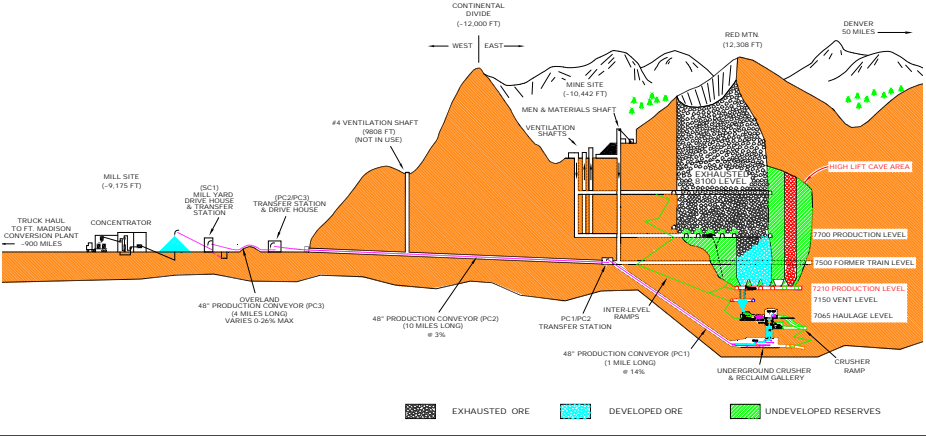
- Orebody discovered 1964
- Shaft sinking began 1968
- Development began in 1970
- Production began in 1976
  - \$500MM Initial Cost
- Henderson 2000 modernization began 1996, completed 1999
  - \$150MM Cost

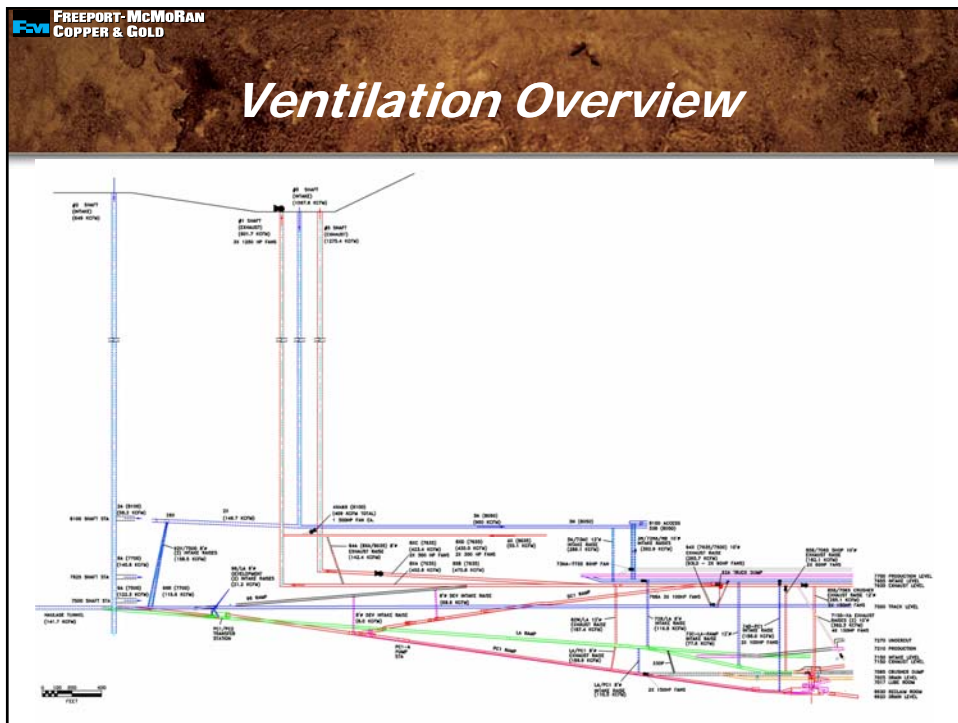
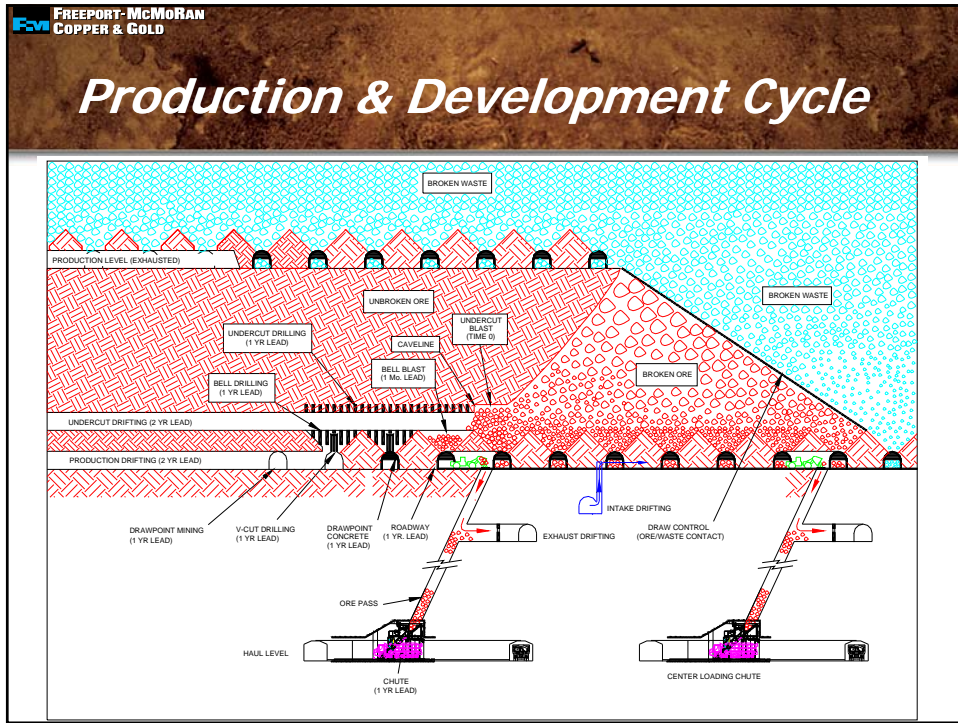


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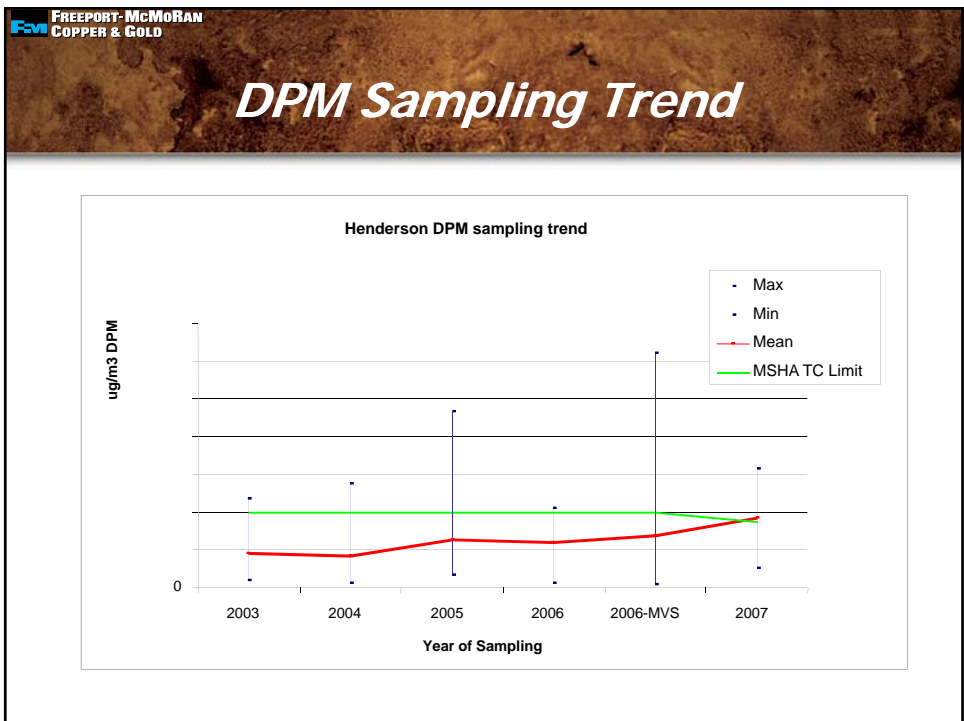
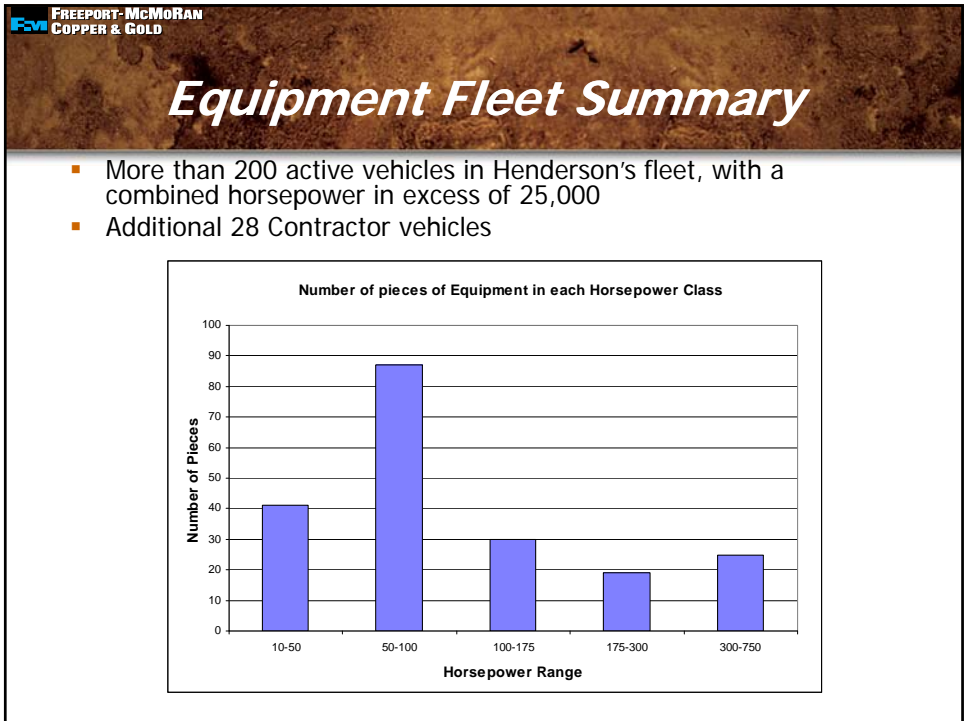
## Henderson Operational Schematic

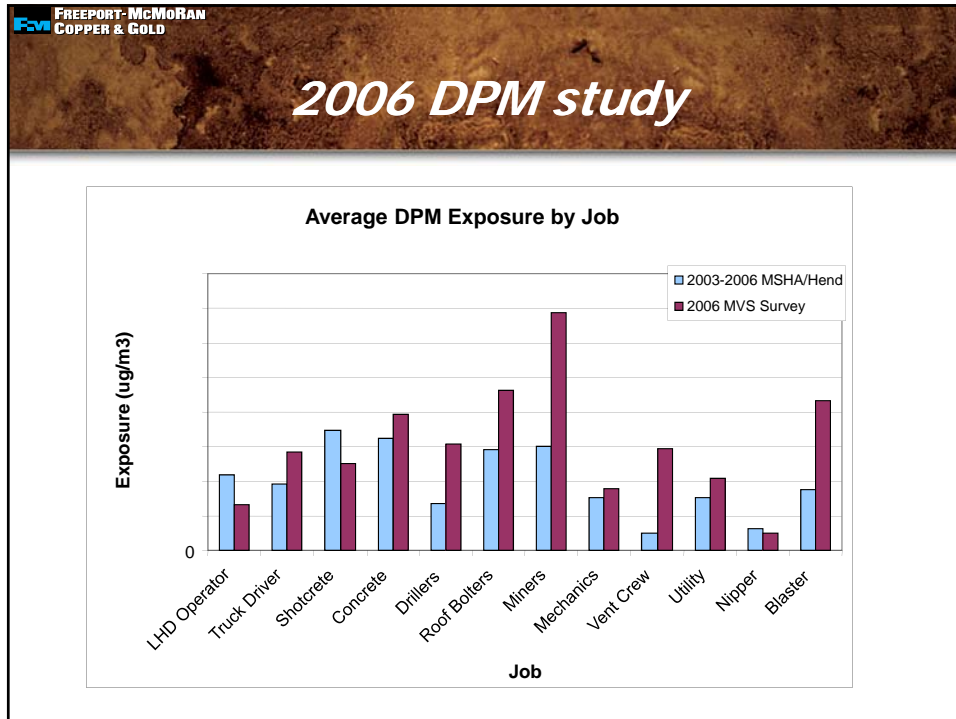
- Proven and Probable reserves as of Dec. 31, 2007
  - 135 million tons @ .193% Mo containing 449 million pounds Mo recoverable
- 205 million tons ore and 932 million pounds Mo produced thru 2007












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## DPM Reduction Program

- DPM team formed
- Goals
  - As with all safety programs, provide a safe and healthy work environment for Henderson employees, contractors, and visitors.
  - Meet the M.S.H.A. standard for Diesel Particulate Matter of  $160 \mu\text{g}/\text{m}^3$  Total Carbon

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## *DPM Program Summary*

- DPM program is a multifaceted approach:
  - Emissions-based maintenance
  - Ventilation improvements
    - (auxiliary systems and mine-wide)
  - Engine replacements
  - Equipment replacements
  - Biodiesel
  - After-treatment
  - Training

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## *2007 Initiatives*

- Implemented weekly auxiliary ventilation audits
- Emissions-based maintenance crew built and trained
  - Tailpipe sampling program initiated.
- Mine tractor replacement 30% completed

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## *Equipment Replacement – 2007-2008*

- 24 Ford mine tractors replaced with Kubota's
  - 1991-1999
- 6 Additional utility and development vehicles
  - 1975-1995

	Engine	BHP	DPM gr/hp
Normet Powder Truck	Cat 3304	180	25.5
Getman Scisscor Lift	Deutz 912W	76	8.5
Cat Diesel Genset	Cat 3306	275	52.7
Concrete Form Jumbo	Deutz 912W	76	8.5
Normet Water Truck	Deutz 912W	76	8.5
Normet Concrete Transport	Cat 3304	180	25.5

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## *Engine Replacements*

- 2 Waldon Forklifts upgraded from non-tier Cummins to Tier 3 Cummins engines
- Normet concrete pump truck upgraded from Deutz 912 to Deutz 914 as a test unit.
  - Equipment replacement deemed the economic option for the majority of Henderson's aging fleets.
  - To date, the 914 engine has not proven superior.
- Deutz 1013 engines upgraded from mechanical fuel control to electronic control, adjusting for altitude.
  - Up to 50% emissions reductions.
- New 150hp class equipment spec'ed with 2013 rather than 1013 engines.

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## *DPF testing and temperature profiling*

- High-risk fleets with old engines not targeted for replacement evaluated for DPF's.
  - Temperature profiling performed initially to spec DPF type.
- Catalyzed DPF's preferred
- Currently testing base-metal DPF's on concrete transports (Cat 3304) & Brookville Loci (Cat 3306)
- Cat 1700 LHD's and Supra Haul Trucks have been purchased with catalyzed exhaust filters since inception.

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## *Biodiesel Testing*

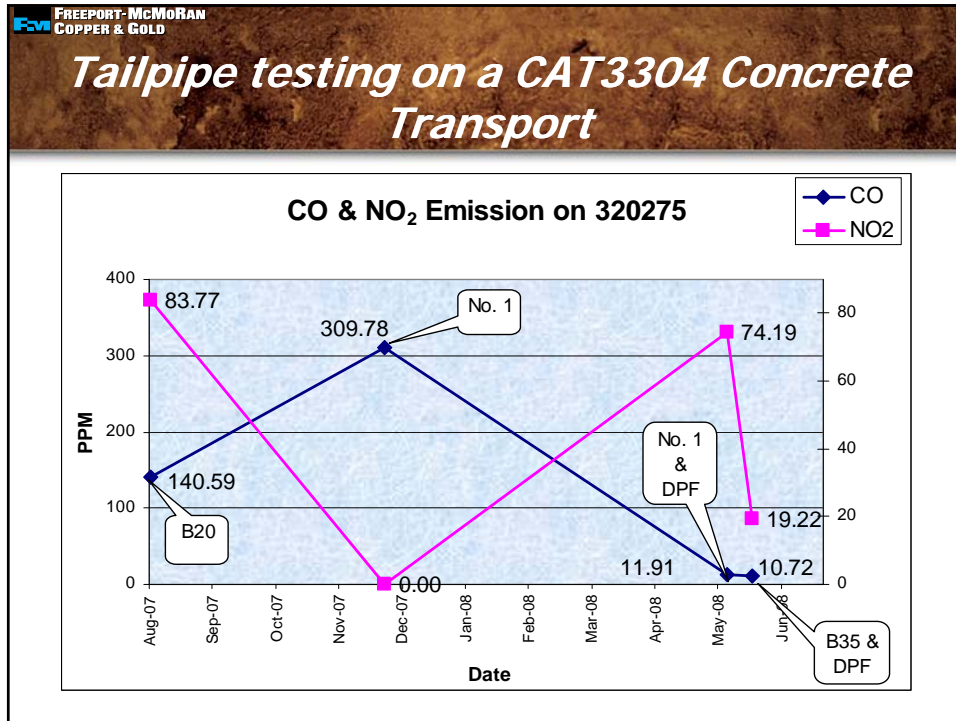
- B20 tested first.
  - Difficult to maintain consistent testing with fuel storage protocol.

	CO	NO2	NOx
No. 1	499	66	562
B20	471	67	758

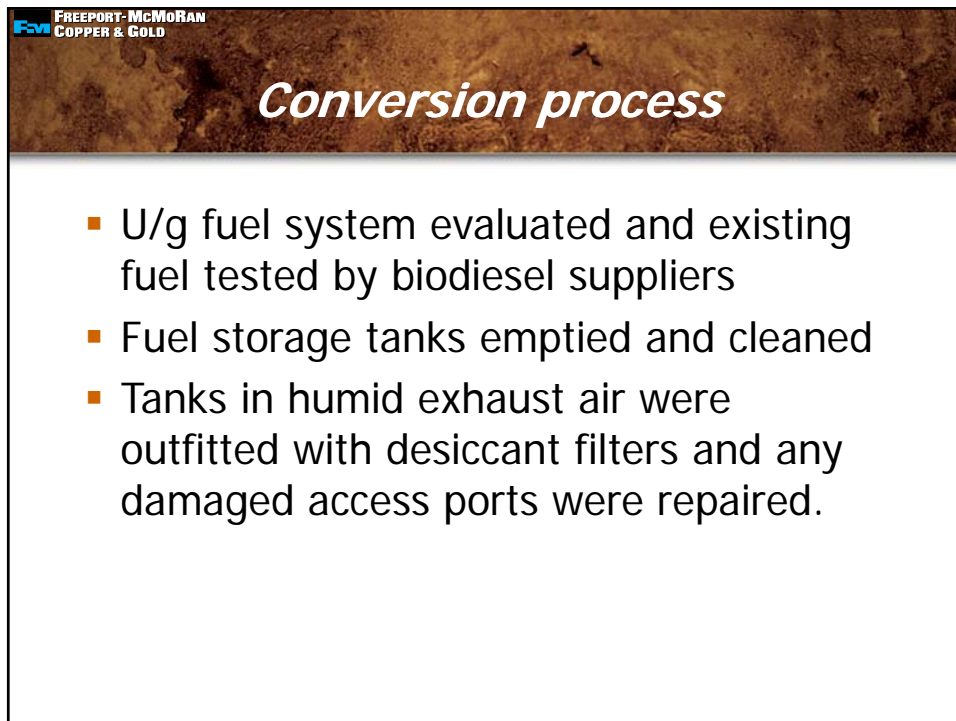
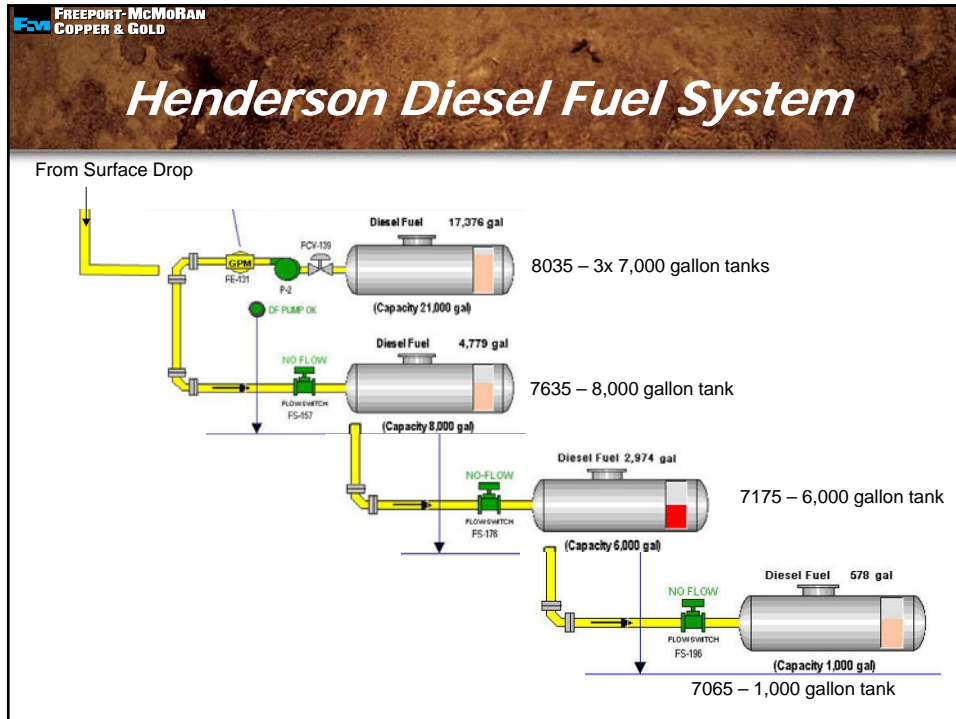
- B99 tested on a new concrete transport with a Deutz 1013.
  - Test suspended due to failure of rubber and plastic parts.

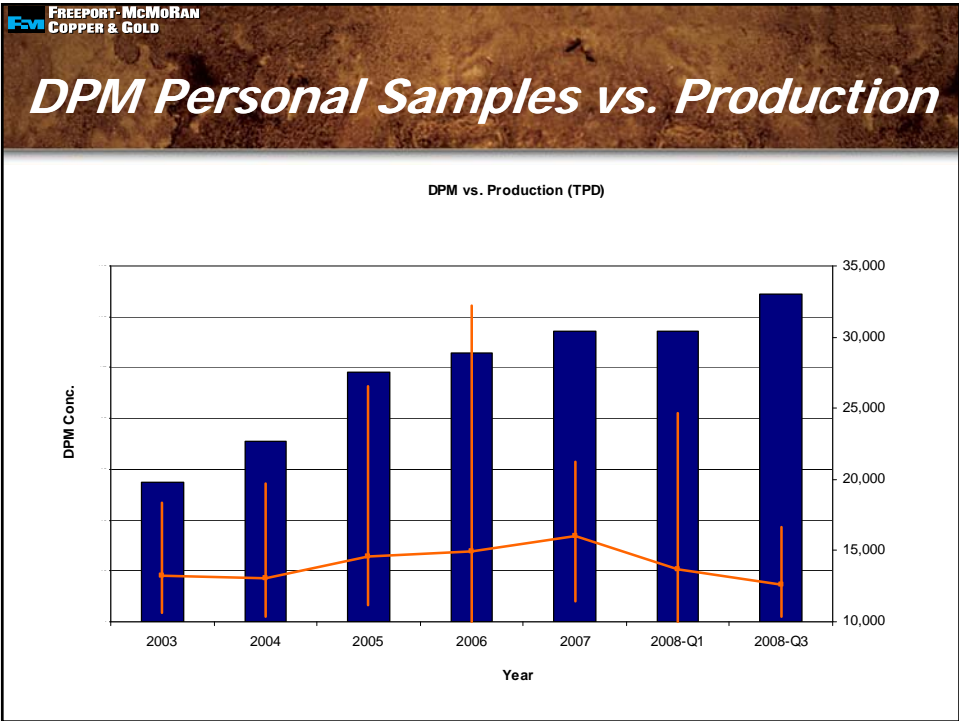
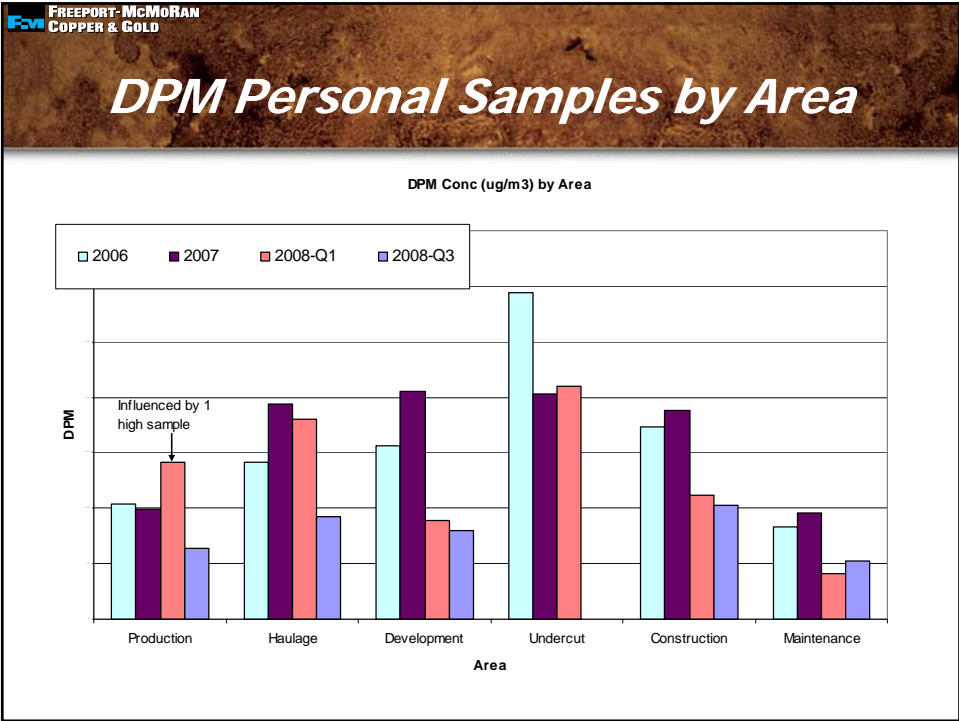
	CO	NO2	NOx
B20	274	67	608
B99	203	126	697

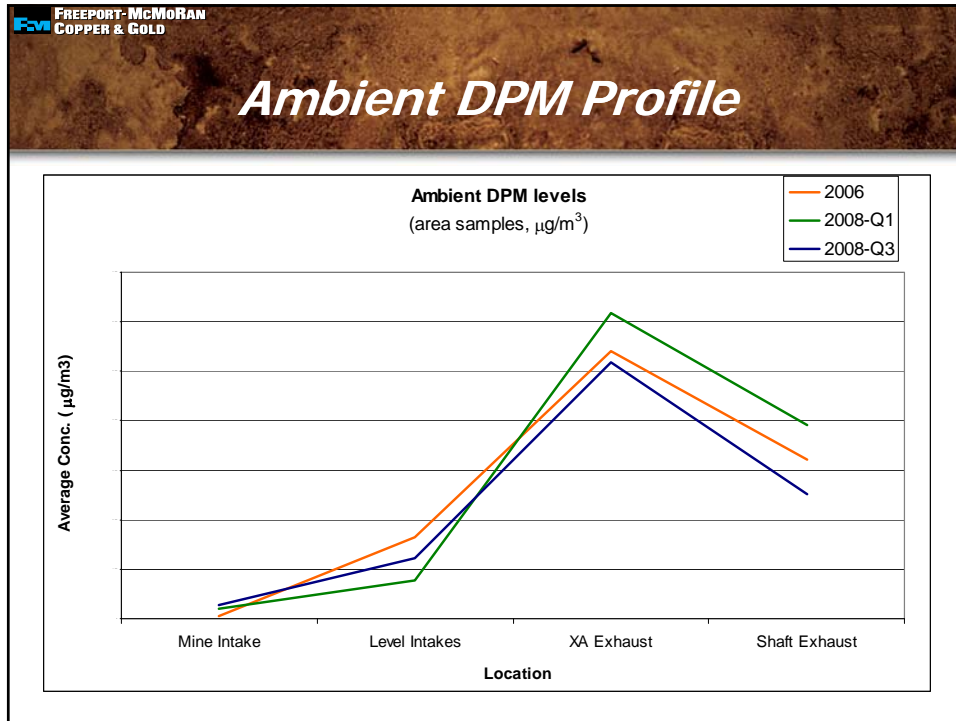




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- ### Conversion to Biodiesel
- DPM team selected B35
    - Higher predicted emissions gains than B20
    - Lower risk than higher blends
    - Warranty issues with a number of engine manufactures above B5, B20
  - Two vendors selected to maintain consistent supply
    - Quality specifications
    - Every shipment tested as it enters the tanker
    - Spot checks prior to transfer to Henderson fuel system
    - Insulated tankers
    - Monthly onsite fuel inspections by supplier
    - Quarterly biocide treatments







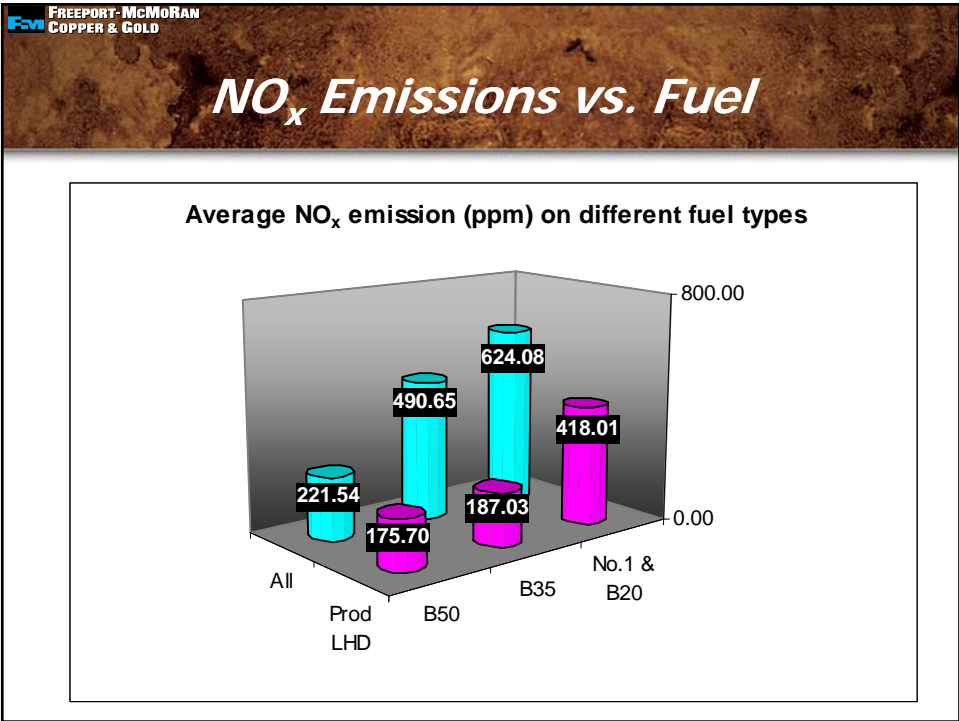
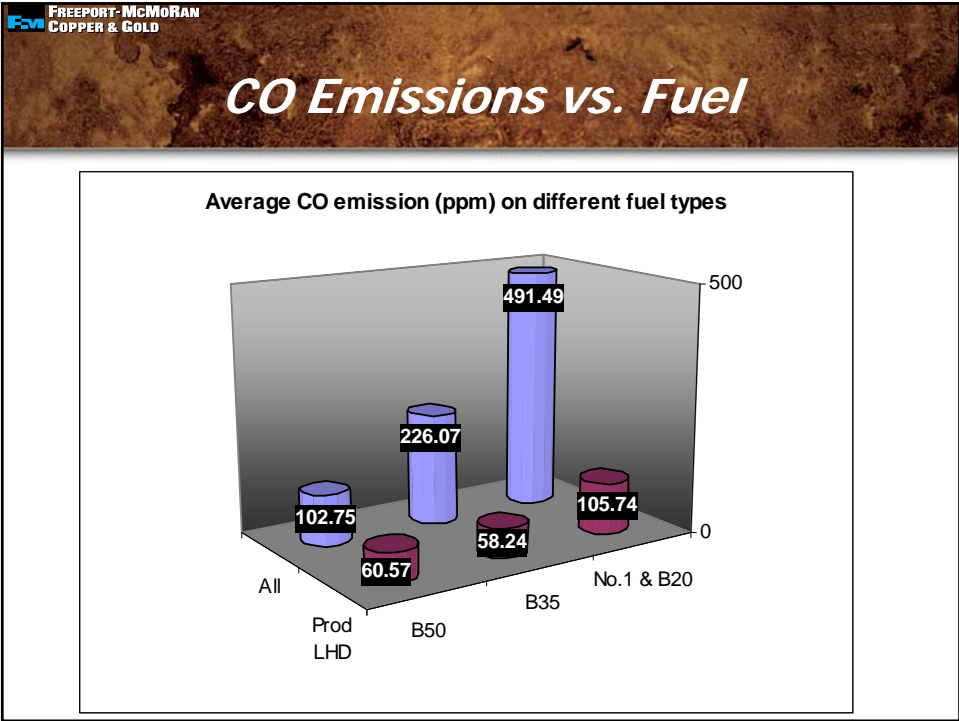
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### Reduction in personal DPM concentration, before and after B35

	8X Exhaust	LHD	Concrete	Trucks	Crusher
Before B35	392	324	270	328	473
After B35	251	123	229	134	280
	36%	62%	15%	59%	41%

Average reduction measured as of August, 2008: ~40%







*Summary*

- Henderson has recognized emissions as a health & safety issue historically.
- Increasing production and development rates, and larger equipment fleets, combined with lower regulatory limits have made DPM an increasing challenge.
- A systems approach, with buy-in from many groups has led to successes.
- Biodiesel has shown significant promise and emissions improvements, but is not the “silver bullet”
- Further reductions are on the way with ventilation upgrades, further use of DPFs, and more...