

**National Mining Association**

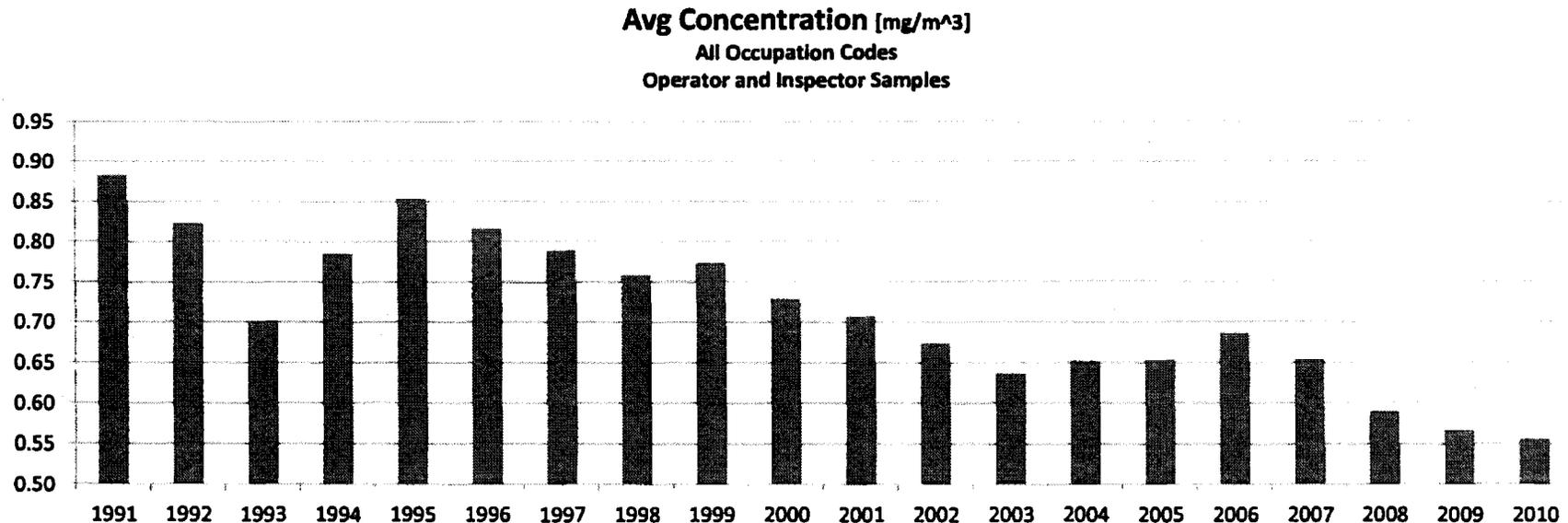
**Analysis of MSHA Coal Dust  
Sampling Data Base & The Impact Of  
The MSHA Proposed Rule**



**Presented By  
Mark Watson and Heath Lovell  
Alliance Coal, LLC  
Feb. 15, 2011  
MSHA Hearing On Proposed  
Coal Dust Regulations,  
75 FR 644112 (Oct 19, 2010)**

*AB64-COMM-74-9*

# All Samples Since 1991 Demonstrate A Successful Effort To Reduce Exposures



- 37% reduction in average concentration in last two decades, 19% reduction since 2006. Average exposures important in understanding health risk for diseases based on long term exposure, but not for understanding daily compliance impacts.
- MSHA must use the “latest scientific data” to analyze risk, and the need for, and the benefits from proposed rules, based on current conditions and trends, not outdated or inapplicable data.

# MSHA Coal Dust Sampling Data Base

Sample Year	2010		
Occ Code	(All)		
<b>Count of Concentration Sample Type Description</b>	<b>Inspector</b>	<b>Operator</b>	<b>Grand Total</b>
DESIGNATED AREA	4,183	6,417	10,600
DESIGNATED OCCUPATION	3,837	25,366	29,203
DESIGNATED WORK POSITION	1,407	1,837	3,244
INTAKE AIR	3,613	8	3,621
NON DESIGNATED OCCUPATION	15,277	18	15,295
NONDESIGNATED AREA	184		184
NONDESIGNATED WORK POSITION	9,099		9,099
PART 90 MINER	237	476	713
TOTALS	37,837	34,122	71,959

- We thank MSHA for providing its sample data base for this analysis
- 1,331,273 dust samples were analyzed dating back to 1986
- 71,959 samples from 2010

# Data Presented by MSHA

Calendar Year	Underground Mines					Surface Operations				
	Total			1.0 mg/m <sup>3</sup> or less		Total			1.0 mg/m <sup>3</sup> or less	
	Mines	DO Samples	Avg Conc	Samples	%	Mines	DWP Samples	Avg Conc	Samples	%
2006	587	25,857	0.88	18,153	70.2	324	2,173	0.48	1,880	86.5
2007	545	25,491	0.82	18,509	72.6	320	2,085	0.52	1,802	86.4
2008	554	26,317	0.76	19,793	75.2	310	2,255	0.49	1,965	87.1
2009	518	25,709	0.77	19,451	75.7	308	2,291	0.44	2,055	89.7
2010	454	17,693	0.73	13,815	78.1	255	1,318	0.46	1,158	87.9

<sup>1</sup> CY2010 thru 8/31/2010.

DO - Designated Occupation

DWP - Designated Work Position

■ To determine the accuracy of the single shift sample compliance determination proposal, and the feasibility of the new rules, MSHA must analyze single shift results, not averages which smooth inaccuracies and reduce the variability of single shift results.

■ MSHA Table, shown above and published at:

<http://www.msha.gov/S&HINFO/BlackLung/2009Charts/OprComplianceSmplsCY2006%20thru%2009-2010.pdf> uses average concentrations to examine the feasibility of the proposed rule, as does the federal register preamble conclusion, at 75 FR 64420. This presentation examines actual sample results.

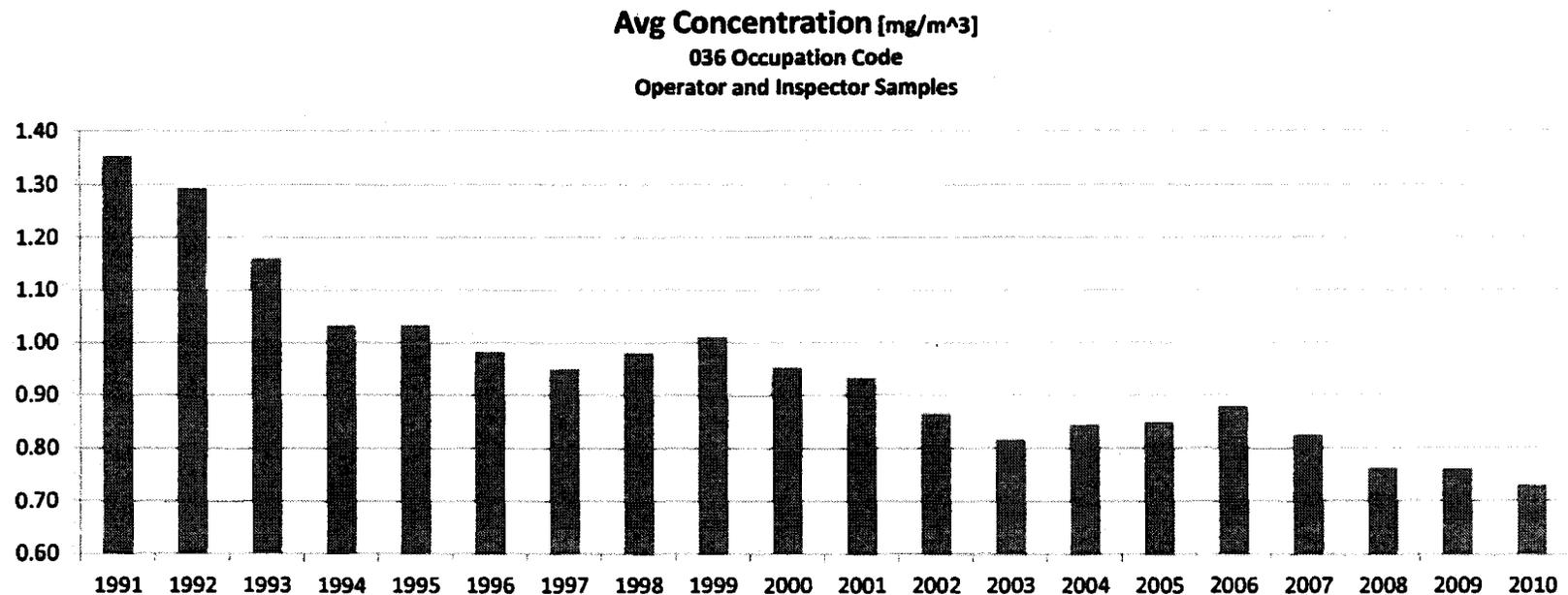
# MSHA Data with Standard Deviation

Source Operator  
 Sample Type Code 1  
 Occ Code (All)

Row Labels	Values				Samples Less Than 1.0	%
	Count of Concentration	Average of Concentration	StdDev of Concentration	2 x StdDev of Concentration		
1995	36,792	1.02	1.17	2.34	23,728	64.5%
1996	33,825	0.97	1.11	2.22	22,396	66.2%
1997	32,949	0.94	1.07	2.14	22,297	67.7%
1998	31,166	0.96	1.04	2.08	20,680	66.4%
1999	28,326	1.01	1.01	2.01	17,863	63.1%
2000	24,925	0.94	0.89	1.78	16,279	65.3%
2001	26,300	0.92	0.99	1.98	17,729	67.4%
2002	24,612	0.87	0.93	1.87	17,179	69.8%
2003	22,997	0.81	0.87	1.73	16,613	72.2%
2004	24,367	0.85	0.92	1.84	17,262	70.8%
2005	24,922	0.85	0.91	1.82	17,662	70.9%
2006	25,857	0.88	0.98	1.95	18,153	70.2%
2007	25,491	0.82	0.88	1.77	18,509	72.6%
2008	26,317	0.76	0.80	1.60	19,793	75.2%
2009	25,709	0.77	0.83	1.66	19,451	75.7%
2010	25,366	0.73	0.75	1.51	19,717	77.7%

- Standard deviation exceeds average, demonstrates wide range of results.
- Large variability must be understood and accounted for before declaring single shift samples accurate, at the level of the new proposed limits (50+% reductions, dependent on shift length, silica content, and production level mandates), or declaring the limits feasible.

# Continuous Miner Operator Samples



- Continuous miner operators accounted for 37% of all samples in 2010
- Accounted for 91% of Designated Occupation samples in 2010
- 46% reduction in average exposures in last two decades; 17% reduction since 2006
- MSHA did not analyze major industry segment impacts, or proposed alternatives such as whether specific occupations or specific regions or specific conditions should be addressed, rather than imposing new industry wide mandates.

# Distribution of All Samples

Count of Concentration Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .1	9,905	9,704	8,963	9,283	9,310	8,126	8,000	10,868	11,581	9,976
> .1 and <= .5	33,775	29,853	28,133	30,696	31,062	27,419	28,446	33,109	34,117	33,217
> .5 and <= .8	15,148	12,882	11,699	13,264	13,040	11,856	12,045	13,251	13,522	13,011
> .8 and <= .9	3,674	3,025	2,733	3,085	2,909	2,778	2,877	3,036	2,981	2,889
> .9 and <= 1.0	3,142	2,538	2,293	2,495	2,492	2,385	2,375	2,412	2,369	2,360
> 1.0 and <= 1.1	2,637	2,101	1,981	2,115	2,158	1,968	1,961	2,025	1,962	1,834
> 1.1 and <= 1.2	2,297	1,870	1,658	1,864	1,799	1,806	1,640	1,674	1,627	1,584
> 1.2 and <= 1.3	1,929	1,592	1,373	1,562	1,508	1,447	1,473	1,437	1,339	1,197
> 1.3 and <= 1.4	1,530	1,334	1,135	1,331	1,249	1,199	1,184	1,201	1,116	943
> 1.4 and <= 1.5	1,399	1,135	1,010	1,105	1,064	1,050	1,016	966	923	786
> 1.5 and <= 1.6	1,241	980	803	875	966	899	800	802	731	659
> 1.6 and <= 1.7	939	809	680	778	818	759	702	670	628	524
> 1.7 and <= 1.8	881	783	565	657	697	613	558	541	504	438
> 1.8 and <= 1.9	767	636	497	504	590	590	479	452	368	359
> 1.9 and <= 2.0	613	519	437	486	502	487	418	372	332	306
> 2.0 and <= 2.1	497	457	347	417	405	390	357	360	252	267
> 2.1 and <= 2.2	460	380	313	330	337	321	281	256	235	166
> 2.2	3,775	2,883	2,149	2,492	2,635	2,703	2,332	1,942	1,773	1,443
<b>TOTAL</b>	<b>84,609</b>	<b>73,481</b>	<b>66,769</b>	<b>73,339</b>	<b>73,541</b>	<b>66,796</b>	<b>66,944</b>	<b>75,374</b>	<b>76,360</b>	<b>71,959</b>

- 1,876 eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 10,506 eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- MSHA and NIOSH must analyze single shift accuracy for the CMDPSU **and** CPDM sampler for the proposed 1.0 mg/m<sup>3</sup> limit; extended shift reduced limits(0.8 mg/m<sup>3</sup> for 10 hour shifts and 0.67 mg/m<sup>3</sup> for 12 hr shifts), and silica content reduced limits.

# All Samples that Exceed Compliance Levels

Count of Concentration										
Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	43,680	39,557	37,096	39,979	40,372	35,545	36,446	43,977	45,698	43,193
> .5 and <= 0.8	15,148	12,882	11,699	13,264	13,040	11,856	12,045	13,251	13,522	13,011
> .8 and <= 1.0	6,816	5,563	5,026	5,580	5,401	5,163	5,252	5,448	5,350	5,249
> 1.0 and <= 2.0	14,233	11,759	10,139	11,277	11,351	10,818	10,231	10,140	9,530	8,630
> 2.0	4,732	3,720	2,809	3,239	3,377	3,414	2,970	2,558	2,260	1,876
TOTAL	84,609	73,481	66,769	73,339	73,541	66,796	66,944	75,374	76,360	71,959

## % Range of Distribution

Count of Concentration										
% of Distribution	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	52%	54%	56%	55%	55%	53%	54%	58%	60%	60%
> .5 and <= 0.8	18%	18%	18%	18%	18%	18%	18%	18%	18%	18%
> .8 and <= 1.0	8%	8%	8%	8%	7%	8%	8%	7%	7%	7%
> 1.0 and <= 2.0	17%	16%	15%	15%	15%	16%	15%	13%	12%	12%
> 2.0	6%	5%	4%	4%	5%	5%	4%	3%	3%	3%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Gravimetric sampler data indicates:

- 2.6% of eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 15% of eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 22% of eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010
- 40% of eight hour single shift samples exceeded 0.5 mg/m<sup>3</sup> in 2010

# All Samples that Exceed Compliance Levels; Excluding Low-Weight Gain Samples

Count of Concentration Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	33,775	29,853	28,133	30,696	31,062	27,419	28,446	33,109	34,117	33,217
> .5 and <= 0.8	15,148	12,882	11,699	13,264	13,040	11,856	12,045	13,251	13,522	13,011
> .8 and <= 1.0	6,816	5,563	5,026	5,580	5,401	5,163	5,252	5,448	5,350	5,249
> 1.0 and <= 2.0	14,233	11,759	10,139	11,277	11,351	10,818	10,231	10,140	9,530	8,630
> 2.0	4,732	3,720	2,809	3,239	3,377	3,414	2,970	2,558	2,260	1,876
TOTAL	74,704	63,777	57,806	64,056	64,231	58,670	58,944	64,506	64,779	61,983

## % Range of Distribution

Count of Concentration % of Distribution	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	45%	47%	49%	48%	48%	47%	48%	51%	53%	54%
> .5 and <= 0.8	20%	20%	20%	21%	20%	20%	20%	21%	21%	21%
> .8 and <= 1.0	9%	9%	9%	9%	8%	9%	9%	8%	8%	8%
> 1.0 and <= 2.0	19%	18%	18%	18%	18%	18%	17%	16%	15%	14%
> 2.0	6%	6%	5%	5%	5%	6%	5%	4%	3%	3%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Low-weight gain samples, samples below 0.1 mg/m<sup>3</sup>, may be voided according to MSHA PIB NO. P10-06

Gravimetric sampler data indicates:

- 3.0% of eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 17% of eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 25% of eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010
- 46% of eight hour single shift samples exceeded 0.5 mg/m<sup>3</sup> in 2010

# Distribution of All DO Samples

Count of Concentration Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .1	2,583	2,360	2,253	2,106	2,229	1,978	1,772	2,374	1,765	1,338
> .1 and <= .5	9,511	9,430	9,290	9,763	10,018	10,042	10,371	11,196	11,182	11,787
> .5 and <= .8	5,788	5,474	5,280	5,774	5,790	5,620	5,774	6,068	6,562	6,491
> .8 and <= .9	1,574	1,399	1,317	1,466	1,374	1,445	1,486	1,582	1,566	1,574
> .9 and <= 1.0	1,417	1,248	1,153	1,233	1,273	1,253	1,293	1,282	1,271	1,372
> 1.0 and <= 1.1	1,252	1,063	1,016	1,095	1,188	1,054	1,128	1,099	1,082	1,083
> 1.1 and <= 1.2	1,162	1,007	876	989	971	1,020	916	931	927	939
> 1.2 and <= 1.3	1,009	878	765	880	864	856	858	853	807	740
> 1.3 and <= 1.4	817	733	651	759	697	741	719	724	691	555
> 1.4 and <= 1.5	757	643	617	645	647	623	632	603	589	478
> 1.5 and <= 1.6	704	551	476	541	560	581	518	505	469	426
> 1.6 and <= 1.7	562	489	418	484	483	520	462	409	404	342
> 1.7 and <= 1.8	513	449	353	395	444	413	346	355	321	286
> 1.8 and <= 1.9	454	381	328	339	358	402	314	295	240	237
> 1.9 and <= 2.0	376	316	286	313	314	329	270	250	220	206
> 2.0 and <= 2.1	306	299	231	266	256	260	245	235	185	181
> 2.1 and <= 2.2	298	236	209	230	230	225	194	181	159	109
> 2.2	2,523	2,016	1,574	1,791	1,885	2,034	1,670	1,378	1,294	1,059
<b>TOTAL</b>	<b>31,606</b>	<b>28,972</b>	<b>27,093</b>	<b>29,069</b>	<b>29,581</b>	<b>29,396</b>	<b>28,968</b>	<b>30,320</b>	<b>29,734</b>	<b>29,203</b>

- 1,349 eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 6,641 eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 9,587 eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010

# All DO Samples that Exceed Compliance Levels

Count of Concentration										
Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	12,094	11,790	11,543	11,869	12,247	12,020	12,143	13,570	12,947	13,125
> .5 and <= 0.8	5,788	5,474	5,280	5,774	5,790	5,620	5,774	6,068	6,562	6,491
> .8 and <= 1.0	2,991	2,647	2,470	2,699	2,647	2,698	2,779	2,864	2,837	2,946
> 1.0 and <= 2.0	7,606	6,510	5,786	6,440	6,526	6,539	6,163	6,024	5,750	5,292
> 2.0	3,127	2,551	2,014	2,287	2,371	2,519	2,109	1,794	1,638	1,349
TOTAL	31,606	28,972	27,093	29,069	29,581	29,396	28,968	30,320	29,734	29,203

## % Range of Distribution

Count of Concentration										
% of Distribution	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	38%	41%	43%	41%	41%	41%	42%	45%	44%	45%
> .5 and <= 0.8	18%	19%	19%	20%	20%	19%	20%	20%	22%	22%
> .8 and <= 1.0	9%	9%	9%	9%	9%	9%	10%	9%	10%	10%
> 1.0 and <= 2.0	24%	22%	21%	22%	22%	22%	21%	20%	19%	18%
> 2.0	10%	9%	7%	8%	8%	9%	7%	6%	6%	5%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Gravimetric sampler data indicates:

- 4.6% of eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 23% of eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 33% of eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010
- 55% of eight hour single shift samples exceeded 0.5 mg/m<sup>3</sup> in 2010

# All DO Samples that Exceed Compliance Levels; Excluding Low-Weight Gain Samples

Count of Concentration										
Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	9,511	9,430	9,290	9,763	10,018	10,042	10,371	11,196	11,182	11,787
> .5 and <= 0.8	5,788	5,474	5,280	5,774	5,790	5,620	5,774	6,068	6,562	6,491
> .8 and <= 1.0	2,991	2,647	2,470	2,699	2,647	2,698	2,779	2,864	2,837	2,946
> 1.0 and <= 2.0	7,606	6,510	5,786	6,440	6,526	6,539	6,163	6,024	5,750	5,292
> 2.0	3,127	2,551	2,014	2,287	2,371	2,519	2,109	1,794	1,638	1,349
TOTAL	29,023	26,612	24,840	26,963	27,352	27,418	27,196	27,946	27,969	27,865

## % Range of Distribution

Count of Concentration										
% of Distribution	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	33%	35%	37%	36%	37%	37%	38%	40%	40%	42%
> .5 and <= 0.8	20%	21%	21%	21%	21%	20%	21%	22%	23%	23%
> .8 and <= 1.0	10%	10%	10%	10%	10%	10%	10%	10%	10%	11%
> 1.0 and <= 2.0	26%	24%	23%	24%	24%	24%	23%	22%	21%	19%
> 2.0	11%	10%	8%	8%	9%	9%	8%	6%	6%	5%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Low-weight gain samples, samples below 0.1 mg/m<sup>3</sup>, may be voided according to MSHA PIB NO. P10-06

Gravimetric sampler data indicates:

- 4.8% of eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 24% of eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 35% of eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010
- 58% of eight hour single shift samples exceeded 0.5 mg/m<sup>3</sup> in 2010

# Distribution of All DO and ODO Samples

Count of Concentration Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .1	2,982	2,766	2,640	2,539	2,630	2,237	1,970	2,670	2,080	1,617
> .1 and <= .5	14,623	13,954	13,798	15,084	15,592	14,074	14,402	16,297	16,923	17,543
> .5 and <= .8	8,672	7,829	7,482	8,623	8,633	7,880	8,125	8,867	9,351	9,174
> .8 and <= .9	2,265	1,895	1,824	2,110	1,986	2,022	2,111	2,243	2,161	2,143
> .9 and <= 1.0	1,961	1,697	1,524	1,779	1,794	1,741	1,739	1,774	1,754	1,808
> 1.0 and <= 1.1	1,681	1,407	1,306	1,492	1,616	1,426	1,504	1,527	1,470	1,385
> 1.1 and <= 1.2	1,479	1,264	1,110	1,351	1,344	1,361	1,215	1,279	1,210	1,226
> 1.2 and <= 1.3	1,280	1,060	942	1,169	1,156	1,099	1,134	1,113	1,040	958
> 1.3 and <= 1.4	1,034	898	776	983	939	948	929	926	896	724
> 1.4 and <= 1.5	918	759	695	825	823	809	808	757	717	606
> 1.5 and <= 1.6	824	664	552	672	719	705	645	631	582	534
> 1.6 and <= 1.7	637	548	474	610	640	610	565	509	488	413
> 1.7 and <= 1.8	579	541	379	488	558	514	442	439	397	349
> 1.8 and <= 1.9	500	428	335	390	455	477	403	370	285	290
> 1.9 and <= 2.0	418	342	305	374	386	399	321	299	266	240
> 2.0 and <= 2.1	343	313	246	317	308	306	296	291	216	217
> 2.1 and <= 2.2	311	264	229	262	269	261	232	214	190	131
> 2.2	2,698	2,101	1,602	1,951	2,118	2,239	1,907	1,582	1,435	1,162
<b>TOTAL</b>	<b>43,205</b>	<b>38,730</b>	<b>36,219</b>	<b>41,019</b>	<b>41,966</b>	<b>39,108</b>	<b>38,748</b>	<b>41,788</b>	<b>41,461</b>	<b>40,520</b>

Occupation codes 13, 14, 36, 38, 39, 41, 44, 46, 48, 50, 70, 72 and 73 used for this analysis

- 1,510 eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 8,235 eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 12,186 eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010

# All DO and ODO Samples that Exceed Compliance Levels

## Count of Concentration

Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	17,605	16,720	16,438	17,623	18,222	16,311	16,372	18,967	19,003	19,160
> .5 and <= 0.8	8,672	7,829	7,482	8,623	8,633	7,880	8,125	8,867	9,351	9,174
> .8 and <= 1.0	4,226	3,592	3,348	3,889	3,780	3,763	3,850	4,017	3,915	3,951
> 1.0 and <= 2.0	9,350	7,911	6,874	8,354	8,636	8,348	7,966	7,850	7,351	6,725
> 2.0	3,352	2,678	2,077	2,530	2,695	2,806	2,435	2,087	1,841	1,510
TOTAL	43,205	38,730	36,219	41,019	41,966	39,108	38,748	41,788	41,461	40,520

## % Range of Distribution

### Count of Concentration

% of Distribution	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	41%	43%	45%	43%	43%	42%	42%	45%	46%	47%
> .5 and <= 0.8	20%	20%	21%	21%	21%	20%	21%	21%	23%	23%
> .8 and <= 1.0	10%	9%	9%	9%	9%	10%	10%	10%	9%	9.8%
> 1.0 and <= 2.0	22%	20%	19%	20%	21%	21%	21%	19%	18%	16.6%
> 2.0	8%	7%	6%	6%	6%	7%	6%	5%	4%	3.7%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Gravimetric sampler data indicates:

- 3.7% of eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 20% of eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 30% of eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010
- 53% of eight hour single shift samples exceeded 0.5 mg/m<sup>3</sup> in 2010

# All DO and ODO Samples that Exceed Compliance Levels; Excluding Low-Weight Gain Samples

Count of Concentration										
Distribution Range	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	14,623	13,954	13,798	15,084	15,592	14,074	14,402	16,297	16,923	17,543
> .5 and <= 0.8	8,672	7,829	7,482	8,623	8,633	7,880	8,125	8,867	9,351	9,174
> .8 and <= 1.0	4,226	3,592	3,348	3,889	3,780	3,763	3,850	4,017	3,915	3,951
> 1.0 and <= 2.0	9,350	7,911	6,874	8,354	8,636	8,348	7,966	7,850	7,351	6,725
> 2.0	3,352	2,678	2,077	2,530	2,695	2,806	2,435	2,087	1,841	1,510
TOTAL	40,223	35,964	33,579	38,480	39,336	36,871	36,778	39,118	39,381	38,903

## % Range of Distribution

Count of Concentration										
% of Distribution	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
<= .5	36%	39%	41%	39%	40%	38%	39%	42%	43%	45%
> .5 and <= 0.8	22%	22%	22%	22%	22%	21%	22%	23%	24%	24%
> .8 and <= 1.0	11%	10%	10%	10%	10%	10%	10%	10%	10%	10%
> 1.0 and <= 2.0	23%	22%	20%	22%	22%	23%	22%	20%	19%	17%
> 2.0	8%	7%	6%	7%	7%	8%	7%	5%	5%	4%
TOTAL	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Low-weight gain samples, samples below 0.1 mg/m<sup>3</sup>, may be voided according to MSHA PIB NO. P10-06

Gravimetric sampler data indicates:

- 3.9% of eight hour single shift samples exceeded 2.0 mg/m<sup>3</sup> in 2010
- 21% of eight hour single shift samples exceeded 1.0 mg/m<sup>3</sup> in 2010
- 31% of eight hour single shift samples exceeded 0.8 mg/m<sup>3</sup> in 2010
- 55% of eight hour single shift samples exceeded 0.5 mg/m<sup>3</sup> in 2010

# Annual Estimate of DO Samples Under Proposed Rule

2010 Actual	Proposed Rule	% Increase	Description
	568,400		Total # of DO and Part 90 samples, from PREA pg 127
	42,250		Total # of Part 90 samples; 169 Part 90 miners, 250 shifts
27,865	526,150	1888%	Total # of DO Samples (Annual); Excluding Low-Weight Gain
	10.00		Run-Hrs Per Shift (Estimate)
	1.00		Proposed Standard (mg / m <sup>3</sup> )
	0.80		Reduced Standard Due to Shift Length (mg / m <sup>3</sup> )
34.4%	34.4%		% of Samples Above 0.8 mg/m <sup>3</sup> (Nationwide)
9,587	181,023	1888%	# of Samples Above 0.8 mg/m <sup>3</sup> (Nationwide)

Estimate based on 2010 results:

- 526,150 annual DO samples required
- 181,023 violations would be assessed for DO's

# Annual Estimate of ODO Samples Under Proposed Rule

2010 Actual	Proposed Rule	% Increase	Description
	215,432		Total # of ODO samples, from PREA pg 127
11,038	215,432	1952%	Total # of ODO Samples (Annual); Excluding Low-Weight Gain
	10.00		Run-Hrs Per Shift (Estimate)
	1.00		Proposed Standard (mg / m <sup>3</sup> )
	0.80		Reduced Standard Due to Shift Length (mg / m <sup>3</sup> )
23.5%	23.5%		% of Samples Above 0.8 mg/m <sup>3</sup> (Nationwide)
2,599	50,725	1952%	# of Samples Above 0.8 mg/m <sup>3</sup> (Nationwide)

Estimate based on 2010 results:

- 215,432 annual ODO samples required
- 50,725 violations would be assessed for ODO's

## Estimate of Samples Above Proposed Limit, Based on 2010 Compliance Sampling

- 40,520 eight hour single shift samples in 2010 for DO and ODO occupations
- 1510 of those samples exceeded the 2.0 mg/m<sup>3</sup> standard
- 133 total dust violations assessed by MSHA in 2010; 70.100(a), 70.101 and 71.1 violations
- At least 27,500 total violations would be assessed annually for DO and ODO samples alone based on proposed single shift sampling frequency without adjusting for shift lengths or reducing compliance limits. (2.0 mg/m<sup>3</sup> standard)
- At least 51,000 total violations would be assessed annually for DO and ODO samples alone based on proposed single shift sampling adjusted for shift length without reducing compliance limits. (1.6 mg/m<sup>3</sup> standard)
- At least 220,000 violations would be assessed annually under the proposed rule for DO and ODO samples alone using the CPDM single shift sample and reduced limit proposal. (0.8 mg/m<sup>3</sup> standard)
- Each violation requires a plan change, a penalty, and likely will entail non operating time and production losses.
- No new technology has been identified to prevent or abate these new violations created by the proposed rule.

## **The Proposed Regulation Is Not Feasible**

- A proposed dust rule that would produce from 27,500 to 220,000 violations at US mines, instead of the 133 issued in 2010, can not be feasible.
- Each violation would require abatement, a penalty, mine plan amendments, and will likely result in mine interruptions until plan approvals can be obtained and abatement accomplished.
- By averaging results from the current dust sampling system, and not using the latest 2010 data base of single shift sample results to determine compliance impacts under the proposed system, MSHA improperly masked the feasibility of the rule.

# **The Proposed Rule Reduces Sample Accuracy, Increases False, Non-Compliance Results, And Does Not Meet Mine Act Single Sample Use Mandates**

- **The MSHA proposal mandates changes in the dust sampling system that increase inaccurate results and non compliance determinations, as shown by the data we will present next, from our own side by side sampling program. Among the changes to the current system, resulting from the new CPDM Sampler are:**
  - **A new cyclone (“HD”) is used to collect different “dust” particle size distributions than are collected with the current cyclone , and lab examinations to prevent contamination induced false results, such as oversized particles, will no longer be used due to the nature of the CPDM**
  - **An increased air flow rate (2.2L/min vs. 2L/min) is used to collect airborne dust into the CPDM.**
  - **An electronic vibration measurement is used by the CPDM to determine sample weight, eliminating lab procedures that use a National Standard to calibrate accurate weight scales.**
  - **A new conversion factor (1.05 CPDM vs 1.38 CMPDSU) is used to relate CPDM results to the British MRE sampler upon which US health based dust limits were based.**
  - **A new filter is used to collect CPDM dust without current lab procedures that analyze blank filters to prevent known filter contamination and variability from creating false weight readings.**
  - **Repeated, current lab quality control procedures, audits and checks to help reduce error are not employed for the instantaneous device which has proven highly likely to malfunction.**
  - **Lab examination to determine sample discoloration or other evidence of rock dust or other contaminants is eliminated, increasing probability of inaccurate measurements.**

**MSHA’s proposed single shift sample accuracy finding does not properly account for these and other changes in the proposed sampling system and their adverse impact on sample accuracy. NIOSH has not joined MSHA in this rulemaking to meet the statutory mandate that both agencies find and declare proposed single shift samples accurate.**

# Alliance CPDM Program

- **PERFORMANCE TESTING OF SAMPLER & ANALYSIS SYSTEMS**
  
- **CMDPSU**
  - **Gravimetric Sampling Device**
  
- **CPDM**
  - **Thermo Scientific Model 3600 Personal Dust Monitor (PDM)**

# Alliance CPDM Program

- **Date Range**
  - **10/2009 – 1/2011**
- **CPDMs Purchased**
  - **40; 1/3 of the 120 CPDM's currently in use by operators**
- **Number of Mines**
  - **6**
- **MSHA Districts**
  - **CO8 & C10**
- **Data Size**
  - **1,019 CPDM Samples**
  - **955 Samples with CMDPSU and CPDM Data**

# Alliance CPDM Program

## ➤ Training

- **Safety Department**
  - **On-site with Thermo Scientific (1 day)**
- **Equipment Operators**
  - **Pre-dust sampling meeting before every bimonthly cycle**
  - **Underground support as needed**

# Alliance CPDM Program

- **CPDMs sent off for Repair, in addition to in-house repairs:**
  - **Of 40 CPDMs, 14 (35.0%) have been sent back to the manufacturer in the last 10 months.**
  - **5 have been sent back multiple times.**
- **CPDM Instantaneous Errors**
  - **218 out of 1,019 (21.4%) had an instantaneous error displayed on the dust data card**
  - **63 (6.2%) showed multiple errors**
- **Diagnostic Failures**
  - **Produces no hard copy or electronic copy**
  - **Stops Sampling**
  - **Diagnostic failures are not included in this data due to lack of any supporting documentation**
  - **Intentional Manipulation by user can also create a Diagnostic Failure**

# Alliance CPDM Program

Date	Cass #	CMDPSU	CPDM	Difference	Abs. Difference	% Difference
6/3/2010	51091032	0.61	0.403	0.207	0.207	33.93%
7/21/2010	51079248	0.849	1.052	-0.203	0.203	23.91%
9/15/2010	51090008	1.049	2.038	-0.989	0.989	94.28%
9/28/2010	51087242	2.141	1.13	1.011	1.011	47.22%
10/8/2010	51094423	0.547	1.058	-0.511	0.511	93.42%
12/1/2010	510943391	1.216	0.710	0.506	0.506	41.61%
Average				0.035	0.571	55.73%

Due to + / - the average does not reflect the difference between individual CMDPSU and CPDM samples.

By taking the absolute value of the difference, a better measure of the variability in individual samples is given.

- **This is sample data taken from over 955 data points.**

# Alliance CPDM Results

- **Samples with both CMDPSU & CPDM**
  - **955**
- **Average CMDPSU Concentration**
  - **0.83 mg/m<sup>3</sup>**
- **Average CPDM Concentration**
  - **0.82 mg/m<sup>3</sup>**
- **Average Concentrations Mask Result Differences**
- **Range of Differences**
  - **-7.684 mg/m<sup>3</sup> to 2.481 mg/m<sup>3</sup>**
- **Average of Difference (mg/m<sup>3</sup>)**
  - **0.26 mg/m<sup>3</sup> = 31.3% (  $\frac{0.26 \text{ mg/m}^3}{0.83 \text{ mg/m}^3}$  )**
- **On Samples with Errors, Average of Difference (mg/m<sup>3</sup>)**
  - **0.32 mg/m<sup>3</sup> = 36.1% (  $\frac{0.32 \text{ mg/m}^3}{0.90 \text{ mg/m}^3}$  )**

# Alliance CPDM Results

- **Samples with both CMDPSU & CPDM where CPDM is less than 0.4.**
  - **128 (13.4% of samples)**
- **Average CMDPSU Concentration**
  - **0.53 mg/m<sup>3</sup>**
- **Average CPDM Concentration**
  - **0.31 mg/m<sup>3</sup>**
- **Average of Difference (mg/m<sup>3</sup>)**
  - **0.23 mg/m<sup>3</sup> = 43.4% (  $\frac{0.23 \text{ mg/m}^3}{0.53 \text{ mg/m}^3}$  )**
- **Range of Differences**
  - **-0.400 mg/m<sup>3</sup> to 1.372 mg/m<sup>3</sup>**

# Alliance CPDM Results

- **Samples with both CMDPSU & CPDM where CPDM readings are within highest 5% (>1.6)**
  - **47 samples**
- **Average CMDPSU Concentration**
  - **1.186 mg/m<sup>3</sup>**
- **Average CPDM Concentration**
  - **2.077 mg/m<sup>3</sup>**
- **Average of Difference (mg/m<sup>3</sup>)**
  - **0.98 mg/m<sup>3</sup> – 82.6% (  $\frac{0.98 \text{ mg/m}^3}{1.186 \text{ mg/m}^3}$  )**
- **Range of Differences**
  - **-7.684 mg/m<sup>3</sup> to 0.895 mg/m<sup>3</sup>**

# Alliance CPDM Results

- **Samples with both CMDPSU & CPDM where CPDM are between 0.8 mg/m<sup>3</sup> and 1.2 mg/m<sup>3</sup>.**
  - **252 samples**
- **Average CMDPSU Concentration**
  - **0.94 mg/m<sup>3</sup>**
- **Average CPDM Concentration**
  - **0.97 mg/m<sup>3</sup>**
- **Average of Difference (mg/m<sup>3</sup>)**
  - **0.20 mg/m<sup>3</sup> – 21.28% (  $\frac{0.20 \text{ mg/m}^3}{0.94 \text{ mg/m}^3}$  )**
- **Range of Differences**
  - **-0.686 mg/m<sup>3</sup> to 1.115 mg/m<sup>3</sup>**

# Alliance CPDM Results

- **NIOSH Accuracy Definition**
  - **Accurate within 25% of actual concentration 95% of the time**
  
- **Actual Performance Data**
  - **554 Samples (58%) within 25% of CMDPSU**
  - **401 Samples (42%) greater than 25% of CMDPSU**
  
- **CMDPSU and CPDM Fail NIOSH Accuracy Definition**
  
- **CMDPSU and CPDM Fail Common Definition of Accuracy And Can Not Meet The Mine Act's Required Finding Of Accurate Single Shift Sample Results**

# Alliance CPDM Results

## ➤ Distribution of Differences Between CMDPSU and CPDM (mg/m<sup>3</sup>) (955 samples)

Difference	Number of Samples (%)
$\leq 0.05 \text{ mg/m}^3$	188 (19.7%)
$> 0.05 \text{ mg/m}^3$ and $\leq 0.1 \text{ mg/m}^3$	167 (17.5%)
$> 0.1 \text{ mg/m}^3$ and $\leq 0.15 \text{ mg/m}^3$	136 (14.2%)
$> 0.15 \text{ mg/m}^3$ and $\leq 0.2 \text{ mg/m}^3$	90 (9.4%)
$> 0.2 \text{ mg/m}^3$ and $\leq 0.25 \text{ mg/m}^3$	68 (7.1%)
$> 0.25 \text{ mg/m}^3$	306 (32.0%)

# Alliance CPDM Results

## ➤ Distribution of Differences Between CMDPSU and CPDM (%) (955 samples)

Difference	Number of Samples (%)
<= 5%	138 (14.5%)
> 5% and <= 10%	123 (12.9%)
> 10% and <= 15%	122 (12.8%)
> 15% and <= 20%	96 (10.1%)
> 20% and <= 25%	75 (7.9%)
> 25%	401 (42.0%)

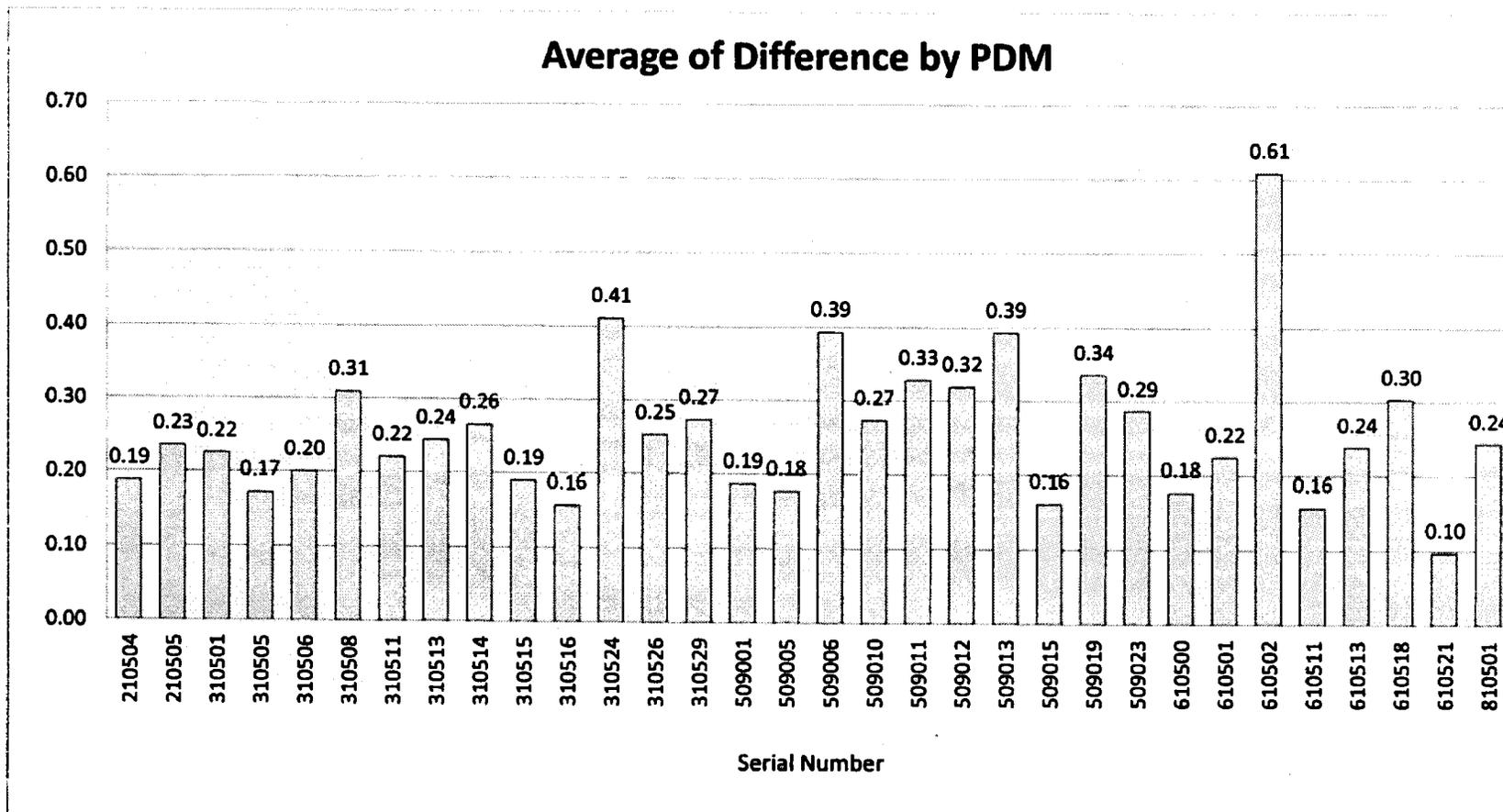
# Alliance CPDM Results

## ➤ Distribution of Differences Between CMDPSU and CPDM (mg/m<sup>3</sup>) (955 samples)

All Samples	CPDM / CMDPSU	Avg. CMDPSU	Avg. CPDM	Count
Mine 1	1.27	0.81	0.94	272
Mine 2	0.92	0.90	0.83	40
Mine 3	1.30	0.93	1.11	33
Mine 4	1.08	1.00	1.02	157
Mine 5 – 9 Seam	.96	0.85	0.77	54
Mine 5 – 11 Seam	1.62	0.70	0.88	58
Mine 6 - 9 Seam	0.92	0.82	0.65	180
Mine 6 - 11 Seam	0.77	0.73	0.52	161

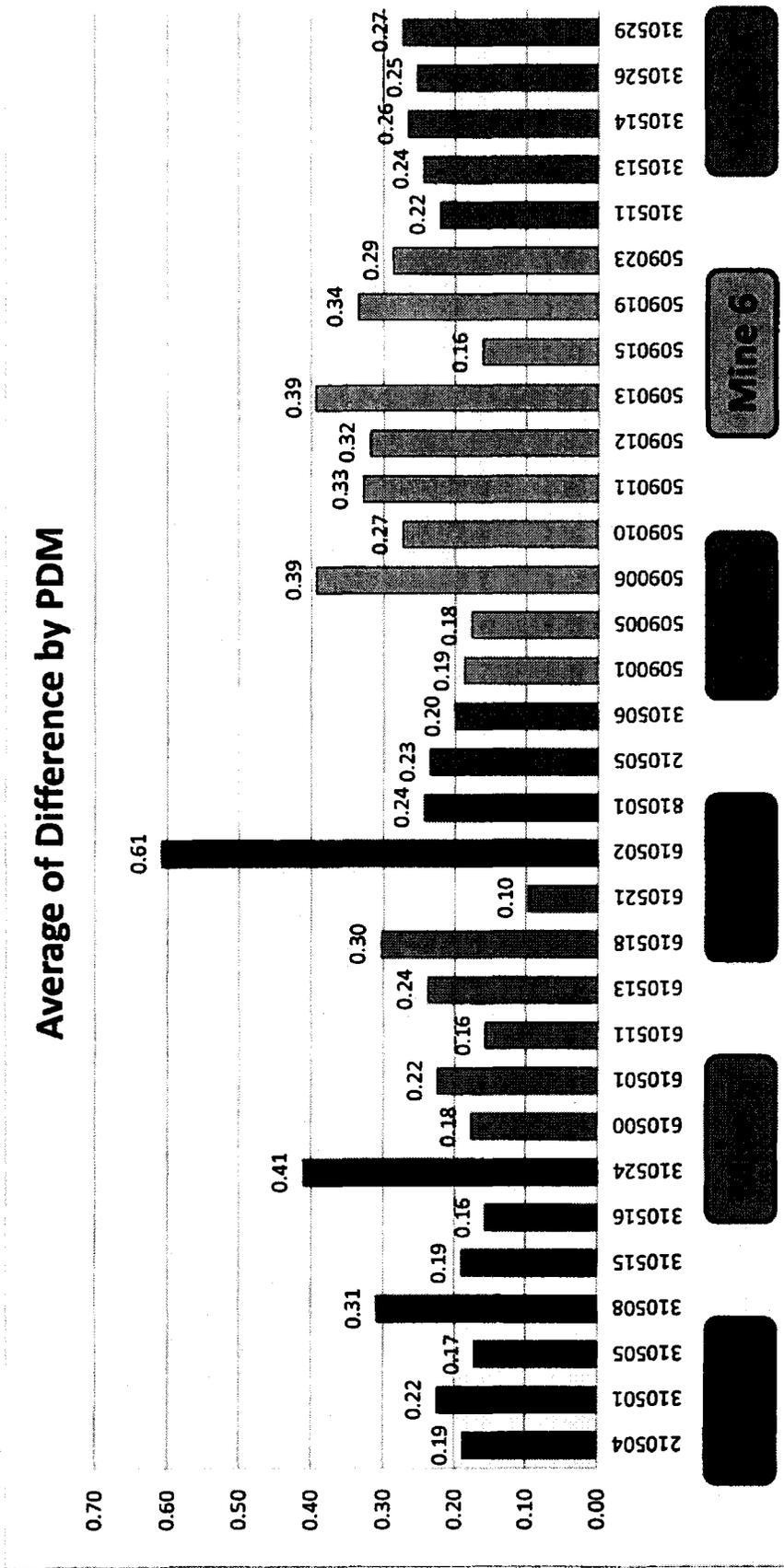
# Alliance CPDM Results

## ➤ Average of Differences by CPDM (mg/m<sup>3</sup>)



# Alliance CPDM Results

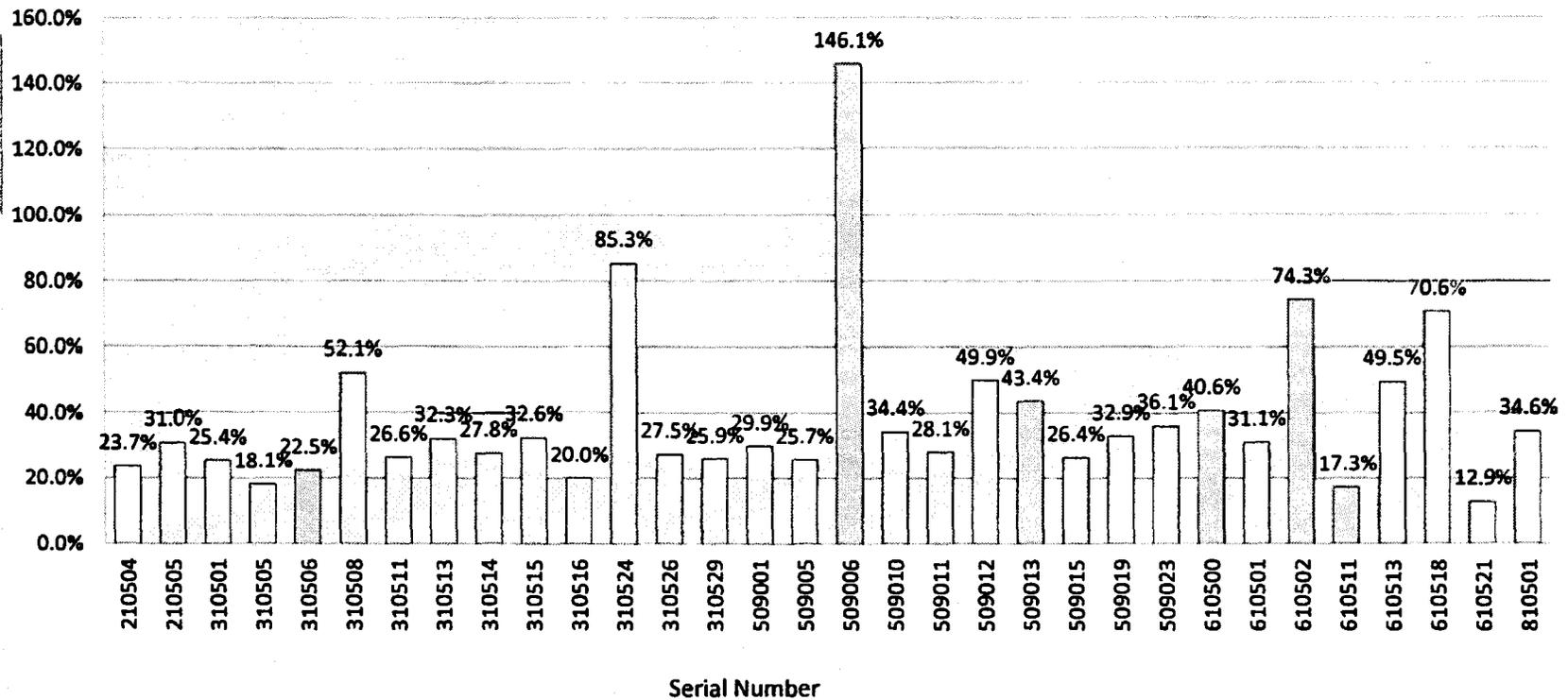
## ➤ Average of Differences by CPDM (mg/m<sup>3</sup>)



# Alliance CPDM Results

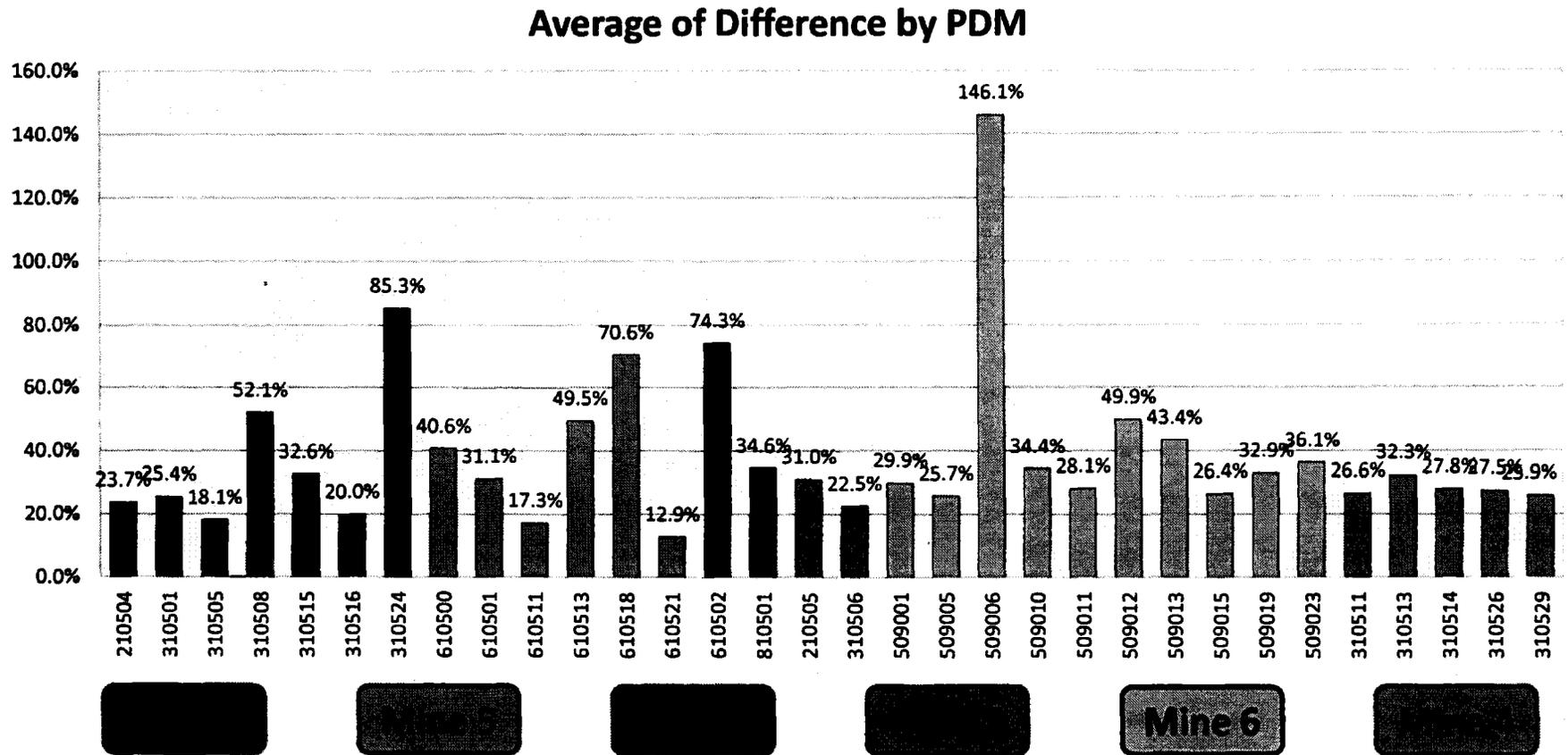
## ➤ Average of Differences by CPDM (%)

### Average of Difference by PDM



# Alliance CPDM Results

## ➤ Average of Differences by CPDM (%)



## Alliance CPDM Results

- **Distribution of Differences Between CMDPSU and CPDM (mg/m<sup>3</sup>) (955 samples)**

Difference	Number of Samples (%)
CPDM > CMDPSU	396 (41.5%)
CMDPSU > CPDM	555 (58.1%)
CMDPSU = CPDM	4 (0.4%)
> 0.25 mg/m <sup>3</sup>	306 (32.0%)

## Alliance CPDM Results

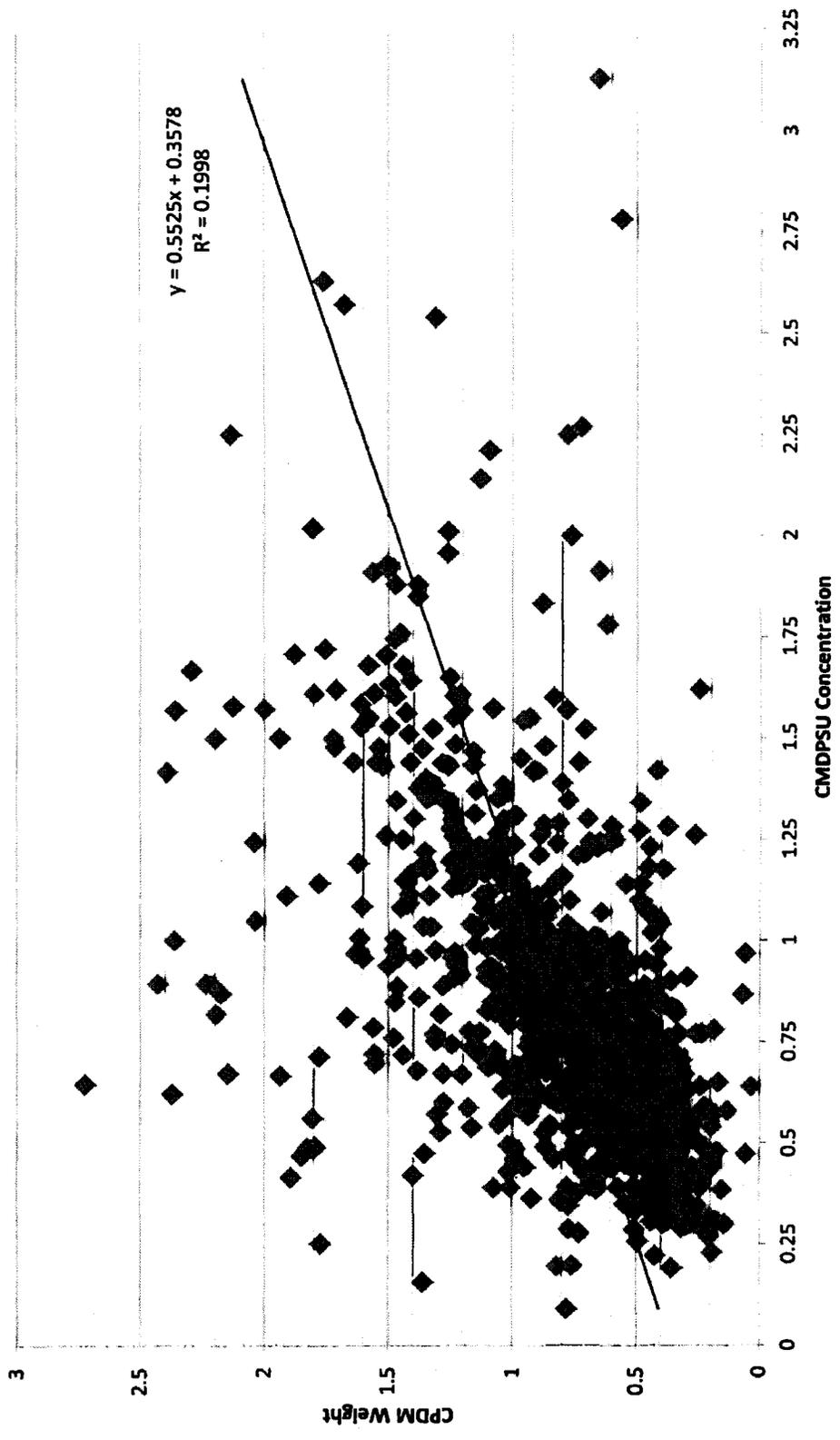
- **Samples with both CMDPSU & CPDM (955 samples)**

Concentration	Number of CPDM Samples (%)	Number of CMDPSU Samples (%)
≤ 0.8	551 (57.7%)	540 (56.5%)
> 0.8	404 (42.3%)	415 (43.5%)

Samples	Average (mg/m <sup>3</sup> )
CPDM	0.83
CMDPSU	0.82

- **\*\*\* Each of these mines operate on a 10-hr shift; therefore, the proposed standard is 0.80 mg/m<sup>3</sup>**

# Alliance CPDM Results



## **Alliance CPDM Results**

- **CPDM units do not produce reproducible, consistent, or precise results. Results are highly variable from unit to unit.**
- **CPDM results are highly variable from current gravimetric samplers and do not meet either the NIOSH accuracy definition or the accuracy mandated by congress.**
- **MSHA has not analyzed nor accounted for CPDM performance in making its determination of single shift sample accuracy, or in declaring the proposed rule feasible.**
- **CPDM performance results demonstrate that single shift samples are neither accurate nor precise, and that the proposed rule is not feasible.**

# Mine 6 CPDM Requirements

- **Mine 6 – 18 MMU's**
- ***Continuous mining section other than auger-type***
- **DO – 1 Continuous mining machine operator**
- **ODOs**
  - **1 roof bolter operator**
  - **2 shuttle car operators (blowing face)**
- **Assumptions**
  - **CPDM can only be used 1 shift per day**
  - **To meet ODO quarterly sampling, a minimum of 6 MMUs will be sampling ODOs simultaneously**
  - **50% extra CPDMs are needed to replace those having problems or being repaired**
  - **\$12,900 list price + \$2,875 (5 yr service plan) = \$15,775 per CPDM**

# Mine 6 CPDM Requirements

- **DOs**
  - **18 MMUs X 1 Operator X 2 Shifts**
  - **= 36 CPDMs**
- **ODOs**
  - **6 MMUs X 3 Operators X 2 Shifts**
  - **= 36 CPDMs**
- **36 + 36 + 50% Spare = 108 CPDMS**
- **108 CPDMS X \$15,775 = \$1.70 million**
- **Does not include any CPDMs for DAs or Intake Sampling**
- **Does not account for any ODO re-sampling (diagnostic failures, mechanical failures, etc.)**
- **Does not include any additional ODOs that may be required by District Manager (§70.208 (b) )**

## Mine 6 CPDM Requirements

- **Dust Technicians**
  - **Currently, 1 Technician per 10 CPDMs**
  - **108 CPDMs = 11 new Dust Technicians**
- **11 employees X \$100,000 = \$1.1 million / year**
- **Filters - \$130 for 20 or \$6.50 each**

# Mine 6 CPDM Requirements

## ➤ Upfront Cost

- 108 CPDMS X \$15,775 = \$1.70 million

## ➤ Annual Cost

- 11 employees X \$100,000 = \$1.1 million / year
- 14,688 samples X \$6.50 (filter) = \$95,472

## ➤ Estimated Mine 6 Administrative Costs

- Upfront – at least \$1.70 million
- Annual – at least \$1.1 million+ \$95,472 = \$1.195 million

# Mine 6 CPDM Requirements

- **Not included in annual administrative cost estimate**
  - **DA, intake or other mine specific sampling requirements**
  - **Plan submission**
  - **Training and certification costs**
  - **Record keeping and related equipment**
  - **Replacement of damaged equipment**
  - **Annual equipment maintenance costs**

# Mine 6 CPDM Requirements

- **DOs**
  - **36 Samples X 240 Days = 8,640 samples**
- **ODOs**
  - **18 MMUs X 3 Operators X 2 Shifts X 14 Days X 4 Quarters = 6,048**
- **8,640 + 6,048 = 14,688 samples / year**
  
- **Even at 96.0% compliance, Mine 6 will have 588 non-compliant samples which will result in on average 2 plan changes per day!**
- **Does not account for any ODO re-sampling**
- **Current nationwide dust compliance on an individual sample basis is 96.3% with 2.0 mg/m<sup>3</sup>**

## Mine 6 CPDM Requirements

- **Projected Non Compliance Assumptions**
  - **1 shift of production downtime for 1 MMU per plan change**
  - **588 plan changes per year**
  
- **Projected Non Compliance Costs**
  - **588 shifts X 1,000 tons/MMU = 588,000 saleable tons**
  - **588,000 saleable tons X \$51.38 / ton\***
  - = \$30.2 million**

\* U.S. DOE, EIA, "Annual Coal Report 2009," Table 28, October 2009

# Alliance CPDM Results

## ➤ Summary

- **CPDMs are beneficial for training and real time measurement of relative high and low dust concentrations.**
- **Niether CPDMs nor CMDPSU's are reliable, accurate or precise enough for single shift sample results or for compliance determinations.**
- **Multiple sample averages mask sample inaccuracy, variability and feasibility analysis. Single shift sample results demonstrate lack of accuracy and the proposed rule's lack of feasibility.**
- **The proposed rule has not been demonstrated to be technologically nor economically feasible, given the actual performance of the CPDM and CMDPSU or its use for single shift sampling.**