

Table 1: Worker Time and Cost - Initial Exposure Assessment

Cost = Burden Hours* Wage Rate

Hours = (Affected Workers/WPA) * WT

Variables

Affected Workers = Number of workers undergoing exposure assessment

WPA = workers per area

IEA = # of initial exposure assessment samples

WT = hours of worker time

Wage Rate = \$ per hour

Table 1 : Worker Time and Cost - Initial Exposure Assessment

	Affected Workers [a]	WPA	IEA [a]	WT	Burden Hours (rounded)	Wage Rate	Item 12 Costs (rounded)
New							
General Industry	0	4	0	0.5	0	\$24.75	\$0
Construction	0	4	0	0.5	0	\$31.63	\$0
Existing							
General Industry	277,949	4	69,487	0.5	34,744	\$24.75	\$859,914
Construction	22,125	4	5,531	0.5	2,766	\$31.63	\$87,489
Total	300,074		75,018		37,510		\$947,403

[a] The number of workers undergoing exposure assessment is calculated differently for general industry and construction. For general industry, the number of affected workers is the number or workers at or above the action level. For the construction industry, the FEA assumes that 10 percent of at-risk construction workers will undergo initial exposure assessment.

Table 2: Contract Costs for Industrial Hygienist and Laboratory to Conduct Analysis - Initial Exposure Assessment

IHPBZ Cost = (GWIML + CWIM)/WPA * IHPBZ
 Direct Cost = (GWIM + CWIM)/WPA * LABSHP
 Total Cost = IHPBZ Cost + Direct Cost

Variables

GWIM = # of workers affected workers in general industry/maritime undergoing initial monitoring
 CWIM = # of workers affected workers in general industry/maritime undergoing initial monitoring
 WPA = workers per area

IHPBZ = direct cost per sample including outside contractor industrial hygienist (IH) fees and PBZ

LABSHP = direct cost per sample for lab fees and shipping

IHPBZ (Small)	\$1,250.00
IHPBZ (Medium)	\$416.67
IHPBZ (Large)	\$312.50
LABSHP	\$140.27

Table 2: Contract Costs for Industrial Hygienist and Laboratory to Conduct Analysis - Initial Exposure Assessment

	GIWIM	CWIM	Total	Workers per Area	Total EA Samples (rounded)	IHPBZ	IHPBZ Costs (Total EA Samples x IHPBZ)	LABSHP	Direct Costs per Sample	Total Costs (IHPBZ + LABSHP)
Small	82,499	7,659	90,158	4	22,539	\$1,250.00	\$28,173,750	\$140.27	\$3,161,546	\$31,335,296
Medium	176,401	12,627	189,029	4	47,257	\$416.67	\$19,690,574	\$140.27	\$6,628,739	\$26,319,313
Large	19,049	1,839	20,887	4	5,222	\$312.50	\$1,631,875	\$140.27	\$732,490	\$2,364,365
Total	277,949	22,125	300,074		75,018		\$49,496,199		\$10,522,775	\$60,018,974

Table 3: Worker Time and Cost - Periodic and Additional Exposure Assessment

$$\text{Hours} = ((\text{GIW} \geq \text{AL} - \text{GIW} > \text{PEL}) / \text{WPA} * \text{AAEA}) * \text{AEAF} * \text{WT}$$

$$\text{Hours} = ((\text{GIW} > \text{PEL} / \text{WPA}) * \text{AAEA} * \text{AEAF} * \text{WT})$$

$$\text{Hours} = (\text{CW} > \text{AL} < \text{PEL} / \text{WPA}) * \text{AAEA} * \text{AEAF} * \text{WT}$$

Variables

Affected Workers = Number of workers undergoing periodic and additional exposure assessment

GIW>=AL =# of workers at or above action level in general industry/maritime

GIW>PEL = # of respirator users above PEL in general industry/maritime

Semi-Annual Sampling = # of workers in construction that undergo semi-annual sampling

Quarterly Sampling = # of workers in construction that undergo quarterly sampling

WPA = workers per area

AAEA = # of annual exposure assessments per year

PEA = # of periodic exposure assessments

AEA = # of additional exposure assessments

AEAF = 1.15 additional exposure assessment factor (1 +.25)

PAEA = # of periodic and additional assessments; (PEA + AEA)

WT = hours of worker's time

Wage Rate = \$ per hour

Table 3: Worker Time and Cost - Periodic and Additional Exposure Assessment

	Affected Workers	Workers per Area	No. of Exposure Assessments (EA) [a]	AAEA	PEA	AEAF	AEA (PAEA - AEA)	PAEA (PEA * AEA)	Hours of Worker's Time	Burden Hours (rounded)	Wage Rate	Item 12 Costs (rounded)
<i>General Industry</i>												
(GIW>=AL - GIW>PEL)	110,388	4	27,597.11	2	55,194	1.25	13,798.50	68,992.50	0.5	34,496.00	\$24.75	\$853,776
GIW > PEL	31,206	4	7,801.39	4	31,206	1.25	7,802.00	39,008.00	0.5	19,504.00	\$24.75	\$482,724
Subtotal	141,594		35,398.50		86,400		21,600.50	108,000.50		54,000.00		\$1,336,500
<i>Construction</i>												
Semi-Annual Sampling	383	4	95.70	2	191	1.25	48.00	239.00	0.5	120.00	\$31.63	\$3,796
Quarterly Sampling	12,099	4	3,024.84	4	12,099	1.25	3,025.00	15,124.00	0.5	7,562.00	\$31.63	\$239,186
Subtotal	12,482		3,120.53		12,290		3,073.00	15,363.00		7,682.00		\$242,982
Total					98,690	-	24,673.50	123,363.50	-	61,682.00	-	\$1,579,482

[a] The FEA assumes that construction workers in compliance with initial monitoring (Table 1) will not undergo periodic monitoring. Periodic monitoring only applies to abrasive blasters and tunnel worker in the construction industry.

Table 4: Contract Costs for Industrial Hygienist and Laboratory To Perform Assessment - Periodic and Additional Exposure Assessment

Cost = (GIW>AL - GIW>PEL / WPA * AEA * AEA * IHPBZ * LABSHIP)
 Cost = (GIW>PEL / WPA * AEA * AEA * IHPBZ * LABSHIP)
 Cost = (CW>AL<PEL / WPA * AEA * AEA * IHPBZ * LABSHIP)
 Cost = (HFW>AL - HFW>PEL / WPA * AEA * AEA * IHPBZ * LABSHIP)
 Cost = (HFW>PEL / WPA * AEA * AEA * IHPBZ * LABSHIP)

Variables

GIW>AL = # of workers at or above the action level in general industry/maritime
 GIW>PEL = # of respirator users (above PEL) in general industry/maritime
 CW>AL = # of workers at or above the action level in construction
 CW>PEL = # of respirator users (above PEL) in construction
 HFW>AL = # of workers at or above the action level in hydraulic fracturing
 HFW>PEL = # of respirator users (above PEL) in hydraulic fracturing
 WPA = workers per area
 AAEA = # of annual exposure assessments

AEA = 1.25 additional exposure assessment factor (1 +.25)
 IHPBZ = direct cost per sample including outside contractor industrial hygienist (IH) fees and PBZ

LABSHP = direct cost per sample for lab fees and shipping

	Construction and Hydraulic Fracturing	General Industry
IHPBZ (Small)	\$1,250.00	\$625.00
IHPBZ (Medium)	\$416.67	\$208.33
IHPBZ (Large)	\$312.50	\$156.25
LABSHP	\$140.27	\$0.00

Table 4: Contract Costs for Industrial Hygienist and Laboratory To Perform Assessment - Periodic and Additional Exposure Assessment

Workers		Worker per Area	No. of Exposure Assessments (EA) (rounded)	AAEA	Total Periodic EA	AEA	Total EA Samples (rounded)	IHPBZ	IHPBZ Costs (rounded)	LABSHP	LABSHP Costs (Total EA Samples x LABSHP) (rounded)		
General Industry													
General Industry (excluding hydraulic fracturing) Above AL and Below PEL = (GIW> AL - GIW>PEL)													
	GI > AL	GI > PEL	GIW>AL - GIW>PEL										
Small	36,526	5,409	31,117	4	7,779	2	15,558	1.25	19,448	\$625.00	\$12,155,000	\$0.00	\$0
Medium	81,149	13,338	67,812	4	16,953	2	33,906	1.25	42,383	\$208.33	\$8,829,792	\$0.00	\$0
Large	10,100	1,252	8,848	4	2,212	2	4,424	1.25	5,530	\$156.25	\$864,063	\$0.00	\$0
Sub-total	127,776	19,998	107,777		26,944		53,888	1.25	67,361		\$21,848,855		\$0
General Industry (excluding hydraulic fracturing) Above PEL (GIW>PEL)													

Small	N/A	5,409		4	1,352	4	5,408	1.25	6,760	\$625.00	\$4,225,000	\$0.00	\$0
Medium	N/A	13,338		4	3,334	4	13,336	1.25	16,670	\$208.33	\$3,472,917	\$0.00	\$0
Large	N/A	1,252		4	313	4	1,252	1.25	1,565	\$156.25	\$244,531	\$0.00	\$0
Sub-total		19,998			4,999		19,996	1.25	24,995		\$7,942,448		\$0
Hydraulic Fracturing Above AL and Below PEL = (HFW> AL - HFW>PEL)													
	HFW > AL	HFW > PEL	HFW> AL - HFW>PEL										
Small	1,060	860	200	4	50	2	100	1.25	125	\$1,250.00	\$156,250	\$140.27	\$17,534
Medium	12,758	10,347	2,411	4	603	2	1,206	1.25	1,508	\$416.67	\$628,338	\$140.27	\$211,527
Large	0	0	0	4	0	2	0	1.25	0	\$312.50	\$0	\$140.27	\$0
Sub-total	13,819	11,207	2,611		653		1,306	1.25	1,633		\$784,588		\$229,061
Hydraulic Fracturing Above PEL (HFW>PEL)													
Small	N/A	860		4	215	4	860	1.25	1,075	\$1,250.00	\$1,343,750	\$140.27	\$150,790
Medium	N/A	10,347		4	2,587	4	10,348	1.25	12,935	\$416.67	\$5,389,626	\$140.27	\$1,814,392
Large	N/A	0		4	0	4	0	1.25	0	\$312.50	\$0	\$140.27	\$0
Sub-total		11,207			2,802		11,208	1.25	14,010		\$6,733,376		\$1,965,182
Construction Industry													
Construction Industry Undergoing Semi-Annual Sampling													
			Affected Workers										
Small			59	4	15	2	30	1.25	38	\$1,250.00	\$47,500	\$140.27	\$5,330
Medium			279	4	70	2	140	1.25	175	\$416.67	\$72,917	\$140.27	\$24,547
Large			45	4	11	2	22	1.25	28	\$312.50	\$8,750	\$140.27	\$3,928
Sub-total			383		96		192	1.25	241		\$129,167		\$33,805
Construction Industry Undergoing Quarterly Sampling													
			Affected Workers										
Small			5,712	4	1,428	4	5,712	1.25	7,140	\$1,250.00	\$8,925,000	\$140.27	\$1,001,528
Medium			5,856	4	1,464	4	5,856	1.25	7,320	\$416.67	\$3,050,024	\$140.27	\$1,026,776
Large			531	4	133	4	532	1.25	665	\$312.50	\$207,813	\$140.27	\$93,280
Sub-total			12,099		3,025		12,100		15,125		\$12,182,837		\$2,121,584
Total	141,594	62,411	122,871		38,519		98,690		123,365		\$49,621,271		\$4,349,632

Table 5: Human Resources Manager Time to Notify Workers of Exposure Assessment Results

Cost = Burden Hours* Wage Rate

Hours = (IEA + PAEA) * HRT

Variables

IEA = # of initial exposure assessments

PAEA = # of periodic and additional exposure assessments

EA = total number of exposure assessments

HRT = hours of human resources manager time to prepare noti 0.25

Wage Rate = \$ per hour

Table 5: Human Resources Manager Time to Notify Workers of Exposure Assessment Results

	IEA	PAEA	EA (IEA + PAEA)	HRT	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
General Industry	69,487	108,001	177,488	0.25	44,372	\$74.97	\$3,326,569
Construction	5,531	15,363	20,894	0.25	5,224	\$74.26	\$387,934
Total	75,018	123,364	198,382		49,596		\$3,714,503

Table 6: Supervisor Time and Cost, Development of Written Exposure Control Plan

Cost = Burden Hours* Wage Rate

Hours = (GIW * ST)

Hours = (CONSFTE * ST)

Variables

GIW = # of affected establishments in general industry

CONSFTE = # of affected establishments in construction

ST = hours of supervisor's time to develop plan

Wage Rate = \$ per hour

Table 6: Supervisor Time and Cost, Development of Written Exposure Control Plan

	Number Affected Establishments/ Written Plans (rounded)	ST	Burden Hours	Wage Rate	Item Cost (rounded)
<i>GIW</i>					
Small	51,949	1	51,949	\$40.38	\$2,097,701
Medium	23,933	4	95,732	\$40.38	\$3,865,658
Large	641	16	10,256	\$40.38	\$414,137
Subtotal	76,523	NA	157,937	NA	\$6,377,496
<i>CONSFTE</i>					
Small	545,417	1	545,417	\$44.04	\$24,020,165
Medium	59,743	4	238,972	\$44.04	\$10,524,327
Large	560	16	8,960	\$44.04	\$394,598
Subtotal	605,720	NA	793,349	NA	\$34,939,090
TOTAL	682,243	NA	951,286	NA	\$41,316,586

Table 7: Supervisor Time and Cost, Review and Update of Written Exposure Control Plan

Cost = Burden Hours* Wage Rate

Hours = (GIW * ST)

Hours = (CONSFTE * ST)

Variables

GIW = # of affected establishments in general industry

CONSFTE = # of affected establishments in construction

ST = hours of supervisor's time to review, and update plan

Wage Rate = \$ per hour

Table 7: Supervisor Time and Cost, Review and Update of Written Exposure Control Plan

	Number Affected Establishments/ Written Plans (rounded)	ST	Burden Hours (rounded)	Wage Rate	Item Cost (rounded)
<i>GIW</i>					
Small	51,949	0.5	25,975.00	\$40.38	\$1,048,871
Medium	23,933	2	47,866.00	\$40.38	\$1,932,829
Large	641	8	5,128.00	\$40.38	\$207,069
Subtotal	76,523	NA	78,969.00	NA	\$3,188,769
<i>CONSFTE</i>					
Small	545,417	0.5	272,709.00	\$44.04	\$12,010,104
Medium	59,743	2	119,486.00	\$44.04	\$5,262,163
Large	560	8	4,480.00	\$44.04	\$197,299
Subtotal	605,720	NA	396,675.00	NA	\$17,469,566
TOTAL	682,243	NA	475,644.00	NA	\$20,658,335

Table 8: Supervisor Time and Cost, Implementation of Exposure Control Plan (Construction Only)

Cost = Burden Hours* Wage Rate

Hours = (CONSRU * ST * JPYR)

Variables

CONSRU = # of affected establishments in construction

ST = hours of supervisor's time to implement plan

Wage Rate = \$ per hour

JPYR = # of jobs per year (=150 working days per year/avg. job length of 10 days (15))

Table 8: Supervisor Time and Cost, Implementation of Written Exposure Control Plan

	Number of Affected Establishments/ Written Programs (rounded)	ST	JPYR	Burden Hours (rounded)	Wage Rate	Item Cost (rounded)
<i>CONSRU</i>						
Small	545,417	0.30	15	2,454,377.00	\$44.04	\$108,090,763
Medium	59,743	0.30	15	268,844.00	\$44.04	\$11,839,890
Large	560	0.30	15	2,520.00	\$44.04	\$110,981
Total	605,720	NA		2,725,741.00	NA	\$120,041,634

Table 8a - Supervisor Burden Hours and Costs to Make Written Exposure Control Plan Available to Employees and Designated Representatives

Source: FEA Table VII-5

Cost = Burden Hours* Wage Rate

Hours = ((Number of Affected Workers Exposed to Silica >= AL *10%) * ST)

Table 8a Supervisor Time and Cost, Make Written Exposure Control Plan Available

	Action Level (> 25 ug/m3)	Between Action Level and PEL (> 25 and < 50 ug/m3)	Above PEL (> 50 ug/m3)	Number of Affected Workers Exposed to Silica > =AL	10% estimate	ST	Burden Hours	Wage Rate	
General Industry	37,586	31,318	6,269	152,263	15,226	0.08	1,218	\$40.38	\$49,183
Construction	426,585	99,372	327,213	1,096,986	109,699	0.08	8,776	\$44.04	\$386,495
Total				1,249,249	124,925		9,994		\$435,678

Table 9: Administrative Burden Arising from Creating and Submitting the Air Quality Permit Notification in Case of Engineering Control Modifications

Burden Hours = Affected ESTB * HRT

Cost = Burden Hours* Wage Rate

Variables

Affected ESTB = Establishments with engineering controls covered by air permits

HRT = hours human resources manager time

Wage Rate = \$ per hour

Table 9: Administrative burden arising from creating and submitting the air quality permit notification in case of engineering control modifications

	Affected ESTB (rounded)	HRT	Burden Hours	Wage Rate	Item 12 Cost (rounded)
General Industry					
Small/Medium (20 to 499)	15,960.00	20	319,200	\$74.97	\$23,930,424
Large (>500)	575.00	40	23,000	\$74.97	\$1,724,310
Total	16,535.00		342,200		\$25,654,734

Table 10: Human Resources Manager Time and Cost to Establish and Revise Respiratory Protection Plan - General Industry

Cost = Burden Hours* Wage Rate

Establish Program Hours = ESTB * PERCOMP * HRT

Revise Program Hours = ESTB * PERCOMP * UPDAT * HRT

Variables

ESTB = # of establishments with respirator users

PERCOMP = percentage of establishments without programs in compliance (50 %)

HRT = hours human resources manager time

UPDAT = percentage of establishments updating program after first year (20%)

Wage Rate = \$ per hour

Table 10: Human Resources Manager Time and Cost to Establish and Revise Respiratory Protection Plan - General Industry

New Programs	ESTB	PERCOMP	Programs	HRT	Burden Hours	Wage Rate	Item 12 Cost (rounded)
> 500 workers	209	50%	105	8	840	\$74.97	\$62,975
< 500 workers	6,038	50%	3,019	4	12,076	\$74.97	\$905,338
Total	6,247		3,124		12,916		\$968,313

Revise Program (After first year)	ESTB	PERCOMP	UPDAT	Programs (rounded)	HRT	Burden Hours	Wage Rate	Item 12 Cost (rounded)
> 500 workers	209	50%	20%	21	4	84	\$74.97	\$6,297
< 500 workers	6,038	50%	20%	604	2	1,208	\$74.97	\$90,564
Total	6,247			625		1,292		\$96,861

Table 10a: Human Resources Manager Time and Cost to Establish and Revise Respiratory Protection Plan - Hydraulic Fracturing

Cost = Burden Hours* Wage Rate

Establish Program Hours = ESTB * PERCOMP * HRT

Revise Program Hours = ESTB * PERCOMP * UPDAT * HRT

Variables

ESTB = # of establishments with respirator users

Program Costs, HF_Respirators, Respirator Unit Costs)

PERCOMP = percentage of establishments without programs in compliance

HRT = hours human resources manager time

UPDAT = percentage of establishments updating program after first year (20%)

Wage Rate = \$ per hour

Table 10a: Human Resources Manager Time and Cost to Establish and Revise Respiratory Protection Plan - Hydraulic Fracturing

New Programs	ESTB	PERCOMP	Programs	HRT	Burden Hours	Wage Rate	Item 12 Cost (rounded)
Large (500+)	0	5%	0.00	8	0	\$74.97	\$0
Medium (20-499)	2,587	20%	517.40	4	2,070	\$74.97	\$155,188
Small (<20)	430	30%	129.00	4	516	\$74.97	\$38,685
Total	3,017		646.40		2,586		\$193,873

Revise Program (After first year)	ESTB	PERCOMP	Programs	UPDAT	Programs (rounded)	HRT	Burden Hours	Wage Rate	Item 12 Cost (rounded)
Large (500+)	0	5%	0.00	20%	0	4	0	\$74.97	\$0
Medium (20-499)	2,587	20%	517.40	20%	103	2	206	\$74.97	\$15,444
Small (<20)	430	30%	129.00	20%	26	2	52	\$74.97	\$3,898
Total	3,017		646.40		129		258		\$19,342

Table 11: Human Resources Manger Time and Cost to Establish and Revise Respiratory Protection Plan - Construction

Cost = Burden Hours* Wage Rate

Establish Program Hours = ESTB * PERCOMP * HRT

Revise Program Hours = ESTB * PERCOMP * UPDAT * HRT

Variables

ESTB = # of establishments with respirator users

HRT = hours human resources manager time

PERCOMP = percentage of establishments without programs in compliance (44 %)

UPDAT = percentage of establishments updating program after first year (20%)

Wage Rate = \$ per hour

Table 11: Human Resources Manger Time and Cost to Establish and Revise Respiratory Protection Plan - Construction

	ESTB	PERCOMP	Programs (rounded)	HRT	Burden Hours	Wage Rate	Item 12 Cost (rounded)
>500 workers	3,994	44%	1,757	8	14,056	\$74.26	\$1,043,799
<500 workers	82,993	44%	36,517	4	146,068	\$74.26	\$10,847,010
Total	86,987		38,274		160,124		\$11,890,809
Combined Totals (w/GI and HF) -->	96,251		42,044		175,626		\$13,052,995

Revise Program (After first year)

	ESTB	PERCOMP	UPDAT	Programs (rounded)	HRT	Burden hours	Wage Rate	Item 12 Cost
>500 workers	3,994	44%	20%	351	4	1,404	\$74.26	\$104,261
<500 workers	82,993	44%	20%	7,303	2	14,606	\$74.26	\$1,084,642
Total	86,987			7,654		16,010		\$1,188,903
Combined Totals (w/GI and HF) -->				8408		17560		\$1,305,106

Table 12: Supervisor and Worker Time and Cost to Complete Qualitative Fit-Testing

Cost = Burden Hours* Wage Rate

Hours = (RU * PERCOMP * WT)

Hours = (RU * PERCOMP * ST)

Variables

RU = # of respirator users

PERCOMP = percentage establishments without programs in compliance

WT = hours of worker time

ST = hours of supervisor time

Wage Rate = \$ per hour

Table 12: Supervisor and Worker Time and Cost to Complete Qualitative Fit-Testing

	RU	PERCOMP	Responses (rounded)	WT/ST	Burden Hours (rounded)	Wage Rate	Item 12 Costs (rounded)
<i>General Industry</i>							
Worker	31,206	100%	31,206	1	31,206	\$24.75	\$772,349
Supervisor	31,206	100%	31,206	0.25	7,802	\$40.38	\$315,045
Total	62,412		62,412		39,008		\$1,087,394
<i>Construction</i>							
Worker	264,761	100%	264,761	1	264,761	\$31.63	\$8,374,390
Supervisor	264,761	100%	264,761	0.25	66,190	\$44.04	\$2,915,008
Total	529,523		529,522		330,951		\$11,289,398
Combined Totals	591,935		591,934		369,959		\$12,376,792
Number of Fit-Tests	295,967						

Table 13: Medical Surveillance, Worker Time and Cost to Complete Initial Medical Examination, Existing Workers

Cost = Burden Hours* Wage Rate

Hours = Affected Workers * PERHSCR * (EXAM + TRVL)

Table 13

Affected Workers = Number of Workers undergoing medical surveillance

PERHSCR = percentage of medical examinations (on-site or off-site)

INIT-EXST = # of existing workers completing initial medical examination

EXAM = hours of worker time to complete initial medical examination (2 hours), including:

- complete occupational health history survey, including medical questionnaire for respirator use*
- physical examination by knowledgeable HCP, including follow-up evaluation for respirator use, if needed*
- chest x-ray*
- pulmonary function test*
- dermal TB test*
- other necessary tests*

TRVL = hours of worker travel time to off-site location

Wage Rate = \$ per hour

Table 13: Medical Surveillance, Worker Time and Cost to Complete Initial Medical Examination, Existing Workers

	Affected Workers [a]	PERHSCR	INIT-EXST (rounded)	EXAM	TRVL	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>General Industry</i>								
(On-site)								
Small	37,586	20%	7,517	2	0	15,034	\$24.75	\$372,092
Medium	93,908	75%	70,431	2	0	140,862	\$24.75	\$3,486,335
Large	10,100	100%	10,100	2	0	20,200	\$24.75	\$499,950
			88,048			176,096		\$4,358,377
<i>General Industry</i>								
(Off-site)								
Small	37,586	80%	30,069	2	1	90,207	\$24.75	\$2,232,623
Medium	93,908	25%	23,477	2	1	70,431	\$24.75	\$1,743,167
Large	10,100	0%	0	2	1	0	\$24.75	\$0
			53,546			160,638		\$3,975,790

	Subtotal General Industry -->		141,594			336,734		\$8,334,167
<i>Construction</i>								
(On-site)								
Small	93,999	20%	18,800	2	0	37,600	\$31.63	\$1,189,288
Medium	152,377	75%	114,283	2	0	228,566	\$31.63	\$7,229,543
Large	24,205	100%	24,205	2	0	48,410	\$31.63	\$1,531,208
			157,288			314,576		\$9,950,039
<i>Construction</i>								
(Off-site)								
Small	93,999	80%	75,199	2	1.5	263,197	\$31.63	\$8,324,921
Medium	152,377	25%	38,094	2	1.5	133,329	\$31.63	\$4,217,196
Large	24,205	0%	0	2	1.5	0	\$31.63	\$0
			113,293			396,526		\$12,542,117
	Subtotal Construction -->		270,581			711,102		\$22,492,156
	Total -->		412,175			1,047,836		\$30,826,323

[a] Number of Workers undergoing medical surveillance is based on different values for general industry and construction. General industry workers is based on workers with an action level greater than 25, and the number of workers in the construction industry is based on the number of respirator users.

Table 14 - Medical Surveillance, Worker Time and Cost for Complete Initial Medical Examination, New Workers

Cost = Burden Hours* Wage Rate

Hours = (Affected Workers * SEP * PERNEW) * (PERHSCR * (EXAM + TRVL))

Variables

Affected Workers = Number of Workers undergoing medical surveillance

SEP = separations rate (layoffs, quits and retirements)

PERNEW = percentage of new workers requiring initial medical examination

PERHSCR = percentage of medical examinations (onsite or offsite)

INIT-NEW = # of new workers completing initial medical examination

EXAM = hours of worker time to complete initial medical examination (2 hours), including:

complete occupational health history survey, including medical questionnaire for respirator use

physical examination by knowledgeable HCP, including follow-up evaluation for respirator use, if needed

chest x-ray

pulmonary function test

dermal TB test

other necessary tests

TRVL = hours of worker travel time to off-site location

Wage Rate = \$ per hour

Table 14 - Medical Surveillance, Worker Time and Cost for Complete Initial Medical Examination, New Workers

	Affected Workers [a]	SEP	PERNEW	Workers*SEP* PERNEW (rounded)	PERHSCR	INIT-NEW (rounded)	EXAM	TRVL	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
General Industry											
(On-site)											
Small	37,586	25%	75%	7,047	10%	705	2	0	1,410	\$24.75	\$34,898
Medium	93,908	25%	75%	17,608	50%	8,804	2	0	17,608	\$24.75	\$435,798
Large	10,100	25%	75%	1,894	90%	1,705	2	0	3,410	\$24.75	\$84,398
									22,428		\$555,094
General Industry											
(Off-site)											
Small	37,586	25%	75%	7,047	90%	6,342	2	1	19,026	\$24.75	\$470,894
Medium	93,908	25%	75%	17,608	50%	8,804	2	1	26,412	\$24.75	\$653,697
Large	10,100	25%	75%	1,894	10%	189	2	1	567	\$24.75	\$14,033
									46,005		\$1,138,624
	Subtotal General Industry -->					26,549			68,433		\$1,693,718
Construction											
(On-site)											
Small	93,999	70%	40%	26,433	10%	2,643	2	0	5,286	\$31.63	\$167,196
Medium	152,377	70%	40%	42,848	50%	21,424	2	0	42,848	\$31.63	\$1,355,282
Large	24,205	70%	40%	6,807	90%	6,126	2	0	12,252	\$31.63	\$387,531
									60,386		\$1,910,009
Construction											
(Off-site)											
Small	93,999	70%	40%	26,433	90%	23,790	2	1.5	83,265	\$31.63	\$2,633,672
Medium	152,377	70%	40%	42,848	50%	21,424	2	1.5	74,984	\$31.63	\$2,371,744
Large	24,205	70%	40%	6,807	10%	681	2	1.5	2,384	\$31.63	\$75,406
									160,633		\$5,080,822
	Subtotal Construction -->					76,088			221,019		\$6,990,831
	Total					102,637			289,452		\$8,684,549
	Current and New Combined					514,812			1,781,995		\$52,334,309

[a] Number of Workers undergoing medical surveillance is based on different values for general industry and construction. General industry workers is based on workers with an action level greater than 25, and the number of workers in the construction industry is based on the number of respirator users.

Table 15 - Medical Surveillance, Initial Medical Examination Costs

Cost = (INIT-EXST + INIT-NEW) * COST

Variables

INIT-NEW = new workers completing initial medical examination

INIT-EXST = existing workers completing initial medical examination

COST = total direct costs for initial medical examination (\$406.57), including:

- Complete occupational health history survey - \$36.94*
- time to be made aware of Appendix B/sample forms by employer, use*
- Chest-xray classified by a NIOSH-certified B Reader - \$131.68*
- Pulmonary function test - \$60.62*
- Other necessary tests - \$66.5*

\$406.57		
\$36.94		
\$110.83		
\$131.68	\$88.24	\$43.44
\$60.62		
\$66.50		

Table 15 - Medical Surveillance, Initial Medical Examination Costs

	INIT-EXST + INIT-NEW	COST	Item 13 Costs (rounded)
Existing Workers	412,175	\$406.57	\$167,578,089
New Workers	102,637	\$406.57	\$41,729,125
Total			\$209,307,214

Table 16 - Worker Time and Cost for Return Reading of TB Test During Initial Medical Examination, Existing Workers

Cost = Burden Hours* Wage Rate
 Hours = (INIT-EXST * (READ+TRVL))

Variables

INIT-EXST = # of existing workers completing initial medical examination

READ = hours of worker time for return reading (5 minutes (0.08 hours))

*Note: Worker time to complete initial dermal TB test is included in the cost for initial medical examinations.

TRVL = hours of worker travel time to off-site location for return reading (general industry - 1 hour; construction - 1.5 hours)

Wage Rate = \$ per hour

0.08		
General Industry	Construction	Hydraulic Fracturing
1	1.5	NA

Table 16 - Worker Time and Cost for Return Reading of TB Test During Initial Medical Examination, Existing Workers

	INIT-EXST	READ	TRVL	Burden hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>General Industry</i>						
<i>(On-site)</i>						
Small	7,517	0.08	0	601	\$24.75	\$14,875
Medium	70,431	0.08	0	5634	\$24.75	\$139,442
Large	10,100	0.08	0	808	\$24.75	\$19,998
	88,048			7,043		\$174,315
<i>General Industry</i>						
<i>(Off-site)</i>						
Small	30,069	0.08	1	32475	\$24.75	\$803,756
Medium	23,477	0.08	1	25355	\$24.75	\$627,536
Large	0	0.08	1	0	\$24.75	\$0
	53,546			57,830		\$1,431,292
Subtotal	141,594			64,873		\$1,605,607
<i>Construction</i>						
<i>(On-site)</i>						
Small	18,800	0.08	0	1504	\$31.63	\$47,572
Medium	114,283	0.08	0	9143	\$31.63	\$289,193
Large	24,205	0.08	0	1936	\$31.63	\$61,236
	157,288			12,583		\$398,001
<i>Construction</i>						
<i>(Off-site)</i>						
Small	75,199	0.08	1.5	118814	\$31.63	\$3,758,087
Medium	38,094	0.08	1.5	60189	\$31.63	\$1,903,778
Large	0	0.08	1.5	0	\$31.63	\$0
	113,293			179,003		\$5,661,865
Subtotal	270,581			191,586		\$6,059,866
Total	412,175			256,459		\$7,665,473

Table 17: Worker Time and Cost for Return Reading of TB Test During Initial Medical Examination, New Workers

Cost = Burden Hours* Wage Rate
 Hours = (INIT-NEW * (READ+TRVL))

Variables (Sources: see initial medical exam tables)

INIT-NEW = new workers completing initial medical examination

READ = hours of worker time for return reading (5 minutes (.08 hours))

*Note: Worker time to complete initial dermal TB test is included in the cost for initial medical examinations.

TRVL = hours of worker travel time to off-site location for return reading

Wage Rate = \$ per hour

0.08	
General Industry	Construction
1	1.5

Table 17: Worker Time and Cost for Return Reading of TB Test During Initial Medical Examination, New Workers

	INIT-NEW	READ	TRVL	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>General Industry</i>						
(On-site)						
Small	705	0.08	0	56	\$24.75	\$1,386
Medium	8,804	0.08	0	704	\$24.75	\$17,424
Large	1,705	0.08	0	136	\$24.75	\$3,366
				896		\$22,176
(Off-site)						
Current						
Small	6,342	0.08	1	6,849	\$24.75	\$169,513
Medium	8,804	0.08	1	9,508	\$24.75	\$235,323
Large	189	0.08	1	204	\$24.75	\$5,049
				16,561		\$409,885
Subtotal	26,549			17,457		\$432,061
<i>Construction</i>						
(On-site)						
Small	2,643	0.08	0	211	\$31.63	\$6,674
Medium	21,424	0.08	0	1,714	\$31.63	\$54,214
Large	6,126	0.08	0	490	\$31.63	\$15,499
				2,415		\$76,387
(Off-site)						
Current						
Small	23,790	0.08	1.5	37,588	\$31.63	\$1,188,908
Medium	21,424	0.08	1.5	33,850	\$31.63	\$1,070,676
Large	681	0.08	1.5	1,076	\$31.63	\$34,034
				72,514		\$2,293,618
Subtotal	76,088			74,929		\$2,370,005
Total	102,637			92,386		\$2,802,066
Existing and New C	514,812			348,845		\$10,467,539

Table 18: Contract Cost for PLHCP to Conduct the Dermal TB Test

Cost = Workers Tested * COST

Variables

TBINIT = new and existing workers completing initial dermal TB test, all industries

TBTRI = workers completing periodic dermal TB test, all industries

TEST = direct cost for dermal TB test (\$16.63, -----> \$16.63)

Table 18: Contract Cost for PLHCP to Conduct the Dermal TB Test

Workers Tested	TEST	Item 13 Costs (rounded)
TBINIT (Year 1)		
514,812	\$16.63	\$8,561,324
TBTRI (Year 4)		
31,492	\$16.63	\$523,712

Table 19: Medical Surveillance, Worker Time and Cost to Complete Periodic Medical Examination (Year 3 after implementation)

Cost = Burden Hours* Wage Rate

Hours = Total Year 4 Tests *(EXAMYR4+ TRVL)

Variables

INIT-EXST = existing workers completing initial medical examination

INIT-NEW = new workers completing initial medical examination

INIT= # of total (existing and new) workers completing initial medical examination

TRI = # of workers completing periodic (triennial) medical examinations in Year 4 (the 3rd year after implementation)

Total Year 4 Tests = All test conducted in year 4 (3rd year after implementation). Combines triennial tests and initial tests conducted that year.

EXAMYR4 = hours of worker time to complete periodic exam (2 hours), including 2.00

- complete occupational health history survey, including medical questionnaire for respirator use*
- physical examination by knowledgeable PLHCP, including follow-up evaluation for respirator use, if needed*
- chest x-ray*
- pulmonary function test*
- other necessary tests, including periodic dermal TB test, if recommended*

TRVL = hours of worker travel time to off-site location

Wage Rate = \$ per hour

Table 19: Medical Surveillance, Worker Time and Cost to Complete Periodic Medical Examination (Year 3 after implementation)

	INIT-EXST (Year 1)	INIT-NEW (Year 1)	INIT (subtotal) (Year 1)	TRI (Year 4)	Total Year 4 Tests (subtotals rounded)	EXAM YR4	TRVL	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>General Industry</i>										
On-Site										
Small	7,517	705	8,222	4,031.95	12,253.95					
Medium	70,431	8,804	79,235	37,777.57	117,012.57					
Large	10,100	1,705	11,805	5,417.41	17,222.41					
Subtotal	88,048	11,214	99,262	47,226.92	146,489.00	2	0	292,978.00	\$24.75	\$7,251,206
<i>General Industry</i>										
Off-Site										
Small	30,069	6,342	36,411	16,128.32	52,539.32					
Medium	23,477	8,804	32,281	12,592.52	44,873.52					
Large	0	189	189	0.00	189.00					
Subtotal	53,546	15,335	68,881	28,720.84	97,601.84	2	1	292,806.00	\$24.75	\$7,246,949
Total	141,594	26,549	168,143	75,947.76	244,091.00			585,784.00		\$14,498,155
<i>Construction</i>										
On-Site										
Small	18,800	2,643	21,443	6,982.04	28,425.04					
Medium	114,283	21,424	135,707	42,442.98	178,149.98					
Large	24,205	6,126	30,331	8,989.37	39,320.37					
Subtotal	157,288	30,193	187,481	58,414.38	245,895.00	2	0	491,790.00	\$31.63	\$15,555,318
<i>Construction</i>										
Off-Site										
Small	75,199	23,790	98,989	27,927.77	126,916.77					
Medium	38,094	21,424	59,518	14,147.54	73,665.54					
Large	0	681	681	0.00	681.00					
Subtotal	113,293	45,895	159,188	42,075.31	201,263.00	2	1.5	704,421.00	\$31.63	\$22,280,836
Total	270,581	76,088	346,669	100,489.69	447,159.00			1,196,211.00		\$37,836,154
Total -->			514,812	176,437.45	691,250.00			1,781,995.00		\$52,334,309

Table 20 - Medical Surveillance, Contract Cost for a PLHCP to Conduct Periodic Medical Examination (Year 3 after implementation)

Cost = (TRI * TRICOST)

Variables

TRI = # workers completing periodic (triennial) medical examinations

TRICOST = Total direct costs for triennial medical examinations (\$346.72), including:

Periodic review and updating of health history - \$36.94	\$346.72
Physical examination by knowledgeable HCP - \$110.83	\$36.94
Chest X-ray - \$88.24	\$110.83
Chest X-ray classified by a NIOSH-certified B Reader - \$43.44	\$88.24
Pulmonary function test - \$60.62	\$43.44
Other necessary tests - \$66.5 (Assumed required by 10 percent of workers)	\$60.62
	\$66.50

Table 20 - Medical Surveillance, Contract Cost for a PLHCP to Conduct Periodic Medical Examination (Year 3 after implementation)

	TRI	TRICOST	Item 13 - Direct Costs for Triennial Medical Screenings
<i>General Industry</i>	75,948	\$346.72	\$26,332,607
<i>Construction</i>	100,490	\$346.72	\$34,841,785
TOTAL	176,437		\$61,174,392

Table 21: Medical Surveillance, Worker Time and Cost to Complete TB Testing During Periodic Medical Examination (Year 3 after impleme

Cost = Burden Hours* Wage Rate

Return Read Hours = (TRI * PERTEST) * (READ + TRVL))

Variables

TRI = # of workers completing periodic (triennial) medical examinations

PERTEST = percentage of workers recommended for periodic testing

TBTRI = # of workers completing TB test in year 4

READ = hours of worker time for return reading (5 minutes (.08 hours))

*Note: Worker time for the dermal TB test is included in the cost for periodic health screening.

TRVL = hours of worker travel time to off-site location for return reading

Wage Rate = \$ per hour

General Industry	Construction
15%	20%
0.08	

Table 21: Medical Surveillance, Worker Time and Cost to Complete TB Testing During Periodic Medical Examination (Year 3 after impleme

	TRI	PERTEST	TBTRI (TRI* PERTEST) (Year 4) (rounded)	READ	TRVL	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>General Industry</i>								
(On-Site)								
Small	4,032	15%	605	0.08	0			
Medium	37,778	15%	5,667	0.08	0			
Large	5,417	15%	813	0.08	0			
Subtotal			7,085	0.08	0	567	\$24.75	\$14,033
<i>General Industry</i>								
(Off-site)								
Small	16,128	15%	2,419	0.08	1			
Medium	12,593	15%	1,889	0.08	1			
Large	0	15%	0	0.08	1			
Subtotal			4,308	0.08	1	4,653	24.75	\$115,162
Total			11,393			5,220		\$129,195
<i>Construction</i>								
(On-Site)								
Small	6,982	20%	1,396	0.08	0			
Medium	42,443	20%	8,489	0.08	0			
Large	8,989	20%	1,798	0.08	0			
Subtotal			11,683	0.08	0	935	\$31.63	\$29,574
<i>Construction</i>								
(Off-site)								
Small	27,928	20%	5,586	0.08	1.5			
Medium	14,148	20%	2,830	0.08	1.5			
Large	0	20%	0	0.08	1.5			
Subtotal			8,416	0.08	1.5	13,297	\$31.63	\$420,584
Total			20,099			14,232		\$450,158
Total -->			31,492			19,452		\$579,353

Table 22: Human Resources Manager Time and Cost to Provide Information to the PLHCP

Cost = Burden Hours * Wage Rate

Year 1 Hours = (INIT * HRT) + (PUL * HRT)

Year 4 Hours = (TRI * HRT) + (PUL * HRT)

Variables

INIT = # of total workers (new and existing) completing initial medical examination

PUL = # of estimated new silica cases per year/cases referred to specialist

TRI = # of workers completing periodic medical examination including use of sample forms.

Wage Rate = \$ per hour

Year 1		Year 4	
Initial	Referral	Periodic	Referral
0.25	1	0.25	1

Table 22: Human Resources Manager Time and Cost to Provide Information to the PLHCP					
Type of Examination	INIT/PUL	HRT	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>Year 1</i>					
Initial					
General Industry	26,549	0.25	6,637	\$74.97	\$497,576
Construction	76,088	0.25	19,022	\$74.97	\$1,426,079
Additional/Pulmonary Function Examination					
General Industry	544	1	544	\$74.97	\$40,784
Construction	563	1	563	\$74.97	\$42,208
Total	102,637		26,766		\$2,006,647
<i>Year 4</i>					
Periodic					
General Industry	244,091	0.25	61,023	\$74.97	\$4,574,894
Construction	447,159	0.25	111,790	\$74.97	\$8,380,896

Additional/Pulmonary Function Examination					
General Industry	544	1	544	\$74.97	\$40,784
Construction	563	1	563	\$74.97	\$42,208
Total	691,249		173,920		\$13,038,782

Table 23: Worker and Human Resources Manager Time and Cost to Provide PLHCP's Written Medical Report to Worker and Opinion to Employer

Cost = Burden Hours* Wage Rate

Year 1 Hours = (INIT*HRT) + (PUL*HRT)

Year 4 Hours = (TRI*HRT) + (PUL*HRT)

Variables

INIT = # of total workers (new and existing) completing initial medical examination

PUL - # of estimated new silica cases per year/cases referred to specialist

TRI = # of workers completing periodic medical examination including use of sample forms.

0.25

Wage Rate = \$ per hour

Type of Examination	INIT/PUL	HRT	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>Year 1</i>					
General Industry					
Initial	26,549				
Specialist/Additional	544				
Subtotal	27,093	0.25	6,773	\$74.97	\$507,772
Construction					
Initial	76,088				
Specialist/Additional	563				
Subtotal	76,651	0.25	19,163	\$74.26	\$1,423,044
Total	103,744		25,936		\$ 1,930,816

Type of Examination	TRI	HRT	Burden Hours (rounded)	Wage Rate	Item 12 Cost (rounded)
<i>Year 4</i>					
Periodic					
General Industry	26,549	0.25	6,637	\$74.97	\$497,576
Construction	76,088	0.25	19,022	\$74.26	\$1,412,574
Additional/Pulmonary Function Examination					
General Industry	544	1	544	\$74.97	\$40,784
Construction	563	1	563	\$74.26	\$41,808
Total	102,637		25,659		\$1,910,150

Small		35%	195	0%	0	1	0	0	\$31.63	\$0
Medium		56%	317	0%	0	1	0	0	\$31.63	\$0
Large		9%	50	0%	0	1	0	0	\$31.63	\$0
(Off-site)										
Small			195	100%	195	1	1.5	488	\$31.63	\$15,435
Medium			317	100%	317	1	1.5	793	\$31.63	\$25,083
Large			50	100%	50	1	1.5	125	\$31.63	\$3,954
TOTAL	1,107							2,494		\$71,401

Table 25: Medical Surveillance, Contract Cost for a PLHCP to Complete Specialist Exam

$COST = PUL * EXAMCOST$

Variables

PUL = # of estimated new silica cases per year/cases referred to pulmonary specialist

EXAMCOST = direct cost for examination by a specialist (\$210.89)

\$210.89

Wage Rate = \$ per hour

Table 25: Medical Surveillance, Contract Cost for a PLHCP to Complete Specialist Exam

PUL	EXAMCOST	Item 13 Cost (rounded)
1,107	\$210.89	\$233,382

Table 26: Rule Familiarization

Burden Hours = ESTABS(rounded) * SUPERHRS
 Costs = Burden Hours * Wage Rate

Variables

SUPERHRS = Supervisor Hours per Estab
 Wage Rate = \$ per hour

Table 26: Rule Familiarization

	ESTABS (Affected)	ESTABS (Affected) (rounded)	SUPERHRS	Burden Hours (rounded)	Wage Rate	Item 12 Costs (rounded)
General Industry						
Small	51,949.19	51,949.00	4	207,796	\$40.38	\$8,390,802
Medium	24,270.73	24,271.00	8	194,168	\$40.38	\$7,840,504
Large	641.38	641.00	40	25,640	\$40.38	\$1,035,343
Sub-Total	76,861.30	76,861.00		427,604		\$17,266,649
Construction						
Small	545,417.45	545,417.00	4	2,181,668	\$44.04	\$96,080,659
Medium	59,743.00	59,743.00	8	477,944	\$44.04	\$21,048,654
Large	560.00	560.00	40	22,400	\$44.04	\$986,496
Sub-Total	605,720.45	605,720.00		2,682,012		\$118,115,809
Total	682,581.74	682,581.00		3,109,616		\$135,382,458

Table 27: Recordkeeping, HR Manager Time and Cost to Establish and Maintain Records for Exposure Monitoring Data

Cost = Burden Hours* Wage Rate

Hours = EA * HRT

Variables

EA = total number of exposure assessments

HRT = hours of human resources manager time to establish and maintain records, including us 0.25

Wage Rate = \$ per hour

Table 27: Recordkeeping, HR Manager Time and Cost to Establish and Maintain Records for Exposure Monitoring Data

	EA	HRT	Burden Hours (rounded)	HRWage	Item 12 Costs (rounded)
<i>General Industry</i>					
Initial	69,487				
Periodic	86,400				
Additional	21,601				
Subtotal	177,488	0.25	44,372	\$74.97	\$3,326,569
<i>Construction</i>					
Initial	5,531				
Periodic	12,290				
Additional	3,073				
Subtotal	20,894	0.25	5,224	\$74.26	\$387,934
Total	198,382		49,596		\$3,714,503

Table 28: HR Manager Time and Cost to Establish and Maintain Record for Medical Surveillance

Cost = Burden Hours* Wage Rate

Hours = (INIT+PUL+TRI) * HRT

Variables

INIT = # of total workers (new and existing) completing initial medical examination

PUL = # of estimated new silica cases per year/cases referred to specialist

TRI = # of workers completing periodic medical examination

HRT = hours of human resources manager time to establish and maintain records for referrals, initial and periodic examinations, including use of sample forms.

Wage Rate = \$ per hour

Initial	Periodic	Referral
0.25	0.25	1

Table 28: HR Manager Time and Cost to Establish and Maintain Record for Medical Surveillance

Type of Examination	INIT/TRI/PUL	HRT	Burden Hours (subtotal rounded)	Wage Rate	Item 12 Cost (rounded)
General Industry					
Initial	26,549	0.25	6,637.25		
Periodic	244,091	0.25	61,022.69		
Referral/additional	544	1	544.00		
Subtotal	271,184		68,204.00	\$74.97	\$5,113,254
Construction					
Initial	76,088	0.25	19,022.00		
Periodic	447,159	0.25	111,789.67		
Referral/additional	563	1	562.65		
Subtotal	523,809		131,374.00	\$74.26	\$9,755,833
Total	794,993		199,578.00		\$14,869,087