Table IX-7. Economic Impacts on Small Business Entities Affected by OSHA's Proposed Standard for Hexavalent Chromium (by Application Group for a PEL of 1 ug/m^3)

	Application Group	NAICS	Category	Cost per Entity[L] Incremental-Requirement Costs	Revenue per Entity[M]	Profit per Entity[M]	Impacts for Incremental-Requirement Costs: Cost/Revenue Impact	Impacts for Incremental-Requirement Costs: Cost/Profit Impact
1	Electroplating - General Industry	All General Industry		$17,073	$7,723,529	$296,584	0.22%	5.76%
		331		$12,869	$19,765,430	$588,199	0.07%	2.19%
		332812	Metal Coating, Engraving (Except Jewerly and Silverware), and Allied Services to Manufacturers	$23,931	$6,192,928	$392,471	0.39%	6.10%
		332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	$13,902	$1,483,200	$93,996	0.94%	14.79%
		Other 332	Fabricated Metal Product Manufacturing	$12,799	$5,002,320	$304,711	0.26%	4.20%
		333	Machinery Manufacturing	$13,414	$10,528,157	$529,745	0.13%	2.53%
		336 (except 33661)	Transportation Equipment Manufacturing	$18,961	$124,514,607	$3,704,808	0.02%	0.51%
		339	Miscellaneous Manufacturing	$20,734	$21,433,301	$1,525,472	0.10%	1.36%
		Other General Industry[A]		$13,971	$3,824,029	$142,545	0.37%	9.80%
2A	Welding - General Industry	31-33[B]	Manufacturing	$4,502	$7,448,864	$341,255	0.06%	1.32%
2B	Welding - Maritime Industry	336611	Ship Building and Repairing	$6,035	$32,947,099	$1,531,546	0.02%	0.39%
2C	Welding - Construction Industry	233[C]	Building, Developing, and General Contracting; Heavy Construction; Special Trade Contractors	$10,715	$2,377,623	$98,731	0.45%	10.85%
2D	Welding - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	$580	$3,670,000	N/A	0.02%	0.02%
3A	Painting - General Industry	31-33	Manufacturing					
		332812	Metal Coating, Engraving (Except Jewerly and Silverware), and Allied Services to Manufacturers	$29,185	$5,662,391	$358,848	0.52%	8.13%
		336411, 336414, 336415, 336419, 336992	Transportation Equipment Manufacturing	$19,580	$225,712,596	$7,336,336	0.01%	0.27%
3B	Painting - Maritime Industry	33661	Ship and Boat Building	$8,505	$18,367,252	$853,802	0.05%	1.00%
3C	Painting - Construction Industry	234[D], 235[E]	Heavy Construction, Special Trade Contractors	$340	$1,831,327	$44,949	0.02%	0.76%
		234[D], 235[E]	Heavy Construction	$708	$9,931,086	$353,547	0.01%	0.20%
		235[E]	Special Trade Contractors	$279	$379,684	$16,492	0.07%	1.69%

Table IX-7. Economic Impacts on Small Business Entities Affected by OSHA's Proposed Standard for Hexavalent Chromium (by Application Group for a PEL of 1 ug/m^3)

				Cost per Entity[L]			Impacts for Incremental-Requirement Costs	
	Application Group	NAICS	Category	Incremental-Requirement Costs	Revenue per Entity[M]	Profit per Entity[M]	Cost/Revenue Impact	Cost/Profit Impact
3D	Painting - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	$536	$3,670,000	N/A	0.01%	0.02%
4	Chromate (Chromite Ore Production)	325188	All Other Basic Inorganic Chemical Mfg.	N/A	N/A	N/A	N/A	N/A
5	Chromate Pigment Producers	325131	Inorganic Dye and Pigment Mfg.	$54,112	$77,883,388	$3,138,701	0.07%	1.72%
6	Chromated Copper Arsenate Producers	325320	Pesticide and Other Agricultural Chemical Mfg.	$7,052	$26,210,731	$1,480,199	0.03%	0.48%
7	Chromium Catalyst Producers	325188	All Other Basic Inorganic Chemical Mfg.	$995,311	$93,357,606	$3,762,312	1.07%	26.45%
8	Paint and Coatings Producers	325510	Paint and Coating Mfg.	$24,564	$16,941,999	$804,203	0.14%	3.05%
9	Printing Ink Producers	325910	Printing Ink Mfg.	$26,872	$15,846,214	$800,598	0.17%	3.36%
10	Plastic Colorant Producers and Users	325211	Plastics Material and Resin Mfg.	$12,563	$8,852,129	$453,140	0.14%	2.77%
		325991	Custom Compounding of Purchased Resin					
		3261	Plastic Product Mfg.					
11	Plating mixture Producers	325998	All Other Miscellaneous Chemical Product and Preparation Mfg.	$23,918	$31,221,004	$4,675,601	0.08%	0.51%
12	Wood Preserving	321114	Wood Preservation	N/A	N/A	N/A	N/A	N/A
13	Chromium Metal Producers	331112	Electrometallurgical Ferroalloy Product Mfg.	N/A	N/A	N/A	N/A	N/A
14	Steel Mills	331111	Iron and Steel Mills	$14,413	$170,519,898	$3,368,791	0.01%	0.43%
15	Iron and Steel foundries	3315	Iron foundries	$20,120	$13,493,814	$655,975	0.15%	3.07%
		331512	Steel Investment foundries					
		331513	Steel foundries (except investment)					
16	Chromium Dioxide Producers	325188	All Other Inorganic Chemicals, n.e.c.	N/A	N/A	N/A	N/A	N/A
17	Chromium Dye Producers	3251317	Chrome Colors and Other Inorganic Pigments	$85,265	$78,623,678	$3,168,534	0.11%	2.69%
18	Chromium Sulfate Producers	325188	All Other Inorganic Chemicals, n.e.c.	$6,954	$2,899,173	$116,837	0.24%	5.95%
19	Chemical Distributors	42269[F]	Other Chemical and Allied Products	$3,859	$3,913,866	$163,627	0.10%	2.36%
20	Textile Dyeing	313	Textile Mills	$1,325	$5,046,265	$158,306	0.03%	0.84%
		314	Textile Product Mills					
21	Colored Glass Producers	3272123	Other Pressed and Blown Glass and Glassware Mfg.	$1,392	$8,645,887	$272,224	0.02%	0.51%
		3272129	Other Pressed and Blown Glass and Glassware Mfg.					
22	Printing	32311	Printing	$593	$783,776	$33,429	0.08%	1.77%
		323113	Commercial Screen Printing					

Table IX-7. Economic Impacts on Small Business Entities Affected by OSHA's Proposed Standard for Hexavalent Chromium (by Application Group for a PEL of 1 ug/m^3)

	Application Group	NAICS	Category	Cost per Entity[L] Incremental-Requirement Costs	Revenue per Entity[M]	Profit per Entity[M]	Impacts for Incremental-Requirement Costs: Cost/Revenue Impact	Impacts for Incremental-Requirement Costs: Cost/Profit Impact
23	Leather Tanning	3161	Leather and Hide Tanning and Finishing	N/A	N/A	N/A	N/A	N/A
24	Chromium Catalyst Users	325110	Petrochemical Mfg., Including Styrene	$6,086	$129,321,394	$5,784,287	0.00%	0.11%
24A	Chromium Catalyst Users - Service Companies	561790	Other Services to Buildings and Dwellings, Including Catalyst handling	$11,349	$1,461,540	$56,120	0.78%	20.22%
25	Refractory Brick Producers	327125	Nonclay Refractory Mfg.	$13,480	$49,494,145	$2,092,266	0.03%	0.64%
26A	Wood Working -General Industry	321	General Industry	$3,815	$6,746,667	$209,147	0.06%	1.82%
26B	Wood Working - Maritime Industry	336611	Ship Building and Repairing	$175	$38,428,332	$1,786,917	0.00%	0.01%
26C	Wood Working - Construction Industry	2332[G], 2333[H], 2349[I], 23551[J]	Construction	$542	$7,316,483	$303,634	0.01%	0.18%
26D	Wood Working - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	$521	$3,670,000	N/A	0.01%	0.04%
27	Solid Waste Incineration	562213	Solid Waste Combustors and Incinerators	$3,671	$3,821,846	$122,548	0.10%	3.00%
27A	Solid Waste Incineration - govt	999300	Local Governments	N/A	$3,670,000	N/A	N/A	0.11%
28	Oil and Gas Well Drilling	213111	Drilling Oil and Gas Wells	N/A	N/A	N/A	N/A	N/A
29	Portland Cement Producers	327310	Cement Mfg.	$2,940	$16,657,610	$1,211,258	0.02%	0.24%
30	Superalloy Producers	331492	Secondary Smelting, Refining and Alloying of Nonferrous Metal	$4,430	$26,787,791	$797,178	0.02%	0.56%
		331528	Other Nonferrous Foundries					
31B	Construction - Refractory Brick Restoration and Maintenance	235[E]	Special Trade Contractors	$84	$973,786	$42,298	0.01%	0.20%
31C	Construction - Hazardous Waste Site Work	2333[H]	Nonresidential Building Construction	$304	$4,621,489	$194,565	0.01%	0.16%
31CG	Hazardous Waste Site Work - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	$226	$3,670,000	N/A	0.01%	0.03%
31D	Construction - Industrial Rehabilitation and Maintenance	23493[K]	Industrial Nonbuilding Structure Construction	$179	$3,303,996	$136,650	0.01%	0.13%
31DG	Industrial Rehabilitation and Maintenance - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	$216	$3,670,000	N/A	0.01%	0.01%
32	Precast Concrete Products Producers	327331, 327332, 327390	Concrete Pipe, Brick, and Block Mfg.	$4,513	$2,997,332	$217,951	0.15%	2.07%

Footnotes

[A] Includes industries in NAICS 31-33, NAICS 42, NAICS 44-45, NAICS 51, NAICS 53, NAICS 54, NAICS 56, NAICS 61, NAICS 71, and NAICS 81.

[B] Includes industries in NAICS 11, NAICS 22, NAICS 31-33, NAICS 42, NAICS 44-45, NAICS 48-49, NAICS 51, NAICS 52, NAICS 53, NAICS 54, NAICS 56, NAICS 61, NAICS 62, NAICS 71, NAICS 72, and NAICS 81.

[C] 1997 NAICS Code is 233, Building, Developing, and General Contracting. 2002 NAICS Code is 236, Construction of Buildings.

[D] 1997 NAICS Code is 234, Heavy Construction. 2002 NAICS Code is 236, Heavy and Civil Engineering Construction.

[E] 1997 NAICS Code is 235, Special Trades Contractors. 2002 NAICS Code is 236, Special Trades Contractors.

[F] 1997 NAICS Code is 42269, Other Chemical and Allied Products. 2002 NAICS Code is 424690, Other Chemical and Allied Products Merchant Wholesalers.

[G] 1997 NAICS Code is 2332, Residential Building Construction. 2002 NAICS Code is 23611, Residential Building Construction.

[H] 1997 NAICS Code is 2333, Nonresidential Building Construction. 2002 NAICS Code is 2362, Nonresidential Building Construction.

[I] 1997 NAICS Code is 2349, Other Heavy Construction. 2002 NAICS Code is 237, Heavy and Civil Engineering Construction.

[J] 1997 NAICS Code is 23551, Carpentry. 2002 NAICS Codes are 23835, Finish Carpentry Contractors, and 23813, Framing Contractors.

[K] 1997 NAICS Code is 23493, Industrial Non-Building Structure Construction. 2002 NAICS Code is 23621, Industrial Building Construction.

[L] "Entities" refer to business firms or governmental bodies; "establishments" refer to industrial plants. Data on affected entities, establishments, and employees are from multiple sources; see the industrial profiles in Chapter II in the PEA (Ex. 35-391) for the complete list of references.

[M] Industry revenues and profits were estimated from data reported in I.R.S., ***Corporation Source Book of Statistics of Income, 2000.*** Data on revenues for State and Local Governments were taken from U.S. Census Bureau, ***Government Finances: 1999-2000***, January 2003.

Source: U.S. Dept. of Labor, OSHA, Office of Regulatory Analysis, based on IT, 2004.

Table IX-8. Economic Impacts on Small (<20 Employees) Establishments Affected by OSHA's Proposed Standard for Hexavalent Chromium (by Application Group for a PEL of 1 ug/m^3)

	Application Group	NAICS	Category	Cost per Establishment[L] Incremental-Requirement Costs	Revenue per Establishment[M]	Profit per Establishment[M]	Impacts for Incremental-Requirement Costs Cost/Revenue Impact	Cost/Profit Impact
1	Electroplating - General Industry	All General Industry		$7,985	$1,662,857	$63,854	0.48%	12.51%
		331		$7,985	$1,600,531	$47,630	0.50%	16.77%
		332812	Metal Coating, Engraving (Except Jewerly and Silverware), and Allied Services to Manufacturers	$7,985	$627,453	$39,764	1.27%	20.08%
		332813	Electroplating, Plating, Polishing, Anodizing, and Coloring	$7,985	$389,893	$24,709	2.05%	32.32%
		Other 332	Fabricated Metal Product Manufacturing	$7,985	$1,081,783	$65,896	0.74%	12.12%
		333	Machinery Manufacturing	$7,985	$1,499,968	$75,474	0.53%	10.58%
		336 (except 33661)	Transportation Equipment Manufacturing	$7,985	$3,227,879	$96,042	0.25%	8.31%
		339	Miscellaneous Manufacturing	$7,985	$1,178,611	$83,885	0.68%	9.52%
		Other General Industry[A]		$7,985	$1,746,042	$65,085	0.46%	12.27%
2A	Welding - General Industry	31-33[B]	Manufacturing	$2,203	$916,520	$41,989	0.24%	5.25%
2B	Welding - Maritime Industry	336611	Ship Building and Repairing	$2,028	$1,221,589	$56,786	0.17%	3.57%
2C	Welding - Construction Industry	233[C]	Building, Developing, and General Contracting; Heavy Construction; Special Trade Contractors	$5,742	$985,431	$40,920	0.58%	14.03%
2D	Welding - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	N/A	N/A	N/A	N/A	N/A
3A	Painting - General Industry	31-33	Manufacturing					
		332812	Metal Coating, Engraving (Except Jewerly and Silverware), and Allied Services to Manufacturers	$6,167	$745,100	$47,220	0.83%	13.06%
		336411, 336414, 336415, 336419, 336992	Transportation Equipment Manufacturing	$6,167	$6,288,227	$204,386	0.10%	3.02%
3B	Painting - Maritime Industry	33661	Ship and Boat Building	$3,577	$1,221,589	$56,786	0.29%	6.30%
3C	Painting - Construction Industry	234[D], 235[E]	Heavy Construction, Special Trade Contractors	$251	$484,203	$10,042	0.05%	2.50%
		234[D], 235[E]	Heavy Construction	$251	$673,405	$23,973	0.04%	1.05%

Table IX-8. Economic Impacts on Small (<20 Employees) Establishments Affected by OSHA's Proposed Standard for Hexavalent Chromium (by Application Group for a PEL of 1 ug/m^3)

	Application Group	NAICS	Category	Cost per Establishment[L] Incremental-Requirement Costs	Revenue per Establishment[M]	Profit per Establishment[M]	Impacts for Incremental-Requirement Costs Cost/Revenue Impact	Cost/Profit Impact
		235[E]	Special Trade Contractors	$251	$248,785	$10,806	0.10%	2.33%
3D	Painting - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	N/A	N/A	N/A	N/A	N/A
4	Chromate (Chromite Ore Production)	325188	All Other Basic Inorganic Chemical Mfg.	N/A	N/A	N/A	N/A	N/A
5	Chromate Pigment Producers	325131	Inorganic Dye and Pigment Mfg.	$7,759	$2,197,133	$88,544	0.35%	8.76%
6	Chromated Copper Arsenate Producers	325320	Pesticide and Other Agricultural Chemical Mfg.	N/A	N/A	N/A	N/A	N/A
7	Chromium Catalyst Producers	325188	All Other Basic Inorganic Chemical Mfg.	N/A	N/A	N/A	N/A	N/A
8	Paint and Coatings Producers	325510	Paint and Coating Mfg.	$24,217	$3,337,373	$158,418	0.73%	15.29%
9	Printing Ink Producers	325910	Printing Ink Mfg.	$11,618	$5,194,382	$262,436	0.22%	4.43%
10	Plastic Colorant Producers and Users	325211	Plastics Material and Resin Mfg.	$8,480	$1,042,866	$53,384	0.81%	15.89%
		325991	Custom Compounding of Purchased Resin					
		3261	Plastic Product Mfg.					
11	Plating mixture Producers	325998	All Other Miscellaneous Chemical Product and Preparation Mfg.	$22,664	$4,385,091	$221,548	0.52%	10.23%
12	Wood Preserving	321114	Wood Preservation	N/A	N/A	N/A	N/A	N/A
13	Chromium Metal Producers	331112	Electrometallurgical Ferroalloy Product Mfg.	N/A	N/A	N/A	N/A	N/A
14	Steel Mills	331111	Iron and Steel Mills	$8,687	$2,095,343	$41,396	0.41%	20.99%
15	Iron and Steel foundries	3315	Iron foundries	$8,010	$728,668	$35,423	1.10%	22.61%
		331512	Steel Investment foundries					
		331513	Steel foundries (except investment)					
16	Chromium Dioxide Producers	325188	All Other Inorganic Chemicals, n.e.c.	N/A	N/A	N/A	N/A	N/A
17	Chromium Dye Producers	3251317	Chrome Colors and Other Inorganic Pigments	$20,803	$2,165,058	$87,252	0.96%	23.84%
18	Chromium Sulfate Producers	325188	All Other Inorganic Chemicals, n.e.c.	$6,954	$2,899,173	$116,837	0.24%	5.95%
19	Chemical Distributors	42269[F]	Other Chemical and Allied Products	$3,022	$1,391,729	$58,184	0.22%	5.19%
20	Textile Dyeing	313	Textile Mills	$982	$558,520	$17,521	0.18%	5.61%
		314	Textile Product Mills					
21	Colored Glass Producers	3272123	Other Pressed and Blown Glass and Glassware Mfg.	$1,127	$908,236	$28,597	0.12%	3.94%
		3272129	Other Pressed and Blown Glass and Glassware Mfg.					
22	Printing	32311	Printing	$428	$246,802	$10,526	0.17%	4.06%

Table IX-8. Economic Impacts on Small (<20 Employees) Establishments Affected by OSHA's Proposed Standard for Hexavalent Chromium (by Application Group for a PEL of 1 ug/m^3)

	Application Group	NAICS	Category	Cost per Establishment[L] Incremental-Requirement Costs	Revenue per Establishment[M]	Profit per Establishment[M]	Impacts for Incremental-Requirement Costs Cost/Revenue Impact	Cost/Profit Impact
		323113	Commercial Screen Printing					
23	Leather Tanning	3161	Leather and Hide Tanning and Finishing	N/A	N/A	N/A	N/A	N/A
24	Chromium Catalyst Users	325110	Petrochemical Mfg., Including Styrene	N/A	N/A	N/A	N/A	N/A
24A	Chromium Catalyst Users - Service Companies	561790	Other Services to Buildings and Dwellings, Including Catalyst handling	$7,824	$906,270	$34,799	0.86%	22.48%
25	Refractory Brick Producers	327125	Nonclay Refractory Mfg.	$0	NA	NA	0.00%	0.00%
26A	Wood Working -General Industry	321	General Industry	$3,282	$1,131,920	$35,090	0.29%	9.35%
26B	Wood Working - Maritime Industry	336611	Ship Building and Repairing	$148	$1,221,589	$56,804	0.01%	0.26%
26C	Wood Working - Construction Industry	2332[G], 2333[H], 2349[I], 23551[J]	Construction	$524	$1,718,617	$71,323	0.03%	0.73%
26D	Wood Working - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	N/A	N/A	N/A	N/A	N/A
27	Solid Waste Incineration	562213	Solid Waste Combustors and Incinerators	$2,021	$1,697,066	$54,416	0.12%	3.71%
27A	Solid Waste Incineration - govt	999300	Local Governments	N/A	N/A	N/A	N/A	N/A
28	Oil and Gas Well Drilling	213111	Drilling Oil and Gas Wells	N/A	N/A	N/A	N/A	N/A
29	Portland Cement Producers	327310	Cement Mfg.	$2,275	$2,609,367	$189,740	0.09%	1.20%
30	Superalloy Producers	331492	Secondary Smelting, Refining and Alloying of Nonferrous Metal	N/A	N/A	N/A	N/A	N/A
		331528	Other Nonferrous Foundries					
31B	Construction - Refractory Brick Restoration and Maintenance	235[E]	Special Trade Contractors	$52	$478,361	$20,779	0.01%	0.25%
31C	Construction - Hazardous Waste Site Work	2333[H]	Nonresidential Building Construction	$226	$1,219,945	$51,360	0.02%	0.44%
31CG	Hazardous Waste Site Work - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	N/A	N/A	N/A	N/A	N/A
31D	Construction - Industrial Rehabilitation and Maintenance	23493[K]	Industrial Nonbuilding Structure Construction	$52	$613,995	$25,394	0.01%	0.20%
31DG	Industrial Rehabilitation and Maintenance - Government	999200	State	N/A	N/A	N/A	N/A	N/A
		999300	Local	N/A	N/A	N/A	N/A	N/A
32	Precast Concrete Products Producers	327331, 327332, 327390	Concrete Pipe, Brick, and Block Mfg.	$3,395	$885,373	$64,380	0.38%	5.27%

Footnotes

[A] Includes industries in NAICS 31-33, NAICS 42, NAICS 44-45, NAICS 51, NAICS 53, NAICS 54, NAICS 56, NAICS 61, NAICS 71, and NAICS 81.

[B] Includes industries in NAICS 11, NAICS 22, NAICS 31-33, NAICS 42, NAICS 44-45, NAICS 48-49, NAICS 51, NAICS 52, NAICS 53, NAICS 54, NAICS 56, NAICS 61, NAICS 62, NAICS 71, NAICS 72, and NAICS 81.

[C] 1997 NAICS Code is 233, Building, Developing, and General Contracting. 2002 NAICS Code is 236, Construction of Buildings.

[D] 1997 NAICS Code is 234, Heavy Construction. 2002 NAICS Code is 236, Heavy and Civil Engineering Construction.

[E] 1997 NAICS Code is 235, Special Trades Contractors. 2002 NAICS Code is 236, Special Trades Contractors.

[F] 1997 NAICS Code is 42269, Other Chemical and Allied Products. 2002 NAICS Code is 424690, Other Chemical and Allied Products Merchant Wholesalers.

[G] 1997 NAICS Code is 2332, Residential Building Construction. 2002 NAICS Code is 23611, Residential Building Construction.

[H] 1997 NAICS Code is 2333, Nonresidential Building Construction. 2002 NAICS Code is 2362, Nonresidential Building Construction.

[I] 1997 NAICS Code is 2349, Other Heavy Construction. 2002 NAICS Code is 237, Heavy and Civil Engineering Construction.

[J] 1997 NAICS Code is 23551, Carpentry. 2002 NAICS Codes are 23835, Finish Carpentry Contractors, and 23813, Framing Contractors.

[K] 1997 NAICS Code is 23493, Industrial Non-Building Structure Construction. 2002 NAICS Code is 23621, Industrial Building Construction.

[L] "Entities" refer to business firms or governmental bodies; "establishments" refer to industrial plants. Data on affected entities, establishments, and employees are from multiple sources; see the industrial profiles in Chapter II in the PEA (Ex. 35-391) for the complete list of references.

[M] Industry revenues and profits were estimated from data reported in I.R.S., ***Corporation Source Book of Statistics of Income, 2000.*** Data on revenues for State and Local Governments were taken from U.S. Census Bureau, ***Government Finances: 1999-2000***, January 2003.

Source: U.S. Dept. of Labor, OSHA, Office of Regulatory Analysis, based on IT, 2004.

F. Benefits and Net Benefits

OSHA estimated the benefits associated with alternative PELs for Cr(VI) by applying the dose-response relationship developed in the risk assessment to current exposure levels. OSHA determined current exposure levels by first developing an exposure profile for industries with Cr(VI) exposures using OSHA inspection and site visit data, and then applying this profile to the current worker population. The industry by industry exposure profile was given in Table IX–2 above.

By applying the dose-response relationship to estimates of current exposure levels across industries, it is possible to project the number of lung cancers expected to occur in the worker population given current exposures (the ''baseline''), and the number of these cases that would be avoided under alternative, lower PELs. OSHA assumed that exposures below the limit of detection (LOD) are equivalent to no exposure to Cr(VI), thus assigning no baseline or avoided lung cancers (and hence, no benefits) to these exposures. For exposures above the current PEL and for purposes of determining the benefit of reducing the PEL, OSHA assumed exposure at exactly the PEL. Consequently, the benefits computed below are attributable only to a change in the PEL. No benefits are assigned to the effect of a new standard increasing compliance with the current PEL. OSHA estimates that between 2,247 and 8,708 lung cancers attributable to Cr(VI) exposure will occur during the working lifetime of the current worker population. Table IX–9 shows the number of avoided lung cancers by PEL. At the proposed PEL of 1 μg/m^3, and estimated 1,970 to 7,500 lung cancers would be prevented over the working lifetime of the current worker population.

TABLE IX–9.—AVOIDED LUNG CANCERS ESTIMATES BY PEL

PEL (μg/^{3}m)	0.25	0.5	1	5	10	20
Avoided Cancers (Total)	2,147–8,270	2,078–7,968	1,970–7,500	1,440–5,233	1,052–3,649	585–1,864
Avoided Cancers (Annual)	48–184	46–177	44–167	32–116	23–81	13–41

Note that the Agency based these estimates on a worker that is employed in a Cr(VI) exposed occupation for his entire working life, from age 20 to 65. The calculation also does not allow workers to enter or exit Cr(VI) jobs, or switch to other exposure groups during their working lives. While the assumptions of 45 years of exposure and no mobility among exposure groups may seem restrictive, these assumptions actually are likely to yield somewhat conservative estimates of the number of avoided cancers, given the nature of the risk assessment model. For example, consider the case of job covered by five workers, each working nine years rather than one worker for 45 years. The former situation will likely yield a slightly higher rate of lung cancers, since more workers are exposed to the carcinogen (albeit for a shorter period of time) and that the average age of the workers exposed is likely to decrease. This is due to: (1) The linearity of the estimated dose-response relationship, and (2) once an individual accumulates a dose, the increase in relative risk persists for the remainder of his lifetime. For example, a worker exposed from age 20 to 30 will have a constant increased relative risk for about 50 or so years (from age 30 on, assuming no lag between exposure and increased risk and death at age 80), whereas a person exposed from age 40 to 50 will have only about 30 years of increased risk (again assuming no lag and death at age 80). The persistence of the increased relative risk for a lifetime follows directly from the risk assessment, and is typical of life table analysis. OSHA intends to investigate the implications of alternative exposure scenarios in the