

## APPENDIX 1

### Appendix 1 Search terms used during the literature review

PubMed (June 2014)

#### Search 1

noise exposure N = 8779

noise exposure (United States OR Canada) N = 1859

#### Search 2

occupational exposure[mesh] OR hearing loss, noise-induced[mesh] (united states OR canada)  
N = 14,241

noise[mesh] "Occupational Exposure/statistics and numerical data"[Mesh] N = 113

with Humans and English lang. filters N=87

with (United States OR Canada) N=29

#### Search 3

((("service industry"[All Fields] OR ("industry"[MeSH Terms] OR "industry"[All Fields])) OR  
("workplace"[MeSH Terms] OR "workplace"[All  
Fields])) AND (((("noise"[MeSH Terms] OR "noise"[All Fields]) OR ("sound"[MeSH Terms] OR  
"sound"[All Fields])) OR (((("noise"[MeSH Terms]  
OR "noise"[All Fields]) AND exposure[All Fields]) OR ("occupational exposure"[MeSH Terms] OR  
("occupational"[All Fields] AND  
"exposure"[All Fields]) OR "occupational exposure"[All Fields]))) AND ((("united states"[MeSH  
Terms] OR ("canada"[MeSH Terms])) AND  
("humans"[MeSH Terms] AND English[lang]) N = 3469

#### Search 4

"noise"[MeSH Terms] OR "sound"[MeSH Terms] AND ("occupational exposure"[MeSH Terms]  
OR "occupational exposure"[All Fields])

N = 1097

#### Search 5

((("noise"[MeSH Terms] OR "noise"[All Fields]) OR ("sound"[MeSH Terms] OR "sound"[All  
Fields]) AND ("occupational exposure"[MeSH  
Terms] OR "occupational exposure"[All Fields])) N = 1640

#### Search 6

(((((("Noise/statistics and numerical data"[Mesh])) OR ("Occupational Diseases/statistics and  
numerical data"[Mesh])) OR ("Hearing Loss,  
Noise-Induced/statistics and numerical data"[Mesh])) OR ("Environmental Exposure/statistics  
and numerical data"[Mesh]))) AND (((("service  
industry") OR industry[MeSH Terms]) OR workplace[MeSH Terms])) AND ((United States OR  
Canada)) N = 1829

#### Search 7

((((((((((("Noise/statistics and numerical data"[Mesh])) OR ("Occupational Diseases/statistics  
and numerical data"[Mesh])) OR ("Hearing  
Loss, Noise-Induced/statistics and numerical data"[Mesh])) OR ("Environmental  
Exposure/statistics and numerical data"[Mesh]))) NOT  
asbestos)))) AND (((((((((((forestry[Title/Abstract]) OR oil extraction[Title/Abstract]) OR gas  
extraction[Title/Abstract]) OR transportation

[Title/Abstract]) OR trucking[Title/Abstract]) OR warehouses[Title/Abstract]) OR warehousing[Title/Abstract]) OR ((((((fishers[Title/Abstract]) OR seafarers[Title/Abstract]) OR fisheries[Title/Abstract]) OR fishing[Title/Abstract]) OR (((("service industry") OR industry [MeSH Terms]) OR workplace[MeSH Terms])) OR (((((((((((("food industry"[Title/Abstract]) OR coffee[Title/Abstract]) OR barista[Title/Abstract]) OR cafe[Title/Abstract]) OR restaurants[Title/Abstract]) OR construction[Title/Abstract]) OR building[Title/Abstract]) OR factory [Title/Abstract]) OR mining[Title/Abstract]) OR coal[Title/Abstract]) OR coking[Title/Abstract]) OR metallurgy[Title/Abstract]) OR farm[Title/Abstract]) OR farming[Title/Abstract]) OR agriculture[Title/Abstract]))) AND (united states OR canada) N = 2464

Search 8

(((noise[Mesh] OR occupational diseases[Mesh] OR hearing loss, noise-induced[Mesh] OR environmental exposure[Mesh]) NOT asbestos)) AND (((((((((((forestry[Title/Abstract]) OR oil extraction[Title/Abstract]) OR gas extraction[Title/Abstract]) OR transportation [Title/Abstract]) OR trucking[Title/Abstract]) OR warehouses[Title/Abstract]) OR warehousing[Title/Abstract]))) OR ((((((fishers[Title/Abstract]) OR seafarers[Title/Abstract]) OR fisheries[Title/Abstract]) OR fishing[Title/Abstract]) OR (((("service industry") OR industry [MeSH Terms]) OR workplace[MeSH Terms])) OR (((((((((((("food industry"[Title/Abstract]) OR coffee[Title/Abstract]) OR barista[Title/Abstract]) OR cafe[Title/Abstract]) OR restaurants[Title/Abstract]) OR construction[Title/Abstract]) OR building[Title/Abstract]) OR factory [Title/Abstract]) OR mining[Title/Abstract]) OR coal[Title/Abstract]) OR coking[Title/Abstract]) OR metallurgy[Title/Abstract]) OR farm[Title/Abstract]) OR farming[Title/Abstract]) OR agriculture[Title/Abstract]))) AND (united states OR canada ) N = 9112

Embase (June 2014)

Search 9

'occupational accident'/exp OR 'occupational accident' AND ('noise'/exp OR noise) AND (united AND states OR 'canada'/exp OR canada)

N=71

Scopus (June 2014)

Search 10

(noise AND occupational exposure AND statistics AND (united states OR canada)) N=37

## APPENDIX 2

### Appendix 2 Sources of data from the published literature

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- construction: a pilot study. *J Occup Environ Hyg* 2012; 9: D117–122.
- [19]Landon P, Breyse P. Noise exposures of rail workers at a North American chemical facility. *Am J Ind Med* 2005; 369; 364–369.
- [20]Legris M, Poulin P. Noise exposure profile among heavy equipment operators, associated laborers, and crane operators. *Am Ind Hyg Assoc J* 1998; 59: 774–778.
- [21]Marsh JP, Jellicoe P, Black B, Monson RC, Clark TA. Noise levels in adult and pediatric orthopedic cast clinics. *Am J Orthop* 2011; 40: E122–124.
- [22]McKernan J, Piacitelli G. Occupational exposures in seismic retrofitting operations. *Appl Occup* (2002). <http://www.tandfonline.com/doi/pdf/10.1080/104732202317201285> (accessed 16 July 2014).
- [23]McIlwaine D, Stewart M, Anderson R. Noise exposure levels for musicians during rehearsal and performance times. *Med Probl Perform Art* 2012; 27: 31–36.
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### Appendix 3: Formula derivations in the Bayesian method section

We assumed the observations from government and from industry follow a normal distribution respectively:  $y_G | \mu_G, \bar{S}_G^2 \sim N(\mu_G, \bar{S}_G^2)$  and  $y_I | \mu_I, \bar{S}_I^2 \sim N(\mu_I, \bar{S}_I^2)$ . We specified informative normal priors as follows:

$$\pi(\mu_G | \bar{Y}_L, \bar{S}_L^2, N_L) = N\left(\bar{Y}_L, \frac{\bar{S}_L^2}{N_L}\right)$$

$$\pi(\mu_I | \bar{Y}_L, \bar{S}_L^2, N_L) = N\left(\bar{Y}_L, \frac{\bar{S}_L^2}{N_L}\right)$$

Based on these two priors, we derived the posterior distribution of  $\mu_G$  and that of  $\mu_I$ :

$$\mu_G | \bar{Y}_G, \bar{S}_G^2, N_G, \bar{Y}_L, \bar{S}_L^2, N_L \sim N\left(\frac{\frac{\bar{S}_L^2}{N_L} N_G \bar{Y}_G + \bar{Y}_L \bar{S}_G^2}{\frac{\bar{S}_L^2}{N_L} N_G + \bar{S}_G^2}, \frac{\frac{\bar{S}_L^2 \bar{S}_G^2}{N_L}}{\frac{\bar{S}_L^2}{N_L} N_G + \bar{S}_G^2}\right)$$

$$\mu_I | \bar{Y}_I, \bar{S}_I^2, N_I, \bar{Y}_L, \bar{S}_L^2, N_L \sim N\left(\frac{\frac{\bar{S}_L^2}{N_L} N_I \bar{Y}_I + \bar{Y}_L \bar{S}_I^2}{\frac{\bar{S}_L^2}{N_L} N_I + \bar{S}_I^2}, \frac{\frac{\bar{S}_L^2 \bar{S}_I^2}{N_L}}{\frac{\bar{S}_L^2}{N_L} N_I + \bar{S}_I^2}\right)$$

Then the estimated SOC level exposure was the posterior mean of the posterior distribution:

$$\hat{\mu}_G = E(\mu_G | \bar{Y}_G, \bar{S}_G^2, N_G, \bar{Y}_L, \bar{S}_L^2, N_L) = \frac{\frac{\bar{S}_L^2}{N_L} N_G \bar{Y}_G + \bar{Y}_L \bar{S}_G^2}{\frac{\bar{S}_L^2}{N_L} N_G + \bar{S}_G^2}$$

$$\hat{\mu}_I = E(\mu_I | \bar{Y}_I, \bar{S}_I^2, N_I, \bar{Y}_L, \bar{S}_L^2, N_L) = \frac{\frac{\bar{S}_L^2}{N_L} N_I \bar{Y}_I + \bar{Y}_L \bar{S}_I^2}{\frac{\bar{S}_L^2}{N_L} N_I + \bar{S}_I^2}$$

We constructed a 95 % confidence interval for  $\hat{\mu}_G$  and  $\hat{\mu}_I$ , based on their posterior distributions:

$$\left[ \hat{\mu}_G - 1.96 \sqrt{\frac{\frac{\bar{S}_L^2}{N_L} \bar{S}_G^2}{\frac{\bar{S}_L^2}{N_L} N_G + \bar{S}_G^2}}, \hat{\mu}_G + 1.96 \sqrt{\frac{\frac{\bar{S}_L^2}{N_L} \bar{S}_G^2}{\frac{\bar{S}_L^2}{N_L} N_G + \bar{S}_G^2}} \right]$$

$$[\hat{\mu}_I - 1.96 \sqrt{\frac{\frac{\bar{S}_L^2 \bar{S}_I^2}{N_L}}{\frac{\bar{S}_L^2}{N_L} N_I + \bar{S}_I^2}}, \hat{\mu}_I + 1.96 \sqrt{\frac{\frac{\bar{S}_L^2 \bar{S}_I^2}{N_L}}{\frac{\bar{S}_L^2}{N_L} N_I + \bar{S}_I^2}}]$$

Based on the formula of posterior distribution,  $\hat{\mu}_G$  is a weighted average of  $\bar{Y}_G$ , the mean from government data and  $\bar{Y}_L$ , the mean from literature data;  $\hat{\mu}_I$  is a weighted average of  $\bar{Y}_I$ , the mean from industry data and  $\bar{Y}_L$ , the mean from literature data. For  $\hat{\mu}_G$ , the weight of government data is based on its number of observations and the standard deviation. The higher the weight of government data, the more the government data contributes to  $\hat{\mu}_G$ . Therefore, this weight represented the contribution of government data:

$$Contribution_G = \frac{\frac{\bar{S}_L^2}{N_L} N_G}{\frac{\bar{S}_L^2}{N_L} N_G + \bar{S}_G^2}$$

Similarly, we applied the above formula to calculate  $Contribution_I$ , the contribution of industry data to estimate  $\hat{\mu}_I$ .

Appendix 4: List of pooled estimates for all SOCs

SOC Number	Title	$\bar{Y}_{pooled}$	95%CI	$X^2$	p-value	$I^2$	Resource
11-1000	Top Executives	80.3	69.5-91.1	0.84	0.36	0	GI
Nov-51	Industrial Production Managers	86.3	74.49-98.01	0.01	0.91	0	GI
Nov-71	Transportation, Storage, and Distribution Managers	82.0	70.76-93.13	0.01	0.91	0	GI
Nov-33	Educational Administrators, Postsecondary	87.2	78.97-95.43	NA	NA	NA	G
Nov-11	Medical and Health Services Managers	73.5	68.99-78.01	NA	NA	NA	G
13-1022	Wholesale and Retail Buyers, Except Farm Products	74.8	67.97-81.64	0.11	0.74	0	GI
13-2011	Accountants and Auditors	84.7	63.92-105.48	NA	NA	NA	G

15-1131	Computer Programmers	80.6	67.47-93.73	NA	NA	NA	G
15-1199	Computer Occupations, All Other	79.7	72.9-86.51	0.38	0.54	0	GI
17-1022	Surveyors	78.4	66.58-90.3	0.07	0.79	0	GI
17-2000	Engineers	85.0	74.86-95.18	0.05	0.98	0	GIL
17-2081	Environmental Engineers	80.9	70.36-91.36	0	0.95	0	GI
19-1031	Conservation Scientists	94.7	88.04-101.36	NA	NA	NA	G
19-4000	Life, Physical, and Social Science Technicians	79.3	67.37-91.22	0.67	0.41	0	GI
19-4011	Agricultural and Food Science Technicians	89.2	79.04-99.39	2.17	0.14	53.86	GI
19-4031	Chemical Technicians	88.4	79.18-97.69	2.99	0.08	66.55	GI

19-4091	Environmental Science and Protection Technicians, Including Health	81.7	70.47- 92.93	1.62	0.2	38.44	GI
21-1012	Educational, Guidance, School, and Vocational Counselors	71.2	56.5- 85.9	NA	NA	NA	G
21-1099	Community and Social Service Specialists, All Other	94.4	82.44- 106.36	NA	NA	NA	G
25-1000	Postsecondary Teachers	89.0	76.46- 101.54	NA	NA	NA	G
25-2031	Secondary School Teachers, Except Special and Career/Technical Education	82.9	69.73- 95.96	0.6	0.44	0	GI

25-2032	Career/Technical Education Teachers, Secondary School	84.3	79.81- 88.71	1.45	0.23	30.87	GI
25-3011	Adult Basic and Secondary Education and Literacy Teachers and Instructors	88.1	75.55- 100.65	0	1	0	GI
27-0000	Arts, Design, Entertainment, Sports, and Media Occupations	79.7	66.86- 92.53	0.04	0.84	0	GI
27-1011	Art Directors	86.8	74.38- 99.25	0.04	0.84	0	GI
27-2042	Musicians and Singers	90.4	85.18- 95.66	0.24	0.89	0	GIL
27-3031	Public Relations Specialists	80.1	73.24- 87	0.49	0.48	0	GI
27-4014	Sound Engineering Technicians	70.2	63.14- 77.26	NA	NA	NA	G

29-1131	Veterinarians	86.2	79.33- 93.13	0.01	0.94	0	GI
29-1171	Nurse Practitioners	71.5	50.14- 92.86	NA	NA	NA	I
29-9011	Occupational Health and Safety Specialists	74.6	63.23- 85.91	0.1	0.76	0	GI
31-0000	Healthcare Support Occupations	78.5	68- 88.95	0.77	0.38	0	GI
33-2010	Firefighters	77.6	77.01- 78.18	0.07	0.79	0	GI
33-2011	Firefighters	86.1	74.61- 97.52	0.05	0.82	0	GI
33-3012	Correctional Officers and Jailers	81.6	69.31- 93.8	0.02	0.88	0	GI
33-3050	Police Officers	85.8	78.11- 93.53	0.16	0.69	0	GI
33-3051	Police and Sheriff's Patrol Officers	86.4	71.71- 101.12	0.06	0.8	0	GI
33-9032	Security Guards	81.8	64.68- 98.96	0.02	0.88	0	GI
35-2000	Cooks and Food Preparation Workers	80.0	77.7- 82.37	0.17	0.68	0	GI

35-2012	Cooks, Institution and Cafeteria	81.0	68.21-93.71	0.39	0.53	0	GI
35-2021	Food Preparation Workers	84.5	77.71-91.18	0.5	0.48	0	GI
35-3011	Bartenders	93.2	88.64-97.72	2.61	0.27	23.51	GIL
35-3021	Combined Food Preparation and Serving Workers, Including Fast Food	76.0	67.11-84.9	0	0.97	0	GI
35-3031	Waiters and Waitresses	87.6	80.01-95.15	0.91	0.34	0	GI
35-3041	Food Servers, Nonrestaurant	86.8	78.85-94.8	1.12	0.29	10.64	GI
35-9011	Dining Room and Cafeteria Attendants and Bartender Helpers	81.6	64.35-98.85	NA	NA	NA	G
35-9021	Dishwashers	83.8	80.46-87.18	0.33	0.56	0	GI

37-2011	Janitors and Cleaners, Except Maids and Housekeeping Cleaners	87.5	76.76-98.21	0.11	0.74	0	GI
37-2012	Maids and Housekeeping Cleaners	82.3	70.54-94.08	0.85	0.36	0	GI
37-3011	Landscaping and Groundskeeping Workers	86.4	76.71-96.1	0.1	0.75	0	GI
37-3012	Pesticide Handlers, Sprayers, and Applicators, Vegetation	86.1	73.75-98.45	NA	NA	NA	G
37-3013	Tree Trimmers and Pruners	92.1	80.91-103.37	0	0.97	0	GI
39-2021	Nonfarm Animal Caretakers	90.5	82.45-98.46	8.68	0.01	76.97	GIL
39-3011	Gaming Dealers	89.7	73.24-106.16	NA	NA	NA	G

39-3031	Ushers, Lobby Attendants, and Ticket Takers	87.2	85.67-88.79	0.14	0.71	0	GI
39-3091	Amusement and Recreation Attendants	84.2	73-95.31	0.01	0.91	0	GI
39-5012	Hairdressers, Hairstylists, and Cosmetologists	84.4	68.59-100.14	0.06	0.81	0	GI
39-6011	Baggage Porters and Bellhops	82.4	70.84-94.03	0.26	0.61	0	GI
39-9011	Childcare Workers	NA	NA-NA	NA	NA	NA	NA
41-1011	First-Line Supervisors of Retail Sales Workers	80.7	74.96-86.36	0.06	0.81	0	GI
41-1012	First-Line Supervisors of Non-Retail Sales Workers	80.1	68.96-91.16	1.16	0.28	14.02	GI
41-2000	Retail Sales Workers	79.3	71.52-87.14	0.67	0.41	0	GI

41-2011	Cashiers	74.2	48.92- 99.48	NA	NA	NA	G
41-2012	Gaming Change Persons and Booth Cashiers	75.6	64.01- 87.26	0.21	0.65	0	GI
41-2031	Retail Salespersons	81.3	68.8- 93.71	1.41	0.24	28.87	GI
41-9099	Sales and Related Workers, All Other	85.6	79.38- 91.83	0.34	0.84	0	GIL
43-1011	First-Line Supervisors of Office and Administrative Support Workers	79.7	71.54- 87.93	0.03	0.86	0	GI
43-2099	Communications Equipment Operators, All Other	86.1	75.48- 96.77	0	0.95	0	GI
43-3031	Bookkeeping, Accounting, and Auditing Clerks	90.8	74.53- 107.07	NA	NA	NA	G
43-4051	Customer Service Representatives	78.7	64.39- 93.01	NA	NA	NA	I

43-4081	Hotel, Motel, and Resort Desk Clerks	79.4	66.27- 92.46	0.01	0.92	0	GI
43-4181	Reservation and Transportation Ticket Agents and Travel Clerks	77.5	70.64- 84.36	NA	NA	NA	I
43-5011	Cargo and Freight Agents	84.5	79.24- 89.83	0.06	0.8	0	GI
43-5032	Dispatchers, Except Police, Fire, and Ambulance	75.5	65.86- 85.11	0.2	0.66	0	GI
43-5053	Postal Service Mail Sorters, Processors, and Processing Machine Operators	88.7	87.09- 90.22	0.57	0.45	0	GI
43-5061	Production, Planning, and Expediting Clerks	81.5	71.76- 91.15	0.03	0.87	0	GI

43-5071	Shipping, Receiving, and Traffic Clerks	77.9	66.1- 89.65	0.13	0.72	0	GI
43-5081	Stock Clerks and Order Fillers	80.8	69.17- 92.34	0.22	0.64	0	GI
43-5111	Weighers, Measurers, Checkers, and Samplers, Recordkeeping	79.1	70.82- 87.27	6.52	0.01	84.66	GI
43-9061	Office Clerks, General	70.0	65.35- 74.56	0	0.96	0	IL
43-9071	Office Machine Operators, Except Computer	83.1	64.68- 101.52	NA	NA	NA	G
43-9199	Office and Administrative Support Workers, All Other	83.8	77.94- 89.75	3.34	0.07	70.03	GI
45-2041	Graders and Sorters, Agricultural Products	88.1	77.54- 98.73	0.74	0.39	0	GI

45-2091	Agricultural Equipment Operators	86.9	81.8- 91.95	0.31	0.86	0	GIL
45-2092	Farmworkers and Laborers, Crop, Nursery, and Greenhouse	89.9	80.68- 99.17	0.09	0.96	0	GIL
45-2093	Farmworkers, Farm, Ranch, and Aquacultural Animals	91.3	83.78- 98.76	0.06	0.97	0	GIL
45-4000	Forest, Conservation, and Logging Workers	93.3	84.97- 101.58	0.01	0.91	0	GI
45-4020	Logging Workers	92.5	91.13- 93.86	0.01	0.92	0	IL
45-4021	Fallers	99.5	92.83- 106.12	0.28	0.6	0	GI
45-4022	Logging Equipment Operators	92.0	82.18- 101.82	0.11	0.74	0	GI
45-4023	Log Graders and Scalers	86.8	72.92- 100.73	0.12	0.73	0	GI
45-4029	Logging Workers, All Other	85.4	73.79- 96.91	0.24	0.62	0	GI

47-1011	First-Line Supervisors of Construction Trades and Extraction Workers	83.0	75.89-90.2	1.37	0.5	0	GIL
47-2000	Construction Trades Workers	87.7	75.11-100.19	0	0.98	0	GI
47-2011	Boilermakers	81.4	71.29-91.47	1.24	0.27	19.27	GI
47-2021	Brickmasons and Blockmasons	89.0	81.2-96.73	0.6	0.74	0	GIL
47-2030	Carpenters	83.2	79.64-86.8	0.22	0.9	0	GIL
47-2031	Carpenters	88.2	78.97-97.36	0.4	0.53	0	GI
47-2042	Floor Layers, Except Carpet, Wood, and Hard Tiles	91.4	90.07-92.8	0.51	0.48	0	GI
47-2044	Tile and Marble Setters	85.9	75.97-95.74	0.03	0.87	0	GI
47-2051	Cement Masons and Concrete Finishers	82.5	78.53-86.53	1.11	0.57	0	GIL
47-2061	Construction Laborers	85.8	79.41-92.24	0.41	0.82	0	GIL

47-2071	Paving, Surfacing, and Tamping Equipment Operators	89.2	82.1- 96.21	0.06	0.81	0	GI
47-2073	Operating Engineers and Other Construction Equipment Operators	86.4	77.88- 94.85	0.27	0.88	0	GIL
47-2111	Electricians	79.9	76.92- 82.89	0.12	0.94	0	GIL
47-2121	Glaziers	84.9	76.27- 93.61	0.01	0.91	0	GI
47-2130	Insulation Workers	76.7	74.82- 78.56	2.55	0.11	60.76	IL
47-2131	Insulation Workers, Floor, Ceiling, and Wall	83.9	74.19- 93.6	0.12	0.73	0	GI
47-2141	Painters, Construction and Maintenance	84.8	74.51- 95.12	0.27	0.6	0	GI
47-2152	Plumbers, Pipefitters, and Steamfitters	82.4	74.03- 90.77	0.01	0.91	0	GI

47-2171	Reinforcing Iron and Rebar Workers	84.6	70.88-98.32	NA	NA	NA	G
47-2181	Roofers	88.5	84.52-92.39	0.02	0.99	0	GIL
47-2211	Sheet Metal Workers	81.0	77.41-84.59	0.99	0.61	0	GIL
47-2221	Structural Iron and Steel Workers	83.5	79.65-87.38	0.66	0.72	0	GIL
47-3013	Helpers--Electricians	79.4	69.51-89.34	0.01	0.91	0	GI
47-4071	Septic Tank Servicers and Sewer Pipe Cleaners	88.9	81.4-96.44	0.31	0.58	0	GI
47-4090	Miscellaneous Construction and Related Workers	80.9	61.89-99.91	NA	NA	NA	G
47-5000	Extraction Workers	90.0	84.84-95.12	0.43	0.51	0	GI
47-5020	Earth Drillers, Except Oil and Gas	85.1	75.95-94.21	0	0.95	0	GI

47-5021	Earth Drillers, Except Oil and Gas	83.8	72.99- 94.54	0.07	0.79	0	GI
47-5031	Explosives Workers, Ordnance Handling Experts, and Blasters	85.6	72.21- 99.03	0	0.98	0	GI
47-5040	Mining Machine Operators	79.4	67.8- 91.05	0	0.99	0	GI
47-5041	Continuous Mining Machine Operators	82.4	76.6- 88.24	0.01	1	0	GIL
47-5051	Rock Splitters, Quarry	96.7	92.67- 100.63	2.6	0.11	61.58	GI
47-5061	Roof Bolters, Mining	83.6	73.73- 93.51	0.01	0.94	0	GI
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	83.4	74.93- 91.89	0	0.96	0	GI

49-2022	Telecommunications Equipment Installers and Repairers, Except Line Installers	85.3	76.78- 93.74	0.01	0.91	0	GI
49-3011	Aircraft Mechanics and Service Technicians	89.9	82.06- 97.69	0.76	0.38	0	GI
49-3020	Automotive Technicians and Repairers	84.6	75.79- 93.39	0.53	0.46	0	GI
49-3021	Automotive Body and Related Repairers	82.1	72.2- 92.08	0.09	0.77	0	GI
49-3023	Automotive Service Technicians and Mechanics	86.4	75.88- 96.97	0.05	0.82	0	GI

49-3031	Bus and Truck Mechanics and Diesel Engine Specialists	83.6	73.13- 94.03	0.05	0.82	0	GI
49-3042	Mobile Heavy Equipment Mechanics, Except Engines	80.0	69.01- 90.93	0.03	0.86	0	GI
49-3051	Motorboat Mechanics and Service Technicians	87.0	78.38- 95.62	NA	NA	NA	G
49-3093	Tire Repairers and Changers	87.5	77.4- 97.62	0.85	0.36	0	GI
49-9000	Other Installation, Maintenance, and Repair Occupations	83.7	74.07- 93.36	0.66	0.42	0	GI

49-9012	Control and Valve Installers and Repairers, Except Mechanical Door	90.5	81.49- 99.47	0.1	0.75	0	GI
49-9021	Heating, Air Conditioning, and Refrigeration Mechanics and Installers	85.1	72.77- 97.41	0.11	0.74	0	GI
49-9041	Industrial Machinery Mechanics	84.1	79.11- 89.06	0.04	0.98	0	GIL
49-9043	Maintenance Workers, Machinery	85.0	74.31- 95.62	0	0.99	0	GI
49-9050	Line Installers and Repairers	89.0	85.66- 92.39	1.62	0.45	0	GIL
49-9051	Electrical Power- Line Installers and Repairers	78.0	68.38- 87.54	1.23	0.27	18.87	GI

49-9052	Telecommunications Line Installers and Repairers	79.0	64.81- 93.14	0	0.98	0	GI
49-9071	Maintenance and Repair Workers, General	98.1	91.08- 105.13	13.32	0	84.98	GIL
49-9093	Fabric Menders, Except Garment	89.7	77.1- 102.25	0.02	0.87	0	GI
49-9096	Riggers	83.3	75.24- 91.44	0.1	0.75	0	GI
49-9099	Installation, Maintenance, and Repair Workers, All Other	85.2	73.77- 96.62	0	0.99	0	GI
51-0000	Production Occupations	82.2	71.28- 93.06	0.01	0.94	0	GI
51-1000	Supervisors of Production Workers	87.7	74.78- 100.52	0.22	0.64	0	GI

51-1011	First-Line Supervisors of Production and Operating Workers	82.5	72.77-92.28	0.11	0.74	0	GI
51-2000	Assemblers and Fabricators	82.8	71.11-94.39	0.54	0.46	0	GI
51-2022	Electrical and Electronic Equipment Assemblers	81.8	71.74-91.87	0.96	0.33	0	GI
51-2041	Structural Metal Fabricators and Fitters	84.1	76.77-91.51	0.95	0.62	0	GIL
51-2091	Fiberglass Laminators and Fabricators	84.4	76.09-92.78	0	0.97	0	GI
51-2092	Team Assemblers	82.9	73.71-92.12	0.2	0.66	0	GI
51-2099	Assemblers and Fabricators, All Other	88.4	77.51-99.28	0.01	0.94	0	GI

51-3000	Food Processing Workers	90.0	82.62-97.34	0	0.97	0	GI
51-3011	Bakers	82.4	78.42-86.29	0.53	0.46	0	GI
51-3021	Butchers and Meat Cutters	85.1	76.29-93.99	0.31	0.58	0	GI
51-3022	Meat, Poultry, and Fish Cutters and Trimmers	91.0	80.45-101.63	0.05	0.82	0	GI
51-3023	Slaughterers and Meat Packers	90.3	81.86-98.74	0.3	0.59	0	GI
51-3090	Miscellaneous Food Processing Workers	90.1	81.12-99.13	0.02	0.88	0	GI
51-3091	Food and Tobacco Roasting, Baking, and Drying Machine Operators and Tenders	88.7	78.33-99.15	0.02	0.89	0	GI
51-3092	Food Batchmakers	88.3	83.34-93.3	2.66	0.26	24.95	GIL

51-3093	Food Cooking Machine Operators and Tenders	90.1	82.01- 98.2	0.01	0.93	0	GI
51-4000	Metal Workers and Plastic Workers	87.7	75.37- 100.04	0.01	0.91	0	GI
51-4012	Computer Numerically Controlled Machine Tool Programmers, Metal and Plastic	80.3	74.57- 85.95	0	0.95	0	GI
51-4021	Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic	87.7	76.67- 98.71	0.08	0.78	0	GI

51-4022	Forging Machine Setters, Operators, and Tenders, Metal and Plastic	95.9	83.76- 108.05	0.01	0.93	0	GI
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51-4023	Rolling Machine Setters, Operators, and Tenders, Metal and Plastic	88.4	77.05- 99.7	0.06	0.8	0	GI
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51-4031	Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic	87.6	77.27- 97.85	0.08	0.78	0	GI
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51-4032	Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic	88.1	74.91- 101.24	0.02	0.88	0	GI
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51-4033	Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic	86.0	76- 95.96	0.11	0.74	0	GI
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51-4034	Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic	86.7	72.72- 100.62	0.01	0.92	0	GI
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51-4035	Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic	89.0	77.85- 100.07	0	0.99	0	GI
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51-4041	Machinists	80.9	71.08- 90.72	0	1	0	GI
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51-4051	Metal-Refining Furnace Operators and Tenders	85.3	75.03- 95.54	0.35	0.55	0	GI
51-4052	Pourers and Casters, Metal	87.2	78.23- 96.09	0.07	0.79	0	GI
51-4062	Patternmakers, Metal and Plastic	79.8	73.3- 86.2	0.95	0.33	0	GI
51-4070	Metal and Plastic	81.5	71.75- 91.25	0.19	0.67	0	GI
51-4071	Foundry Mold and Coremakers	90.2	82.78- 97.55	0.01	0.91	0	GI
51-4072	Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic	85.0	74.98- 95.07	0.02	0.89	0	GI

51-4081	Multiple Machine Tool Setters, Operators, and Tenders, Metal and Plastic	85.8	74.28- 97.24	0.24	0.63	0	GI
51-4111	Tool and Die Makers	82.2	71.11- 93.33	0	0.97	0	GI
51-4121	Welders, Cutters, Solderers, and Brazers	85.0	75.21- 94.85	0	0.98	0	GI
51-4191	Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic	86.0	76.24- 95.83	0.21	0.65	0	GI
51-4192	Layout Workers, Metal and Plastic	90.8	82.56- 99.13	0.83	0.36	0	GI

51-4193	Plating and Coating Machine Setters, Operators, and Tenders, Metal and Plastic	84.8	73.79- 95.72	0	0.99	0	GI
51-4199	Metal Workers and Plastic Workers, All Other	88.8	78.3- 99.28	0.11	0.74	0	GI
51-5112	Printing Press Operators	85.4	75.05- 95.71	0.05	0.83	0	GI
51-5113	Print Binding and Finishing Workers	82.2	70.28- 94.12	0.01	0.91	0	GI
51-6000	Textile, Apparel, and Furnishings Workers	90.3	77.6- 102.89	0.01	0.91	0	GI
51-6011	Laundry and Dry- Cleaning Workers	83.2	74.26- 92.14	0.49	0.48	0	GI
51-6031	Sewing Machine Operators	80.6	68.46- 92.79	0.01	0.91	0	GI
51-6040	Shoe and Leather Workers	85.1	78.05- 92.04	0.52	0.47	0	GI

51-6041	Shoe and Leather Workers and Repairers	88.6	77.34-99.78	0.02	0.89	0	GI
51-6052	Tailors, Dressmakers, and Custom Sewers	95.8	84.9-106.78	0.72	0.4	0	GI
51-6062	Textile Cutting Machine Setters, Operators, and Tenders	86.1	75.26-96.9	0.35	0.56	0	GI
51-6063	Textile Knitting and Weaving Machine Setters, Operators, and Tenders	92.9	77.61-108.19	NA	NA	NA	G
51-6064	Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders	87.9	76.78-98.92	0.21	0.65	0	GI

51-6091	Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers	84.9	81.01-88.85	0.8	0.37	0	GI
51-6092	Fabric and Apparel Patternmakers	79.0	72.18-85.75	0.18	0.67	0	GI
51-6093	Upholsterers	80.4	72.99-87.71	0.46	0.5	0	GI
51-6099	Textile, Apparel, and Furnishings Workers, All Other	88.5	77.26-99.81	0.05	0.83	0	GI
51-7000	Woodworkers	90.5	80.31-100.61	0.01	0.91	0	GI
51-7011	Cabinetmakers and Bench Carpenters	89.8	79.71-99.8	0	0.95	0	GI
51-7021	Furniture Finishers	83.8	77.29-90.31	1.31	0.25	23.51	GI

51-7041	Sawing Machine Setters, Operators, and Tenders, Wood	92.7	82.86- 102.51	0	0.98	0	GI
51-7042	Woodworking Machine Setters, Operators, and Tenders, Except Sawing	88.4	85.08- 91.74	0.49	0.78	0	GIL
51-7090	Miscellaneous Woodworkers	88.0	78.12- 97.82	0.04	0.85	0	GI
51-8000	Plant and System Operators	92.2	82.38- 102.01	0	0.98	0	GI
51-8013	Power Plant Operators	87.6	78.35- 96.81	0.47	0.49	0	GI
51-8021	Stationary Engineers and Boiler Operators	86.8	76.85- 96.78	0.05	0.82	0	GI
51-8091	Chemical Plant and System Operators	80.9	71.08- 90.65	0.07	0.8	0	GI

51-8093	Petroleum Pump System Operators, Refinery Operators, and Gaugers	83.3	71.56- 94.96	0.26	0.61	0	GI
51-9010	Chemical Processing Machine Setters, Operators, and Tenders	85.2	73.63- 96.67	0.06	0.8	0	GI
51-9011	Chemical Equipment Operators and Tenders	84.3	73.86- 94.78	0.16	0.69	0	GI
51-9012	Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders	82.7	75.79- 89.65	0.2	0.66	0	GI

51-9021	Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders	87.6	75.67- 99.62	0.17	0.68	0	GI
51-9022	Grinding and Polishing Workers, Hand	88.3	79.44- 97.24	1.8	0.18	44.36	GI
51-9023	Mixing and Blending Machine Setters, Operators, and Tenders	84.7	75.22- 94.2	0.02	0.89	0	GI
51-9031	Cutters and Trimmers, Hand	86.1	76- 96.18	0.46	0.5	0	GI
51-9032	Cutting and Slicing Machine Setters, Operators, and Tenders	87.2	76.41- 97.9	0.02	0.89	0	GI

51-9041	Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders	85.8	72.87- 98.82	0.02	0.89	0	GI
51-9051	Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders	89.3	78.89- 99.7	0.02	0.88	0	GI
51-9061	Inspectors, Testers, Sorters, Samplers, and Weighers	82.1	67.8- 96.46	0.05	0.82	0	GI
51-9111	Packaging and Filling Machine Operators and Tenders	85.6	75.64- 95.56	0.15	0.7	0	GI

51-9121	Coating, Painting, and Spraying Machine Setters, Operators, and Tenders	83.7	74.55- 92.88	0.15	0.69	0	GI
51-9191	Adhesive Bonding Machine Operators and Tenders	86.0	75.44- 96.48	0.11	0.74	0	GI
51-9192	Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders	89.6	76.33- 102.91	0	0.98	0	GI
51-9194	Etchers and Engravers	83.6	71.38- 95.86	2.11	0.15	52.64	GI
51-9195	Molders, Shapers, and Casters, Except Metal and Plastic	87.2	75.17- 99.18	0.27	0.6	0	GI

51-9196	Paper Goods Machine Setters, Operators, and Tenders	86.6	75.55- 97.59	0.08	0.78	0	GI
51-9198	Helpers--Production Workers	87.9	77.02- 98.78	0	0.97	0	GI
51-9199	Production Workers, All Other	86.5	75.05- 97.91	0.1	0.76	0	GI
53-1031	First-Line Supervisors of Transportation and Material-Moving Machine and Vehicle Operators	80.9	75.77- 86	1.36	0.24	26.57	GI
53-2000	Air Transportation Workers	80.5	73.5- 87.53	1.72	0.19	41.79	GI
53-2011	Airline Pilots, Copilots, and Flight Engineers	87.2	75.55- 98.93	1.11	0.29	9.96	IL

53-3011	Ambulance Drivers and Attendants, Except Emergency Medical Technicians	88.2	82.99- 93.42	0.4	0.53	0	GI
53-3032	Heavy and Tractor- Trailer Truck Drivers	83.6	77.33- 89.86	0.07	0.96	0	GIL
53-3033	Light Truck or Delivery Services Drivers	89.4	81.02- 97.84	2.55	0.11	60.75	GI
53-4000	Rail Transportation Workers	88.0	68.4- 107.6	NA	NA	NA	I
53-4021	Railroad Brake, Signal, and Switch Operators	79.8	76.51- 83.06	0.07	0.79	0	GL
53-5021	Captains, Mates, and Pilots of Water Vessels	84.2	69.16- 99.25	0.02	0.9	0	GI

53-6061	Transportation Attendants, Except Flight Attendants and Baggage Porters	83.2	71.57-94.76	0	0.99	0	GI
53-7000	Material Moving Workers	81.9	68.54-95.29	0.29	0.59	0	GI
53-7011	Conveyor Operators and Tenders	89.2	79.02-99.38	0.06	0.81	0	GI
53-7021	Crane and Tower Operators	88.0	78.19-97.78	0.04	0.85	0	GI
53-7032	Excavating and Loading Machine and Dragline Operators	90.6	82.28-98.84	0.07	0.79	0	GI
53-7041	Hoist and Winch Operators	83.0	77.81-88.23	0.43	0.51	0	GI
53-7051	Industrial Truck and Tractor Operators	86.6	77.6-95.64	0	0.98	0	GI

53-7061	Cleaners of Vehicles and Equipment	84.9	71.11- 98.68	0.23	0.63	0	GI
53-7062	Laborers and Freight, Stock, and Material Movers, Hand	79.4	73.4- 85.44	1.06	0.59	0	GIL
53-7063	<u>Machine Feeders and Offbearers</u>	92.1	82.09- 102.17	0.02	0.89	0	GI
53-7064	Packers and Packagers, Hand	86.6	76.06- 97.12	0.01	0.94	0	GI
53-7072	Pump Operators, Except Wellhead Pumpers	89.3	79.26- 99.28	0.23	0.63	0	GI
53-7081	Refuse and Recyclable Material Collectors	86.6	75.37- 97.85	0.01	0.92	0	GI
53-7121	Tank Car, Truck, and Ship Loaders	81.0	70.89- 91.1	0.05	0.83	0	GI

53-7199	Material Moving Workers, All Other	85.8	74.9- 96.65	0.36	0.55	0	GI
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<sup>A</sup> G= Government, I = Industry, & L = Literature

## APPENDIX 5

### Appendix 5 Summary of sample mean differences across data sources

Of the 27 SOCs present in three sources of data, the government and industry data each provided the largest sample mean exposure for 10 (37%) of the SOCs. Among the 203 SOCs that are common to both government data and industry data, 131 (65%) SOC sample means in government data are greater than their sample means in industry data. We illustrate the nature of these differences across sources within these 203 SOCs in the table below. Sample mean from the government data was more than 2 dBA or exactly 2 dBA greater than the mean from the industry data in 45% of the SOCs but there are also 21% SOCs in which the sample mean from the industry data was more than 2 dBA or exactly 2 dBA greater than the sample mean from the government data.

Table 1 Summary of sample mean differences in SOCs that are common to both government and industry data

Table 1 Summary of sample mean differences in SOCs that are common to both government and industry data

Scenario	$\bar{Y}_G \geq \bar{Y}_I + 2$	$\bar{Y}_I + 2 > \bar{Y}_G \geq \bar{Y}_I + 1$	$\bar{Y}_I + 1 > \bar{Y}_G \geq \bar{Y}_I$	$\bar{Y}_I > \bar{Y}_G \geq \bar{Y}_I - 1$	$\bar{Y}_I - 1 > \bar{Y}_G \geq \bar{Y}_I - 2$	$\bar{Y}_I - 2 > \bar{Y}_G$	Total
<b>SOC count</b>	91 (45%)	19 (9%)	21 (10%)	12 (6%)	17 (8%)	43 (21%)	203 (100%)