

SUPPORTING STATEMENT—Part B: Collections of Information Employing
Statistical Methods

National Occupational Safety and Health Professional Workforce
Assessment: Employer and Education Provider Survey Data Collection

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B. Collections of Information Employing Statistical Methods

1.0 Respondent Universe and Sampling Methods

The Occupational Safety and Health (OS&H) professions about which data will be collected include safety, industrial hygiene, occupational medicine, occupational health nursing, health physics, ergonomics, occupational epidemiology, occupational injury prevention, and occupational health psychology. Two separate groups are being surveyed in this study, one is the providers of OS&H education and training and the other is the potential employers of OS&H professionals. We will discuss each group separately.

1.a Educational Providers

The universe for this portion of the study is college and university programs that provide at least bachelor's degrees in some OS&H profession. This includes approximately 400 programs. We are compiling lists of OS&H education and training programs from professional associations, professional certification bodies, from our Task Force contacts, and from the list of NIOSH funded programs. We will merge this information into a single listing of OS&H provider programs, which will then constitute the provider population for this survey. To be eligible for inclusion, a "program" must offer at least a Bachelor's degree in one or more of the nine OS&H categories of interest to NIOSH for this survey. Based on the information currently available to us, we believe we cover nearly all of the OS&H programs in colleges and universities, and so we propose to include all of these programs in our survey. We expect this to be about 400 providers and expect approximately 180 to participate.

1.b Employers

The universe for this portion of the study is all employers of OS&H professionals. NIOSH's objective for this effort is to provide statistically defensible estimates for each specialty. The following paragraphs describe our sample design.

The sample design will generate a national probability sample of employers of Occupational Safety and Health (OS&H) professionals. The survey will cover industries with the largest concentrations of OS&H professionals while including 75 percent of these professionals. The survey will use a stratified random sample design. The larger employers and employers in industries where OS&H professionals are concentrated will be oversampled. The target sample size is 400 completed interviews. This section describes the sample design. It includes a description of the respondent universe and sampling frame, sample size determination, stratification and sample size allocation, and expected precision of the estimates.

1.b.1 Respondent universe and sampling frame

The target population of employers of OS&H professionals presents a rare population problem relative to the general employer population. If a simple random sample of employers were selected, an enormous screener sample size would be needed to identify the employers of OS&H professionals. To avoid this inefficiency, we plan to use a stratified design that identifies the industries where OS&H professionals are concentrated, and oversample the employers in those industries to reduce the screening. Other industries where the number of OS&H workers is small can be excluded without increasing the overall under coverage substantially or causing noticeable bias in the estimates. We used the Occupational Employment Statistics (OES) survey data from the Bureau of Labor Statistics (BLS) to identify the industries where employment of OS&H professionals is concentrated.

The OES survey provides employment and wage statistics for detailed occupations, including Occupational Health and Safety (OHS) specialists. Estimates are provided for detailed industries, e.g., by 4-digit NAICS.

The BLS's OHS specialists occupation (OCC code of: 29-9011) includes four of the six largest specialties of interest for this survey: industrial hygienists, safety professionals, ergonomists, and health physicists. Membership numbers for the American College Occupational of Occupational and Environmental Medicine (ACOEM) and the American Association of Occupational Health Nurses (AAOHN) suggests there are sizable numbers of occupational physicians and occupational health nurses, however, they do not have separate OCC codes in BLS. Also, the three other smaller OS&H specialties are expected to have very small numbers relative to medicine and occupational health nursing do not have separate OCC Codes. With the extensive coverage of the OHS specialists group, for this survey we have assumed that the specialties not included in this code are likely to be found in the same industries where OHS specialists are concentrated. Therefore, for our sampling plan to identify employers of the nine OS&H professional specialties of interest we have concentrated on those industries where OHS specialists are found.

Table 1 shows the 29 industries (defined by 4-digit NAICS) with the largest numbers of OHS specialists based on the 2008 OES data. As shown in Table 1, the total number of OHS specialists in the nation is 51,800 and the 29 industries, together, contain 38,840 OHS specialists, thus covering 75 percent of the total OHS specialist employment. To maximize the efficiency of this survey, we therefore have defined these 29 industries to be "in scope."

We have determined that a cutoff of establishments of fewer than 100 employees will substantively decrease the cost of screening and increase its efficiency. Excluding smaller employers will decrease the frequency of screening closed businesses or businesses that do not employ OS&H professionals. Therefore, the sampling universe will exclude establishments with fewer than 100 employees. However, there are certain employers whose focus is on providing OS&H services, such as OS&H consultants and occupational medicine clinics that likely normally have fewer than 100 employees. For these employers we will include establishments with fewer than 100 employees.

Table 1. Industries with the largest numbers of occupational health and safety (OHS) specialists covering 75 percent of the total OHS specialist employment

Industries by 4-digit NAICS		OHS specialist employment	Percent of the total OHS specialist employment
NAICS Code	Description		
211100	Oil and Gas Extraction	480	0.93
212100	Coal Mining	220	0.42
212200	Metal Ore Mining	160	0.31
213100	Support Activities for Mining	770	1.49
221100	Electric Power Generation, Transmission and Distribution	940	1.81
311600	Animal Slaughtering and Processing	320	0.62
322100	Pulp, Paper, and Paperboard Mills	160	0.31
324100	Petroleum and Coal Products Manufacturing	310	0.60
325100	Basic Chemical Manufacturing	530	1.02
325200	Resin, Synthetic Rubber, and Artificial Synthetic Fibers and Filaments Manufacturing	380	0.73
325400	Pharmaceutical and Medicine Manufacturing	370	0.71
331100	Iron and Steel Mills and Ferroalloy Manufacturing	120	0.23
331300	Alumina and Aluminum Production and Processing	140	0.27
331400	Nonferrous Metal (except Aluminum) Production and Processing	180	0.35
331500	Foundries	180	0.35
336300	Motor Vehicle Parts Manufacturing	230	0.44
336400	Aerospace Product and Parts Manufacturing	670	1.29
482100	Rail Transportation	160	0.31
491100	Postal Service	410	0.79
492100	Couriers and Express Delivery Services	360	0.69
541600	Management, Scientific, and Technical Consulting Services	3370	6.51
541700	Scientific Research and Development Services	1110	2.14
551100	Management of Companies and Enterprises	1450	2.80
611300	Colleges, Universities, and Professional Schools	1650	3.19
622100	General Medical and Surgical Hospitals	3040	5.87
622300	Specialty (except Psychiatric and Substance Abuse) Hospitals	190	0.37
999100	Federal Executive Branch (OES Designation)	6820	13.17
999200	State Government (OES Designation)	7330	14.15
999300	Local Government (OES Designation)	6790	13.11
Subtotal		38,840	74.98
All remaining industries		12,960	25.02
Total		51,800	100.00

Source: 2008 OES survey, Occupational Employment and Wage Estimates,
http://www.bls.gov/oes/oes_dl.htm

Sampling frame

We explored several establishment lists of potential value for developing population frames for the employer survey. The business registers maintained by Bureau of Labor Statistics (BLS) and the U.S. Bureau of Census, although desirable choices for a sampling frame, cannot be used due to confidentiality and data restrictions. We also examined the option of using the OES establishment sample list, which identifies the establishments containing an OHS specialist. This approach would have eliminated the screener costs almost completely. However, our request to BLS for access was not granted.

The Dun & Bradstreet (D&B) database, formerly known as the Dun's market Identifiers (DMI) register maintained by Dun & Bradstreet (D&B), is the most comprehensive establishment list available for public use. The D&B database, which is updated monthly, covers all of the U.S. economy and its coverage of most industries is quite complete. The records contain the following fields: a D-U-N-S number; North American Industry Classification System (NAICS) code or Standard Industrial Classification (SIC) code; Federal Information Processing Standards (FIPS) state code; Standard Metropolitan Statistical Area (SMSA) code; number of employees at the location; total number of employees for the entire organization; status indicator, i.e., single location, headquarters, or branch; a subsidiary indicator; D-U-N-S numbers of the domestic topmost firm, headquarters, and parent (if a subsidiary); and hierarchy and DIAS codes to identify its location within the corporate structure.

The D&B database provides the option of choosing alternative organizational levels. The database includes both headquarters and branch level records. It defines a headquarters as a business establishment that has branches or divisions reporting to it, and is

financially responsible for those branches or divisions. The sampling unit for this survey is the establishment. Thus, we will include both headquarters and branches as separate sampling units in the sampling frame. The headquarters record provides the total number of employees for the company, including the employees in the branches and the number of employees at the location. We will use D&B's information on the number of employees at the location in designing the sample.

1.b.2 Sample size determination

The survey targets 400 completed interviews with employers of OS&H professionals. We estimate that we will need to sample at least 9,211 establishments (assuming that we will be able to reach at least 85% of them during the screening process).

If we assume we can successfully complete screening interviews with at least 85 % of these establishments (e.g., some will have gone out of business), we estimate that we will need to screen 7,829 establishments by telephone to identify 1,000 eligible establishments (i.e., establishments that employ one or more OS&H professionals) to participate in the survey. When we establish eligibility we will obtain or confirm mailing contact information. We expect that 40% of the 1,000 eligible establishments will complete the survey, yielding a total of 400 completed surveys.

The following is a description of the derivation of the total sample sizes stated above. Table 2 shows the sample size needed for each of the 29 in-scope industries. Column (1) of Table 2 shows the number of OHS specialists (from BLS) in each industry employed by establishments with 100 or more employees. Column (2) shows the corresponding percentage of the 29 in-scope industry total in each industry. Column (3) shows the percent of the establishments in the industry with at least one OHS specialist. The estimates in column (3) were obtained from the OES survey. Note that BLS could not provide us the data for

the distribution of OHS specialists by establishment size classes due to confidentiality reasons. To obtain the estimates in column (1), we assumed that in a given industry, the proportion of the total OHS specialists employed in establishments with 100 or more employees is the same as the proportion of total employment in establishments with 100 or more employees. For example, we had an estimate that the employment in establishments with 100 or more employees makes up 72 percent of total employment in the coal mining industry (NAICS 2121). Then, we assumed that 72 percent of the OHS specialists in the coal mining industry work in establishments with 100 or more employees. We obtained a distribution of employment by establishment size classes for industries associated with the private sector from the BLS's 2008 Quarterly Census of Employment and Wages and for the public sector from D&B.

The total sample size needed for each industry is derived to minimize the overall screener sample size while providing a total of 400 completed interviews. Thus, the size of screener sample needed in

industry h , $n_h^{(c4)}$, (column (4) of Table 2) is derived as:

$$n_h^{(c4)} = \frac{Y_h}{0.85 \times 0.40 \times \sum_h^H \theta_h Y_h} \times 400$$

where,

Y_h is the number of OHS specialists employed in establishments with 100 or more employees in industry h ;

θ_h is the proportion of establishments with one or more OHS specialist in industry h (column (3) divided by 100);

H is the number in-scope industries, that is, 29;

0.85 is the proportion of sampled establishments that are expected to complete the screener;

0.40 is the expected interview response rate for the establishments that are identified as having at least one OS&H professional.

The expected number of establishments completing the screener in industry h , $n_h^{(c5)}$, is obtained, as:

$$n_h^{(c5)} = 0.85 \times n_n^{(c4)}$$

The expected number of establishments identified in screener, as having one or more OS&H professionals in industry h , $n_h^{(c6)}$, is obtained, as:

$$n_h^{(c6)} = \theta_h \times n_h^{(c5)}$$

The expected number of completed interviews in industry h , $n_h^{(c7)}$, is obtained, as:

$$n_h^{(c7)} = 0.40 \times n_h^{(c6)}$$

Note that the estimate for the proportion of establishments in the industry with at least one OHS specialist, which was used in the screener sample size calculations obtained from the OES survey, includes establishments of all sizes. We expect that this proportion will be substantially higher for establishments with 100 or more employees. Thus, the required screener sample size estimates, as derived above, can be considered as an upper bound and we expect

the actual screener sample size needed will be smaller. We will release the sample in at least two waves, using the first random wave to assess our assumptions. This will enable us to adjust the size of screener sample based on the results from the first wave.

Table 2. Sample sizes needed and the expected yields by 29 in-scope industries

Industry NAICS Code	OHS specialist employment in establishmen ts with 100+ employees (1)	Percent of total OHS specialist employment (2)	Percent of establisshmen ts reporting at least one OHS specialist (3)	Size of the screeener sample needed (4)	Expected number of screeener completes (5)	Expected number of eligible screeener completes (6)	Expected number of completed interviews (7)
211100	271	0.99	2	91	77	2	1
212100	159	0.58	10	53	45	5	2
212200	144	0.53	14	49	41	6	2
213100	401	1.46	3	135	115	3	1
221100	621	2.27	4	209	178	7	3
311600	289	1.06	3	97	83	2	1
322100	142	0.52	12	48	41	5	2
324100	229	0.84	5	77	65	3	1
325100	342	1.25	7	115	98	7	3
325200	279	1.02	9	94	80	7	3
325400	321	1.17	6	108	92	6	2
331100	106	0.39	8	36	30	2	1
331300	113	0.41	9	38	32	3	1
331400	129	0.47	10	43	37	4	1
331500	130	0.48	4	44	37	1	1
336300	194	0.71	3	65	56	2	1
336400	610	2.23	5	205	175	9	3
482100	107	0.39	7	36	31	2	1
491100	202	0.74	2	68	58	1	0
492100	277	1.01	2	93	79	2	1
541600	972	3.55	1	327	278	3	1
541700	772	2.82	1	260	221	2	1
551100	1,006	3.67	2	338	288	6	2
611300	1,588	5.80	4	534	454	18	7
622100	3,007	10.98	18	1,012	860	155	62
622300	172	0.63	5	58	49	2	1
999100	4,817	17.60	17	1,621	1,378	234	94
999200	5,177	18.91	32	1,742	1,481	474	190
999300	4,796	17.52	2	1,614	1,372	27	11
Total	27,372	100.00		9,211	7,829	1,000	400

1.b.3 Stratification and sample size allocation

The establishments in the sampling frame will be stratified within each industry by four establishment size classes based on the number of employees at the establishment. The four size classes will be: 100-249 employees; 250-499 employees; 500-999 employees; and 1000 or more employees.

The sample size allocated to each industry, as described in Section 1.2 above, will be allocated to four size strata by Neyman allocation method, which provides an optimum allocation by minimizing the variance of the estimate for a given total sample size. The sample allocation for size stratum k in industry h , n_{hk} , will be obtained, as:

$$n_{hk} = n_h^{(c4)} \frac{N_{hk} S_{hk}}{\sum_{k=1}^K N_{hk} S_{hk}}$$

where,

$n_h^{(c4)}$ is the total sample size allocated to industry h (see column (4) of Table 2 in Section 1.2),

N_{hk} is the number of in-scope establishments (with 100 or more employees) in size class k in industry h ,

S_{hk} is the standard deviation of the number of OH&S professionals in size class k in industry h .

We assume that number of OS&H professionals in establishments

follows a Poisson distribution with a mean $\frac{Y_{hk}}{N_{hk}}$ and standard deviation

$\sqrt{\frac{Y_{hk}}{N_{hk}}}$, where Y_{hk} refers to the number of OS&H professionals in size class k in industry h and N_{hk} is the number of establishments in size class k in industry h .

Table 3 shows the allocation of the screener sample to size strata in each of the 29 industries. Table 3 shows the number of establishments (N_{hk} in the sample size allocation formula) and average number of OS&H professionals per establishment (square of S_{hk} in the sample size allocation formula) in each industry by size stratum. Table 3 also shows the resulting sample size in each industry by size stratum (n_{hk} in the sample size allocation formula) after allocating the total screener sample size of each industry to size classes by the Neyman allocation formula.

This sample size allocation results in oversampling of large establishments. The establishments in larger size classes will be selected with higher probability. The establishments within each industry by size stratum will be selected with equal probability.

Table 3. Allocation of the screener sample size to the establishment size strata

Industry NAICS code	Number of establishments				Average number of OS&H professionals per establishment				Screener sample size				
	Size of establishment				Size of establishment				All	Size of establishment			
	100-249	250-499	500-999	1000+	100-249	250-499	500-999	1000+		100-249	250-499	500-999	1000+
211100	152	63	20	16	0.467	1.054	2.214	5.504	91	40	25	12	15
212100	109	66	16	4	0.441	0.996	1.869	3.722	53	23	21	7	2
212200	31	17	22	6	0.678	1.402	2.583	6.998	49	13	10	17	8
213100	444	132	47	17	0.355	0.799	1.665	3.513	135	75	34	17	9
221100	565	150	95	33	0.364	0.850	1.625	4.021	209	107	43	38	21
311600	273	175	170	137	0.100	0.223	0.446	1.073	97	20	19	26	33
322100	133	81	59	17	0.200	0.446	0.871	1.620	48	15	14	14	5
324100	126	58	31	15	0.424	0.996	1.869	3.942	77	30	21	15	11
325100	223	79	30	12	0.527	1.160	2.260	5.165	115	58	31	16	10
325200	155	55	25	7	0.553	1.244	2.395	9.298	94	46	24	15	8
325400	243	131	74	44	0.198	0.435	0.840	3.501	108	34	27	21	26
331100	51	59	23	21	0.187	0.423	0.843	2.430	36	7	12	7	10
331300	114	42	20	6	0.318	0.686	1.501	2.965	38	18	10	7	3
331400	123	44	16	3	0.436	0.979	1.962	0.000	43	24	13	7	0
331500	254	100	37	8	0.180	0.410	0.804	1.729	44	22	13	7	2
336300	758	392	176	63	0.066	0.139	0.275	0.657	65	26	20	12	7
336400	312	131	87	77	0.205	0.462	0.900	5.307	205	59	37	35	74
482100	163	47	12	6	0.278	0.600	1.198	3.225	36	21	9	3	3
491100	811	130	69	43	0.097	0.238	0.493	1.365	68	41	10	8	8
492100	730	173	91	93	0.103	0.235	0.485	1.268	93	45	16	12	20
541600	872	207	68	21	0.490	1.140	2.145	7.555	327	202	73	33	19
541700	610	211	103	88	0.267	0.619	1.247	3.978	260	106	56	39	59
551100	2,295	843	431	204	0.118	0.264	0.527	1.399	338	150	83	60	46

Table 3 (continued). Allocation of the screener sample size to the establishment size strata

Industry NAICS code	Number of establishments				Average number of OS&H professionals per establishment				Screener sample size				
	Size of establishment				Size of establishment				All	Size of establishment			
	100-249	250-499	500-999	1000+	100-249	250-499	500-999	1000+		100-249	250-499	500-999	1000+
611300	429	413	307	212	0.244	0.526	0.996	4.532	534	89	126	129	190
622100	881	755	855	1,366	0.117	0.256	0.508	1.666	1,012	100	126	202	584
622300	200	98	38	23	0.163	0.355	0.738	3.264	58	22	16	9	11
999100	1,978	761	369	224	0.526	1.199	2.314	8.988	1,621	665	386	260	311
999200	2,071	797	386	234	0.540	1.230	2.375	9.224	1,742	714	415	279	334
999300	4,917	1,893	916	556	0.211	0.480	0.927	3.599	1,614	662	384	259	309
Total	20,025	8,107	4,595	3,557					9,211	3,433	2,074	1,565	2,138

1.b.4 Expected precision of the estimates

The most important population parameters of interest for the survey are the total number of OS&H professionals currently employed in the nation and the total number expected to meet future needs. This survey is expected to provide an estimate of the total number of OS&H professionals with a coefficient of variation (CV) of 5.1 percent.

The population subgroups of interest are OS&H professionals by specialty, including industrial hygiene, health physics, safety, ergonomics, occupational health nursing and occupational medicine. The precision of the estimates for these subgroups is expected to be lower.

In addition to the six OS&H specialties mentioned above, the survey will collect data on OS&H professionals in occupational health psychology, occupational injury prevention, and occupational epidemiology. However, because these three specialties are rare compared to the total population of OS&H professionals, we may not be able to provide stable estimates individually for each of them.

Below we describe the calculation of the expected precision of the total number of OS&H professionals stated above. Table 4 shows the expected number of completed interviews by industry and establishment size strata based on the screener sample size allocation presented in Table 3. First, variance of the population total estimate, \hat{Y} , was calculated, as:

$$v(\hat{Y}) = \sum_{h=1}^H \sum_{k=1}^K N_{hk} (N_{hk} - n_{hk}) \frac{S_{hk}^2}{n_{hk}}$$

where,

n_{hk} is the expected number of completed interviews size class k in industry h ;

N_{hk} is the number of in-scope establishments (with 100 or more employees) in size class k in industry h (shown in Table 3);

S_{hk}^2 is the population variance of number of OH&S professionals in size class k in industry h (average number of OH&S professionals per establishment by size classes, shown in Table 3);

H and K are the numbers of industries and size classes, respectively.

Then, standard error of the estimate $se(\hat{Y})$ was obtained as square root of

$v(\hat{Y})$. CV of \hat{Y} was obtained as: $CV(\hat{Y}) = \frac{se(\hat{Y})}{\hat{Y}}$, where, \hat{Y} is the total number of

OS&H specialists, 27,372, shown in the total row of column (1) of Table 2.

Table 4. Expected number of completed interviews by industry and establishment size classes

Industry NAICS code	Expected number of completed interviews				
	Industry total	Size of establishment			
		100-249	250-499	500-999	1000+
211100	4	2	1	1	1
212100	2	1	1	0	0
212200	2	1	0	1	0
213100	6	3	1	1	0
221100	9	5	2	2	1
311600	4	1	1	1	1
322100	2	1	1	1	0
324100	3	1	1	1	0
325100	5	3	1	1	0
325200	4	2	1	1	0
325400	5	1	1	1	1
331100	2	0	1	0	0
331300	2	1	0	0	0
331400	2	1	1	0	0
331500	2	1	1	0	0
336300	3	1	1	1	0
336400	9	3	2	2	3
482100	2	1	0	0	0
491100	3	2	0	0	0
492100	4	2	1	1	1
541600	14	9	3	1	1
541700	11	5	2	2	3
551100	15	7	4	3	2
611300	23	4	5	6	8
622100	44	4	5	9	25
622300	3	1	1	0	0
999100	70	29	17	11	13
999200	76	31	18	12	14
999300	70	29	17	11	13
Total	400	149	90	68	93

2.0 Procedures for Collection of Information

Information will be collected from both groups (educational providers and employers) using similar strategies. This strategy includes the following steps:

- Telephone screening of employer establishments to determine eligibility and to obtain contact information for the most appropriate respondent. We will contact sampled establishments by phone and attempt to speak with someone who can tell us whether the establishment employs any OS&H professionals – it is expected that this person will often be a Human Resources person. If the establishment does employ OS&H professionals, we will ask for the name and contact information for the person most knowledgeable about these professionals and/or who oversees OS&H activity for the establishment. This person will be the target respondent for the establishment. For a small number of establishments, we may be directed to more than one person. In such instances we will obtain contact information for other such persons.
- Invitation Letter mail-out to all eligible establishments and educational providers inviting them to participate and directing them to the website where the questionnaire is located.
- Data collection primarily by web questionnaire.
- Follow-up with non-respondents once by mail two weeks after initial mailing. This will be followed by up to 7 attempted telephone contacts (with an offer to conduct the questionnaire by telephone at that point).

3.0 Methods to Maximize Response Rates and Deal with Non-response

3.a Methods to Maximize Response Rates

We will make every effort to maximize our response rates through efforts before questionnaire administration and after the initial administration. Our efforts include the following:

- Correcting or collecting contact information for the appropriate respondent at the screening phase;
- Offering 2 options for completing the questionnaire— web or telephone;
- Conducting a quick mail follow-up for non-respondents; and
- Repeated telephone follow-up for non-respondents with the offer of a telephone interview at that time.

3.b Methods to Deal with Non-Response

Although significant efforts will be made to obtain the highest possible response rates, as described above, some nonresponse is inevitable. We expect to have to address both unit and item nonresponse. In the former situation, a sampled unit, establishment or educational institution, does not participate in the survey while in the later, a responding unit provides incomplete data. We first discuss how we will deal with these two types of nonresponse and then we describe what we will do to assess the possibility of nonresponse bias.

Analyzing and Correcting for Nonresponse

To deal with unit nonresponse standard practice is to inflate survey weights to reflect this loss in participation. In addition, where possible, we benchmark the adjusted weights to known population totals, either by post-stratifying, raking or calibrating. This second step is contingent on having

information, control counts or universe totals, available for the entire universe.

The first step in this process is to analyze the response pattern and determine the nature of adjustments that may help reduce potential biases. We will analyze the survey response rates by important characteristics of the sampled units. For establishments, we will tabulate response rates by NAICS codes, by size class and by other variables that may be important. Similar choices will be made for the provider survey. Once the response pattern is understood, a plan for weight adjustment can be finalized.

Survey weights of responding units are adjusted up to sample frame totals, within cells of similar units. Bias occurs when there is both a difference in propensity to respond as well as in the response. As a result, it is desirable to identify these adjustment cells by dividing the respondents into groups within which both the propensity to respond and the responses are similar. It is relatively easy to separate responding units into cells containing units with like propensity. We will use standard procedures such as CHAID or logistic regression models, to identify characteristics of the responding units that define these cells. We put into these models all the variables known about the responding units and assess their predictive power to model response propensity. Size of an establishment or educational facility, for example would be included in these models. NAICS categories would be included in the establishment models and ownership in the higher educational facility models.

Imputing for Item Nonresponse

Imputation methods are used to complete items that are not reported by respondents. At a minimum, we will perform imputation on any variable required by our weighting procedures. We will use a form of Hot Deck imputation, in which the items provided by a responding unit is copied into the missing item. Hot Deck is done carefully, matching a non-responding unit with one that is very similar on a defined set of characteristics. This 'donation' of information is monitored by our software to ensure that one

donor's response are not used unduly, and therefore does not over contribute to survey estimates.

Nonresponse Bias Assessment

We will take the following steps to assess the potential for bias caused by unit nonresponse. We will compare summed weights using base weights, using weights adjusted for nonresponse and finally using weights that have been benchmarked to universe totals. Any important differences that emerge from these comparisons can help to identify potential biases, as well as, assess the effectiveness in the weighting steps in reducing that potential.

4.0 Tests of Procedures

We pre-tested the survey instruments with fewer than 10 employers of OS&H professionals and representatives of OS&H educational programs to establish burden and to identify any sources of confusion or lack of clarity in the wording of the question. Respondents were emailed a draft version of the instrument, asked to fill it out, and discuss it with us in a brief teleconference call a few days later. In response to these pretests we improved the wording of several questions and clarified the definitions of key concepts that will be provided to survey respondents.

Once OMB approval is received, we will begin data collection following the steps outlined above in Section 2.0. After we have completed the steps for about 875 cases (expected to yield 100 completed surveys) we will review the procedures and data obtained to assess whether any adjustments in our methodology may be necessary. We will examine indicators such as: (a) the establishment eligibility rate (i.e., percentage of sampled establishments that employ at least one OS&H professional), (b) the response rate among eligible establishments (including the extent of break-offs occurring within the web survey), (c) numbers of professionals being reported across the key OS&H fields of interest to NIOSH, and (d) item nonresponse within the web survey. We do not anticipate that any substantial changes to the study methodology will result from this review. However, if modifications are

necessary we will communicate with OMB before making the changes and proceeding with the remaining data collection.

5.0 Individuals Consulted on Statistical Aspects and Individuals Collecting or Analyzing the Data

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