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Standardizing industrial hygiene data collection forms used by workers' compensation insurers

Kelsey R. Babik^a, Taylor M. Shockey^{a,b}, Libby L. Moore^a, Steven J. Wurzelbacher^a

^aDivision of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, Cincinnati, Ohio

^bDivision of Environmental Health Sciences, College of Public Health, The Ohio State University, Columbus, Ohio

Abstract

Workers' compensation (WC) insurers collect large amounts of industrial hygiene (IH) data in the United States. The data collected is not easily accessible for research or surveillance purposes. Individual WC insurers are using computerized systems to standardize and store the IH data, leaving a gap in standardization among the different WC insurers. This study sought to standardize IH data collection among WC insurers and to determine the feasibility of pooling collected IH data. IH air and noise survey forms were collected from WC insurers. Data fields on the forms were evaluated for importance and a study list of core fields was developed. The core study list was presented to an IH review panel for review before finalization. The final core study list was compared to recommendations published by the American Conference of Governmental Industrial Hygienists (ACGIH) and the American Industrial Hygiene Association (AIHA). Fifty-nine forms from 10 organizations were collected. Industrial hygienists from research organizations, state-based WC insurers, and private WC insurers participated in the data field evaluation and on the review panel. For both air and noise survey forms, more than half the data fields (55% and 54%, respectively) were ranked as "essential." Three of the four fields in the worker and control observations category ranked "essential" were found less than half of the time on both types of survey forms. The study list of core data elements consisted of more than half of the data fields from both the air and noise survey forms. Three additional fields were added based on the comparison to the ACGIH-AIHA recommendations. Data fields essential to standardizing IH data collection were identified and verified. The "essential" data fields will be made available and have the potential to be incorporated into WC insurers electronic IH data management systems. Future

CONTACT Kelsey R. Babik, kelsey.babik@gmail.com, National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, 1090 Tusculum Ave., Cincinnati, OH 45226

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The findings and conclusions in this report are those of the author(s) and do not necessarily represent the views of the National Institute for Occupational Safety and Health.

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research should focus on other IH survey forms, such as those used in ergonomic assessments and specific chemical exposures, and methods to transfer data fields to electronic platforms.

Keywords

Exposure assessment; industrial hygiene data collection; workers' compensation

Introduction

A large portion of health and exposure data collected in the United States (US) is captured by systems where the primary use of the data is not related to occupational health surveillance.^[1–3] Yet these systems, like the ones used by workers' compensation (WC) insurers, are in the unique position to support worker safety and health research and related initiatives. For instance, the American Association of State Compensation Insurance Funds (AASCIF) covers 26 states, with state-based WC carriers, accounting for 15–99% of the WC data collected within those states.^[4] The state-based insurers capture WC claims as well as workplace exposure data. For example, the Ohio Bureau of Workers' Compensation (OHBCW) collects over 1,500 air and noise samples per month for clients in a wide range of industries, with over 90% of the site visits occurring in small businesses (11–249 employees).^[5] Determining representative exposures at these small businesses would be very difficult for occupational health research and prevention groups without visiting many individual companies. Furthermore, detailed information on representative chemical exposures and noise levels by specific industry or by job title are difficult to find in the United States outside of enforcement data such as what is available in the Occupational Safety and Health Administration's (OSHA) Integrated Management Information System (IMIS).^[6]

While the burden of occupational illness is vast and well documented, information on occupational exposure and its relation to this disease burden is not evident. For instance, it is estimated an excess of two million cases of asthma in U.S. adults are work-related.^[7] It is known that a wide variety of agents are associated with occupational asthma,^[8] yet the number of workers exposed to these agents remains unclear. The surveillance systems currently used to track these work place exposures were not designed for long-term worker exposure monitoring or research purposes. For instance, while the National Occupational Exposure Survey (NOES) collected data on occupational exposures to chemical, physical, and biological agents in over 500 industries employing more than one million workers, it only did so for 3 years from 1981–1983.^[9] Additionally, the OSHA IMIS database was designed for and administered as a management tool for OSHA to help it direct its resources.^[10] Similarly, for hearing loss, burden estimates are difficult to quantify because the data are not largely a part of a general surveillance program that captures American worker hearing health. Studies have suggested the prevalence of hearing loss ranges from 11–25% of workers in various industries,^[11] including construction, manufacturing, mining, and public safety.^[12] Again, the systems in place to monitor work-related hearing loss were not designed for exposure monitoring and are inadequate for research and prevention purposes. In 1996, a joint American Conference of Governmental Industrial Hygienists

(ACGIH®) and the American Industrial Hygiene Association (AIHA®) Task Group on Occupational Exposure Databases put forth recommendations for standardized data elements that should be recorded during industrial hygiene (IH) assessments. The task group suggested recording these standardized data elements during IH assessments in addition to the exposure measurements to provide enhanced analyses of the data and to allow for aggregation of data across organizations or worksites.^[13] However, little has been done in recent decades to verify that these data elements are being used in industrial hygiene exposure assessments.

Using WC claims data and systems, the National Institute for Occupational Safety and Health (NIOSH) Center for Workers' Compensation Studies (CWCS) has sought to address these data-gap issues and improve workplace safety and health. Along with this study, the CWCS has several claims and exposure assessment studies ongoing that focus on the use of IH data, including a concurrent survey study to determine what IH exposure and employer data were available among both state-based and private WC insurers. As WC insurers begin adopting computerized commercial systems from data management software companies to standardize the data collected by industrial hygienists (IHs) in the field, the understanding of what types of data they are collecting becomes critical to studies focusing on using such data to improve workplace safety and health. While standardization may ultimately ensure that the same data are being collected within a company and among companies, it does not ensure that insurers are capturing the necessary data to help their policyholders and for research purposes.

This study sought to partner the CWCS with WC insurers who are beginning to implement data management systems for their IH data to address the gap in the collection of workplace exposure data in a standardized fashion by: (1) identifying the common elements from IH air and noise exposure data collection forms used by WC insurers; (2) developing a list of IH exposure data elements from the core elements identified and compare these findings to the ACGIH-AIHA task group recommended data elements; (3) assessing the usability of the core, standardized IH data elements on forms that WC insurers would use in the field; and (4) establishing the groundwork for pooling collected data. This final goal is critical to understanding risk and best practices for IH exposure assessment and exposure prevention across multiple industries. In achieving these goals, future studies linking exposure data to electronic health outcome data will enable occupational health researchers to understand worker health, from exposure to outcome, across many industries.

Methods

To begin, IH air and noise survey forms were collected from CWCS partners in the private WC insurance industry, the public WC insurance industry (i.e., state-based WC insurers), and from selected organizations that had air and noise survey forms freely accessible on their websites.

Introductory letters explaining the study were emailed directly to known contacts and distributed at conferences. In addition, phone calls were made to recruit WC insurers, private companies, and other organizations that conduct IH surveys for WC purposes. The letters

and calls explained the project's aims and how their participation would help to achieve those aims.

Participating organizations sent to NIOSH air and noise sampling forms used for those assessments. Companies that did not use data collection forms instead provided IH assessment reports that contained the types of information collected during surveys. All completed reports were provided without information that could be used to identify the individual companies for which the assessment was conducted. Organizations were told participation was voluntary, results would be published only in aggregate form, and all company identifying information would be removed from the forms before they were reviewed.

To evaluate the IH forms, two NIOSH IHs classified the data fields into four categories based on themes common across all forms: general information, sample specific, sampling equipment, and worker and exposure control measures. The list of fields in their respective categories was presented to seven IHs from NIOSH, each from different areas of research, and five IHs from the WC insurance industry, each from a different organization. All IHs were also provided a survey asking them to rank the importance of each data field on the air and noise sampling forms and to provide feedback about the fields based on his/her experience as an IH. The rankings available ranged from 1–3, with: 1 = not essential to the IH survey; 2 = somewhat essential to the IH survey; and 3 = essential to the IH survey. The individual fields were assigned a final ranking based on the majority ranking given by the IHs. If no final ranking could be assigned due to lack of a majority, the average was calculated using the individual rankings in order to obtain a final ranking.

A list of core fields for air and noise sampling forms (henceforth called the study list) was developed based on the fields that ranked as essential (2.5 or greater). The study list was presented to a selected review panel of IHs including the seven NIOSH research personnel and five IHs from the WC insurance industry. All WC organizations that provided the initial forms were invited to participate. The review panel provided input on the field-usability of the study lists, and the provided input was used to edit the study list. The study list was compared to the Recommended Data Elements list developed by the ACGIH-AIHA group (Supplemental Table 1) before finalization.

Results

Characteristics of forms, organizations, and industrial hygienists

Fifty-nine forms were collected from 10 different organizations (Table 1). Organizations were classified into five groups: federal government agency, military, private WC insurer, state-based WC insurer, or private industrial company.

The majority of organizations (90%) provided several forms in addition to air and noise data forms. These included general IH assessment forms, dermal and wipe sampling forms, bulk sampling forms, ventilation and engineering controls assessment forms, specific industry or hazard exposure assessment forms, worker observation forms, calibration sheets, and calculation spreadsheets. One organization provided three different worker observation

forms, including a general observation form, an air survey-specific observation form, and a noise survey-specific observation form. Three organizations from three different groups had separate noise sampling and dosimetry sampling forms. The noise and dosimetry sampling forms appeared to have been separated for the purposes of area and personal noise monitoring, respectively. For instance, noise sampling forms did not include data fields for worker observations and dosimetry sampling forms did not include data fields for area observations. Four organizations' forms had specific fields and spaces for both dosimetry and noise surveys on the same noise sampling form.

Twelve IHs participated in the data field ranking survey. IHs included seven who worked in research, three who worked in state-based WC insurers, and two who worked in private WC insurers. The seven research IHs included experts in air and noise exposure assessments.

Seventeen IHs from eight different WC data collecting organizations (i.e., state-based WC carriers, private carriers, or private industrial companies) and six NIOSH IH personnel were invited to participate in the review panel. Ultimately, the review panel consisted of four IHs from the WC insurance industry (three from state-based carriers and one from a private carrier) and three NIOSH IHs.

Field characteristics

Fields on air survey forms—The air survey forms had 38 fields identified over four categories. Twenty-one (55%) of those fields were ranked as “essential” (2.5 or greater) by the 12 IHs. Fields that occurred on 50% or more of the forms in the general information category also tended to be ranked “essential” (Table 2). The “Environmental Conditions” field was the only commonly found field with a low importance ranking. However, the “Duration and Frequency of Work/Exposure” field was ranked as “essential” but found only one-third of the time. Commonly found fields in the sample specific category also exhibited high rankings (2.5 or greater) from the IHs (Table 3). Two fields from the equipment category, “Instrument Calibration” and “Total Air Volume,” had discrepancies between their prevalence on the forms and their importance ranking (Table 4). The “Instrument Calibration” field was a commonly found field with a low importance ranking while the “Total Air Volume” field was not as commonly found but ranked as “essential.” Worker and control observations category also had discrepancies between most of the fields' prevalence and importance rankings (Table 5). Three of the four fields that were ranked “essential” were found less than half of the time on the forms.

Fields on noise survey forms—The noise survey forms had 39 fields identified over four categories. Twenty-one (54%) of those fields were ranked as essential (2.5 or greater) by the 12 IHs. Similar to the fields on the air forms, fields on the noise forms that were on 50% or more of the forms in the general information category also tended to be ranked essential (Table 2). Again, the “Duration and Frequency of Work/Exposure” field was ranked as important but found less than one-third of the time. Half of the fields in the sample specific category had discrepancies between their prevalence on the noise survey forms and their importance rankings (Table 3). Most of the fields that were ranked important were not commonly found on the survey forms. The fields in the equipment category were the only

ones that did not exhibit major discrepancies between their prevalence on the survey forms and their importance (Table 4). Again, like the air survey forms, the noise survey forms had three out of four fields in the worker and control observations category ranked important that were found less than half the time (Table 5).

Study list of fields

The study list of essential, core data fields for air and noise sampling forms included 23 of the original 38 fields found on the air survey forms and 24 of the original 39 fields found on the noise sampling forms (Table 6). After presenting the study list to the IH review panel, four fields with non-essential rankings (less than 2.5) were added to the list, for both air and noise sampling forms, based on the IHs' professional judgements. These four fields were from three of the four categories and included: "Page Number," "(Sampling) Time Adjusted," "Specific Worker Observations," and "Occupational Code."

The panel-generated revised study list of essential, core data fields was then compared to the Recommended Data Elements developed by the ACGIH-AIHA group (Supplemental Table 1). Three fields were added to the final study list of essential data elements based on this comparison (Table 7). Of the 27 essential fields on the air survey forms, all but four were identified as Recommended Data Elements by the ACGIH-AIHA group. These were "Page Number," "Time of Survey," "Space for Photos and Diagrams," and "Field Blank Reference." For the 28 essential fields on the noise survey forms, the same four fields from the air surveys forms in addition to "Noise Source Description," "Noise Exposure Origin," "Noise Pattern," and "Noise Radius," were not identified as critical by the ACGIH-AIHA group (Table 6). Additionally, our analysis identified three essential fields that the ACGIH-AIHA group did not consider critical (Table 7).

Discussion

This study supports developing occupational health research and public health surveillance uses for WC IH data that go beyond WC risk control consulting, compliance testing, and other insurance purposes. Industry and job specific chemical and noise level exposures cannot be understood through large data analyses without the data being collected in a uniform manner. By attempting to identify the essential, core data fields that should be included on IH air and noise survey forms for WC insurers, this study sought to offer a more uniform approach to IH data collection during air and noise surveys as well as to expand upon the recommendations provided by the ACGIH-AIHA group in the development of a list of IH data elements for collection.

Many WC insurers have begun adopting computerized commercial systems from data management software companies to collect IH data in the field and have been compiling it for their own internal uses (resource allocation, budgeting, etc.). This study has developed a tool that will enable these new data collection systems used by the WC insurers to be compatible with future research endeavors. Additionally, in its fourth edition of A Strategy for Assessing and Managing Occupational Exposures, the AIHA's Exposure Assessment Strategies Committee (EASC) has noted that collecting exposure data in a way that meets

both current and future needs can be done with a modest investment of resources and will result in high-quality data that is aptly suited for research purposes.^[14]

The variety of forms collected highlight the inconsistency in the collection of IH data throughout the industry. However, as all the fields from the forms could be placed into one of four categories, this suggests that the similar IH data are being collected in different ways. Additionally, there appears to be a gap between what IHs believe is essential field data to collect and what many of the data collection forms contain. For instance, of the 21 fields from the air survey forms that ranked as essential (2.5 or greater), almost one-third were found less than 50% of the time on the forms. A similar trend was seen with the fields on the noise survey forms. Of those 21 fields that ranked essential, more than one-third (38%) were found less than 50% of the time on the forms. As IH assessment primarily focuses on the collection of samples for exposure assessment, it is not surprising that the fields most strongly related to collecting the exposure sample (i.e., sample specific fields and equipment fields) were categorized as most important while the worker and exposure control observation fields were categorized at a lower importance. From a research perspective, the worker and exposure control observation fields are critical for data analysis and linking the exposure data to claims and health outcome data.

The incorporation of the four fields with a non-essential ranking (less than 2.5) onto the final study list of core fields suggests that a gap exists between what is considered important data to collect for WC IH practice purposes and important data to collect for IH research purposes. For instance, research IHs did not consider “Page Number” to be essential while IHs who primarily do field work did because they need it to keep track of papers when in the field. However, even though the IHs acknowledged that “Page Number” would become obsolete when the industry implements electronic survey forms, almost all noted they would still keep a written log or notes since there is concern the electronic platform might not be nimble enough to use effectively in the field in some circumstances (i.e., how would an IH note a pump failure or indicate a change in sample media). Comparatively, field IHs did not consider “Occupational Code” to be a field of importance, while research IHs noted that field is critical for data analysis. The IH review panel discussion around these and the other two fields [(“Sampling) Time Adjusted” and “Specific Worker Observations”] resulted in mutual understanding of why each group considered the field important and it was agreed that they should be incorporated into the final list.

The comparison of the study list of essential data fields to the list of Recommended Data Elements identified by the ACGIH-AIHA group indicated a close alignment of field importance. The ACGIH-AIHA standardized list includes 13 data groups with 134 specific data elements ranging from information on the work area to the employee to the exposure itself.^[13] While not as expansive as the ACGIH-AIHA list, the study list had essential elements in each of the 13 data groups identified by the ACGIH-AIHA group. Comparison of the lists suggests that the basic data deemed critical for standardizing IH-survey data collection decades ago is still collected today, while not always in a standardized fashion. Similarities between the past and present IH data elements collected may make it easier to incorporate historical IH data into the newer IH databases, which would allow for analysis of exposure trends. However, if this incorporation is to occur, it is important to note that the key

determinants of exposure as outlined by the ACGIH-AIHA group and the EASC need to be included as core data fields. Without these fields, the context of worker exposure would be inaccurate, which could greatly affect researchers' analysis. For instance, as noted in the results section, the "Duration and Frequency of Work/Exposure" field was ranked as important, but it was missing 30% of the time. While most practicing IHs understand the immediate need for this data field to calculate OELs, some might not consider the future or alternate uses of that data field, such as researchers trying to determine if the exposure data is transferable to similar exposure groups and/or worksites. As a specific example, if exposure samples were collected from a non-routine task that occurs once a month for a short period of time, without having the "Duration and Frequency of Work/Exposure" field completed, a researcher might consider the data from this task as objective exposure data for a site where workers do the same task daily for longer periods of time. This would cause significant error in data interpretation from one site or industry to another.

More immediately, however, is the implication that the essential elements identified by our group are just as flexible as the ones identified by ACGIH-AIHA group to be used by different collectors of IH data, for WC or other uses. Additionally, comparing the study list to the one developed by the ACGIH-AIHA group highlighted areas where the study list was lacking and allowed for the addition of elements, such as "Number of Employees," that will enable WC insurers and other researchers to compare exposure-relevant variables across industries, states, and sectors.

A 2014 report from Verdantix, an independent research and consulting firm specializing in the environment, health, and safety (EHS) field, stated that the fastest growing area of EHS spending in the US general industry sector is in EHS data management systems, including industrial hygiene data management.^[15] As EHS data management systems become more accessible and affordable, WC carriers may be more likely to adopt them in the future. Additionally, the Chemical Watch and Chemical Risk Manager's 2017 data management software survey found that, globally, most companies that use safety data management software integrate those systems with their internal IT systems for ease of access and analysis.^[16]

To the authors' knowledge, this is the first study to evaluate the comprehensive list of data elements for an IH survey form developed by the ACGIH-AIHA group. The AIHA's EASC identifies four groups of variables (workplace, environmental agent(s), monitoring, exposure assessment) that IHs should aim to collect data for recordkeeping and future reporting needs.^[14] While these groupings are similar to those identified in this study, the manual does not indicate how many of those variables are actually being collected by organizations such as WC insurers. This study was done with the support of state-based and private WC insurers within the WC-insurance industry. Many of the forms gathered for analysis were provided by the WC-insurance industry and IHs from the WC-insurance industry participated in the IH review panel. Furthermore, the variety of IHs who participated in the field ranking survey allowed for both research and practice perspectives to be taken into consideration. Additionally, including the feedback of IHs from the WC-insurance industry into the final study list of core fields ensured that the fields were applicable and relevant to their work.

Finally, providing a list of core data fields for air and noise surveys instead of a form template allows for ease in the incorporation into preexisting forms or systems.

This study had limitations that could affect the usability of the identified core fields. First, it was limited to the IHs and WC insurers that participated. Few of the participating IHs had used electronic IH survey forms or had electronic data management systems in place. Therefore, assessing the ease of use on an electronic platform was limited. Additionally, the fields were not incorporated into an electronic system, so any transferability issues that might have occurred could not be addressed. Finally, incorporating hightech data management systems and software into their work could be challenging for WC carriers in part due to the scale of IH sampling conducted at client employers across many industries. A next step would be to add the core elements to air and noise survey forms and then share the updated forms with a more representative sample of IHs for field use and evaluation. An additional recommendation is to encourage data management software companies that are familiar with insurance practices to collaborate directly with the insurers to develop an IH data collection template that can be used across the insurance industry

Conclusions

This study identified 27 fields on IH air survey forms and 28 fields on IH noise survey forms that are essential to data collection for future research use. It also verified that the data elements identified by the ACGIH-AIHA group more than 20 years ago are being used in the field today. Based on industry participation in this study, it is likely the essential, core data fields will be incorporated into the participants' electronic data management systems. The gaps identified between the perceived important data fields for IHs in industry and IHs conducting research suggests more collaboration between these groups is needed. The understanding that developed between the two groups of industry IHs and research IHs indicates this is an attainable goal. Future research should seek to develop lists of essential fields for other types of IH surveys as well as determine how easily transferable these fields are to electronic platforms.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Number of IH survey forms provided.

Type of Organization	<i>n</i>	Air Sampling Forms	Noise Sampling Forms	Additional IH Forms [*]	Total Number Forms
Federal Government Agency	3	3	3	8	14
Military	1	2	2 [‡]	7	11
Private Worker's Compensation Carrier	2	2 [‡]	3 ^{‡‡}	4	9
State Worker's Compensation Fund	3	7	4 [‡]	12	23
Private Industrial Company ^{§**}	1	1	1	0	2
Total	10	15	13	31	59

IH: industrial hygiene.

^{*} include general IH assessment, dermal and wipe sampling, bulk sampling, ventilation and engineering controls assessment, specific industry or hazard exposure assessment, worker observation forms, calibration sheets, and calculation spreadsheets.

[‡] One organization had separate noise and dosimetry forms. They were counted individually.

^{‡‡} One organization did not have a standard assessment form but provided a completed survey report instead.

[§] Conducts internal IH assessments for self-auditing purposes.

^{**} Uses an electronic application to conduct surveys. Provided screen shots of each section for both air and noise surveys.

Table 2.

Number, proportion, and importance of general information fields found on survey forms.

	<i>n</i>	Date	Company/Job Identification	Page Number	IH Name/I D	Time of Survey	Envr. Conditions	Blank Space for Comments	Space for Diagrams/ Photos	Reason for Sampling	Notes for Lab	Process Description *	Duration and Frequency of Work/ Exposure *	Rec.
Air Sampling Forms	15	15 (100%)	12 (80%)	2 (13%)	15 (100%)	3 (20%)	8 (53%)	14 (93%)	7 (47%)	4 (27%)	3 (20%)	0 (0%)	5 (33%)	2 (13%)
IH Importance Ranking	12	3	3	2	3	3	2.4	3	2	1.9	1	2.4	3	1.7
Noise Sampling Forms	13	11 (85%)	10 (77%)	4 (31%)	11 (85%)	3 (23%)	3 (23%)	13 (100%)	5 (38%)	2 (15%)	0 (0%)	7 (54%)	3 (23%)	1 (8%)
IH Importance Ranking	12	3	3	2	3	2.5	2	3	2	2	1	2.5	3	1.7

Cells for sampling forms report number of fields (bold) as well as proportions.

Cells for field importance ranking report level of importance: (1) – Not essential to IH survey, (2) – Somewhat essential to IH survey, (3) – Essential to IH survey.

Envr.: environmental; ID: identification; IH: industrial hygienist; Rec: recommendations

* Fields fit into both the General and Sample Specific fields.

Table 3.

Number, proportion, and importance of sample specific fields found on survey forms.

	<i>n</i>	Chemical/ Hazard of Interest	Sample Type (area or personal)	Media	Sample Number/I D	Area Sample Description	Sampling Results	Analytical Method	Results QC	Field Blank Reference	Noise Source Description	Noise Exposure Origin	Noise Pattern	Noise Radius
Air Sampling Forms	15	10 (67%)	10 (67%)	11 (73%)	12 (80%)	10 (67%)	7 (47%) [*]	3 (20%)	1 (7%)	2 (13%)	n/a	n/a	n/a	n/a
IH Importance Ranking	12	3	3	3	3	3	1.9	1.9	1	1	n/a	n/a	n/a	n/a
Noise Sampling Forms	13	n/a	3 (23%)	n/a	5 (38%)	8 (62%)	10 (77%) [‡]	n/a	0 (0%)	0 (0%)	7 (54%)	1 (8%)	1 (8%)	2 (15%)
IH Importance Ranking	12	n/a	3	n/a	3	3	2.3	n/a	1	1	3	3	2	1.8

Cells report number of fields (bold) as well as proportions.

Cells for field importance ranking report level of importance: (1) - Not essential to IH survey, (2) - Somewhat essential to IH survey, (3) - Essential to IH survey.

ID: identification; n/a: not applicable; QC: quality control.

^{*} Results field nonspecific, include space for value and units.

[‡] Results include 80 and 90 dBA readings.

Table 4.

Number, proportion, and importance of sampling equipment fields found on survey forms.

	<i>n</i>	Instrument Used	Instrument Number	Start Time	Stop Time	Total Time	Time Adjusted	Instrument Calibration	Calibration QC	Total Air Volume	Space for Noting Equipment Checks	Sound Meter Response
Air Sampling Forms	15	11 (73%)	13 (87%)	13 (87%)	13 (87%)	14 (93%)	3 (20%)	11 (73%) [‡]	0 (0%)	7 (47%)	2 (13%)	n/a
IH Importance Ranking	12	3	3	3	3	3	2.1	2	1	3	2	n/a
Noise Sampling Forms	13	10 (77%)	11 (85%) [*]	9 (69%)	9 (69%)	9 (69%)	0 (0%)	11 (85%) [‡]	2 (15%)	n/a	0 (0%)	1 (8%)
IH Importance Ranking	12	3	3	3	3	3	2.1	2	1	n/a	2	2.2

Cells report number of fields (bold) as well as proportions.

Cells for field importance ranking report level of importance: (1) - Not essential to IH survey, (2) - Somewhat essential to IH survey, (3) - Essential to IH survey, n/a: not applicable; QC: quality control.

^{*} Three organizations had separate forms for dosimetry and noise surveys.

[‡] Calibration fields included pre and post calibration flow rates, average flow rate, and air volume.

[‡] Calibration fields included pre and post calibration readings as well as calibration dates.

Table 5.

Number, proportion, and importance of worker-related and exposure control measures fields found on survey forms.

	<i>n</i>	Worker Description/ID for Sample	PPE Identification and Use *	Specific Worker Observations [†]	PPE Assessment	Control Type and Assessment	Occupation Code
Air Sampling Forms	15	14 (93%)	2 (13%)	10 (67%)	7 (47%)	7 (47%)	1 (7%)
IH Importance Ranking	12	3	3	2.3	3	3	2.1
Noise Sampling Forms	13	10 (77%)	4 (31%)	7 (54%)	5 (38%)	3 (23%)	1 (8%)
IH Importance Ranking	12	3	3	2.3	3	3	2.1

Cells report number of fields (bold) as well as proportions.

Cells for field importance ranking report level of importance: (1) - Not essential to IH survey, (2) - Somewhat essential to IH survey, (3) - Essential to IH survey.

ID: identification; PPE: personal protective equipment.

* For noise forms, this field was restricted to hearing PPE.

[†]These included the individual's work area description, job, department, gender, etc.

Table 6.

Identification and comparison of essential data fields identified for industrial hygiene air and noise surveys.

Data Field	Essential for Air Survey Forms	Essential for Noise Survey Forms	ACGIH-AIHA Critical Field
General Fields			
Date	x	x	x
Company/Job Identification	x	x	x
Page Number*	x	x	
IH Name/ID	x	x	x
Time of Survey	x	x	
Environmental Conditions	x		x
Blank Space for Comments	x		x
Space for Diagrams/Photos		x	
Reason for Sampling			x
Notes for Lab			x
Process Description	x	x	x
Duration and Frequency of Work/Exposure	x	x	x
Recommendations			x
Equipment Fields			
Instrument Used	x	x	x
Instrument Number	x	x	x
Start Time	x	x	x
Stop Time	x	x	x
Total Time	x	x	x
Time Adjusted [†]	x	x	x
Instrument Calibration			x
Calibration QC			x
Total Air Volume	x	n/a	x
Space for Noting Equipment Checks			x
Sound Meter Response	n/a	x	x
Sample Specific Fields			
Chemical/Hazard of Interest	x	n/a	x

Data Field	Essential for Air Survey Forms	Essential for Noise Survey Forms	ACGIH-AIHA Critical Field
Sample Type (area or personal)	x	x	x
Media	x	n/a	x
Sample Number/ID	x	x	x
Area Sample Description	x	x	x
Sampling Results			x
Analytical Method		n/a	x
Results QC			x
Field Blank Reference			
Noise Source Description	n/a	x	
Noise Exposure Origin	n/a	x	
Noise Pattern	n/a	x	
Noise Radius	n/a	x	
Worker/Controls Fields			
Worker Description/ ID for Sample	x	x	x
PPE Identification and Use	x	x	x
PPE Assessment	x	x	x
Specific Worker Observations [†]	x	x	x
Control Type and Assessment	x	x	x
Occupation Code [‡]	x	x	x

Data fields listed are those originally identified and classified into the four groups prior to first form evaluation. Fields given an “essential” ranking either by the IH review panel or by the ACGIH-AIHA list have been noted with an “x.”

* Field originally not identified on a form but considered essential by IHs conducting importance ranking.

[†] Included after focus group.

n/a: Filed not applicable to survey.

Table 7.

Essential data fields for industrial hygiene air and noise surveys.

Data Field
General Fields
Date
Company/Job Identification
Standard Industrial Classification
(SIC) code
Total Number of Employees
Page Number
IH Name/ID
Time of Survey
Environmental Conditions
Blank Space for Comments
Process Description
Duration and Frequency of Work/Exposure
Equipment Fields
Instrument Used
Instrument Number
Start Time
Stop Time
Total Time
Time Adjusted
Total Air Volume *
Sound Meter Response †
Sample Specific Fields
Chemical/ Hazard of Interest *
Sample Type (area or personal)
Media *
Sample Number/ID
Area Sample Description
Noise Source Description †
Noise Exposure Origin †
Noise Pattern †
Noise Radius †
Representative nature of sample
Worker/Controls Fields
Worker Description/ ID for Sample
PPE Identification and Use
PPE Assessment

Data Field

Specific Worker Observations

Control Type and Assessment

Occupation Code

* Not applicable for noise surveys.

† Not applicable for air surveys.