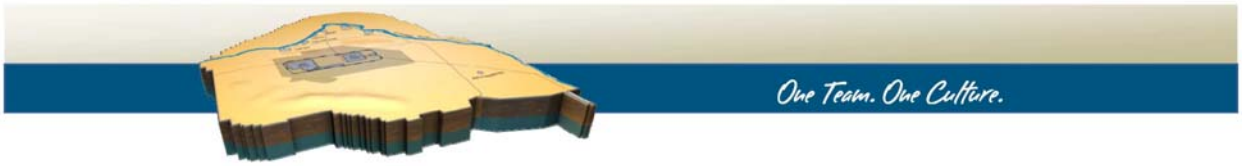

Administrative Procedure

PRC-PRO-SH-17916

Industrial Hygiene Baseline Hazard Assessments

Revision 1, Change 1

Published: 08/21/10
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Project: CH2M HILL Plateau Remediation Company
Topic: Occupational Safety & Industrial Hygiene

Technical Authority: L.A. Hill
Functional Manager: M.T. Hughey

Administrative Use

CH2MHILL
Plateau Remediation Company

CHANGE SUMMARY

AJHA: N/A
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Description of Change

Rev 1-1. Added an action statement 3.1 Item 16 to utilize the IHBHA results to establish exposure levels and controls for operations and activities to make the content of task-based JHAs and the preparation of employee EJTAs more effective. (CR-2010-0718, CA01)

Rev. 1-0 (10/20/09):
Added clarification to Scope applied to work areas covered under 29 CFR 1910.120(b)(4).
Added Responsibility section, editorial changes to align with CHPRC PRO template.
Added the 8 elements of IHBHA to Section 3.0. Added step 3.1.8. Added employees to walk-through identifiables and clarified the wording to note 1 in section 3.1.
Added clarification to steps 3.1.15 and 3.1.16 about the elements required to be in an IHBHA.
Updated table 1 definitions to be quantifiable. Added table 3 for Prioritization Scheduling.

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1.0 INTRODUCTION

1.1 Purpose

This procedure provides instructions to industrial hygienists (IH) and other Occupational Safety and Industrial Health (OS&IH) professionals for conducting Industrial Hygiene Baseline Hazards Assessments (IHBHAs) for CH2M HILL Plateau Remediation Company (CHPRC) facilities /projects and tasks.

IHBHAs are intended to:

1. Systematically identify and qualitatively assess the potential for occupational exposure of workers to chemical, physical, and biological hazards; and
2. Allow for objective prioritization of follow-up exposure monitoring/sampling activities so as to make the most efficient use of CHPRC OS&IH resources; and
3. Serve as a basis for recommendation and evaluation of control measures for actual and potential hazards; and
4. Communicate information regarding chemical, physical, and biological exposure hazards and controls to line management and affected employees; and
5. Serve to document qualitative exposure assessment results required by the Occupational Safety and Health Act (OSHA), applicable substance-specific OSHA standards and U.S. Department of Energy (DOE) Order requirements.

1.2 Scope

This procedure is applicable to CHPRC Team employees in operations and activities where worker exposure to chemical, physical, and biological hazards at levels of occupational significance exists. It applies to operations covered under both OSHA general industry operations (29 CFR 1910, *Occupational Safety and Health Standards*) and OSHA construction activities (29 CFR 1926, *Safety and Health Regulations for Construction*).

This procedure is not intended to address radiological hazards or bloodborne pathogens.

For those operations where a Health and Safety Plan (HASP) has been developed, the eight elements of a hazard assessment (See Section 3.0) will be incorporated into the HASP.

This procedure generally does ***not*** apply to hazard assessments in office environments such as:

1. Ergonomic hazard assessments in office facilities (see PRC-RD-SH-8471, *Ergonomics*, for information on the identification and control of ergonomics hazards); and
2. Indoor air quality studies where it is not appropriate to directly relate exposures to occupational exposure limits (OELs) such as OSHA permissible exposure limits (PELs) and American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs).

In certain cases, specific OSHA standards contain requirements for qualitative and quantitative exposure assessment and/or hazard analysis. Examples include 29 CFR 1926.62, *Lead*; 29 CFR 1926.1101, *Asbestos*; 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*, 29 CFR 1910.146, *Permit Required Confined Spaces*, and 29 CFR Subpart I, *Personal Protective Equipment*.

Although this procedure does not attempt to delineate the requirements of specific OSHA standards, the framework is consistent with implementing specific OSHA exposure assessment requirements. The OS&IH professional should ensure that standard-specific OSHA requirements regarding qualitative exposure assessment are either incorporated during the implementation of IHBHAs or are addressed separately.

This procedure provides information to enhance the pre-planning and job hazard analysis (JHA) processes (see PRC-PRO-WKM-079, *Job Hazard Analysis*) and the Employee Job Task Analysis (EJTA) process (see PRC-RD-SH-11058, *Occupational Medical Qualification and Monitoring*) by:

1. Addressing facility/project operations and activities that may not be subject to JHAs, ***and***

2. Establishing exposure levels and controls for operations and activities that can make the content of task-based JHAs and the preparation of employee EJTAs more effective; ***and***

3. Providing an overview of project/facility IH hazards.

Though this procedure establishes the basis for planning and prioritizing quantitative exposure assessment activities, it is not meant to address the implementation of such activities.

NOTE: *Definitions of terms specific to this document are presented on the CHPRC CMP Webpage.*

1.3 Implementation

This procedure is effective on the date published.

2.0 RESPONSIBILITIES

All responsibilities associated with this procedure are identified in the process steps.

3.0 PROCESS

Industrial Hygiene Baseline Hazard Assessments contain the following eight elements. The order in which these elements are presented in IHBHA documentation is not important, but each element must be considered and documented. These elements are listed below and detailed in the Section 3.1:

- Describe the work or tasks performed (step 3.1.8)
- Identify the potentially exposed workers (step 3.1.1)
- Identify and describe the potential sources of hazardous agents (step 3.1.9)
- Evaluate the controls used to prevent of minimize exposure (step 3.1.12)
- Asses the level(s) of exposure (step 3.1.10)
- Include a conclusion, with rationale, whether the identified agent(s), their use(s), and the potential exposures they cause pose a hazard to workers (i.e. generate a positive or negative exposure assessment (step 3.1.15)
- Recommend additional controls for hazardous agents where necessary (step 3.1.12 and 3.1.15)
- Recommend the scope and frequency of further exposure monitoring (Table 3)

3.1 Performing the IHBHAs

Actionee	*Step*	*Action*
CHPRC OS&IH professional	1.	Perform initial walk-through of each area of each facility to identify operations/activities/projects, and the employees involved therein, taking place at that time that present significant potential for occupational exposure to chemical, physical, non-office ergonomic and biological hazards.

NOTE 1: *Activities covered by a JHA, JSA or similar documented hazard analyses that are performed routinely (at least once per month), such as those covered by a standing AJHA or those that require use of a respirator for non-radiological purposes must be included in the IHBHAs.*

NOTE 2: *Any activity performed by one or more employees for four or more hours at least once per year and which requires use of respirators for non-radiological purposes shall also be included in the IHBHAs.*

NOTE 3: *Activities likely to result in employee exposures to covered hazards at or above applicable occupational exposure limits, regardless of the time spent on such activities, must be included in the IHBHAs*

	2.	For those operations/activities that occur in multiple facilities/locations, identify the operations/activities performed which present significant potential for occupational exposure to chemical, physical, non-office ergonomic and biological hazards.

Actionee	Step	Action
	3.	As part of the initial walkthrough surveys, review appropriate existing historical employee exposure monitoring data;
	4.	Conduct employee/line management interviews.
	5.	Review work plans, JHAs, Material Safety Data Sheets (MSDSs), product specifications, waste inventories, other relevant hazard analyses and other pertinent documents.
	6.	Wherever possible, conduct walkthroughs with line management and/or affected personnel to gain a full understanding of the worksite, work practices/procedures, hazard sources, and hazard controls. Where walkthroughs cannot be conducted (e.g., for projects being planned, for inactive operations anticipated to startup or for active operations where as low as reasonably achievable (ALARA) considerations may outweigh the need for actual walkthroughs), conduct the evaluation in a predictive manner based on work plans, project designs, other relevant document reviews, and discussions with managers, designers, craft, and other appropriate personnel.
	7.	Consult Appendix B, *Decision Tree for Inclusion of Hazards in IHBHAs*, for assistance in making determinations as to which hazards should be included in an IHBHA.
	8.	Describe the work or tasks performed in clear, succinct language.
	9.	List on the field hazard evaluation form (see Appendix C for field hazard evaluation form) each chemical, physical, non-office ergonomic and/or biological hazard noted during the initial walkthrough**,** along with its source operation/activity/task and similar exposure group(s) (SEGs) (see definition in Appendix A of this PRO). List specific workstations, as appropriate, on the field evaluation form, including all workstations used for 10 or more hours per week.
	10.	Evaluate each hazardous agent/condition identified individually so as to gather data necessary for an objective exposure assessment. When more than one SEG has differing exposures to the same hazard at the same location, list the hazard individually for each SEG (see illustrative examples in Appendix C). **EXAMPLE:** A noisy compressor located in an equipment room could present one degree of hazard for a SEG in which job duties require that the members spend only a small amount of time in the room but a significantly different degree of hazard for a SEG in which job duties require them to spend significantly more time in the room.

Actionee	Step	Action

NOTE: *In some cases, quantitative or semi-quantitative exposure data and/or hazard control assessment data which can provide enhanced input for the Qualitative Exposure Rating step of the process can be accomplished conveniently with direct reading-type instrumentation during the IH baseline assessments activities. Such data may include noise levels measurements, lighting levels, Drager tube measurements, organic vapor concentration measurements and/or velometer measurements. Where convenient and reasonable, data collection with such direct-reading instrumentation should be considered as part of the IHBHAs so as to result in the most rapid and accurate characterization of worker exposures.*

11. Assess and document overall exposure for each SEG for each agent identified by assigning a numerical "Qualitative Exposure Rating" (see Table 1) and a numerical "Qualitative Health Effects Rating" (see Table 2). The multiplication of these two numbers results in the overall "Qualitative Exposure Assessment Rating, which is used to determine the priority for performing quantitative exposure monitoring (see Table 3)."

NOTE: *This exposure assessment strategy is based on the American Industrial Hygiene Association's (AIHA) publication titled "A Strategy for Assessing and Managing Occupational Exposures"*

CHPRC OS&IH professional

12. Describe in-place engineering and administrative exposure control measures and work practices that impact employee exposure levels and/or recommend interim hazard controls to line management where initial exposure assessments indicate significant enough exposures to warrant immediate control measures.

13. Determine the feasibility of/necessity for quantitative exposure assessment (i.e., personal and area exposure monitoring) for each agent/condition identified.

14. Establish a written schedule for review/revision of the IHBHAs sufficient to assure that hazards are adequately identified/assessed and exposure profiles are up-to-date. A suggested schedule for review/updating of IHBHAs is as follows:

- Industrial areas (general industry areas, craft shops) -- annually or more frequently, if necessary;
- Frequently changing worksites (construction sites, hazardous waste sites) -- as often as necessary to characterize current worker exposures;
- Low hazard areas (office areas, non-hazardous facilities) -- at least every three years;
- Whenever there is a change in process operations, work practices, change in presence of chemical, physical or biological agents or when changes in personnel could affect exposure profiles.

Actionee	Step	Action

- Unoccupied areas -- when hazards not previously identified for the affected SEGs are present.

15. Via written report, inform line management of results of the IHBHA. The report should include the following minimum content:

- A brief description of the purpose or use of the building such as offices only, offices and industrial, storage, work shop, or industrial only;
- A brief description of the industrial, storage or workshop activities that normally occur within the building;
- Copies of completed IHBHA field evaluation form(s) (see Appendix C);
- Recommendations for additional engineering, administrative or personal protective equipment controls that may be necessary;
- Copies of the previous 2 years monitoring data for hazardous agents identified, as obtained from the OS&IH Hanford Industrial Hygiene 2 (HIH2) database and/or the Integrated Data Management System (IDMS) ; and
- Additional documentation, as necessary, to support hazard/control evaluations. This documentation must provide the rationale for assigning the qualitative exposure rating and the health effects rating for the agent(s) identified and a conclusion indicating the degree of hazard to the employees; and
- The schedule for review/revision of the IHBHAs, as suggested in Step 3.1.14.

16. Utilize the IHBHA results to establish exposure levels and controls for operations and activities to make the content of task-based JHAs and the preparation of employee EJTAs more effective.

Actionee	*Step*	*Action*
	17.	As described herein, the IHBHA is a qualitative or semi-quantitative assessment of potential exposure. Whenever an exposure potential exists (i.e. a qualitative exposure assessment rating greater than 0), it is the goal of CHPRC to further refine our exposure assessments through quantitative measures. As such, a follow-on activity to the IHBHA is the development of a schedule for quantitative exposure monitoring and a quantitative exposure sampling plan. Although preparation of the quantitative exposure assessment sampling plan is beyond the scope of this procedure, the plan should specify validated sampling and analytical methods for the contaminants being measured and define appropriate occupational exposure limits. The plan should identify the minimum number of samples and the length of the sampling period to characterize worker groups. Initial prioritization for sampling is based upon the "Qualitative Exposure Assessment" rating. However, this prioritization may be modified by applicable regulatory requirements and other appropriate professional judgment. As a rule, the "Qualitative Exposure Assessment Rating" determines the priority for the quantitative exposure assessment. Although it is recognized that work schedules are highly variable and cannot always be anticipated with accuracy, every effort should be made to adhere to the prioritization schedule outlined herein (See Table 3). Other general rules affecting the prioritization process are: • When a specific OSHA standard requires monitoring under applicable circumstances, this monitoring is mandatory and should generally be top priority. • If there is significant potential for exposure to a carcinogenic chemical (per definition in PRC-RD-SH-10994, *Occupational Carcinogen Control*), monitoring for such exposure should have very high priority. • Whenever respiratory protection is used for protection against exposure to chemical agents, even as a "precaution", representative monitoring should be conducted as a high priority. • SEGs with "worst case" exposures should generally have exposure monitoring first, with other SEGs for the same hazard to follow. • Operations/activities with highly variable or unstable conditions should be considered for both "worst case" and "random" conditions exposure monitoring.

NOTE: *Proper application of these prioritization techniques relies heavily on the professional judgment of the OS&IH professional performing the hazard assessments.*

Table 1 - Qualitative Exposure1 Rating

Category	Description
0 (No exposure)	No contact with agent.
1 (Low Exposure)	<10% of the Occupational Exposure Limit (OEL)
2 (Moderate Exposure)	10-50% of the OEL
3 (High Exposure)	>50% to <100% of the OEL
4 (Very high Exposure)	>100% of the OEL

[1] Exposures in this table relate to the airborne concentration of the chemical or physical agent being assessed (inhalation route). For dermal exposure potential, the magnitude should be described as low exposure (incidental contact), moderate exposure (routine contact), high exposure (immersion of hands), and very high exposure (exposure to a gas or vapor contaminant with "skin" notation at airborne concentrations >100% of the OEL). Ratings should ***not*** take into consideration the use of personal protective equipment.

Table 2 - Qualitative Health-Effect Rating

Category	Health Effect
0	Reversible effects of little concern or no known or suspected adverse health effects.
1	Reversible health effects of concern.
2	Severe, reversible health effects of concern.
3	Irreversible health effects of concern.
4	Life threatening or disabling injury or illness.

Table 3 – Prioritization Schedule

QEA Rating[1]	Initial Prioritization Schedule
>12	As soon as practical, but no later than 1 week after the task having potential for exposure is begun.
9-12	Within 1 month after task with potential for exposure is begun
4-8	Within 6 months after task with potential for exposure is begun
<4	When time and schedule permit

[1] The QEA indicates the degree of hazard to employees and is determined by multiplying the Qualitative Exposure Rating (from Table 1) and the Qualitative Health Effect Rating (from Table 2).

4.0 FORMS

Field Evaluation Form (see Appendix C)

5.0 RECORD IDENTIFICATION

All records are generated, processed, and maintained in accordance with PRC-PRO-IRM-10588, *Records Management Processes*.

Records Capture Table

Name of Document	Submittal Responsibility	Retention Responsibility
IHBHA "Field Evaluation form" (see step 3.1.9 and Appendix C of this procedure).	CHPRC OS&IH professional performing the Industrial Hygiene Baseline Hazard Assessments	CHPRC OS&IH manager(s)
Documented written schedule for review/revision of IHBHAs (see step 3.1.14 of this procedure).	CHPRC OS&IH manager(s)	CHPRC OS&IH manager(s)
Written IHBHA report (see step 3.1.15 of this procedure).	CHPRC OS&IH professional performing the Industrial Hygiene Baseline Hazard Assessments	CHPRC OS&IH manager(s)

6.0 SOURCES

6.1 Requirements

This procedure implements requirements specified or referenced in PRC-RD-SH-7769, *OSH Compliance* and PRC-RD-SH-7652, *Safety and Health Inspections.*

Requirements for baseline IH surveys, evaluation of potential worker health risks and documented exposure assessments are from 10 CFR, Part 851, *Worker Safety and Health Program*, sections 851.21, and 851 Appendix A, Item 6.

10 CFR, Part 851, *Worker Safety and Health Program*, also requires CHPRC to follow requirements in 29 CFR 1910 and 29 CFR 1926. Requirements for qualitative and quantitative exposure assessment and/or hazard analysis are contained in a number of 29 CFR 1910 and 29 CFR 1926 sections and communicated in numerous other CHPRC documents.

6.2 References

10 CFR 815, *Worker Safety and Health Program*
American Conference of Governmental Industrial Hygienists (ACGIH), "*Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*" (2005)
A Strategy for Assessing and Managing Occupational Exposures, AIHA Press, 1998
29 CFR Subpart I, *Personal Protective Equipmen*t
29 CFR 1910, *Occupational Safety and Health Standards*
29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*
29 CFR 1910.146, *Permit Required Confined Spaces*
29 CFR 1926, *Safety and Health Regulations for Construction*
29 CFR 1926.62, *Lead*
29 CFR 1926.1101, *Asbestos*
PRC-PRO-IRM-10588, *Records Management Processes*
PRC-PRO-WKM-079, *Job Hazard Analysis*
PRC-RD-SH-8471, *Ergonomics*
PRC-RD-SH-10994, *Occupational Carcinogen Control*
PRC-RD-SH-11058, *Occupational Medical Qualification and Monitoring*
PRC-RD-SH-13299, *Hazard Communication*

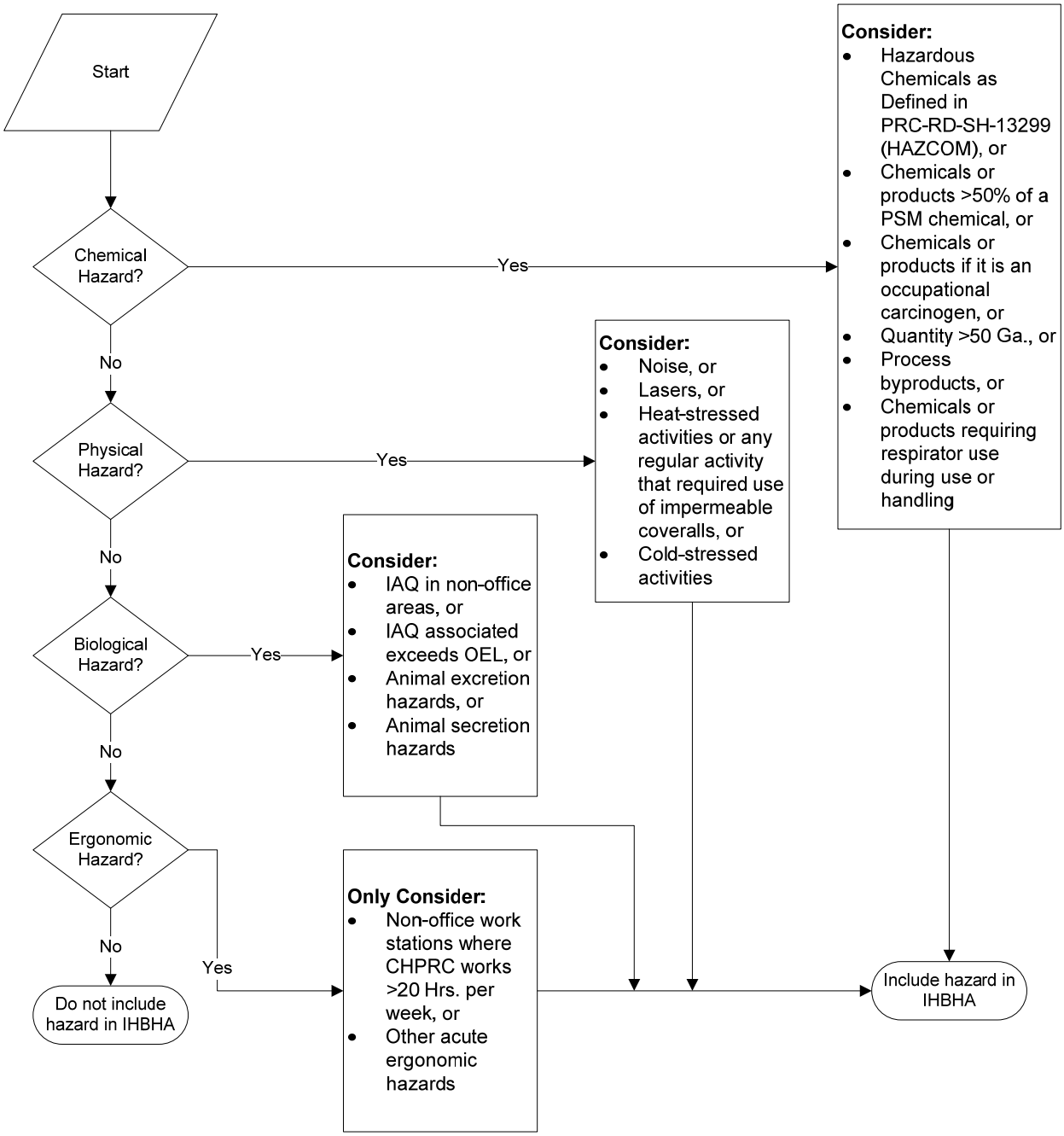
7.0 APPENDIXES

Appendix A - Glossary
Appendix B - Decision Tree for Inclusion of Hazards in IHBHAs
Appendix C - Example -- Industrial Hygiene Hazards Baseline Assessment Field Evaluation Form

Appendix A - Glossary

Term	Definition
Similar exposure group *(SEG)*	A group of employees whose exposures to chemical substances or physical hazards have been determined to be similar enough that monitoring the exposures of randomly selected workers in the group provides data useful for predicting the exposures or exposure profiles of the remaining workers. An SEG is also defined as a group of individuals who perform the same jobs or tasks and who have similar exposures to an individual hazardous agent.

Appendix B - Decision Tree for Inclusion of Hazards in IHBHAs



Appendix C - Example -- Industrial Hygiene Hazards Baseline Assessment Field Evaluation Form

Bldg (name/#)	Work station	Hazard	Activity	Hazard Use Info	SEG(s)	Qual Exposure Rating (0-4)	Health Effects Rating (0-4)	Qual. Exposure Assessment (0-16)	Hazard Controls In Place	Respiratory protection used (for non-rad hazards)	Prioritization For Additional Exposure Assessment	Rationale for exposure rating
XYZ Plant/ Carpenter's Shop	Radial arm saw	Noise	Sawing wood	Mostly oak, also some pine.	Carpenters, millwrights	4	3	12	Ear plugs/ muffs	None	As soon as Practical or within one week of commencement of task	Up to 2hrs/day exposure. @ 95 dba OSHA regulated.
XYZ Plant/ Carpenter's Shop	Desk area	Noise	Radial Arm Saw - Sawing wood	Mostly oak, also some pine.	Line managers	2	3	6	Ear plugs/ muffs	None	Within one month of commencement of task**	Incidental exposures - less than 30 min/day exposure @ 85 dbA OSHA Regulated.
XYZ Plant, Pumphouse	Multiple	Noise	N/A (Pump generated noise)	Noise levels constant/ consistent throughout pumphouse	All who enter pumphouse	2	3	6	Ear plugs available	None	Within one month of commencement of task**	Max est. exposures - less than 15 min/day exposure. OSHA Regulated.
Various	Multiple	Methylene chloride in mastic	Various mastic uses	Indoor & outdoor use	Painters	1	4	4	Respirators	½ mask APR w/ OV	As soon as Practical or within one week of commencement of task*	Infrequent use Short-term exposures. Low concentration of hazardous ingredient in product. Carcinogen

*Prioritization for quantitative assessment is based on the fact that the agent of concern is a carcinogen.

**Prioritization for quantitative assessment is based on the fact that monitoring for agent of concern is governed by regulatory requirements