



Industrial Hygiene Tactics, Techniques, and Procedures (TTP)



Force Readiness Command
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Subj: INDUSTRIAL HYGIENE PROGRAM

- Ref:
- (a) Safety and Environmental Health, COMDTINST M5100.47(series)
 - (b) A Strategy for Assessing and Managing Occupational Exposures, Third Edition, AIHA Press: 2006.
 - (c) American Industrial Hygiene Association (AIHA), "The Occupational Environment-It's Evaluation, Control, and Management," latest revision.
 - (d) Title 29 CFR 1910 Subpart Z, Toxic and Hazardous Substances.
 - (e) American Conference of Governmental Industrial Hygienists (ACGIH), "Documentation of the Threshold Limit Values and Biological Exposure Indices," latest revision.
 - (f) National Institute for Occupational Safety and Health (NIOSH), "Pocket Guide to Chemical Hazards," latest revision.
 - (g) Coast Guard Medical Manual, COMDTINST M6000.1(series).

1. PURPOSE. To provide industrial hygienists working out of the Safety and Environmental Health Division at the Health Safety and Work-Life Service Center [HSWL SC(se)] with Coast Guard tactics, techniques, and procedures (CGTTP) on executing the occupational exposure monitoring strategy outlined in reference (a).
2. ACTION. This CGTTP publication applies primarily to Safety and Environmental Health Officers (SEHOs) and other industrial hygienists at HSWL SC (se). Industrial hygienists at other Coast Guard units (e.g, Aviation Logistics Center, Coast Guard Yard, Strike Teams) can benefit from this guidance as well. Internet release is authorized.
3. DIRECTIVES/TTP AFFECTED. None.
4. DISCUSSION. This publication begins with an overview of the exposure assessment strategy. It provides procedures and resources to execute the strategy, and guidance on how to document and communicate findings. This is a new industrial hygiene program, and as such it will evolve during its implementation. Lessons learned during initial implementation will be incorporated into future revisions.

5. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is itself a rule. It provides guidance for Coast Guard personnel and does not impose legally-binding requirements on any party outside the Coast Guard.
6. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. While developing this publication, Integrated Process Team (IPT) members examined environmental considerations under the National Environmental Policy Act (NEPA) and determined they are not applicable.
7. DISTRIBUTION. FORCECOM TTP Division posts an electronic version of this TTP publication to the CGTTP Library on CGPortal. In CGPortal, navigate to the CGTTP Library by selecting **References > Tactics, Techniques, and Procedures (TTP)**. FORCECOM TTP Division does not provide paper distribution of this publication.
8. RECORDS MANAGEMENT CONSIDERATIONS. Integrated Process Team (IPT) members thoroughly reviewed this publication during the TTP coordinated approval process and determined there are no further records scheduling requirements per Federal Records Act, 44 U.S.C. Chapter 31 § 3101 et seq., National Archives and Records Administration (NARA) requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This publication does not have any significant or substantial change to existing records management requirements.
9. FORMS/REPORTS. None.
10. REQUEST FOR CHANGES. Submit recommendations for TTP improvements or corrections via email to FORCECOM-PI@uscg.mil or through the TTP Request form on CGPortal. In CGPortal, navigate to the TTP Request form by selecting **References > Tactics, Techniques, and Procedures (TTP) > TTP Request**.

Send lessons learned applicable to this TTP publication via command email to FORCECOM TTP Division at CMD-SMB-CG-FORCECOM.

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By Direction of Commander,
Force Readiness Command

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Chapter 1: Introduction

Introduction This chapter describes the contents and scope of this TTP publication. It also defines the use of notes, cautions, and warnings in TTP publications.

In This Chapter This chapter contains the following sections:

Section	Title	Page
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B	Notes, Cautions, and Warnings	1-3

Section A: Introduction

A.1. Overview Industrial hygiene (IH) is a key component of the Coast Guard occupational and environmental health program. The IH program mitigates health risks by applying IH principles: anticipating, recognizing, evaluating, preventing, and controlling workplace health hazards.

CG IH personnel support all units to ensure compliance with applicable laws, regulations, and policies with the goal of providing all USCG personnel a safe and healthy work environment.

A.2. Background In September of 2014, the Coast Guard Office of Safety and Environmental Health (CG-113), promulgated an updated revision of reference (a), Safety and Environmental Health COMDTINST M5100.47 (series). Chapter 26 of reference (a), defines policy for the IH program. This policy outlined a new mandate to structure the IH program based on the exposure monitoring strategy described in reference (b), A Strategy for Assessing and Managing Occupational Exposures, Third Edition, AIHA Press: 2006. This publication provides procedural guidance to execute that strategy.

A.3. Scope This publication defines standard procedures to effectively capture, analyze, document, and communicate information about health hazards and risks in the workplace. It is primarily written by and for USCG IH personnel working in the Safety and Environmental Health Division at the Health Safety and Work-Life Service Center [HSWL SC(se)].

Additionally, it provides useful guidance for all USCG units who wish to execute the strategy. Non-HSWL SC (se) units should contact the Safety and Environmental Health Officer (SEHO) for assistance.

Section B: Notes, Cautions, and Warnings

B.1. Overview The following definitions apply to notes, cautions, and warnings found in TTP publications.

NOTE: **An emphasized statement, procedure, or technique.**

CAUTION: **A procedure, technique, or action that, if not followed, carries the risk of equipment damage.**

WARNING: *A procedure, technique, or action that, if not followed, carries the risk of personnel injury or death.*

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Chapter 2: Occupational Exposure Monitoring Strategy

Introduction This chapter discusses the Coast Guard occupational exposure monitoring strategy, describes its structure, and provides procedures for its execution.

In This Chapter This chapter contains the following sections:

Section	Title	Page
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B	Rationale	2-4
C	Program Structure	2-5
D	Conducting Exposure Assessments	2-7
E	Developing the Exposure Monitoring Plan (EMP)	2-14

Section A: Policy and Supporting References

A.1. Policy Reference (a), Safety and Environmental Health COMDTINST M5100.47(series), defines the Coast Guard occupational exposure monitoring strategy.

A.2. Foundational Reference This publication guides implementation of the USCG strategy based on reference (b), A Strategy for Assessing and Managing Occupational Exposures, Third Edition, AIHA Press: 2006.

This foundational reference provides additional detailed instruction for executing the technical aspects of the USCG industrial hygiene program.

A.3. Supporting References See the applicable assessment protocol for exposure-specific references at the following file path:

\\CGIH-FS\FOM\Protocols

NOTE:

The above file path is not a hyperlink, but a representation of the file structure within the HSWL SC file directory, currently located at \\D05MS-MMST1\PUBLIC\SAFETY & ENVIRONMENTAL HEALTH. All other similar file paths in this document use the same format. If this directory is moved to a server other than D05MS-MMST1, follow the files to the new server.

Reference (c), American Industrial Hygiene Association (AIHA), “The Occupational Environment—Its Evaluation and Control and Management,” latest revision, is considered the standard comprehensive industrial hygiene reference. Consult this reference if you need further guidance beyond this TTP or the protocols provide.

A.4. Occupational Exposure Limits (OELs)

For OELs see references:

- (d), Title 29 CFR 1910 Subpart Z, Toxic and Hazardous Substances.
- (e), American Conference of Governmental Industrial Hygienists (ACGIH), “Documentation of the Threshold Limit Values and Biological Exposure Indices,” latest revision.
- (f), National Institute for Occupational Safety and Health (NIOSH), “Pocket Guide to Chemical Hazards,” latest revision.

Per reference (a), USCG units must strive to maintain exposures below the more stringent industry accepted occupational exposure limits (OELs), and

must maintain exposures below the permissible exposure limits (PELs) published in reference (d).

NOTE:

If local law provides OELs per references not listed here, continue to strive to maintain exposures below the more stringent OEL.

**A.5.
Occupational
Medical
Surveillance and
Evaluation
Program
(OMSEP)**

Per reference (g), Coast Guard Medical Manual, COMDTINST M6000.1(series), the SEHO, and other designated personnel with the technical training and abilities are the competent authorities for determining Occupational Medical Surveillance and Evaluation Program (OMSEP) enrollment for USCG personnel.

Use information gathered during IH surveys to approve unit requests for OMSEP enrollment.

See reference (g), Chapter 12, for further information about exposure documentation and enrollment criteria.

Section B: Rationale

B.1. Targeted Sampling for Efficient and Effective use of Resources

For many USCG workplace processes, exposure monitoring opportunities are too infrequent, or the processes too variable, to allow collection of a statistically valid number of measurements. This makes certain quantitative determinations of workplace exposures extremely difficult. In such cases, the industrial hygienist exercises sound professional judgment in conducting an exposure assessment. After considering the available workplace information, the IH can often estimate potential workplace exposures with well documented rationale in lieu of quantitative measurement.

This exposure assessment strategy is a move away from traditional compliance assessment. It seeks to determine if the exposure is clearly “acceptable” or “unacceptable,” or “uncertain.”

Acceptable exposures require infrequent or no monitoring. Unacceptable exposures merit controls and monitoring. Uncertain exposures provide insufficient information to make an acceptable or unacceptable determination, so further monitoring is necessary. When making the decision about where to direct resources, best practice is to sample workplaces where the occupational exposure is uncertain.

Section C: Program Structure

C.1. Overview

USCG IH surveys—initial and periodic—help execute the strategy outlined in Figure 2-1. The Coast Guard exposure monitoring strategy is cyclical, and continual. The information gathered in each survey feeds back into the process, refining the definition of SEGs, their exposure profiles and assessments, and the exposure monitoring plan (EMP).

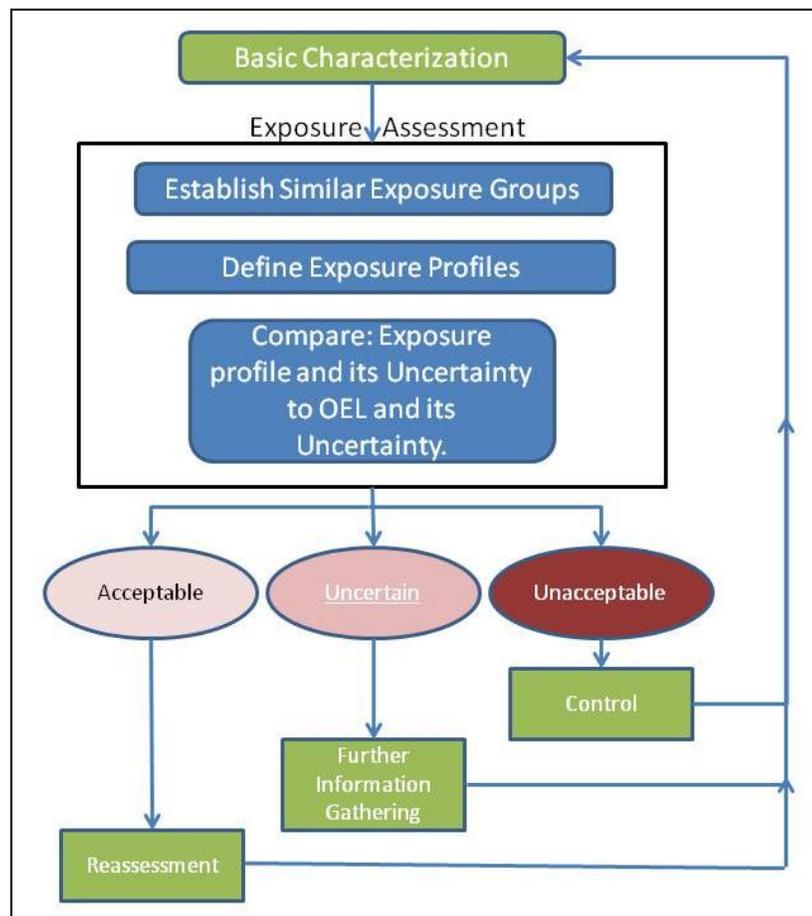


Figure 2-1 Exposure monitoring strategy process map

C.2. Initial Survey

Conduct an initial survey for every unit in your area of responsibility, unless one has already been done. The initial survey provides basic characterization of the workplace, and baseline exposure assessments for the unit.

C.3. Periodic Survey

Conduct periodic surveys per the schedule defined in the unit EMP. Periodic surveys provide opportunities for further information gathering and the refinement of exposure profiles.

C.4. CGIH-FS

Maintain records and documentation, and access resources to execute the exposure monitoring strategy in the Coast Guard Industrial Hygiene File System (CGIH-FS).

Section D: Conducting Exposure Assessments

D.1. Summary Industrial hygiene is the science and art of anticipating, recognizing, evaluating, preventing, and controlling workplace health hazards. Exposure assessments are an integral part of recognizing and evaluating potential health hazards. Understanding exposures allows for better characterization of worker health risks, and aids in prioritizing hazard control efforts.

There are four steps to an exposure assessment:

1. Define similar exposure groups (SEGs).
2. Define exposure profiles.
3. Judge acceptability of exposure profile for each SEG.
4. Determine the need for further information gathering or exposure monitoring.

D.1.a. SEG Worksheet

Use the SEG Worksheet to capture information as you work up the exposure assessment and exposure monitoring plan (EMP).

- Record the information for each SEG on the first sheet.
- Record the exposure profile for each environmental agent on the remaining tabs on the spreadsheet.

Each unit folder you create contains an SEG Worksheet (See Chapter 4 for more information). You can also find one at the following file path:

```
\\CGIH-FS\FOM\Exposure Assessment  
Tools\SEG_Worksheet_UNITNAME_OPFAC_YEARMODA.xlsx
```

Find a partially completed sample SEG Worksheet at this file path: \\CGIH-FS\FOM\Exposure Assessment Tools\SEG_Worksheet_Exemplar.xls

D.1.b. Quantitative Data

The techniques and procedures for assessing occupational exposures in Sections D and E call for quantitative data analysis.

Consult Chapter 7 of reference (b), A Strategy for Assessing and Managing Occupational Exposures, Third Edition, AIHA Press: 2006, for guidance on exposure data interpretation, decision making, and statistical tools for generating exposure profiles.

See statistical exposure assessment tools at the following file path:

```
\\CGIH-FS\FOM\Exposure Assessment Tools
```

D.2. Defining SEGs

Occupational exposure assessments determine the magnitude of varying exposures to workers. In most workplaces, it is cost prohibitive to measure exposures for every worker, because of the number of employees and the need for daily measurements. One strategy to overcome this challenge is to group workers believed to have similar exposures. Characterizing the exposure of one or a few in the group then represents the exposures of everyone in the group. Classifying workers into SEGs allows better use of limited resources, and characterization of more workplace exposures.

There are two methods to define SEGs: the observational approach, and the sampling approach. IH personnel use the following method to use the two:

1. Use the observational approach as the primary, default strategy to define SEGs.
2. Qualitatively assess exposures and use existing monitoring data when available for the SEGs formed by observation.
3. Identify critical SEGs for which misclassifying an individual worker's exposure poses a significant risk (e.g., IDLH tasks, irreversible health effects, acute adverse health effects, and carcinogens).
4. Use exposure monitoring and statistical analysis to validate and refine critical SEGs using the sampling approach.

D.2.a. Observational Approach to Define SEGs

Establish similar exposure groups by observation using the data gathered during the basic characterization of the workplace, work force, and environmental agents. See Chapter 3: Initial Survey, Section A.2., for guidance on basic characterization.

The industrial hygienist reviews these data and uses their training and experience to group employees believed to have similar exposures. SEGs established by observation are generally classified by the following determinants: process, job, task, and environmental agent.

Using this approach, you can organize SEGs as follows:

1. Process and environmental agent.
2. Process, job and environmental agent.
3. Process, job, task and environmental agent.
4. Process, task and environmental agent.
5. Work teams.
6. Non-repetitive work.

See Appendix B for an example of SEGs classified by process, job, task and environmental agent.

D.2.a.(1). Process, Environmental Agent	Identify the major work process first. In some operations, all employees working in a “process” are the SEG. For example, a process-oriented work team (i.e. vessel boarding team) where each member of the team performs each task with about the same frequency. If team members are similarly exposed to environmental agents, then each process-environmental agent combination is a SEG.
D.2.a.(2). Process, Job, Environmental Agent	Consider the similarity or dissimilarity of jobs in each process as a tool for identifying SEGs. If exposure profiles for different job classifications are unique, define each job classification as a different SEG. If two or more job classifications have essentially equivalent exposure profiles, group them into one SEG.
D.2.a.(3). Process, Job, Task, Environmental Agent	<p>The classification scheme frequently requires the identification of a task. A task is a work element or series of work elements. Peak exposures are inherently task related.</p> <p>Identify a task as an element of the SEG when assessing exposure relative to a ceiling or short-term exposure limit (STEL). Furthermore, the task must be identified if the exposure is assessed as an 8-hour time-weighted average (TWA) and does not occur daily.</p>
D.2.a.(4). Process, Task, Environmental Agent	Classify SEGs by process, task, and environmental agent if classification of workers into jobs is difficult, or adequate exposure history links workers to the process element. This strategy is effective when processes are strongly linked to a task (i.e. product development or maintenance), and that task is linked to specific environmental agents.
D.2.a.(5). Work Teams	<p>When work teams share responsibilities and flexible duties, job titles and work tasks often overlap and are insufficient to classify a SEG. Make reasoned adjustments as necessary. For example:</p> <ul style="list-style-type: none">• Use job title for permanently assigned work locations.• If workers change locations after working one day at a specific location, substitute work team for job title, and work location for work task.• If workers rotate through the various locations during each day, substitute work team for job title and ignore the work task (unless assessing exposures against a ceiling or STEL OEL). In this case use work location instead of work task.

D.2.a.(6).
Non-Repetitive
Work

Many USCG personnel perform batch processes, shop-type work, or research and development. People performing this type of work are difficult to categorize into SEGs.

If none of the above strategies to define the SEG work, try one of these alternate strategies.

- Assess compliance with OELs by using worst case exposure estimates.
 - Consider each project as a distinct process and define SEGs for each.
-

D.2.b. Sampling
Approach to
Define SEGs

This approach uses sample data from random monitoring evolutions to classify workers into SEGs. This requires sufficient data to group workers with confidence using statistical analysis (i.e., analysis of variance).

**D.3. Establish
Exposure Profile
for SEGs**

Develop an exposure profile for the SEG by estimating the exposure and its variability.

Analyze exposure data using appropriate statistical models to quantitatively determine the exposure profile.

If such data does not exist, estimate the exposure profile qualitatively using knowledge, experience, and professional judgment.

Both qualitative and quantitative data are acceptable means of establishing exposure profiles. However, quantitative data are more accurate.

D.3.a.
Exposure
Estimate

Estimate the exposure based on monitoring data, surrogate data, or modeling.

D.3.a.(1).
Monitoring Data

Draw upon professional experience of exposures from the same or similar process. Consult scientific literature for published data. Make a limited number of screening measurements to confirm that the current process appears to correspond to available data.

D.3.a.(2).
Surrogate Data

When more relevant data is unavailable, consider exposure data from another environmental agent with similar physical properties and used in a similar process.

Alternately, consider exposure data from another process involving the same environmental agent.

D.3.a.(3).
Modeling

Estimate exposure based on models that consider the chemical and physical properties of an environmental agent, along with the effect of existing controls, and estimated generation and removal rates.

Select model parameters to arrive at a conservative estimate of exposure. Modeling based on environmental release data from a process can also help estimate exposures.

NOTE:

Make conservative exposure estimates to avoid concluding that an exposure is acceptable when it is not.

D.3.b. Exposure Profile Uncertainty

When conducting the initial exposure assessment, most exposure profile characterizations are made with little quantitative data, because sufficient monitoring data does not yet exist.

To account for high uncertainty levels during the initial characterization, develop an estimated exposure range based on worst-case assumptions, and use the highest exposure estimates from this range. If the worst-case exposure range is acceptable when compared to the OEL, you can be confident that the workplace exposure is acceptable given the uncertainty in the estimate.

D.3.c. Refining Exposure Profiles

Refine and update the exposure profile for increased accuracy as additional monitoring data is collected through periodic surveys.

D.4. Exposure Ratings

Assign an exposure rating to each SEG. An exposure rating is a numerical value of 1 to 4 that represents the likelihood that the workers in a SEG are exposed over the OEL.

For USCG OELs (which are mainly 8-hour TWAs, STELs, and ceiling values), the target parameter is the 95th percentile value and the uncertainty is described by the 95% upper tolerance limit around the 95th percentile value (UTL95/95).

Compare the exposure profile to the OEL assuming no personal protective equipment (PPE) is worn. Use the exposure rating descriptions in table 2-1 as a guide.

4	>5% exceedance of the OEL (95th percentile > OEL)
3	>5% exceedance of the 0.5 x OEL (95th percentile between 0.5 x OEL and 1.0 x OEL)
2	>5% exceedance of 0.1 x OEL (95th percentile between 0.1 x OEL and 0.5 x OEL)
1	Little to no exceedance of 0.1 x OEL (95th percentile <0.1 x OEL)

Table 2-1 Exposure rating summaries

D.4.a. Exposure Rating 4	The 95th percentile exposure estimate is greater than the OEL.
D.4.b. Exposure Rating 3	The 95th percentile exposure estimate lies below the OEL. However, the UTL 95/95 greatly exceeds the OEL. This exposure profile could be either extremely variable (large GSD) or has insufficient number of samples demonstrating high uncertainty.
D.4.c. Exposure Rating 2	The 95th percentile exposure estimate is below the OEL. However, the UTL 95/95 is above the OEL by only a narrow margin. With either a small geometric standard deviation (GSD) or sufficient number of samples, there is only moderate uncertainty in the exposure profile.
D.4.d. Exposure Rating 1	Little to no exceedance of the OEL (i.e., the 95th percentile exposure estimate and the UTL 95/95 are virtually always less than the OEL).
D.5. Exposure Judgment	Use the exposure rating to assign an exposure judgment of “acceptable,” “uncertain,” or “unacceptable” to each SEG. The exposure judgment is a working exposure assessment, as it can change over time as new information updates the exposure profile.
D.5.a. Acceptable	<p>Exposures are acceptable where there is no overlap of the exposure profile, and the OEL is greater than the 95th percentile point estimate and the UTL95/95 of the SEG's exposure profile. There is a low potential to exceed the OEL.</p> <p>A SEG with an exposure rating of 1 or 2 with high certainty about the exposure profile and the OEL can be considered an “acceptable” exposure. No adverse health effects are likely, since the exposures should not exceed 50% of the OEL.</p>
D.5.b. Uncertain	<p>Exposures are uncertain where there is overlap of the exposure profile and OEL.</p> <p>A SEG with an exposure rating of 3 can be considered an “uncertain” exposure since the upper tail of its exposure profile may approach the OEL. The available information is unable to predict with certainty whether overexposure will occur. Where the 95th percentile point estimate is less than the OEL, but the UTL95/95 is greater than the OEL, the exposure is technically acceptable. But since the UTL95/95 is over the OEL, there is uncertainty as to actual worker exposure; the working exposure assessment is “uncertain” until further sampling data brings the UTL95/95 below the OEL.</p>

D.5.c.
Unacceptable

Exposures are unacceptable where there is overlap of the exposure profile and the OEL, and the exposure's 95th percentile point estimate is greater than the OEL.

A SEG with an exposure rating of 4 represents an “unacceptable” exposure. The exposures of these SEGs are expected to exceed the OEL more frequently than is acceptable and need to be controlled.

Section E: Developing the Exposure Monitoring Plan (EMP)

E.1. Overview An EMP is a description of the information that needs to be gathered for each SEG and a schedule for collecting it through periodic surveys.

Target SEGs with uncertain exposure assessments first. SEGs with acceptable and unacceptable exposure assessments might also require additional monitoring depending on the circumstances defining the exposure profile.

E.2. Documentation Use the last 6 columns of the SEG worksheet to develop the EMP for each SEG that requires monitoring.

Use the EMP document, found at the file path below, to communicate the EMP to the unit and individual shops. Include an EMP for each shop in your report.

\\CGIH-FS\FOM\Reports\CGIH_EMP_Template.doc

E.3. Health Effects Rating and Health Risk Rating Use SEG exposure rating (developed in the previous Section D), along with the health effects rating to develop a health risk rating. The health risk rating helps to prioritize exposure monitoring.

E.3.a. Assigning a Health Effects Rating to a SEG Assign a health effects rating to each SEG based on the environmental agent's toxicity (e.g., reproductive, hemo, neuro). Use authoritative sources (e.g., SDS, epidemiological studies) to determine toxicity. See Table 2-2 for health effect rating.

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

Table 2-2 Health effect ratings

E.3.b.
Determining the
Health Risk
Rating

Health risk is a function of the potential health effect caused by the agent and the potential exposure. Multiply the exposure rating times the health effect rating to determine the health risk rating (see Table 2-3).

Health Effect Rating	4	4	8	12	16
	3	3	6	9	12
	2	2	4	6	8
	1	1	2	3	4
		1	2	3	4
	Exposure Rating				

Table 2-3 Health risk ratings

E.4. Controls

Acceptable exposures merit no controls. Unacceptable exposures always merit controls. For uncertain exposures, given the health risks associated with potential exposures, recommend controls so that workers remain safe as further data is collected to make a more certain exposure assessment. Consideration for controls should begin at health risk rating of 6 except for any exposure ratings of 4 (unacceptable exposures).

E.5. Exposure
Monitoring

Sample SEGs with qualitative exposure profiles at a health risk rating of 6 in order to verify the exposure profile quantitatively.

For quantitative exposure profiles, continue to gather samples for health risk ratings of 6 or greater.

Use the health risk rating to prioritize SEGs for information gathering to focus efforts on exposures presenting the greatest health risk.

E.5.a. Uncertainty
Rating

Assign an uncertainty rating of 0, 1, or 2 that reflects the overall uncertainty in the exposure assessment. See table 2-4.

Rating	Certainty	Definition
0	Certain	The agent's exposure profile and health effects are well understood. The IH has high confidence in the exposure judgment.
1	Uncertain	There is enough information to make a judgment, but further information is warranted to verify the exposure assessment.
2	Very Uncertain	The exposure judgment was made without significant information on the exposure profile and/or health effects.

Table 2-4: Uncertainty ratings

E.5.b. Monitoring Priority	To determine the monitoring priority value, multiply the health risk rating by the uncertainty rating. Schedule monitoring for the SEGs with the highest monitoring priority values first.
E.5.c. Exposure Monitoring Considerations	Consider the following factors when deciding how and when to do exposure monitoring. <ul style="list-style-type: none">• Exposure pathway.• Sampling duration.• Seasonal variation.• Differences between shifts.• Numbers of samples.• Random sampling.• Regulatory requirements.
E.5.d. Exposure Pathway	Select a monitoring method that is appropriate for the significant exposure pathways (e.g., inhalation, skin absorption, ingestion).
E.5.e. Sampling Duration	Monitoring duration must mirror the averaging time of the OEL for that environmental agent (e.g., full shift monitoring for 8-hour TWAs, 15 minute sample duration for STELs).
E.5.f. Seasonal Variation	If seasonal changes in working conditions (e.g., doors closed in the winter and open in the summer) will affect exposures, structure sampling to address differences in environmental conditions. Sample during each season, and document each season's exposures.
E.5.g. Differences Between Shifts	If exposures might differ between shifts, define those shifts as different SEGs, or sample all shifts.
E.5.h. Number of Samples	Collect 6 to 10 samples from randomly selected members of a SEG. Six samples is the minimum to provide reasonable certainty, and more than 10 samples provide only a small amount of increased certainty per extra sample.
E.5.i. Random Sampling	Randomly select the 6-10 samples to allow statistically valid inferences to be drawn. Random selection gives the best chance of documenting variability in the population of all exposures. Use the following actions to randomly select the persons to sample and the dates and shift of the sample:

E.5.i.(1). Time Period	Determine the period over which you will take samples (e.g., a year, a season, a month). Very long periods (i.e., several months to a year) delay interpretation of data and risk change in the exposures during the sampling campaign. Very short time periods (i.e., a week) might not reveal the true variation of exposures.
E.5.i.(2). Dates	Randomly choose sampling dates from the time period selected. If the process in question does not occur frequently, it may be necessary to sample every time it occurs until the required number of samples has been collected. This assumes the exposure distribution is stationary (i.e., exposure variables such as weather, equipment, engineering controls, and operator skill do not change). Although a stationary distribution may not exist for infrequently performed processes, sampling each occurrence is often the only practical strategy due to the small number of workers involved. If the number of similarly exposed individuals involved in an infrequent process is large enough (i.e., at least six) then sampling all the individuals or a statistically valid random sample of the individuals in the SEG is a good strategy.
E.5.i.(3). Work Shifts	If applicable, randomly choose shifts for sampling on sampling dates.
E.5.i.(4). Workers	Randomly choose workers to sample from the SEG on a given shift on a given day. You will most likely have to do this within a few days of the sampling date since work schedules change frequently.
E.5.i.(5). High-Exposure Tasks	If collecting STEL or ceiling samples, randomly select the high-exposure tasks that occur during the shift and day chosen for sampling.
E.5.j. Regulatory Requirements	While constructing an exposure monitoring plan, collect samples for regulatory compliance (e.g., lead standard). Arrange sampling to serve the dual purpose of regulatory compliance, and providing random data points for statistical inference whenever possible.

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Chapter 3: Industrial Hygiene Surveys

Introduction This chapter describes the procedures for conducting initial and periodic surveys.

In This Chapter This chapter contains the following sections:

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Section A: Initial Survey

A.1. Overview The initial survey includes basic information gathering and workplace characterization to identify combinations of process, personnel, and environmental agents used to define groups of workers with like exposures or SEGs. The initial survey develops a baseline assessment of the workplace, and identifies locations or processes that require further evaluation.

A.2. Gathering Information Gathering background information is the first step of basic characterization.

- Preview the SEG Worksheet at the outset to make sure you gather all the information you need.
- Develop worksheets and checklists that meet your needs.

Use the information you collect during the initial survey to inform your exposure assessment.

A.2.a.
Historical
Information

Review all existing reports and sampling data for the unit. Include:

- Previous IH survey reports.
 - \\CGIH-FS\DISTRICTS
- Past health risk assessments (HRAs)
 - \\Paperless Filing System
- Safety Mobile Assistance, Response, and Training Team (SMART) visit reports.
- Mishap investigation reports.
- PPE matrices.
- Results of industrial hygiene monitoring.
- Results of biological monitoring.
- Engineering control assessments.

A.2.b.
Administrative
Information

Before the site visit, access the unit profile and record the following information:

- Unit size/personnel numbers.
- Mission types.

Access the unit profile via the HSWL SC homepage:

<https://hswl.uscg.mil/default.htm>

Communicate with unit point of contact (POC) to request background information about the workplaces in the scope of the initial survey.

Request the following information:

- Unit’s personnel classification system (e.g, organization charts, personnel allowance list, etc.)
- Facility diagrams and pictures showing the locations of different types of operations or process equipment.
 - If none are available, take pictures and create diagrams during the site visit.
- Process flowcharts.
- Job hazard analyses (JHA) completed by the unit.
- Chemical inventories.
- Unit “fact sheets.”

A.2.c. Begin
Characterization

Consider gathered information from three perspectives:

1. Workplace
2. Workforce
3. Environmental Agent

Use this information to begin to categorize workers into SEGs.

A.2.c.(1).
Workplace

Begin to describe the workplace.

- Document the processes or operations that are performed.
- Document occasional maintenance and repair processes that might result in exposure.

A.2.c.(2).
Workforce

Begin to describe the workforce.

- Consider that identical job titles are not reliable predictors of similar exposures.
 - Compare the unit’s workplace information against workforce information and identify processes to observe and people to interview.
-

A.2.c.(3).
Environmental
Agents

Begin to describe the workplace environmental agents to which the workforce could be exposed.

- Inventory the chemical, physical, and biological agents used in workplace operations, and review safety data sheets (SDS).
 - Consider all routes of exposure (e.g., inhalation, ingestion, skin absorption).
-

A.3. Site Visit

The site visit is the second step in basic characterization. Gather enough information about the workplace, workforce, and environmental agents to identify combinations of processes, personnel, and stressors that can be used to define SEGs.

NOTE:

The workplace is occasionally not co-located with unit command. As such, a single unit might require site visits to multiple locations.

A.3.a. Preparing
for the Site Visit

To prepare for the site visit, do the following:

1. Contact unit command to schedule site visit.
 2. Describe the purpose and scope of the survey.
 3. Request a brief on the following topics:
 - a. Existing unit operations.
 - b. Duty schedules and shift rotations.
 - c. Engineering, administrative, and personal protective equipment (PPE) controls already in place.
 - d. Current unit safety program publications, plans, SOPs and instructions.
-

A.3.b. Opening
Conference

During the opening conference:

1. Meet with unit command.
 2. Conduct briefing.
 3. Reiterate purpose and scope of the survey.
-

A.3.c. Site Walk-
Through

Walk the entire site making observations, asking questions, and gathering information to help define the definition of SEGs.

Verify previous information gathered about the unit.

A.3.c.(1).
Workplace

Observe processes and operations in progress to fully understand the potential exposures involved.

Verify documents accurately reflect current operations.

Have informal discussions with workers, supervisors, engineers, and activity safety professionals to better understand the workplace.

A.3.c.(2).
Workforce

Recognize that identical job titles are not reliable predictors of similar exposures. For example, welder exposures vary greatly depending on the type of welding. A break-down of workers by department or shop might be useful but, within a department or shop, there is often a variety of processes (e.g., welding, abrasive blasting, grinding) or tasks (e.g., administrative, quality assurance, production, supervision) that result in different exposures.

Identify ways that workers fall into SEG categorization schemes.

Consider a process-based or task-based work force classification.

Consider differences in work tasks and tempo between shifts.

A.3.c.(3).
Environmental
Agents

Look out for environmental agents not already identified.

Note potential exposures needing further investigation during periodic surveys.

Develop the following information for each environmental agent in the workplace posing potentially hazardous exposures:

- Quantity.
 - Relevant physical properties (e.g., vapor pressure, particle size distribution).
 - Health effects.
 - OEL.
-

**A.4. Exposure
Assessment**

Use the SEG Worksheet and the information you gathered to do an exposure assessment and develop an EMP per the strategy outlined in Chapter 2: Sections D and E.

Section B: Periodic Survey

B.1. Overview	Use the periodic survey to conduct exposure monitoring for SEGs with uncertain exposure profiles, or for any other information gathering purpose. Use that information to increase certainty in the exposure profile.
B.2. Gathering Information	Review background information specific to the SEGs you will evaluate during the periodic survey.
B.3. Site Visit	Schedule a site visit to evaluate any changes to the SEG with regard to the workplace, workforce and environmental agents.
B.3.a. Opening Conference	<p>In the opening conference:</p> <ol style="list-style-type: none">1. Meet with applicable SEG worker representatives (i.e. shop supervisors, team leader, etc.).2. Discuss the purpose of the periodic survey and request updated information on existing SEG work processes.3. Identify engineering, administrative, and PPE controls already in place.4. Identify any new work processes and/or environmental agents.
B.3.b. Site Walk-Through	Walk applicable SEG work sites and verify all information gathered (new and historical).
B.3.c. Quantitative Sampling	<p>Take samples as indicated by the EMP.</p> <p>Use the appropriate protocol from \\CGIH-FS\FOM\Protocols.</p> <p>If there is no protocol for the type of sampling you are conducting, work with your branch chief to create one and add it to the \Protocols folder.</p>
B.4. Exposure Assessment	<p>Use the information gathered during the periodic survey to refine the exposure assessment for the unit.</p> <p>Refer back to Chapter 2: Sections D & E as necessary.</p>
B.4.a. Exposure Profile	<p>Review SEG worksheet previously defined during the initial survey.</p> <p>Use statistical analysis of exposure monitoring data to quantitatively determine the exposure profile using exposure means, standard deviations, and statistical confidence limits.</p>

Make changes to the exposure profiles based on exposure monitoring data (i.e., quantitative sampling data) and update profiles.

Consult Chapter 7 of reference (b), *A Strategy for Assessing and Managing Occupational Exposures*, Third Edition, AIHA Press: 2006, as necessary for guidance on exposure data interpretation, decision making, and statistical tools for generating exposure profiles.

Statistical tools for exposure assessment are located at the following file path:

\\CGIH-FS\FOM\Exposure Assessment Tools

B.4.b. Exposure Rating	Assign an exposure rating based on the exposure level compared to the OEL, as outlined in Chapter 2, Section D.4.
B.4.c. Exposure Judgment	Determine if changes to the exposure profile impact any exposure judgments, and assign the SEG a new working exposure assessment—acceptable, uncertain, or unacceptable—as necessary.
B.4.d. EMP	Re-evaluate exposure monitoring priorities, and update the EMP where applicable.

Section C: Reporting and Archiving

C.1. SEG Worksheet	Save the SEG Worksheet in the unit's SEG folder with a current date in the file name. Move the old version into the SEG Worksheet Archive folder if applicable.
C.2. HSWL SC (se) Information Systems	<p>If any information gathered during the survey is different than the unit profile, update the unit profile.</p> <p>For any discrepancy observed during the survey, create a hazard condition notification (HCN) in the Hazard Condition Management System (HCMS).</p>
C.3. Exposure Monitoring Results	<p>When members of a SEG are sampled, notify the command of the results within the timeframe mandated by reference (d), Title 29 CFR 1910 Subpart Z, Toxic and Hazardous Substances.</p> <ul style="list-style-type: none">• Direct the command to notify all members of the affected SEG about the results.• Use the Exposure Notification Memo Template at this file path: \\CGIH-FS\FOM\Reports\CGIH_ExposureNotificationMemo_Template.doc• Provide completed template to your branch chief for review and approval before sending.• Deliver exposure notification memos via email, and request a read receipt.
C.4. OMSEP	Contact the unit OMSEP coordinator if any unit member is identified as meeting OMSEP enrollment criteria per reference (g), Coast Guard Medical Manual, COMDTINST M6000.1(series).
C.5. Report	The IH survey report is the main record of a unit's overall exposure assessment.
C.5.a. Report Body	<p>Write survey reports according to division standards. An example of an initial survey report, and a template for creating one, are provided at the following file paths:</p> <p>\\CGIH-FS\FOM\Reports\CGIH_Initial_Survey_Report_Example.pdf</p> <p>\\CGIH-FS\FOM\Reports\CGIH_Initial_Survey_Report_Template.doc</p>

NOTE:

Template and example are provided for the initial survey report only. Material guidance for periodic survey reports will be added as it becomes available. Report format and content standards are subject to change as IH program develops.

C.5.b. EMP

Use information from the SEG worksheet to fill out an EMP document for each shop included in the survey. Include all SEGs in the shop on the EMP. Attach EMPs to the report as Appendix 1.

An EMP template is available at the following file path:

\\CGIH-FS\FOM\Reports\CGIH_EMP_Template.doc

C.5.c. Cover
Memo

Write the cover memo with the unit command as the target audience. Be brief, and include just the information the unit needs to know to keep workers safe from occupational exposures.

Use the cover memo template located at this file path:

\\CGIH-FS\FOM\Reports\
CGIH_Survey_Report_Cover_Memo_Template.doc

C.5.d. Peer
Review and
Signature

Once complete, pass the draft report to a peer for review, and then to a supervisor for review as appropriate. Once both reviews have been completed, route report to the appropriate signature authority.

C.5.e. Archive

Once the report is signed and delivered, save a copy of the signed report along with all supporting and related materials to the unit's folder in \\CGIH-FS\ DISTRICTS. See Chapter 4: CGIH-FS for further guidance.

C.5.f. Paperless
Filing System
(PFS)

Once signed and delivered, file a copy of the signed report ONLY in the appropriate unit folder in the PFS. The PFS is a separate file system from CGIH-FS with unique file naming conventions. Follow guidance on the document "PFS FILE NAME FORMAT.pdf" located in each district folder in the PFS.

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Chapter 4: Coast Guard Industrial Hygiene File System (CGIH-FS)

Introduction This chapter discusses the Coast Guard Industrial Hygiene File System, its contents, and how to access and use it.

In This Chapter This chapter contains the following sections:

Section	Title	Page
A	Overview	4-2
B	Field Operations Materials (FOM) Folder	4-3
C	Districts Folder	4-4
D	IH Database Folder	4-8

Section A: Overview

A.1. CGIH-FS The Coast Guard Industrial Hygiene File System (CGIH-FS) is the location of all industrial hygiene documents and records. The CGIH-FS also contains resources to assist IH personnel in conducting surveys and standardizing practice. Find the file system at the following file path:

\\D05MS-MMST1\SAFETY & ENVIRONMENTAL HEALTH\CGIH-FS

A.2. Structure The file system is divided into three main folders:

- DISTRICTS
 - FOM-(Field Operations Materials)
 - IH DATABASE
-

A.3. Access All District Safety and Environmental Health Officers will be provided access to the CGIH-FS. If you need access to the system, contact the main HSWL SC (se) office at 757-628-4392.

A.4. Changes Updating or adding a protocol, template, or form within the FOM is occasionally necessary. Submit a request for change to your branch chief via email. When developing a new document, ensure a similar document is not being developed at the same time. Once complete, send to your branch chief for vetting and filing in the appropriate location within the CGIH-FS.

A.5. Reports Draft, review, finalize and file signed reports, and all related and supporting materials, in the \DISTRICTS folder under the appropriate unit. See Chapter 3 for further guidance.

A.6. Sampling Records SEHOs create records of sampling data in a district specific IH database spreadsheet (e.g., D1_IH_DATABASE.xlsx).

A.6.a. Records Requests For USCG personnel requesting access to individual sampling results, identify the SEG applicable to the individual, and re-send the notification memo. See Chapter 3: Section C.3 for notification memo guidance.

For command or co-worker level requests, re-send relevant report.

For external and legal requests, forward request to your supervisor.

A.7. File Naming Name files according to the examples provided throughout this TTP publication. General conventions are to underscore between each part of the file name, leaving no spaces, and use the date format YYYYMMDD.

Section B: Field Operations Materials (FOM) Folder

B.1. Overview The FOM folder contains resources to support the execution of the USCG exposure monitoring strategy. SEHOs access these resources to do work. Division leadership manages the contents of this folder.

B.2. Structure The FOM folder is broken down into the following sub-folders:

- Exposure Assessment Tools
- Forms
- Protocols
- Reports
- Safe Work Practices

B.2.a. Exposure Assessment Tools The exposure assessment tools folder includes spreadsheets developed to assist in statistical analysis of exposure monitoring data (e.g., IHSTAT, IHSkinPerm). It also contains a blank SEG Worksheet, and a partially filled in SEG Worksheet as an example.

B.2.b. Forms The forms folder includes sampling forms to record IH data. Examples include wipe sampling, air sampling, noise monitoring, ventilation, and thermal stress.

These forms are staged here for convenience. Use the form that is best for the situation. Navy forms are required for Navy labs, and using them as a default is considered best practice.

B.2.c. Protocols This folder contains approved sampling protocols.

B.2.d. Reports This folder includes templates and examples for writing reports. It also contains a table with abbreviations of environmental agents for use when naming reports that address specific exposures.

B.2.e. Safe Work Practices This folder is for all developed safe work practices. Examples include lead dust, Ebola, and coating application and removal operations.

Section C: Districts Folder

C.1. Overview The DISTRICTS folder contains a sub-folder for each SEHO AOR (e.g., D1, D5, D7, etc.). SEHOs file documents and records pertaining to surveys and exposure assessments here in their respective district folder.

C.2. District Folders Each district folder is initially set up with two items, a district IH database spreadsheet, and a template for creating unit folders.

C.3. District IH Database Within each district folder (e.g, D1, D5) is a district specific IH database file (e.g., D1_IH_DATABASE.xlsx). Enter all sampling data collected in the district here.

C.3.a. Tabs The spreadsheet has three tabs based on the type of sample taken. If you have samples to enter, but there is no tab appropriate to the sample type, request to add one through your branch chief.

C.3.b. Sample ID When entering data into the spreadsheet, use a unique sample ID for each entry consisting of the following parts:

- Sequential ID—determined by the SEHO at the time of sampling, and used to differentiate samples for lab analysis.
- Date the samples were taken (Format: YYYYMMDD).
- First initial, last initial.

For example, 01-20150317-TC, 02-20150317-TC, etc.

C.4. Unit Folder Template Also within each district folder is a template for creating unit folders with the following name:

- UNIT_FOLDER_TEMPLATE_CopyAndRenameWithUnitName

C.4.a. Creating Unit Folders To create a unit folder:

- Right click the unit folder template.
- Select copy.
- Paste the copy within the district folder.
- Rename the folder with the unit name. Spell out the unit name in all CAPS and separate elements with underscores (e.g., SECTOR_NEW_YORK).

NOTE:

For organizational purposes, you might need to divide units further into shops. In this case, create a single folder with the unit name, and use the unit template folder to create folders for each shop at the unit.

**C.5. Working
with Unit
Folders**

Unit folder organization uses the following schema (in this example, plain text represent folders, and *italicized text* lists files):

- UNIT_NAME_HERE
 - SEG Worksheet Archive
 - *SEG_Worksheet_UNITNAME_OPFAC_YEARMODA.xlsx*
 - A folder for each survey report (you will create these as you go).

C.5.a. SEG
Worksheets

Use SEG Worksheet to work up SEGs, exposure assessments, and unit EMPs.

Each time you change the SEG Worksheet, save-as with a new date, and move the old copy to the SEG Worksheet Archive folder.

C.5.b. Reports

For each report, create a folder to hold the final report and all of its supporting materials. For example:

- *Covermemo.doc*
- *ReportBody.doc*
- *NotificationMemo.doc*
- *ChainOfCustody/LabResults.pdf*
- *Pics/Videos/Diagrams/Etc.*

Create the folder and final report using the same name. Examples are provided below.

C.5.b.(1). Initial
Survey Naming
Convention

IS_FYyy_YEARMODA_UNITNAME

- *IS_FYyy_YEARMODA_UNITNAME.pdf*

C.5.b.(2).
Periodic Survey
Naming
Convention

PS_FYyy_YEARMODA_AGE_NTS_UNITNAME

- *PS_FYyy_YEARMODA_AGE_NTS_UNITNAME.pdf*

NOTE:

For periodic surveys, use shorthand to list in the filename each environmental agent studied in the survey. A table of environmental agent shorthand is located at this file path:

**\\CGIH-
FS\FOM\Reports\CGIH_Environmental_Agent_Shorthand.doc**

C.5.c. Unit Folder
Example

The following layout represents an established unit folder.

- SECTOR_NEWYORK
 - *SEG_Worksheet_SECTOR_NEWYORK_37040_20150131.xlsx*
 - SEG Worksheet Archive
 - *SEG_Worksheet_SECTOR_NEWYORK_37040_20140606.xlsx*
 - *SEG_Worksheet_SECTOR_NEWYORK_37040_20140306.xlsx*
 - IS_FY14_20140306_SECTOR_NEWYORK
 - *IS_FY14_20140306_SECTOR_NEWYORK.pdf*
 - *Covermemo.doc*
 - *ReportBody.doc*
 - *HAZMAT inventory.doc*
 - *Pics/Videos/Diagrams/Etc*
 - PS_FY14_20140606_BTEX_NSE_SECTOR_NEWYORK
 - *PS_FY14_20140606_BTEX_NSE_SECTOR_NEWYORK.pdf*
 - *Covermemo.doc*
 - *ReportBody.doc*
 - *NotificationMemo.doc*
 - *ChainOfCustody/LabResults.pdf*

- *Pics/Videos/Diagrams/Etc*
- PS_FY15_20150131_ACM_Pb_SECTOR_NEWYORK
 - *PS_FY15_20150131_ACM_Pb_SECTOR_NEWYORK.pdf*
 - *Covermemo.doc*
 - *ReportBody.doc*
 - *NotificationMemo.doc*
 - *ChainOfCustody/LabResults.pdf*
 - *Pics/Videos/Diagrams/Etc*

NOTE:

This “SEHO” visited Sector New York three times, first in March of 2014 for the initial survey, and then June and January periodic surveys. You can see the SEG worksheet was updated each time information was gathered from the unit, and that the filenames for the periodic survey reports reflect the environmental agents studied.

Section D: IH Database Folder

D.1. Overview

The IH DATABASE folder contains a spreadsheet that is an aggregate of all sampling data gathered by USCG IH personnel.

This folder and its contents are managed by division leadership.

Appendix A: Glossary and Acronyms

ACGIH	American Conference of Governmental Industrial Hygienists
Agent	A chemical, radiological, thermal, physical, or biological entity that may cause deleterious effects in an exposed worker. Also known as an “environmental agent.”
AIHA	American Industrial Hygiene Association
AOR	Area of responsibility
Ceiling limit	The concentration of a chemical or material that no person should be exposed to for any period of time to prevent ill effects or death.
CG IH Personnel	All persons doing IH work across the Coast Guard. This includes SEHOs, and IHs at the Yard, ALC, and Strike Teams.
Exposure judgment	The exposure judgment is the classification of occupational exposures as "acceptable", "uncertain", or "unacceptable" based on current best information. It is a working exposure assessment that is revised continually as new information becomes available.
Exposure monitoring plan (EMP)	The exposure monitoring plan is a schedule for future periodic surveys, and a plan for what will be observed and measured according to that schedule.
Exposure monitoring priority	Determined by the health risk rating. Higher health risk ratings indicate a higher exposure monitoring priority.
Exposure profile	An exposure profile is a characterization of the day-to-day variability of exposures of a SEG. An exposure profile is defined based on qualitative and quantitative data, and can be based on statistics including measures of central tendency and measures of variability.
Exposure rating	An exposure rating is an estimate of 95 th percentile exposure level relative to an OEL. The rating is divided into four categories ranging from 1 to 4 with exposure ratings of 1 being the lowest and 4 being the highest.

FOM	Field operations materials
GSD	Geometric standard deviation
HCMS	Hazardous Condition Management System
Health effect rating	Numerical category, with a scale from 0 to 4, assigned to an environmental agent based on considering the conditions of use. Zero represents the least effect and 4 the greatest effect.
Health risk rating	A numerical rating ranging from 0 to 16 that is obtained by multiplying the Exposure Rating times the Health Effect Rating. This number becomes the exposure monitoring priority.
HRA	Health risk assessment. A legacy term that used to be applied to all IH surveys in the CG. This term is no longer in use, and has been replaced with initial and periodic surveys.
HSWL SC (se)	Safety and Environmental Health Division of the Health Safety and Work-Life Service Center
IH	Industrial hygiene
IHQAB	Industrial Hygiene Quality Assurance Board
Job	A position or occupation held by one or more persons in an organization. In the hierarchy of many workplaces, a process or department frequently contains one or more jobs. One or more tasks or work activities are often assigned to each job.
Monitoring priority	A numeric value resulting from the multiplication of the health risk rating and the uncertainty rating. The monitoring priority value is used to prioritize monitoring; the greater the value, the higher the priority.
NIOSH	National Institute for Occupational Safety and Health
Occupational Exposure Assessment Strategy	A five part strategy to monitor workplace exposures across the CG. It includes: workplace characterization, ongoing information gathering, exposure assessment, communication and documentation, and periodic reassessment.
OEL	Occupational exposure limit

OH	Occupational health
OM	Occupational medicine
OMSEP	Occupational Medical Surveillance and Evaluation Program
PEL	Permissible exposure limit
PFS	Paperless file system
POC	Point of contact
Process	A stand-alone manufacturing or service operation.
SDS	Safety data sheet
SEG	Similar exposure group
SEHO	Safety and Environmental Health Officer
Similar exposure group (SEG)	A group of employees who experience such similar exposures to environmental agents, that if one of the employees were monitored, the results of the monitoring could be used to predict the exposures of the remaining members of the group. Individuals within the group generally conduct the same work processes, use the same equipment, have the same job description, and are exposed to the same environmental agents at similar frequencies and durations.
SMART	Safety Mobile Assistance, Response, and Training Team
STEL	Short term exposure limit
Survey, Initial	The workplace characterization that is used to establish an exposure monitoring plan. It includes: reviewing historic data, meeting with local command/safety personnel, a walkthrough of the workplace including interviews of supervisors and employees, and any measurements or sampling necessary to complete an initial survey report.
Survey, Periodic	Workplace surveys that are used to verify the effectiveness of recommended controls, gather further information for uncertain exposures, and refine existing exposure profiles.

Task	A work element or series of work elements.
TWA	Time weighted average
Uncertainty rating	A numeric value of 0-2 representing the uncertainty of the exposure assessment. The higher the value, the more uncertain the IH is about the exposure assessment.
Unit	The basic unit of organization for CGIH information. Units can have many workplaces. Identified by name and OPFAC.
UTL	Upper tolerance limit
Work process	A single workplace can have many work processes; each can generate one or more exposures, or none.
Workplace	The physical location where the work gets done, where process would be observed, samples taken, and controls implemented. Units can have many workplaces.

Appendix B: SEG Example

B.1. The aircraft coating operations at Air Station Kodiak, Alaska illustrate the observational strategy for identifying similar exposure groups.

Information on the workplace, work force, and environmental agents gathered during the basic characterization stage is used to identify SEGs. Using this data, begin by identifying the site’s major processes. For example, one major operation at Air Station Kodiak is aircraft coating. Administratively, aircraft coating is divided into 2 processes:

- Coating removal/surface preparation
- Coating application

Aircraft coating begins with the coating removal, or surface preparation process. There are two distinct job classifications within this process: C-130 painter and H-60/H-65 painter. Although C-130 workers and H-60/H-65 workers are completing the same process, they are separate SEGs due to varying exposures resulting from differences in aircrafts, paint booths, and engineering controls. The coating preparation process includes several tasks including scruff sanding/mechanical abrasion, chemical stripping, final washing, conversion coating and paint mixing. Each task has unique associated environmental agents, and therefore are different SEGs.

Let’s consider the aircraft coating application process. Coating application is considered a unique process and therefore constitutes the “process” element of the SEG. The coating applicators (painters) use the same environmental agents (chromate and diisocyanates containing coating) and production rates are similar. The operation of each is noisy.

In aircraft coating, both job classifications engage in equipment maintenance and clean-up.

Table B-1. Similar Exposure Groups (Process-Job-Task-Environmental Agent)

Process	Job	Task	Environmental Agent
Coating Preparation	C-130 painter	Scruff Sand/Mechanical Abrasion	Hexavalent Chromium, Dust, Hand/Eye/Skin injury
Coating Preparation	C-130	Chemical Strip	Hexavalent Chromium,

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	painter		VOCs, Hand/Eye/Skin injury
Coating Preparation	C-130 painter	Final Wash/Acid Etch	Hexavalent Chromium, Dust, Hand/Eye/Skin injury
Coating Preparation	C-130 painter	Conversion Coat	Hexavalent Chromium, Dust, Hand/Eye/Skin injury
Coating Preparation	C-130 painter	Paint Mixing	Hexavalent Chromium, Diisocyanates, VOCs
Coating Preparation	H-60/H-65 painter	Scruff Sand/Mechanical Abrasion	Hexavalent Chromium, Dust, Hand/Eye/Skin injury
Coating Preparation	H-60/H-65 painter	Chemical Strip	Hexavalent Chromium, VOCs, Hand/Eye/Skin injury
Coating Preparation	H-60/H-65 painter	Final Wash/Acid Etch	Hexavalent Chromium, Dust, Hand/Eye/Skin injury
Coating Preparation	H-60/H-65 painter	Conversion Coat	Hexavalent Chromium, Dust, Hand/Eye/Skin injury
Coating Preparation	H-60/H-65 painter	Paint Mixing	Hexavalent Chromium, Diisocyanates, VOCs
Coating Application	C-130 painter	Primer application	Hexavalent Chromium, Dust, VOCs
Coating Application	C-130 painter	Top coat application	Diisocyanates, VOCs
Coating Application	H-60/H-65 painter	Primer application	Hexavalent Chromium, Dust, VOCs
Coating Application	H-60/H-65 painter	Top coat application	Diisocyanates, VOCs
Coating Equipment Maintenance/Cleaning	All painters	Equipment maintenance/Cleaning	Hexavalent Chromium, Dust

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