

Valero CTEMS Standard		
	# - #.# Industrial Hygiene Workplace Exposure Assessment	Effective Date: (Date)
		Revision Date: (Date)

Standard Owner : Lead Industrial Hygiene Specialist

**1.0 Purpose**

This standard defines the minimum requirements for a basic characterization of the workplace exposures, qualitative and quantitative risk assessment, monitoring, data interpretation, and documentation of employee exposures to physical and chemical agents in the workplace. This standard draws from the exposure assessment strategy documented in the American Industrial Hygiene Association’s (AIHA) “A Strategy for Assessing and Managing Occupational Exposures”. This standard is to be used to develop and update a documented site exposure assessment, sampling strategy, and sampling schedule.

**2.0 Scope**

This standard applies to all Valero Refineries and Terminals.

**3.0 Requirements**

Each facility’s local Workplace Exposure Assessment Procedures will address the following issues, at a minimum:

**3.1 Establishment of Similar Exposure Groups (SEG)**

Each facility will define the SEG's to be established within their respective employee populations and develop monitoring goals to acquire quantitative exposure monitoring data. This is the core of basic characterization and qualitative risk assessments. Appendix A contains an example of the process used to determine the exposure groups and tasks requiring monitoring. Example exposure assessment forms are attached at the end of the standard for both TWA and STEL/Task exposure assessments. In addition to the qualitative assessment, intrafacility monitoring data for similar processes, or monitoring data on job tasks at other refineries, or previous site quantitative monitoring can be used as a basis for the establishment of a SEG. Monitoring data from other facilities cannot be used as quantitative data for another site, so site monitoring of exposures must be conducted.

SEG’s will be classified based on one of the following three schemes:

- 3.1.1 By process, job classification(s), and environmental agent;
- 3.1.2 By process, job classification(s), job task, and environmental agent;
- 3.1.3 By process, job task, and environmental agent.

All tasks requiring the use of air-purifying respirators will require establishment of a SEG using the classification scheme listed in items 3.1.2 or 3.1.3 above.

**3.2 Monitoring Methods, Sample Collection and Data Interpretation**

**3.2.1 Minimum Number of TWA Samples per SEG**

For each SEG, initial baseline monitoring will include a minimum of three TWA personal samples to assess exposure levels. Six baseline TWA samples are preferred to increase statistical accuracy. If each of the initial three samples per

SEG/Environmental Agent results are  $\leq 10\%$  of the applicable OEL, then statistical analysis and additional monitoring are not required. Future monitoring may be necessary in the event of significant process changes. If any of the initial three sample per SEG/Environmental Agent results are  $\geq 10\%$  of the applicable OEL, then an additional three samples will be required per SEG/Environmental Agent and a statistical analysis will be conducted (See Appendix B Figure 1 – General Algorithm for Exposure Assessment Decision-Making). Changes to process, equipment, and work methods must be assessed to determine if new or additional exposures may occur. The site management process shall include an assessment of changes as they relate to exposures.

The minimum number of samples required to be collected to measure exposures to STEL's and Tasks must be based on professional judgment to determine if corrective actions or additional monitoring is required.

### 3.2.2 Sample Collection & Analysis

Sites shall use a recognized method such as those published by NIOSH (National Institute for Occupational Safety & Health) or OSHA. NIOSH is a part of the Centers for Disease Control (CDC) and publishes the NIOSH "Manual of Analytical Methods", available from the NIOSH Website. OSHA sampling methods can be obtained from the OSHA Website. Laboratory analysis will only be performed by laboratories with active accreditation through the American Industrial Hygiene Association (AIHA), or National Voluntary Laboratory Accreditation Program (NVLAP).

Evaluation of physical agents such as noise, heat, and non-ionizing and ionizing radiation will be conducted using survey equipment meeting the requirements of the applicable Local and Federal regulations, regarding accuracy and performance. Survey equipment will be maintained and calibrated per manufacturer specifications. All exposure monitoring equipment will be appropriately calibrated before and after each use; calibration data must be documented in a logbook or on Monitoring Data Information Sheets.

Air and Noise Monitoring Data will need to be documented using a Monitoring Data Information Sheets equivalent to the examples found at the end of the standard. A Chain of Custody (COC) form will accompany each shipment of samples to the analyzing laboratory. The laboratory's COC will be used where available. A copy of the COC as sent from the facility will be kept on file with the field sampling records until the completed copy or original is returned by the laboratory. **Analytical results are employee exposure records and subject to Corporate RIMS record retention guidelines. (30 years post-employment)**

### 3.2.3 Data Interpretation

#### 3.2.3.1 Selection of an Occupational Exposure Limit (OEL)

The applicable OEL which will be considered are those established by a jurisdictional governmental agency, referring agency, or professional association. OEL's that can be used include OSHA Permissible Exposure Limits (PEL) or the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV). Refer to the TWA & STEL Occupational Exposure Limits listed in the ESS IH Database for documentation.

The exposure limit should be selected based on the following hierarchy:

- If the environmental agent has a PEL or TLV available, use the lower of the two values as the basis of the exposure assessment, unless scientific literature does not clearly support the TLV – such as in the case of benzene, sulfur dioxide, or noise;
- If no PEL or TLV is available for the environmental agent, consult with the Corporate Health & Safety department to establish an exposure limit based on a review of available scientific literature to establish an alternative exposure limit.

#### 3.2.4 Statistical Analysis

All SEG monitoring data will need statistical analysis, unless all baseline samples for the SEG are  $\leq 10\%$  of the applicable OEL. AIHA's lognorm spreadsheet is used for this analysis. Three samples or more are needed per SEG for statistical evaluation to determine the following information from the sample results:

- Whether the data fits a lognormal or normal distribution - Typically air monitoring data and noise dose percent (%) data fits a lognormal distribution and noise dBA data fits a normal distribution. The normal distribution may be used for air monitoring data and noise dose % data if the distribution does not fit the lognormal distribution and it fits the normal distribution (lognormal – no and normal – yes). The lognormal distribution may be used for noise dBA data if the distribution does not fit the normal distribution and it fits the lognormal distribution (normal – no and lognormal – yes).
- What is the SEG's predicted long-term exposure level (95% TL);
- Is the SEG's risk to overexposure less than 5%
- Is installation of feasible engineering controls indicated;
- Determine frequencies for resampling or re-evaluation.

The Environmental Support Solutions' (ESS) Essential IH Management Software electronic database will be used for running these statistics based on software from AIHA in their text "A Strategy for Assessing and Managing Occupational Exposures". Appendix B has a brief description of this system.

If the collected data does not fit either a lognormal or normal distribution (e.g. bimodal), the SEG may actually be two SEG's grouped together. SEG characterization and assessment should be repeated, and information analyzed more closely to determine if two SEG's are indicated.

Other approved AIHA statistical method may used to analyze data, but the lognorm spreadsheet must be completed and reviewed first, with other software analysis being secondary.

### 3.3 Employee Notification of Results

All employees who were participants in the personal exposure monitoring and members of the SEG will be notified of the monitoring results in **within 15 working days** of receipt of monitoring results and the corrective action(s), if any, to be taken. Employees must acknowledge receipt of the notification of results and this must be documented and maintained as part of the monitoring records. The exceptions to the notification requirement are in cases where regulations require shorter notification time periods.

- Lead – 5 working days after receiving results

- Asbestos - as soon as possible but no later than 5 working days after receiving results

At least bi-annually, the site will update the statistics for those SEG's monitored during the calendar year. This would include the arithmetic or geometric mean and 95% TL for the monitoring results for each of the SEG classifications. The sampling strategy and monitoring schedule must be set up bi-annually and documentation maintained at the site.

### **3.4 Electronic Databases for Exposure Assessment Programs**

All personal monitoring data will be maintained in the ESS Essential IH Management Software electronic database. The data stored needs to contain at least the following information:

- The SEG classification (TWA) or SEG Task (STEL)
- The name(s) of the environmental agent monitored
- The tasks performed during the sampling period (if not already identified in the SEG classification)
- For SEG task classifications, the frequency that the task occurs (once a week, once a month, etc.)
- The monitored employee's name and unique identifying code (employee # or Social Security number)
- Employee shift (day, night, graveyard)
- Process or work area where employee was located during the sampling period
- Unique identification number for the monitoring sample (i.e. sample number)
- Date sample was collected
- Sample duration: begin and end measurement times
- Work schedule (e.g. 8, 10, or 12 hours per day)
- Sample type (e.g. routine, non-routine, TWA, STEL personal, area, or biological)
- Reason for monitoring (baseline, diagnostic, turnaround)
- Weather conditions – relative humidity, temperature, wind direction, etc.
- Measured exposure level and unit of measure
- TWA assumptions; exposure during un-sampled period
- Sampling and analytical methods
- Monitoring media and device, such as Pump ID #, Noise Dosimeter ID #, etc.
- Calibration documentation such as flow rate or noise dosimeter calibration
- PPE used by employee monitored
- Observations or comments on health hazard controls, contaminant sources, or other professional judgments crucial to the sample collection
- Statistical analysis parameters for the exposure assessment of each SEG classification

## **4.0 Performance Management**

### **4.1 Site self-audits**

- 4.1.1** Ensure implementation of the Industrial Hygiene monitoring schedule.
- 4.1.2** Ensure bi-annually the site will update the Workplace Exposure Assessment and statistics by SEG.
- 4.1.3** Bi-annually develop and implement a monitoring schedule.

### **4.2 Corporate compliance audits**

- 4.2.1** Will be conducted based upon audit schedules.

## 5.0 Definitions

- 5.1 **Baseline Monitoring-** The initial characterization of exposure levels within a Similar Exposure Group (SEG) to determine the range of exposures for one or more exposure profiles.
- 5.2 **Environmental Agent-** A chemical, radiological, thermal, physical, or biological agent that may cause adverse health effects in an exposed worker
- 5.3 **Exposure Profiles-** Magnitude and variability of exposures to a specific environmental agent within a SEG. This includes the mean and range of exposure.
- 5.4 **Exposure Assessment -**The subjective process of defining exposure profiles and weighing the significance of employee exposures to environmental agents.
- 5.5 **Occupational Exposure Limit (OEL) –** An exposure limit which has been validated through an established review process and recognized by a jurisdictional governmental agency, referring agency, or professional association. (ACGIH TLV, OSHA PEL)
- 5.6 **Similar Exposure Group (SEG) -** Groups of employees having the same general exposure profiles for physical or chemical agents; due to similarity and frequency of tasks they perform, materials and processes they work with, and work methods used. Groupings allow field exposure measurements to be made on a random representative sampling basis, such that the results being applicable to all members of the group.
- 5.7 **Quantitative Risk Assessment -** An exposure assessment based on previous site monitoring results to develop risk rankings
- 5.8 **Qualitative Risk Assessment -** An exposure assessment based on professional judgment for the evaluation of potential exposures and risk rankings.
- 5.9 **95% Tolerance Level (95% TL) –** A statistical calculation for a specific SEG, environmental agent, and time period. This calculation for a data group predicts that 95% of the time a future monitoring event exposure levels should be at or below the calculated value (95% TL).

## 6.0 Roles And Responsibilities

- 6.1 Site
  - 6.1.1 Assure compliance with this standard.
  - 6.1.2 Develop site requirements which incorporate the Workplace Exposure Assessment and a Bi-annual Monitoring Schedule.
  - 6.1.3 Bi-annually the site will update the site Workplace Exposure Assessment and statistics by SEG.
  - 6.1.4 Bi-annually develop and implement a monitoring schedule.
  - 6.1.5 Conduct self and contractor audits & track corrections.
- 6.2 Corporate
  - 6.2.1 Review these requirements every 3 years
  - 6.2.2 Ensure these requirements are integrated into the audit criteria
  - 6.2.3 Assist sites with implementation
  - 6.2.4 Corporate compliance audits will be conducted based upon audit schedules

## 7.0 Management Review

Corporate Health and Safety will periodically review the results of the assessment, including performance measures. Based on this review corrective/preventive action shall be implemented to address

deficiencies or non-conformances in the design or implementation of this Standard. The results of the management review should also be used as appropriate to revise and improve this CTEMS Standard to confirm it is achieving the desired business results.

## **8.0 References**

- 8.1** AIHA "A Strategy for Assessing and Managing Occupational Exposures" – Third Edition.

## **9.0. Appendices**

### **APPENDIX A: BASIC CHARACTERIZATION & QUALITATIVE ASSESSMENT GUIDELINES**

#### **Basic Characterization Information**

A Basic Characterization of the workplace is the process of obtaining information to guide in the establishment of SEG's, determining exposure profiles, prioritizing exposure monitoring, and application of controls.

The facility should gather information on the following areas for use in establishing monitoring goals:

- Operations, processes, and facilities;
- Work force, tasks, and division of labor;
- Chemical, physical, and biological agents in the workplace;
- How and when workers have potential exposure to the environmental agents;
- Employee interviews and unit walkthrough with employees concerning SEG responsibilities;
- Quantities of the environmental agents;
- Chemical and physical properties of the environmental agents;
- Potential health effects of the environmental agents including carcinogenicity ratings by the International Agency for Research of Carcinogenicity (IARC) and occupational exposure limits for these agents;
- Exposure controls present in the workplace, including engineering controls, administrative controls, work practice controls, and personal protective equipment.

#### **Qualitative Exposure Assessment Guidelines**

Listed below are guidelines for the completion of a qualitative Exposure Assessment. The attached example SEG Basic Characterization and Exposure Assessment forms may be used for documentation. This process can assist in identifying and establishing quantitative monitoring exposure goals for the facility. Quantitative Data Ratings results are to be used when available instead of Qualitative Ratings. Qualitative or Quantitative Exposure Ranking Group Category(s) will be based on the Control of exposure Rating (C), Frequency of Exposure Rating (F), and the Health Hazard Rating (HHR) or Quantitative Data Rating; as based in Charts A and B.

#### **1) Identify Hazards**

- a) Obtain a list of the chemicals used and any physical hazards in the area/department being reviewed.
- b) The list should be reviewed by personnel knowledgeable of the operation of the area/department to determine if any revisions are necessary.
- c) Categorize the chemical and physical agents per department or process.

- List each job and all exposure sources within that job. Record this information, along with other pertinent information on the Documentation for Workplace Exposure Assessment Worksheet.
- d) Obtain a Plant Layout
- Identify the location of process equipment, storage vessels, unloading/loading areas and other potential sources of exposures.
  - Use as a reference for reporting exposure data (code each location, reference during monitoring, e.g., area noise monitoring locations)
- e) Obtain a Process Flow Diagram
- Identify progression of the raw material thorough intermediate steps to the final product.
  - Should provide insight as to possible contact points where the employee can be exposed to process chemicals or physical hazards.
- f) Obtain a Process Description
- Use to supplement the process flow diagram.
  - Should provide additional insight into possible contact points where the employee can be exposed to process chemicals or physical hazards.
- g) Obtain department Organizational Charts and Job Descriptions
- Conduct personal interviews with an individual in each Job Title
  - Use the Documentation for Workplace Exposure Assessment in order to obtain and document pertinent information, which will be transferred to the Exposure Assessment Worksheet.
  - When choosing someone to interview, choose someone who is familiar with all aspects of his/her position.

## 2) Prioritizing Hazards

- a) Complete the Exposure Assessment portion of the Exposure Assessment Worksheet for each chemical or physical hazard employees may come into contact with during specific job tasks.
- Determine the Health Hazard Rating by reviewing the MSDS and other pertinent information. The HHR will be determined by using either the HMIS or NFPA rating system for health hazards. For any substance for which OSHA specific standard requires monitoring, score it at a minimum of a 3.
  - Determine how often there is the potential for exposure to substance/agent (Frequency of Exposure Rating). Assign a rating based on the criteria for evaluating the Frequency of Exposure.
  - Determine what controls are in place. Assign a rating based on the criteria for evaluating Control of Exposure Rating.
  - Determine the Qualitative or Quantitative Data Ranking Exposure Group Category (or the potential risk for employees) based on the rating criteria listed in Charts A and B.
  - Determine the Priority Ranking for Exposure Monitoring based on Chart C.

**Control of Exposure Rating**

Code	Control of Exposure Rating (C)
1	Minor Exposure Potential; Operations done in closed system or conducted in a laboratory hood
2	Moderate Exposure Potential; Operations conducted in open systems, usually provided with local exhaust
3	Major Exposure Potential; Operation conducted in open system without local exhaust ventilation or includes activities such as cleaning, maintenance and repair which involve direct, overt potential for exposure

**Frequency of Exposure Rating**

**Quantitative Data Rating**

Code	Frequency of Exposure Rating (F)	Quantitative Data Rating
1	Less than Monthly	≤10% of the OEL at the 95% TL / <85 dBA 8hr or 82.5 dBA 12hr TWA at the 95% TL
2	Monthly	11% to 50% of the OEL at the 95% TL / 85 – 87.5 dBA 8hr or 82.5 – 85 d BA 12hr at the 95% TL
3	Weekly	51% to 100% of the OEL at the 95% TL / 87.5 – 90 dBA 8hr or 85 – 87.5 d BA 12hr at the 95% TL
4	Daily	>OEL at the 95% TL / >90 dBA 8hr or 87.5 dBA 12hr TWA at the 95% TL

**Health Hazards Rating**

Rating	Explanation
4	Materials, which on very short exposure, could cause death or major injury even with prompt medical attention. >110 dBA TWA
3	Materials, which on short exposure, could cause death or major injury even though prompt medical attention is given. >100 dBA TWA
2	Materials, which on intense or continued exposure, could cause temporary incapacitation or possible residual injury unless prompt medical attention is given. >85 dBA TWA
1	Materials, which on exposure, would cause irritation but only minor residual injury, even if given no treatment. <85 dBA TWA

Agents that are classified as carcinogens are given an HMIS or NFPA HHR of 3.

Chart A. Qualitative Data Ranking  
Exposure Group Category

Control of Exposure Rating (C) = 3	Frequency of Exposure Rating (F)			
HMIS/NFPA Health Hazard Rating	4	3	2	1
4	A	A	A	A
3	A	A	A	A
2	A	A	A	A
1	B	B	B	B
0	B	B	C	C
Control of Exposure Rating (C) = 2	Frequency of Exposure Rating (F)			
HMIS/NFPA Health Hazard Rating	4	3	2	1
4	A	A	A	A
3	A	A	A	A
2	A	A	B	B
1	B	B	B	B
0	C	C	C	C
Control of Exposure Rating (C) = 1	Frequency of Exposure Rating (F)			
HMIS/NFPA Health Hazard Rating	4	3	2	1
4	A	A	A	A
3	A	A	A	A
2	B	B	B	B
1	B	B	C	C
0	C	C	C	C

Chart B. Quantitative Data Ranking  
Exposure Group Category

	Quantitative Data Rating 95% Tolerance Level			
HMIS/NFPA Health Hazard Rating	4 >OEL / >90 dBA-8h or 87.5 dBA-12h TWA	3 51% to 100% OEL / 87.5-90 8h or 85-87.5 12h TWA	2 11% to 50% OEL / 85-87.5 8h or 82.5-85 12h TWA	1 ≤10% OEL / <85 8h or 82.5 dBA 12h TWA
4	A	A	A	C
3	A	A	B	C
2	B	B	B	C
1	B	B	C	C
0	C	C	C	C

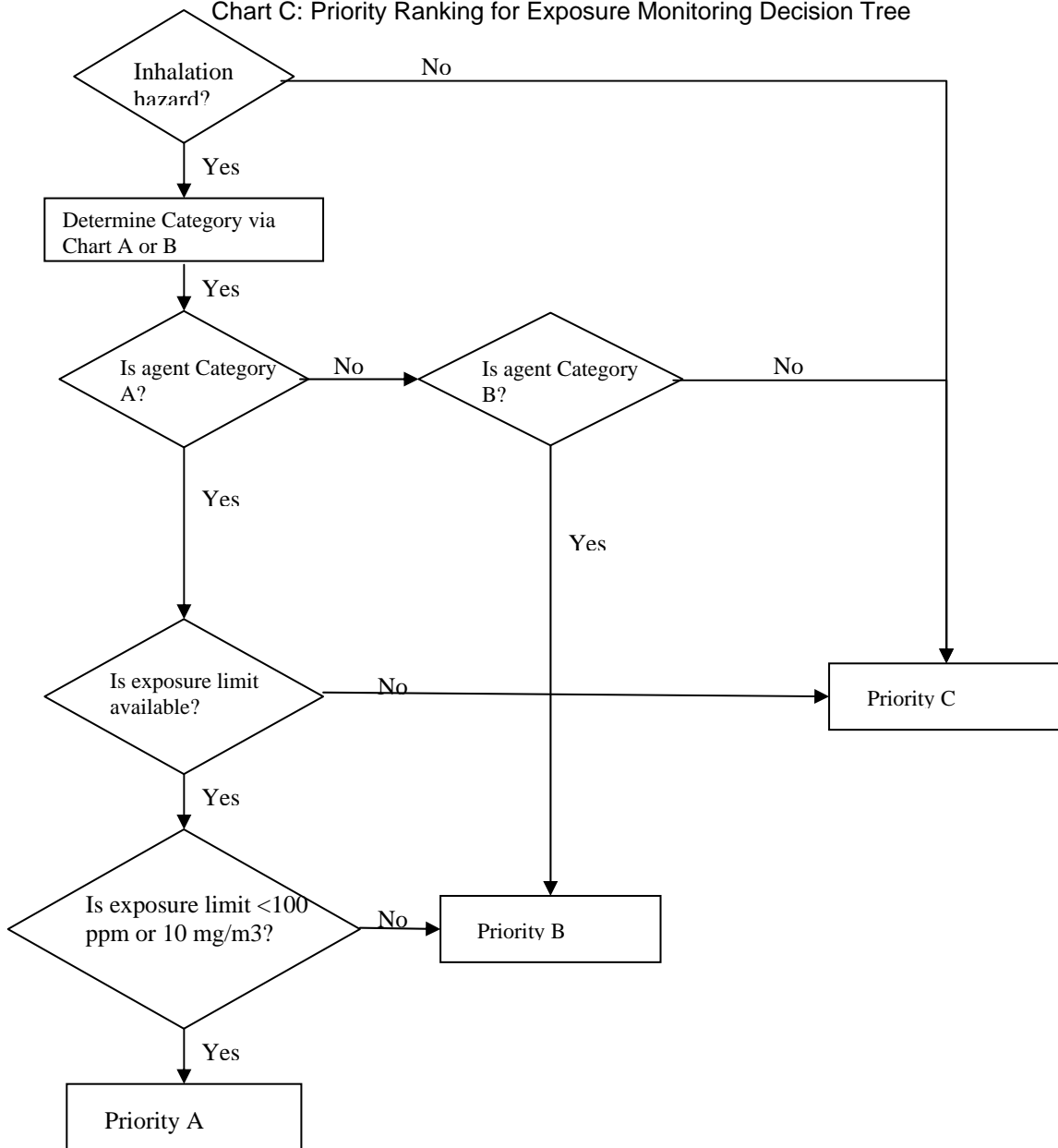
### 3) Determination of Inhalation Hazard and Monitoring Prioritization

The next step in the decision logic (Chart C) is to determine whether or not a chemical represents an inhalation hazard. Physical agent such as noise, ergonomics, heat, radiation or lighting are included if they represent an exposure hazard. Chemical agents associated with an exposure group are evaluated for inhalation hazard based on the environmental and operating conditions associated with a task. The potential for a substance to become airborne as a gas, vapor, fume, mist, or particulate needs to be determined. Inhalation hazards are identified as those chemicals that have vapor pressures greater than 10 mmHg at the point of exposure or agents that are inhalable dust, fumes, or mist. Inhalable particles are those materials that are hazardous when deposited anywhere in the respiratory tract. Inhalable particles have an aerodynamic diameter that is less than 100 microns (as defined by ACGIH). Only agents considered to be an inhalation hazard will be further evaluated for industrial hygiene monitoring.

Monitoring priorities will be assigned based on the potential for an agent to exceed the applicable exposure limits, as listed in Chart C. Chemical agents that do not have published exposure limits are given a "C" priority ranking.

A priority C designation will also be given to agents that are not considered to be inhalation hazards. This does not mean that agents within a priority C are non-hazardous. However, these agents have the lowest priority for monitoring based on a qualitative evaluation following Chart C decision logic.

Chart C: Priority Ranking for Exposure Monitoring Decision Tree



#### 4) Exposure Evaluation

- a) Initially, conduct baseline monitoring for all exposures having a Monitoring Priority Ranking (Chart C) of A. Future baseline monitoring should be scheduled for all exposures having a Priority Ranking of B.
- b) Obtain prior monitoring results from the same or similar processes.
  - Include all previous sampling that is representative of the current exposure (no changes in process since sampling).
- c) Develop an IH Monitoring Plan by Job Classification to complete the Baseline Monitoring.
  - Give preference to the highest ranked exposures from the Workplace Exposure Assessment Worksheet.
  - The number of samples that will need to be collected should be based on the number of employees exposed or variability of the data. Take enough samples to be statistically valid, such as outlined in the NIOSH Manual of Analytical Methods or another statistically valid method.
  - Determine the appropriate method to do the sample collection. The laboratory that will be used for analysis can provide information on the type of equipment and media that will be needed.
  - Obtain the appropriate IH sampling equipment and documentation forms.
  - Conduct exposure monitoring on days/shifts that are representative of the exposures that might be found. If there are certain times of the day that are worse than others, it may be beneficial to break those out as separate exposure events.
  - Conduct further exposure assessments when process changes occur, or new health information, or employee complaints/concerns.
  - Full shift samples should be collected for exposure groups as noted in the monitoring strategy. According to the OSHA Industrial Hygiene Field Operation's manual, a full shift sample should have a minimum total sample time of 7 hours or 80% of the shift (10 hours out of a 12 hour shift), including the potentially highest exposure activities. Time weighted average (TWA) results should be compared to the appropriate standard.
  - Extended shifts may require adjustment of the exposure limit. There is an OSHA letter of interpretation (dated March 23, 1988) that states that the benzene standard does not include a provision for reduction of the benzene standard for extended shifts. OSHA requires monitoring of the worst eight hours of exposure for an individual working an extended shift. There is also instructions in the OSHA field manual that includes a calculation for time-weighting exposure limits.

## APPENDIX B: AIHA LOGNORMAL STATISTICAL WORKPLACE EXPOSURE DATA EVALUATION

LOGNORMAL is a statistical methodology for the analysis of SEG exposure data groups, set-up in an Excel Spreadsheet. This program will be the primary tool in the interpretation of the data for characterizing SEG exposures. The basic features of this program include the following (See following example):

- Give the measure of fit to the distribution.
- Maintain employee risk of overexposure at less than 5% above the OEL.
- Provide cumulative probability plots (normal/lognormal).

The program uses inferential statistics to estimate what the true exposure level is since it is economically unfeasible to collect all data to determine the true exposure level. The basis of the procedure is lognormal probability plotting. The program calculates both lognormal and normal statistics. Lognormal distributions (Yellow) are typically used for air monitoring and normal distributions (Green) are used for noise (dBA). From this lognormal plot, the following parameters are estimated:

- The geometric mean;
- The geometric standard deviation;
- 95% TL
- Percent above OEL (%>OEL)

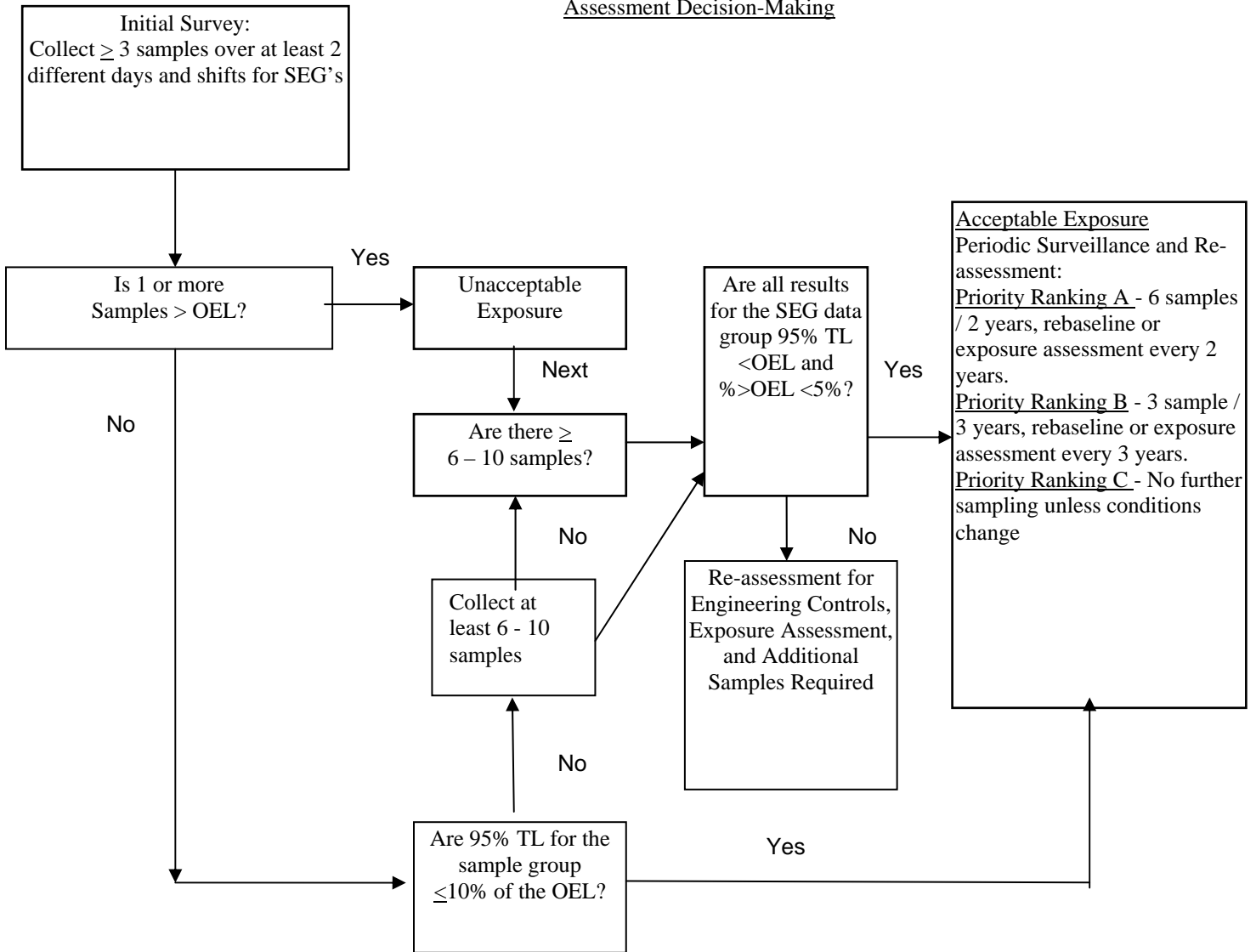
From the normal plot the following parameters are estimated:

- The arithmetic mean;
- The arithmetic standard deviation;
- 95% TL
- Percent above OEL (%>OEL)

After data analysis the frequency of monitoring and monitoring priority will be determined following Figure 1 – General Algorithm for Exposure Assessment Decision-Making.

**FIGURE 1:**

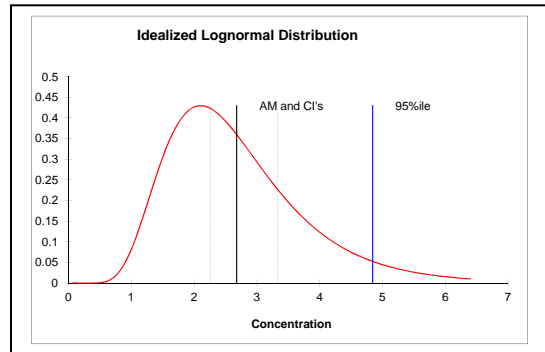
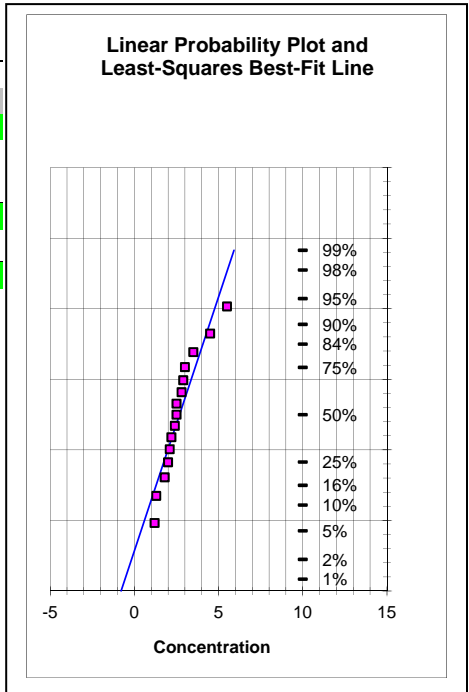
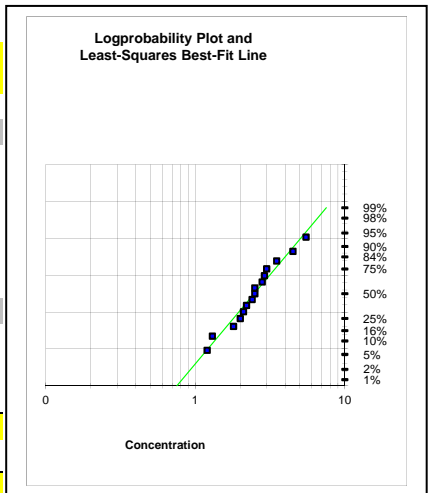
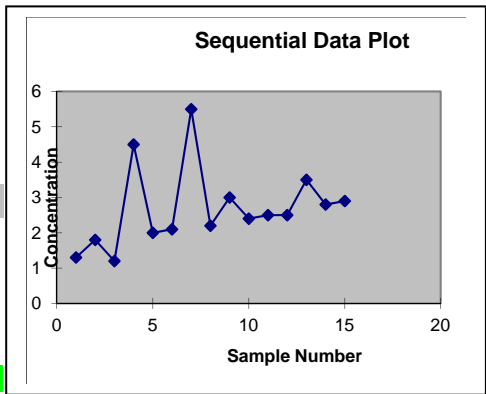
General Algorithm for TWA Exposure  
 Assessment Decision-Making



# Industrial Hygiene Statistics

Data Description:

OEL		DESCRIPTIVE STATISTICS	
5		Number of samples (n)	15
		Maximum (max)	5.5
		Minimum (min)	1.2
		Range	4.3
		Percent above OEL (%>OEL)	6.667
		Mean	2.680
		Median	2.500
		Standard deviation (s)	1.138
		Mean of logtransformed data (LN)	0.908
		Std. deviation of logtransformed data (LN)	0.407
		Geometric mean (GM)	2.479
		Geometric standard deviation (GSD)	1.502
		<b>TEST FOR DISTRIBUTION FIT</b>	
		W-test of logtransformed data (LN)	0.974
		Lognormal (a = 0.05)?	Yes
		W-test of data	0.904
		Normal (a = 0.05)?	Yes
		<b>LOGNORMAL PARAMETRIC STATISTICS</b>	
		Estimated Arithmetic Mean - MVUE	2.677
		LCL <sub>1,95%</sub> - Land's "Exact"	2.257
		UCL <sub>1,95%</sub> - Land's "Exact"	3.327
		<b>95% Tolerance Level</b>	<b>4.843</b>
		UTL <sub>95%,95%</sub>	7.046
		<b>Percent above OEL (%&gt;OEL)</b>	<b>4.241</b>
		LCL <sub>1,95%</sub> %>OEL	0.855
		UCL <sub>1,95%</sub> %>OEL	15.271
		<b>NORMAL PARAMETRIC STATISTICS</b>	
		Mean	2.680
		LCL <sub>1,95%</sub> - t statistics	2.162
		UCL <sub>1,95%</sub> - t statistics	3.198
		<b>95% Tolerance Level</b>	<b>4.553</b>
		UTL <sub>95%,95%</sub>	5.60
		<b>Percent above OEL (%&gt;OEL)</b>	<b>2.078</b>



SEG BASIC CHARACTERIZATION AND EXPOSURE ASSESSMENT			
<p>Note: The goal is to identify workplace hazards, and perform an exposure assessment to determine if workplace monitoring should be conducted. If several job classifications have potentially the same exposure to the same agents, then list all job classifications for the SEG Name on the same form.</p>			
Exposure Assessment Ratings			
Health Hazard Rating (Chemical Agents)	Health Hazard Rating (Physical Agents- Noise)	Health Hazard Rating (Physical Agents- Heat-Dry Bulb)	
(4) Materials, which on very short exposure, could cause death or major injury even with prompt medical attention. (3) Materials, which on short exposure, could cause death or major injury even though prompt medical attention is given. Carcinogens are given a HHR of 3 (2) Materials, which on intense or continued exposure, could cause temporary incapacitation or possible residual injury unless prompt medical attention is given. (1) Materials, which on exposure, would cause irritation but only minor residual injury, even if given no treatment	(4) >110 dBA (3) >100 dBA (2) >85 dBA (1) <85 dBA	(4) Work area > 90° F. (3) Work area 80-90° F. (2) Work area 75-80° F. (1) Work area <75	
Control of Exposure Rating (Qualitative Rating)	Frequency of Exposure Rating (Qualitative Rating)	Quantitative Data Rating 95% Tolerance Level	
(3) Major Exposure Potential; Operation conducted in open system without local exhaust ventilation or includes activities such as cleaning, maintenance and repair which involve direct, overt potential for exposure (2) Moderate Exposure Potential; Operations conducted in open systems, usually provided with local exhaust. (1) Minor Exposure Potential; Operations done in closed system or conducted in a laboratory hood	(4) Daily (3) Weekly (2) Monthly (1) Less than Monthly	(4) >OEL / >90 dBA-8h or 87.5 dBA-12h TWA (3) 51% to 100% OEL / 87.5-90 8h or 85-87.5 12h (2) 11% to 50% OEL / 85-87.5 8h or 82.5-85 12h (1) ≤10% OEL / <85 dBA 8h or 82.5 dBA 12h TWA	
Department Information			
Facility			
Unit/Job Title		Area:	
SEG Name		No. of Employees	
SEG Description			
Date:		Completed by:	





AIR MONITORING DATA INFORMATION SHEET					
Plant / Area				Date	
Employee Name				Employee #	
Job Classification				Department/shift	
List SEG Name					
Denote whether Routine TWA Monitoring or Task Specific Monitoring					
Routine TWA Monitoring _____			Task Specific Monitoring _____		
List SEG Name if routine			List GROUP/TASK if task specific		
SAMPLING MEDIA/ANALYSIS INFORMATION					
Sampling Media				Assigned Number	
Analysis type				NIOSH method #	
ANALYTES		Lab Results	Units		
CALIBRATION and SAMPLING DATA					
Calibration Method/Instrument				Date	
Calibrator Serial #					
Starting Flow rate (l/min)				AVG (l/min)	
End Flow Rate (l/min)				AVG (l/min)	
Average Flow rate for sampling period (l/min)					
Start Time		End time		Total sampling time (mins)	
Volume Collected (liters)					
WEATHER INFORMATION					
Wind Direction				Wind velocity (mph)	
Temperature (F)				Humidity	
JOB TASK INFORMATION					
Job Task Description				Duration (mins)	

NOISE MONITORING DATA INFORMATION SHEET				
Plant / Area			Date	
Employee Name			Employee #	
Job Classification			Department/shift	
List SEG Name				
DOSIMETER CALIBRATION and SAMPLING DATA				
Dosimeter Type			Dosimeter Serial #	
Calibration Method/Instrument			Date	
Calibrator Serial #				
Calibrator readings (dBA)				Sound Level Meter Calibration
<i>Pre-calibration</i>				
<i>Post-calibration</i>				
Start Time		End time		Total sampling time (mins)
Dosimeter logging rate			Dosimeter Doubling rate	
JOB TASK INFORMATION				
Job Task Description				Duration (mins)
DOSIMETER RESULTS				
EXPOSURE TIME (mins)			8-hr TWA (80 dBA threshold)	
L <sub>avg</sub> (80 dBA threshold)			Fast L <sub>max</sub> (1/16 sec)	
Dose (80 dBA %)			Peak	
L <sub>avg</sub> (90 dBA threshold)				
Dose (90 dBA %)				
SOUND LEVEL METER SURVEY RESULTS				
Readings in dBA	Location taken		Time taken	Comments or Octave band

**Revision Log**

<b>Revision Date</b>	<b>Revision No.</b>	<b>Revision Summary</b>
		Initial Version