
HEALTH AND SAFETY PROCEDURE 409 – Air Monitoring and Regulated Areas Program

1.0 PURPOSE

Westlake, Plaquemine Operations (Westlake) is committed to providing a safe, healthy, workplace free from recognized hazards.

Westlake takes extensive precautions to prevent airborne chemical releases to the workplace and the environment. Employees receive comprehensive training to enhance job safety. Additionally, various work permit programs have been implemented to anticipate, recognize, evaluate, and control potential hazards during work activities. However, the potential for accidental release and contact with airborne chemicals cannot be completely eliminated.

Therefore, it is Westlake's policy to routinely monitor airborne chemical concentrations in the workplace. Westlake is committed to minimize airborne chemical concentrations by accepted engineering control practices. When effective engineering controls are not feasible, or while they are being implemented, appropriate respiratory protection will be worn by all employees whose duties require them to work in areas where airborne chemical concentrations may approach or exceed appropriate occupational exposure limits.

2.0 SCOPE

This program applies to all Westlake employees.

3.0 DEFINITIONS

- 3.1 **Accuracy** - The measure of the correctness of data, as given by the difference between the measured value and the true value.
- 3.2 **Action Level** - Approximately 50% of the permissible exposure level for select chemicals.
- 3.3 **Agent** - or Environmental Agent - A chemical, radiological, mineralogical, physical, or biological entity which has the potential to cause deleterious effects.
- 3.4 **Analytical Method(s)** - Chemical analyses and techniques used to quantify an agent collected on a sampling media.
- 3.5 **Area Sample** - An air sample collected at a fixed point in the workplace. Area samples measure workplace airborne chemical concentrations, which may not correlate with results from personal air samples.
- 3.6 **Authorized Person** - An individual who has completed all Westlake

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requirements for entry into a regulated area.

- 3.7 **Breathing Zone** - An area of ambient air in the immediate vicinity of a worker's head from which air is breathed. Personal breathing zone measurements of airborne chemical concentrations are the preferred method for obtaining air samples for comparison with Westlake and the Occupational Safety and Health Administration (OSHA) airborne chemical standards.
- 3.8 **Compliance Program** - An OSHA-mandated written program to reduce airborne regulated chemical concentrations.
- 3.9 **Concentration** - The airborne concentration of the chemical. The concentration for dusts and mists is usually expressed as milligrams per cubic meter (mg/m³). Gases and vapors are typically expressed as parts per million (ppm) while fibers are expressed as fibers per cubic centimeter (f/cc) of air.
- 3.10 **Confidence Limit** - The statistical measurement of the upper and lower boundaries around a measured value.
- 3.11 **Continuous Air Monitors (CAMs)** - Direct reading systems used to monitor airborne chemical concentrations continuously with some preset averaging time. CAMs are frequently linked to alarm systems to provide a warning if airborne chemical concentrations begin to approach a preset level.
- 3.12 **Control Strategies** - Tools to reduce and control workplace airborne chemical concentrations. Examples include engineering controls (ventilation, enclosure), personal protective equipment (respirators), and changes in work practices.
- 3.13 **Employee Workplace Monitoring Record** - Documents containing any of the following types of information:
 - 3.13.1 Workplace monitoring or measure of potentially toxic substances or harmful physical agents including personal, area, grab, wipe, or other forms of sampling;
 - 3.13.2 Biological monitoring results which directly determine the absorption of a potentially toxic substance or harmful physical agent by body systems (i.e., chemical concentration in blood, urine, breath, hair, fingernails); and
 - 3.13.3 Safety Data Sheets indicating the material that may pose a

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potential hazard to human health.

- 3.13.4 Related collection and analytical methodologies, calculations, and other background information relevant to interpretation of monitoring results;
- 3.13.5 Safety Data Sheets indicating the material that may pose a potential hazard to human health.
- 3.14 **Excursion Limit** - The maximum allowable airborne asbestos fiber level measured over a 30-minute period (1.0 f/cc).
- 3.15 **Health Effects Data** - Toxicological, epidemiological, and clinical data that demonstrates potential harmful health effects from contact with environmental agents.
- 3.16 **Homogeneous Exposure Group** - A group of employees who experience airborne chemical concentrations similar enough that monitoring of any worker within the group provides sufficient data, which is useful for predicting airborne chemical concentrations for the remaining workers.
- 3.17 **Limit of Detection** - The smallest concentration or amount of a substance that can be differentiated from background by a given analytical method.
- 3.18 **Media** - The material on which airborne chemicals are captured for analysis. Media includes filters, charcoal, silica gel, chromasorb, etc.
- 3.19 **Monitoring** - The act of collecting a sample for analysis to determine the concentration of an environmental agent.
- 3.20 **Passive Dosimeter** - A sampling device which relies on the diffusion of air and chemicals onto a collection media. Passive dosimeters do not rely on pumps to draw an air sample through the media.
- 3.21 **Permissible Exposure Limit (PEL)** - The OSHA-established time-weighted average concentration or ceiling concentration of an airborne chemical contaminant that will not be exceeded.

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- 3.22 **Personal Monitoring** - A sample collected from an individual's breathing zone. Personal samples may be collected using personal air sampling pumps, passive dosimeters, or direct reading methods.
- 3.23 **Precision** - The measure of the reproducibility of a measured value under a given set of conditions.
- 3.24 **Quality Assurance** - A system of activities to provide the user of that data assurance that the data meets defined standards of quality.
- 3.25 **Sampling Frequency** - The time interval between the collection of successive samples.
- 3.26 **Short Term Exposure Limit (STEL)** - The maximum allowable airborne concentration of a chemical measured over a 15-minute average.
- 3.27 **Standard Deviation** - A statistical measurement of the positive square root of the variance of a distribution.
- 3.28 **Surveillance** - Ongoing scrutiny to detect changes in the distribution or trends of airborne chemical concentrations to initiate more focused monitoring or control measures.
- 3.29 **Threshold Limit Value (TLV)** - The American Conference of Governmental Industrial Hygienist's (ACGIH's) establishes time-weighted average airborne chemical concentration in which most people can work consistently for eight hours a day, day after day, with no harmful effects.
- 3.30 **Time-Weighted Average (TWA)** - Employee's average airborne chemical exposure generally measured over an eight-hour period.

4.0 AIR MONITORING PROGRAM

- 4.1 **Periodic workplace surveillance and monitoring is conducted to:**
 - 4.1.1 Assess potential health risks;
 - 4.1.2 Identify unacceptable airborne chemical concentrations,

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conditions, or work practices;

- 4.1.3 Identify sources and work practices that pose the greatest exposure potential;
 - 4.1.4 Evaluate engineering control effectiveness;
 - 4.1.5 Establish and document a historical record; and
 - 4.1.6 Ensure and demonstrate compliance with appropriate OSHA standards, as well as Westlake policies and procedures.
- 4.2 **To select an occupational exposure limit for an unregulated chemical, H&S will compare:**
- 4.2.1 OSHA PEL;
 - 4.2.2 ACGIH TLV;
 - 4.2.3 NIOSH REL;
 - 4.2.4 AIHA WEEL AND
 - 4.2.5 Accepted industry consensus standards
- 4.3 **Sampling Plan**
- 4.3.1 The number of samples collected for a particular chemical will be determined by the professional judgment of an industrial hygienist. Factors to be considered include:
 - 4.3.1.1 The Toxicity of the material;
 - 4.3.1.2 The number of individuals potentially exposed;
 - 4.3.1.3 Employee mobility;
 - 4.3.1.4 The duration of chemical usage; and
 - 4.3.1.5 Previous monitoring results.
 - 4.3.2 Personal breathing zone sampling is the preferred method for determining airborne chemical concentrations in the workplace.

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- 4.3.3 Area sampling may be used to evaluate background chemical concentrations.
- 4.3.4 Samples will be collected for a sufficient duration to get an accurate, representative, 8-hour time-weighted average airborne chemical concentration. Whenever possible, 8-hour samples will be collected.
- 4.3.5 Samples to determine STEL airborne chemical concentrations will be collected over a 15-minute period unless otherwise stipulated.
- 4.3.6 Excursion limit samples for asbestos monitoring will be collected over a 30-minute period.
- 4.3.7 The frequency of monitoring will be determined by:
 - 4.3.7.1 Historical records;
 - 4.3.7.2 Specific OSHA standards; and
 - 4.3.7.3 Case-by-case determinations based on interim action program and compliance program requirements
- 4.4 **Sampling Methods:**
 - 4.4.1 NIOSH or OSHA-recommended sampling methods will be used when available.
 - 4.4.2 Air sampling pumps or passive dosimeters may be used for sample collection as appropriate.
 - 4.4.3 Factors to be considered when developing a sampling methodology include:
 - 4.4.3.1 Collection media;
 - 4.4.3.2 Sample flowrate;
 - 4.4.3.3 Minimum sample volume;
 - 4.4.3.4 Maximum sample volume (if applicable);

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4.4.3.5 Potential interferences;

4.4.3.6 Sample storage requirements; and

4.4.3.7 Analytical detection limit.

4.4.3.8 When appropriate, blanks will represent 10% of the total number of samples. Blind blanks or spiked samples may also be used as a further quality assurance method.

4.5 Sampling Device Calibration:

4.5.1 All monitoring devices requiring calibration will be calibrated before and after sampling.

4.5.2 All calibration equipment will be calibrated annually using methods consistent with manufacturer specifications.

4.5.3 Calibrations will be traceable to National Institute for Science and Technology (NIST) standards (formally National Bureau of Standards).

4.6 Laboratory Analysis:

4.6.1 Sample analysis will be performed by a laboratory accredited by the American Industrial Hygiene Association Committee on Laboratory Accreditation.

4.6.2 When available, analytical methods selected should be the most recent NIOSH or OSHA-recommended method.

4.7 Sample Documentation:

4.7.1 A Sampling Field Data Sheet will be completed for each sample collected. (An example of a typical data sheet is located in Appendix A.)

4.7.2 The individual conducting monitoring will ensure that the following information is recorded on the sampling field data sheet or in the current industrial hygiene database:

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- 4.7.2.1 Date;
- 4.7.2.2 Sample number;
- 4.7.2.3 Type of sample
- 4.7.2.4 Chemical sampled;
- 4.7.2.5 Sampling method
- 4.7.2.6 Sampling media lot number;
- 4.7.2.7 Sampling equipment serial number;
- 4.7.2.8 Calibration device serial number;
- 4.7.2.9 Location of sampler;
- 4.7.2.10 Conditions, notes specific to activities during sampling;
- 4.7.2.11 Employee name and job;
- 4.7.2.12 Employee social security number (optional);
- 4.7.2.13 Any personal protective equipment used;
- 4.7.2.14 Engineering controls utilized;
- 4.7.2.15 Weather Conditions;
- 4.7.2.16 Sample start and stop times;
- 4.7.2.17 Initial and final sample flowrate;
- 4.7.2.18 Average flowrate;
- 4.7.2.19 Total sample volume;
- 4.7.2.20 Total sampling time; and
- 4.7.2.21 "Sampled by" signature initials and date.

Employees will be notified of sampling results within the time period specified by applicable OSHA standards. (See HSP 408- Workplace

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Monitoring Records and Medical Records. The notification form may be generated within the Westlake IH Database or by utilizing Appendix B - Employee Notification of Personal Sampling Results.

- 4.7.3 The sampling field data sheet form and any exposure notification forms should be secured in a safe place. All original sampling field data sheets will be maintained for at least 30 years in accordance with the requirements of HSP 408- Employee Workplace Monitoring and Medical Records. These records may be maintained electronically in the industrial hygiene database or in another secure electronic location. They may also be maintained as a hard copy in the HSE Library.

4.8 Sample Chain of Custody:

- 4.8.1 A Sample Chain of Custody Form will be completed for each group of samples submitted to a laboratory. The Chain of Custody Form may be generated within the IH Database or via EHSS-13-FRM-103.
- 4.8.2 Chain of custody procedures are used to ensure sample validity and document that each individual receiving the samples has maintained the samples in a secure manner.
- 4.8.3 The Chain of Custody Form will include the following type of information:
 - 4.8.3.1 Sample number;
 - 4.8.3.2 Sample media description;
 - 4.8.3.3 Type of analysis for that particular sample;
 - 4.8.3.4 Signatures of submitters and receiver of sample(s)
 - 4.8.3.5 Chain of Custody Forms will be maintained in accordance with HSP 408- Employee Workplace Monitoring and Medical Records requirements.

4.9 Data Analysis and Interpretation:

- 4.9.1 Sample results should be reviewed as soon as possible once they

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have been received from the laboratory.

4.9.2 If applicable, statistical analysis techniques will be applied to sample results to correct for potential errors in sampling and analysis.

4.9.3 Statistical techniques utilized will be those recommended by NIOSH and used by OSHA compliance personnel. These include the use of:

4.9.3.1 Coefficient of variation (sampling and analysis);

4.9.3.2 Calculation of standardized concentration; and

4.9.3.3 Calculation of one-sided upper and lower confidence limits.

4.9.4 The first calculation performed is the determination of coefficient of variation (CV). The CV is also known as the relative standard deviation of the randomly distributed potential errors occurring in sampling and analytical procedures.

4.9.5 Each NIOSH and OSHA sampling/analytical procedure has a published coefficient of variation.

4.9.6 Total coefficient of variation may be calculated using the following formula:

$$CV_T = \sqrt{(CV_P)^2 + (CV_A)^2}$$

Where: CV_P = Pump or sampling technique CV.
 CV_A = Analytical CV.

4.9.7 The standardized concentration is determined by:

$$X = \frac{x}{OEL}$$

Where: X = standardized concentration
 x = reported sample concentration
OEL = Occupational Exposure Limit for chemical.

Example: If the laboratory reported a vinyl chloride time-weighted average concentration of .35 parts per million (ppm) and a total

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coefficient of variation of 0.1, the following calculation would be used:

$$\text{UCL} = 0.35 \text{ ppm} + (1.645)(0.1) = 0.51 \text{ ppm}$$

$$\chi = \frac{0.35}{1 \text{ ppm}} = 0.35$$

4.9.8 Following a calculation of the standardized concentration, upper and lower confidence limits (UCL, LCL) will be calculated at a 95% confidence level.

4.9.9 The upper confidence limit is calculated as follows:

$$\text{UCL}(95\%) = \chi + (1.645)(\text{CVT})$$

Where: χ = the standardized concentration.

4.9.10 The lower confidence limit is then calculated using the following:

$$\text{LCL}(95\%) = \chi - (1.645)(\text{CVT})$$

Using the same example the LCL would be calculated as follows:

$$\text{LCL} = 95\% (= 0.35 \text{ ppm} - (1.645)(0.1) = 0.18 \text{ ppm}.$$

Where the laboratory reported a concentration of 0.35 ppm the true concentration (at 95% confidence) is somewhere in the range of 0.18 - 0.51 ppm.

4.9.11 If applicable, both upper and lower confidence limits will be calculated for each sample. The true sample concentration will then fall somewhere between the upper and lower confidence interval.

4.9.12 The UCL and LCL are then compared to the appropriate standard. If the UCL is less than the standard or action level, then the sample result is below the PEL or action level. If the LCL is above the standard or action level, then sample results are clearly above the appropriate standard. If the LCL or UCL are near the standard, then results may be above or below the standard.

4.10 Recommendations and Reporting:

4.10.1 Any sample result found to represent an unacceptable airborne

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concentration, where appropriate controls were not in place, will require follow-up action to:

4.10.1.1 Determine the cause for the high concentration; and

4.10.1.2 Develop a control plan to reduce concentrations.

4.10.2 An Overexposure Investigation Form will be completed for each sample result(s) that exceeds an acceptable exposure limit for the particular analyte where appropriate controls were not in place. An IH Overexposure Investigation Form is found in Appendix C

4.10.3 Controls will be evaluated and implemented to reduce airborne concentrations using the following prioritization scheme:

4.10.3.1 Engineering controls (ventilation, isolation);

4.10.3.2 Administrative controls;

4.10.3.3 Personal protective equipment;

5.0 PROCEDURES

Employee exposure monitoring will be conducted when there are changes in the process that may significantly change the employee's exposure. Or as mandated by chemical specific OSHA regulations.

6.0 TRAINING

6.1 Employees will receive information concerning air monitoring policies and procedures and Regulated Areas during their annual Access to Employee Monitoring and Medical Records training

6.2 Employees will be informed of:

6.2.1 The reasons for a routine Air Monitoring Program;

6.2.2 Their rights and responsibilities;

6.2.3 The existence, location, and availability of workplace monitoring records;

7.0 RECORDS

Records will be maintained and kept for the time specified in this program.

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8.0 AUDITS

Will be conducted according to the Westlake audit schedule.

9.0 REFERENCES

- 9.1 National Institute for Occupational Safety and Health (NIOSH), (1977). "Occupational Exposure Sampling Strategy Manual," Leidel, N.A., et al, Publication No. 77-173, Cincinnati, OH.
- 9.2 National Institute for Occupational Safety and Health (NIOSH), (1973). "The Industrial Environment - Its Evaluation and Control," Publication No. 017-001-00396-4, Cincinnati, OH.
- 9.3 Occupational Safety and Health Administration's 29 CFR 1910.1020 (2006). "Access to Employee Exposure and Medical Records."
- 9.4 **Occupational Safety and Health Administration's 29 CFR 1910.1001 (2006). "Asbestos." Occupational Safety and Health Administration's 29 CFR 1910.17 (1980). "Vinyl Chloride."**
- 9.5 Occupational Safety and Health Administration's 29 CFR 1910.1027 (2006). "Cadmium."
- 9.6 Occupational Safety and Health Administration's 29 CFR 1910.1028 (2006). "Benzene." Occupational Safety and Health Administration's 29 CFR 1910.1052 (2006). "Methylene Chloride."
- 9.7 Patty's Industrial Hygiene and Toxicology, 4th edition. Edited by George and Florence Clayton, 1991. Published by Wylie Interscience.

10.0 APPENDICES

- 10.1 Appendix A – Industrial Hygiene Sampling Field Data Sheet.
- 10.2 Appendix B – Employee Notification of Personal Sampling Results
- 10.3 Appendix C – Overexposure Investigation Form



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Revision History

Rev	Changes	Approved	Date
9	Revised Westlake Branding. Review Cycle. Added revision history.	H. Garner	3/7/2023

Appendix A – Industrial Hygiene Field Data Sheet



Industrial Hygiene Field Data Sheet

Employee Name:	Survey Name:	Sample Number:
IH Job Task:	Survey ID #:	Laboratory:
		Analytics

Limit Type:		Sampling Method:		
☐ Bulk ☐ Ceiling ☐ EX30 ☐ Grab ☐ Part. Per. ☐ STEL ☐ TWA(8) ☐ Wipe				
Media:	Lot Number:	Start Time:	Stop Time:	Duration (mins.):
Sampling Equipment Identification:		Pre-Cal:	Post-Cal:	Avg. Flow Rate (LPM):
Manufacturer				
: Model:		Calibration Equipment:		Volume (L):
Serial #:				

Observation Notes:					
Non-Standard PPE Worn:			Analytes:		
Weather:					
Time:	Temperature:	Pressure:	Humidity:	Wind Speed/Dir:	Conditions:
:	°F	in Hg	%	mph from	
Signature: _____ Date: _____					

Appendix B – Employee Notification of Personal Sampling Results



EMPLOYEE NOTIFICATION OF PERSONAL SAMPLING RESULTS

Employee Name:		SSN/ID:	
Job Title/SEG:		Area:	
Date of Monitoring		Date Results Received:	

In accordance with company policy, you are notified of the following industrial hygiene sampling results. *Note: The results below may not reflect your actual personal exposure as it depends on a number of factors including the proper use of PPE. You should talk with your IH/H&S representative if you have questions regarding your sample results.*

Type of Monitoring

☐ 8-hr TWA (Full Shift) ☐ STEL (Short Term Exposure Limit)

Sample No.	Date Sampled	Sample Duration (mins)	Chemical Sampled	Exposure Limit*	Reference	Results (ppm)

*The occupational exposure limit(s) represent the level under which it is believed that nearly all workers may be repeatedly exposed, day after day, over a working lifetime without adverse health effects.

The following controls were in place (Please list all PPE worn):

☐ This sample resulted in an overexposure according to the established exposure limits (Internal PEL, OSHA-PEL, ACGIH-TLV, others)

Management Actions

- | | |
|---|---|
| ☐ None Required | ☐ Respiratory Protection |
| ☐ Process Controls | ☐ Hearing Protection Devices |
| ☐ Ventilation Controls | ☐ Administrative Controls |
| ☐ Other Engineering Controls | ☐ Other- _____ |

Comments

Employee Acknowledgement

I certify that I have read and understand the information provided to me.

Employee Signature

Date

Appendix C – IH Overexposure Investigation Form



IH OVEREXPOSURE INVESTIGATION FORM

General Information:				
Employee Name:		Job Title		Sample Date
Chemical Agent(s)	Sample Result(s)		Exposure Limit(s)	
		ppm		ppm
Additional Information:				
What was the probable source of the exposure? (if known)				
What work activities could have contributed to the exposure?				
Was personal protective equipment used during the work activities in question?				
What respiratory protective equipment was worn? (if applicable)				
The following are needed to prevent similar exposures in the future (if applicable):				
Equipment changes or modifications:				
Procedure or work practice changes:				
Changes in employee behavior:				
Review Signatures				
Employee:			Date:	
Immediate Supervisor:			Date:	
Department Manager:			Date:	
IH/Safety Representative:			Date:	