

	<b>INDUSTRIAL HYGIENE PROGRAM</b> ALL-HSE-PGM-155	<b>Retention Code:</b> CG01 - CA
		<b>Revised:</b> March 2015
<b>Owner:</b> Technical Safety	<b>Approved By:</b> Manager, HSE Performance Assurance	<b>Review Frequency:</b> Five years or less
<i>This document contains proprietary information belonging to ConocoPhillips Canada. It is intended to govern activities of ConocoPhillips Canada employees and contractors who perform work at ConocoPhillips Canada worksites. Its most current version may only be relied upon by those parties who receive a copy provided by ConocoPhillips Canada directly.</i>		

## Table of Contents

	<b>Page</b>
<b>1.0 Purpose</b> .....	<b>2</b>
<b>2.0 Hazards to Mitigate</b> .....	<b>2</b>
<b>3.0 Procedure-Specific Roles and Responsibilities</b> .....	<b>2</b>
3.1. Supervisors .....	2
3.2. HSE Specialist.....	3
3.3. Workers .....	3
3.4. HSE Manager, Technical Safety .....	3
3.5. Program Administrator – Senior Industrial Hygienist .....	3
<b>4.0 Procedure</b> .....	<b>5</b>
4.1. Industrial Hygiene Surveys .....	5
4.2. Exposure Monitoring Strategy.....	5
4.3. Exposure Monitoring Results .....	6
4.4. Occupational Exposure Limits .....	6
4.5. Control Measures .....	6
<b>5.0 References</b> .....	<b>7</b>
<b>6.0 Document Retention</b> .....	<b>7</b>
<b>Appendix A – CPC Industrial Hygiene Process Flow Diagram</b> .....	<b>8</b>
<b>Appendix B – Acronyms</b> .....	<b>9</b>
<b>Appendix C – Definitions</b> .....	<b>10</b>
<b>Appendix D – Revision Record</b> .....	<b>11</b>

### 1.0 Purpose

The purpose of this program is to ensure potential exposures to environmental stressors, including chemical, biological, radiological and physical stressors are evaluated and controlled to eliminate or minimize the risk of occupational injury or illness to employees and contractors.

This Industrial Hygiene (IH) Program applies to all CPC operations.

### 2.0 Hazards to Mitigate

Hazards include, but are not limited to, the following:

<b>Chemical Hazards</b> Asbestos Benzene, Toluene, Ethyl benzene, Xylene (BTEX) Carbon Monoxide (CO) Hydrogen Sulfide (H <sub>2</sub> S) Inert gases – Nitrogen, Argon, Carbon Dioxide Indoor Air Quality Refractory Ceramic Fiber Silica – Crystalline Sulfur Dioxide (SO <sub>2</sub> )	<b>Biological hazards</b> Mold Hantavirus Blood-borne pathogens
	<b>Physical Hazards</b> Temperature extremes Noise Ergonomics
	<b>Radiation Hazards</b> Naturally occurring radioactive material (NORM) Nuclear gauge devices

### 3.0 Procedure-Specific Roles and Responsibilities

#### 3.1. Supervisors

- Plan in advance for exposures that could occur during routine and non-routine tasks.
- Include a line item in turn-around budgets under HSE for industrial hygiene monitoring during turn-around activities.
- Coordinate with the Senior Industrial Hygienist during turn-around planning to identify any requirements for IH support, and management of exposures to harmful materials and conditions.
- Notify the Senior Industrial Hygienist regarding potential exposures and employee complaints.
- Discuss any exposure in excess of accepted limits with impacted workers.
- Participate in corrective action planning meetings to agree on recommended action items arising from exposure monitoring data.
- Implement, support and enforce the Corporate Industrial Hygiene and Occupational Medicine Standard.

### 3.2. HSE Specialist

- Support the implementation of the Industrial Hygiene program, including respiratory protection, hearing conservation, and management of hazardous products such as asbestos, benzene, hydrogen sulphide and other harmful substances.
- Notify the Senior Industrial Hygienist of any employee concerns and/or exposure potentials that have been identified in their areas.
- Notify the Senior Industrial Hygienist when a process change, equipment change or procedure change occurs in their area that may require new monitoring data and the characterization of employee exposure under the new process.
- Participate in corrective action planning meetings to agree on recommended action items arising from exposure monitoring data.

### 3.3. Workers

- Participate in industrial hygiene sampling or surveys when requested.
- Perform job duties in a normal and routine manner when requested to wear an industrial hygiene monitoring device.
- Only remove an industrial hygiene monitoring device if it has been coordinated with the person performing the monitoring.
- Use all controls methods and/or equipment provided (e.g. personal alarms, ventilation) to prevent exposures.
- Take no action that would cause an inaccurate reading on the industrial hygiene monitoring device and advising HSE personnel of any unusual circumstances or problems that may affect the instrument readings or media analysis.
- Report any change in the work environment that could adversely impact worker health or safety.

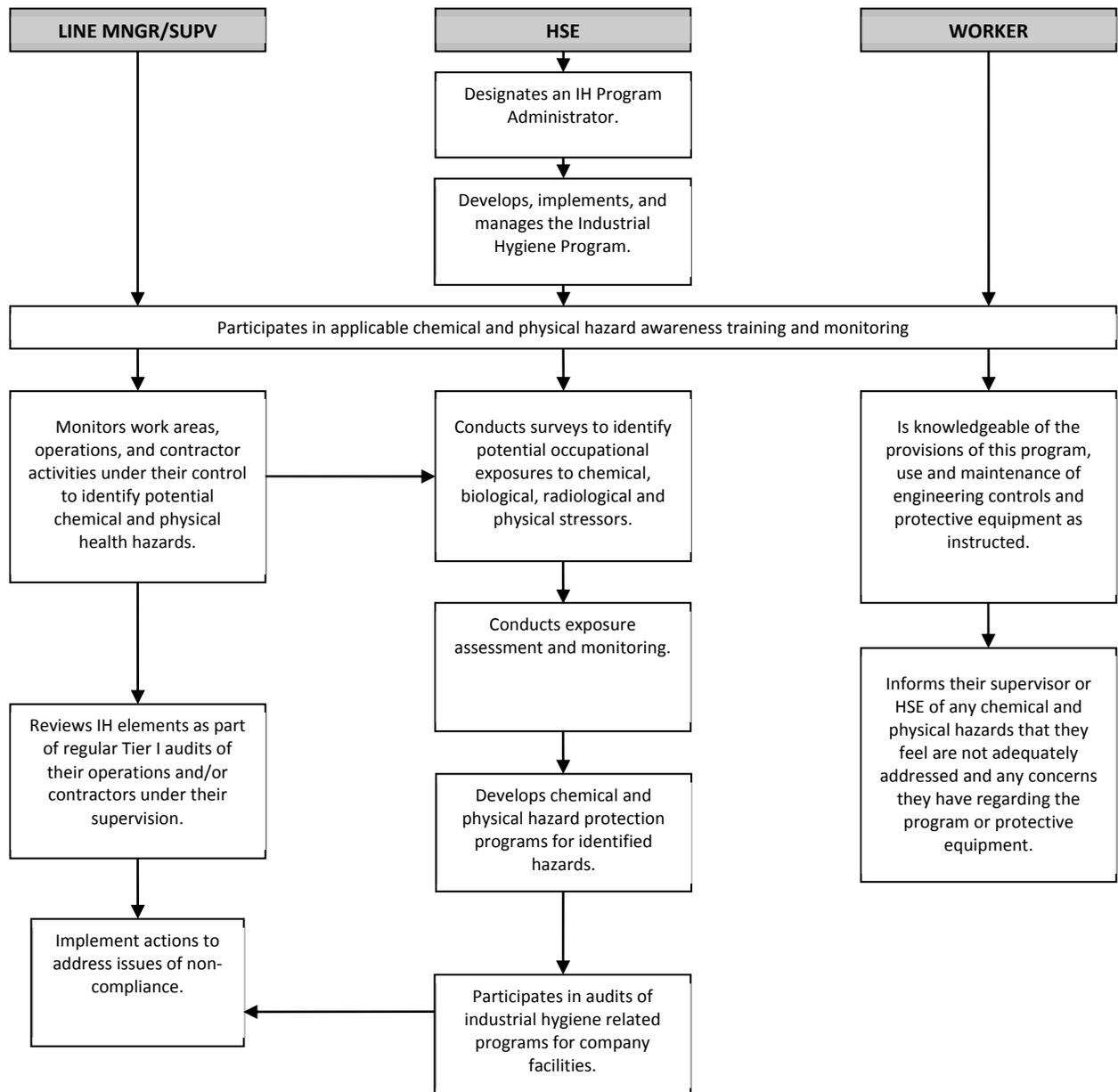
### 3.4. HSE Manager, Technical Safety

- Ensure that an exposure assessment strategy is in place to address the evaluation and control of exposures in routine and emergency situations.
- Assign an Industrial Hygiene Program Administrator.

### 3.5. Program Administrator – Senior Industrial Hygienist

- Develop and implement the Exposure Assessment Program:
  - Develop annual plans for industrial hygiene surveys of facilities to evaluate effectiveness of exposure controls, including engineering controls, programs, and use of PPE. Enter deficiencies into IMPACT for assignment of responsibility and tracking, as required.
  - Coordinate industrial hygiene surveys of facilities to identify new or previously unrecognized chemical, radiological, biological, or physical stressors and conduct follow-up as needed.
- Ensure industrial hygiene activities are performed by qualified personnel.
- Coordinate exposure assessments and, where appropriate, recommend exposure controls.

- Develop communication channels with CPC Health Services, engineering, operations, maintenance, and supervisory personnel regarding changes in the workplace.
- Provide exposure notifications and summaries for exposure monitoring.
- Maintain exposure records in a centralized location.
- Review and provide direction for industrial hygiene related programs, including Controlled Products, Respiratory Protection, Hearing Conservation, NORM Management, and Confined Space Entry.



## 4.0 Procedure

Where employee exposure to a harmful substance or condition, such as an ACGIH listed chemical or physical agent, is reasonably foreseeable, appropriate measures must be taken to evaluate and, when exposure exceeds the established limits, control such exposure.

### 4.1. Industrial Hygiene Surveys

Anticipation of potential hazards and recognition of known hazards is fundamental to industrial hygiene activities.

- Surveys must be conducted to identify potential occupational hazards and exposures.
- An exposure monitoring plan will be prepared by the fourth quarter (Q4) of each year for the following year.
- The exposure monitoring plan will meet the requirements detailed in the CPC Exposure Assessment Program.
- Walk-through surveys should be conducted when new processes are added, changes to processes or chemicals are made, and regulations or exposure limits change to identify any changes in potential exposures.
- A qualitative health hazard assessment will be developed based on the results of the industrial hygiene surveys and this information must be used to plan routine employee exposure monitoring.
- The data collected during surveys will be organized and analyzed to determine the scope of exposure.
- Representative surveys may be used to consider the hazards for similar facilities provided the equipment, product streams, and processing system are similar.
- During the walk-through survey, the following should be reviewed to identify potential exposures:
  - Materials present, used and/or produced in the process.
  - Chemical reactions/interactions in the processing system or during handling and storage.
  - The potential for biological and physical stressors.
  - Operating procedures and work activities.
  - Construction and maintenance project scopes.
  - Accident/incident reports and investigations.
  - Complaint reports.

### 4.2. Exposure Monitoring Strategy

The IH Program Administrator must establish a schedule for industrial hygiene exposure monitoring, based on regulatory and corporate requirements and the CPC Exposure Assessment Program.

- This schedule should be reviewed each year for routine monitoring at CPC facilities. The schedule must identify the locations, similar exposure groups (SEG), and contaminants to be monitored during the year.
- When follow-up samples are required, they must be added to the annual monitoring schedule.
- Monitoring should be conducted during large, non-routine activities (e.g. facility turnarounds).

- Turnaround plans and budgets should include a provision under HSE for industrial hygiene support and monitoring.

Monitoring must be conducted following established industrial hygiene measurement procedures, regulatory requirements, and industry accepted practices, such as NIOSH, OSHA and EPA standards.

- Only accredited industrial hygiene laboratories will be used for analysis of samples.
- Samples will be collected by established methods, in consultation with the analytical laboratory, as required.
- Industrial hygiene monitoring equipment calibration will be verified prior to and following monitoring activities.
- Sample information will be documented using an approved industrial hygiene data form.

### 4.3. Exposure Monitoring Results

Sample results will be interpreted and management must be notified of the monitoring results, conclusions, and recommendations.

- Workers must be notified of their personal monitoring results by individual notification.
- Workers with exposure in excess of an occupational exposure limit (OEL) must be verbally notified by their supervisor with support from the Senior Industrial Hygienist.
- Employees identified as having been over-exposed to a harmful substance may be referred to CPC Health Services.
- Employees have the right to access their medical and industrial hygiene records. Employees can receive copies of these records by contacting CPC Health Services.
- Contractors should go through their own medical provider to access any personal medical records.

### 4.4. Occupational Exposure Limits

- CPC will comply with the OELs listed in the applicable provincial OHS regulations, or as specified in the corporate OEL list, whichever is more protective of workers.
- The corporate OELs are listed on the COP Industrial Hygiene and Toxicology home page, and are reviewed and updated on a regular basis.

### 4.5. Control Measures

Control measures must be implemented when exposures exceed the established exposure limits, and in some instances, may be instituted at 50% of the exposure limit (Action Level).

- Engineering Controls – should be used as the primary method for reducing employee exposure. Types of controls to be considered:
  - Substitution of less toxic materials.
  - Local and general exhaust ventilation to control gases and vapors.
  - Enclosures and mufflers to control noise.
  - Engineering design to eliminate ergonomic stressors.
  - Other suitable engineering controls, as appropriate.

- Work Practice Controls – restructuring tasks to reduce exposure potential (e.g. work-rest regimens for heat stress).
- Personal Protective Equipment – a support method for engineering and work practice controls. Protective equipment to be considered may include gloves, goggles, protective suits, hearing protection, and respiratory protection, etc.
- Other control methods include housekeeping, training, good personal hygiene, proper waste management, etc.
- Health Monitoring Plans – may be established when engineering or work practice controls are not feasible or unable to reduce exposure levels to within established limits. The plans must include requirements for exposure monitoring and medical surveillance.
- In cases where the Action Level (50% of the exposure limit) is reached, an exposure control plan, including ongoing monitoring, must be established.

## 5.0 References

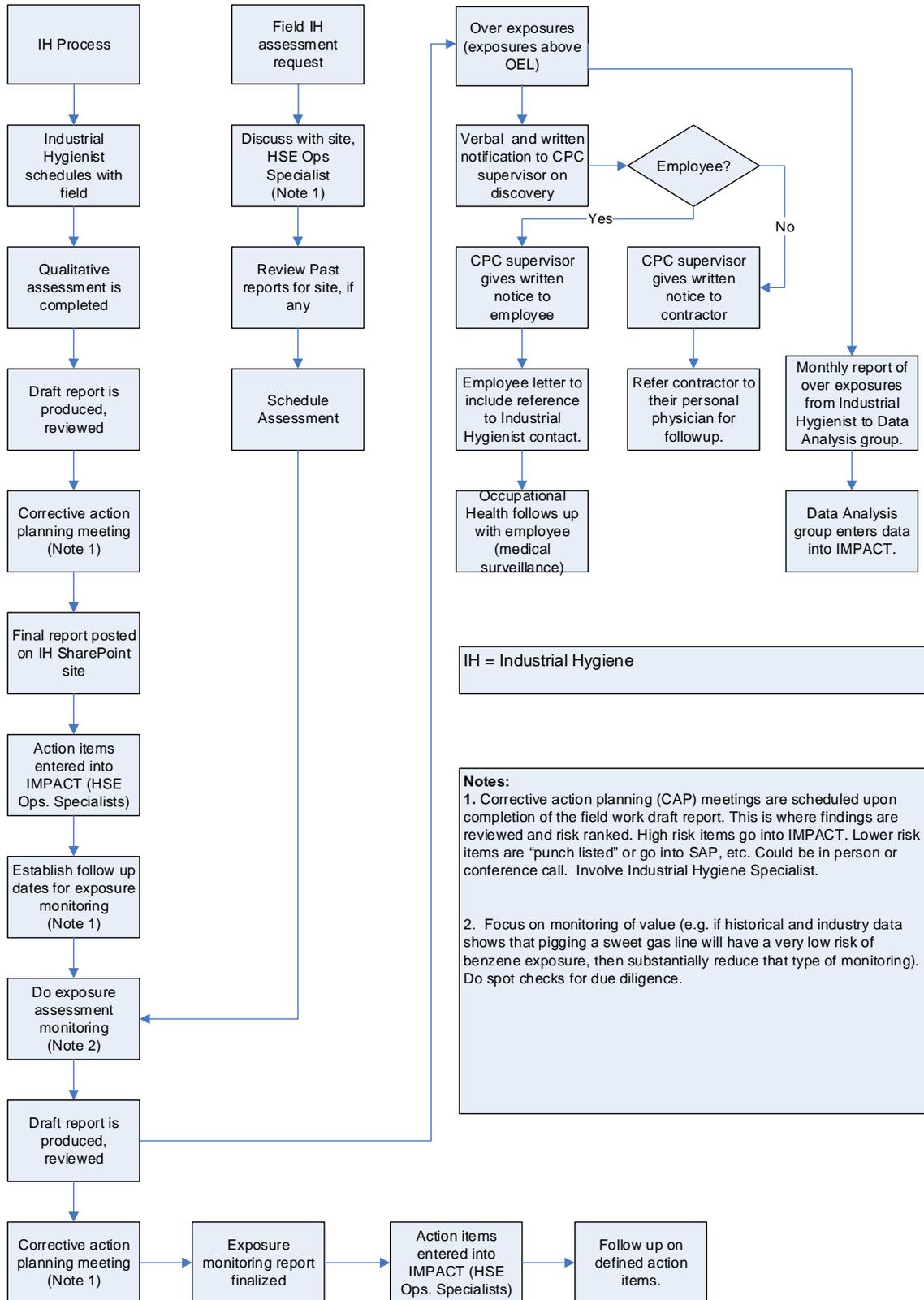
- ConocoPhillips Industrial Hygiene and Occupational Medicine (IHOM) Standard (12-12-2008 or latest revision)
- Chemical Protective Clothing (ALL-HSE-PRC-141)
- Exposure Assessment Plan (ALL-HSE-PRC-154)
- Food, Water, and Sanitation (ALL-HSE-PRC-143)
- Medical Surveillance (ALL-HR-PRC-148)
- Respiratory Protection (ALL-HSE-PRC-151)
- Alberta Occupational Health and Safety Code, Part 4
- British Columbia Occupational Health and Safety Regulation, Parts 5 and 6
- Saskatchewan Occupational Health and Safety Regulations, Part 6
- American Conference of Governmental Industrial Hygienists (ACGIH) “Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices.”
- United States Code of Federal Regulations, Title 29, Subpart Z, 1910.1000 “Air Contaminants.”
- National Institute for Occupational Safety and Health (NIOSH), U.S. Department of Health, Education and Welfare, Occupational Exposure Sampling Strategy Manual (1977)

## 6.0 Document Retention

Records must be retained in accordance with ConocoPhillips’ Document Retention Schedule.

Record	Owner	Classification	Retention
Exposure Monitoring and Measurement Results	Industrial Hygiene Specialist	HE06	Permanent
Employee medical records including medical exposure, audiometric testing, etc.	Occupational Health Nurse	HE05	End of employment + 30 years

**Appendix A – CPC Industrial Hygiene Process Flow Diagram**



## Appendix B – Acronyms

Common acronyms for the Industrial Hygiene Program are defined below:

<b>ACGIH</b>	American Conference of Governmental Industrial Hygienists. Develops and publishes recommended occupational exposure guidelines for chemical substances and physical agents.
<b>BTEX</b>	Benzene, Toluene, Ethyl benzene, Xylene
<b>dBa</b>	Unit used to express the intensity of sound that is measured based on an 'A' weighted scale to account for the anatomy of the human ear.
<b>EPA</b>	Environmental Protection Agency (US)
<b>NIOSH</b>	National Institute for Occupational Safety and Health (US)
<b>OSHA</b>	Occupational Safety and Health Administration (US)
<b>PPM</b>	Parts of vapor or gas per million parts of air by volume.
<b>SEG</b>	Similar Exposure Group
<b>STEL</b>	Threshold Limit Value – Time-Weighted Average
<b>TLV-TWA</b>	Short Term Exposure Limit

## Appendix C – Definitions

Terms that are important to understanding the Industrial Hygiene Program are defined below:

<b>Action Level</b>	A level that is one-half (50%) of an allowable exposure limit (OEL). For specified chemicals, if an employee’s 8-hour sample result is equal to or greater than the action level, the employer must start certain required activities, such as employee training and regular exposure monitoring.
<b>Acute</b>	Severe, often dangerous effect used to denote an excessive exposure to an agent for short duration.
<b>Administrative Controls</b>	Methods of controlling employee exposures to contaminants by training, job rotation, work assignments away from the contaminant, and medical surveillance.
<b>Ceiling Limit</b>	An airborne concentration of a contaminant that should not be exceeded.
<b>Chronic</b>	An adverse effect that develops slowly over a long period of time or that recurs frequently.
<b>Environmental Stressor</b>	A chemical, biological, radiological or physical stressor that can negatively impact the health of an employee.
<b>Occupational Exposure Limit</b>	A Company identified exposure limit for a substance derived from ACGIH Threshold Limit Values or other sources of exposure criteria developed for the purpose of protecting the health and safety of workers and ensuring regulatory compliance.
<b>Short Term Exposure Limit (TLV-STEL)</b>	A 15-minute time weighted average (TWA) exposure established by ACGIH which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposures should be no longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures.
<b>Threshold Limit Value – Time-Weighted Average (TLV-TWA)</b>	The time weighted average concentration for a conventional 8-hour workday and a 40-hour workweek to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect.

**Appendix D – Revision Record**

Page#	March 11, 2015	Previous Information	Change Assessment
all	Full revision of document to conform to a Program.	Previous document was a collection of health hazards and information.	Low – Outlines how CPC currently manages worker exposure risks.