Laboratory Chemical Hygiene

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Objectives - A Satellite Perspective

- Understand purpose & why a safety-minded culture
- Know of the rules, exemptions and resources
- Guide to develop and implement a written Chemical Hygiene Plan
- Understand how to evaluate and maintain safety & health effectiveness
- Wildfire Smoke and High Heat conditions for field workers
- How COVID affects lab operations and employer responsibilities –
- 437-002-0744(3)(a)-(m)

ALL LABS ARE HAZARDOUS
Purpose

- To minimize risk of a hazardous exposure to employees
- To prevent explosions and fires
- To prevent contamination and spread of contamination
- To prevent hazardous waste exposure
- To have an escape/rescue plan if something goes wrong
- Not to underestimate the risk

Safety Minded-Culture for all personnel is to nurture basic attitudes and habits of prudent behavior so that safety is a valued and inseparable part of all laboratory activities throughout their career.

- Proper controls in place to prevent exposure
  - Facility design, Ventilation & other required engineering controls
  - Administrative control, supervision and written Standard Operational Procedures
  - PPE & Process Hazard Assessment
- Trained non-management employees and management employees to anticipate (rule-related), recognize and control hazardous processes and how to respond to emergencies and exposures
- Review and verify/certify when changes are identified or made to ensure containment and control of any hazard
- Maintain safe operations and equipment (preventative maintenance/repair/replacement)

Laboratory Use and Scale definitions

2/z: 1910.1450 Hazardous Chemicals in the Laboratory:

- "USE" of Hazardous Chemicals:
  - Chemical manipulations are carried out on a "laboratory scale."
  - Multiple chemical procedures or chemicals are used.
  - The procedures involved are not part of a production process, nor in any way simulate a production process.
  - Protective laboratory practices and equipment are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

- "SCALE"
  - means work with substances in which the containers used for reactions, transfers, and other handling of substances are designed to be easily and safely manipulated by one person.

Exemptions & Related-rules

Most quality control laboratories are not expected to meet the qualification for coverage under the standard. They are usually adjuncts of production operations which typically perform repetitive procedures for the purpose of assuring reliability of a product or a process.

Laboratories that conduct research and development and**/or** related analytical work are subject to the requirements of the Laboratory Standard

- If Exemptions – Kits, strips, colorimetric tests – then:
  - 2/I: 437-002-134 PPE Hazard Assessment; 1910.134 Respiratory Protection
  - 2/H: 1910.106 Flammable/combustible Liquids & chemical incompatibility
  - 2/G: 437-002-0081 Industrial Ventilation
  - 2/Z: 437-002-0382 Toxic Air Contaminants & vertical codes, e.g. Benzene, DCM
  - 2/E: 437-002-0041Exits & Exit Ways; 0042 Emergency Action Plan; 0043 Fire Prevention Plan
  - 2/Z: 1910.1200 Hazard Communication
  - 2/K: 437-002-0161 Medical Emergencies (eyewash and/or shower)

Don't forget ergonomics

Chemical Hygiene Plan

- Written – Content development
  - (a) Individual chemical hygiene responsibilities;*
  - (b) Standard operating procedures;
  - (c) Personal protective equipment, engineering controls, regulated areas, and apparel;
  - (d) Laboratory equipment;
  - (e) Safety equipment;
  - (f) Chemical management;
  - (g) Housekeeping;*
  - (h) Emergency procedures for accidents and spills;
  - (i) Chemical waste;
  - (j) Training;*

Chemical Hygiene Plan - continued

- Written- Content development
  - (k) Safety rules and regulations;
  - (l) Laboratory design and ventilation; * fume hood

    ANSI/AIHA/ASSE Z9.5-2012 & ANSI/ASHRAE 110-2016 standards
  - (m) Exposure monitoring;*
  - (n) Compressed gas safety;
  - (o) Medical consultation and examination.*
  - It should be noted that the nature of laboratory work may necessitate addressing biological safety, radiation safety and security issues.

Chemical Hygiene Plan

- Implementation and Support:
  - Upper management commitment to valued laboratory safety, Director, CEO – GM.
  - Chemical Hygiene Officer (oversees CHP and lab employees)
  - Laboratory chemical safety committee/meetings: add-hoc, upper management
  - Verified containment & management of hazardous substances (think fail-safe)
  - Annual review to update – continuous improvement, inform Director, employees, etc.
  - Prevents / stops hazardous conditions or operations, develop interim operations till hazardous conditions are resolved
  - Follow CHP, prudent practices, and approved SOPs for all laboratory activities
- Top 5 Laboratory Hazards –EHS Today:
  - 1. Fire/Explosion
  - 2. Thermal & Chemical Burns
  - 3. Skin Absorption / Adsorption of chemicals
  - 4. Inhalation of Toxic Fumes
  - 5.Cuts to the Skin

For PM2.5 wildfire smoke

ETS / AQI	101	201	500
Training	X		
Communication	X	X	X
**95 FF Respirator Use	X	X*	X
Admin/Eng. Controls		X	X
Respiratory Protection Program 1910.134			X

Notes: * Follow Wildfire Smoke ETS appendix.

** N/R/P or higher filter rating such as 99, 100 (HEPA).

AQI Reaches 101

- Information & Training – August 16, 2021
  - Symptoms
    - Eye irritation,
    - Respiratory distress,
    - Fatigue, Heart and pulmonary issues,
    - definition of sensitive groups and their health issues (asthma, COPD, age, medications, etc.)
  - Right to report health issues & obtain medical care without retaliation
  - Supervisory and medical emergency procedures when severe symptoms are exhibited
  - How employees can acquire current and forecasted aqi information
  - Designated PM2.5 AQI meter operator and interpretation of AQI Information
  - Employer's communication system under section (4)
  - How to properly wear a FFP, its importance, limitations and benefits

AQI Reaches 101

- Communication system
  - Notify Any employee when working location AQI reaches 101, 201 or 501
  - Notify any employee when working location AQI drops below any protective level
  - Encourage Employees to inform employer when:
    - AQI improves / worsens
    - Severe health symptoms
- Voluntary Filtering Facepiece Respirator Use
  - Employer maintain adequate supply for use at no cost to employee

AQI Reaches 201

- Use engineering controls when Feasible
  - Indoors with mechanical ventilation system
  - In Vehicle(s) with filter system (recirculation)
- Use Administrative controls when feasible
  - Move outdoor location to less than AQI of 201
  - Change schedule to work when conditions are less then AQI of 201
- Required use of FFR with proper seal check (+/-)
  - Full written respiratory protection program not required
  - Follow wildfire smoke appendix

AQI Reaches 500 (501)

- All feasible engineering and administrative controls
- Required respirator use
- Full written respiratory protection program
  - Respirator Program Administrator
  - Medical evaluations
  - Fit testing
  - Training
  - maintenance
  - Surveillance

High Heat Body Stress

Heat Index of 80 °F drinking water & training, 90 °F communication, monitoring & medical response

- 80 - Provide all employees with 32 oz. water every hour
- (a)The environmental and personal risk factors for heat illness, as well as the added burden of heat load on the body caused by exertion, clothing, and personal protective equipment.
- (b) The procedures for complying with the requirements of this standard, including, but not limited to, the employer's responsibility to provide water, provide daily heat index information, shade, cool-down rests, how to report symptoms of heat-related illness, and access to first aid as well as the employees' right to exercise their rights under this standard without fear of retaliation.
- (c) The concept, importance, and methods of acclimatization.
- (d) The importance of employees immediately reporting symptoms or signs of heat illness in themselves, or in co-workers.
- (e) The effects of nonoccupational factors (medications, alcohol, obesity, etc.) on tolerance to occupational heat stress.
- (f) The different types of heat-related illness, the common signs and symptoms of heat-related illness.

- 90
- Effective communication with affected employees
- Monitoring
- Medical Plan
- Response
  - Cool down required for ten minutes every two hours
  - Affected with heat stress - not left alone
  - Cool down – shade, rest and water
  - Show signs of heat exhaustion (cool down , shade and water/ ice packs) monitor for deterioration
  - Heat Stroke medical emergency 911 first aid response