Qualis Corporation
Safety Manual

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This Manual covers OSHA industrial safety regulation elements likely to be applicable to Qualis' Managers and Supervisors. It does not cover every OSHA regulation and, of those regulations covered, it does not cover them in full depth. If you want more information, contact the Safety and Environmental Office for copies of the regulations, or visit OSHA's web site at OSHA.GOV to view a specific Part / Subpart of the Standard 29CFR1910 (Occupational Safety and Health Standard).

All managers and supervisors should read the Preface and Section 1, which apply to all facilities and offices. All managers and supervisors over hazardous operations such as shops, laboratories, and maintenance operations should read section 2. Section 3 covers various special applications. Managers and supervisors should check for and read subjects applicable to their area. If OSHA requires separate Plans, Programs, or Procedures, they are referenced in the applicable area and are listed in Appendix 4.2 of the Manual.

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Section 0.2 – Document Revision History

Revision	Author of change	Description	Release Date	Approved
00	Stan Pietrzak	Initial Release	31 July 2002	

Section 0.3 – Preface

This Safety manual has been prepared to provide Management and Supervisors at Qualis with information, guidelines, and requirements related to their role in industrial safety. This Manual supplements **Qualis Company Policies and Procedures (Qualis-PP1 and Qualis-PP2)** that are available at the Safety and Industrial (S&E) Office. In turn, this Manual calls out specific **Qualis-PP3 and Qualis-PP4 procedures** where added instructions are needed. The S&E Office distributes these Qualis-PP3 and Qualis-PP4 procedures separately. This Manual is part of the implementation of Company Policy **Qualis-PP3-500, Safety and Environmental Compliance.**

Personnel safety and the safety of our facilities, equipment, and environment that allows us to earn a living are a vital concern to Qualis.

Your commitment to safety, your involvement in providing a safe work place, and leadership of people are key elements of our Safety program. A **General Safety Instruction booklet (Qualis-PP3-501-1)** is available for all employees.

Each manager and supervisor is responsible for assuring their work force and their work places are safe. The S&E office in Huntsville and safety representatives at other facilities will help you in providing this safe work environment, will provide some services to you, and will audit your compliance to the many regulations that control our safe work. The S&E Office will assist in the development of effective and efficient corrective and preventive actions to reduce the chance of injuries, losses, and noncompliances.

Qualis' managers and supervisors are the Company's first line of defense against accidents, losses, noncompliances with regulations, and other safety / hazardous material matters. Your responsibilities are detailed throughout this Manual as well as in referenced Procedures and Plans.

A. All Managers and Supervisors

A1. Employee Direction

Never direct an employee to perform an unsafe act, never assign them a hazardous task, which they are not qualified to perform (i.e. never let an uncertified person operate a fork lift, never assign an untrained person to work with hazardous chemicals, etc.) and never instruct them to use unsafe equipment. You may be personally, financially, and criminally liable in case of accident!

A2. Employee Motivation

Each supervisor and manager is responsible for developing safety consciousness or motivation from his or her employees. Positive leadership is best.

Encourage your employees to work safe! If they see a hazard that can be eliminated or reduced, fix it! If it is beyond your authority, have the employee submit a suggestion to the Safety and Environmental Office. If an employee violates safety rules, reprimand him or her to show them the correct way to perform the job. If violations are serious or repetitive, take prompt action per Qualis' **Disciplinary Rules (Procedure Qualis-PP1-325)**. Do not let safety slide!

Penalties for failing to observe safety regulations and practices are as follows:

a. Minor Offense
For the first occurrence, an oral and / or a written reprimand is given. A written reprimand is accompanied by a probationary period not less than 30 nor more than 90 days. For the second occurrence, a written reprimand is given along with 3-5 days suspension. For the third occurrence, 5-10 days of suspension is given or the employee is terminated for cause.

b. Major Offense
For the first occurrence, the employee may be suspended for 5-10 days or may be terminated for cause. For the second occurrence, the employee is terminated.

A3. Housekeeping
You must inspect and correct any poor housekeeping examples in your areas. Trash causes accidents, can increase fire hazards, can provide unhealthy working conditions, etc. Be neat!

A4. Injury Reporting and Investigation
Every accident and work related illness must be promptly reported to the facility Safety representative and you must complete the **Supervisors Investigation Report** within five (5) days of the event, without fail! This is covered in **Company Procedure Qualis-PP3-501**. Failure to have an accident or illness reported or failure to issue the supervisor's report is a safety violation under Company disciplinary rules.

A5. Visitor Control
When visitors (either guests of the company, subcontractors, service personnel, other employees, or auditors enter your area, you are responsible for their safety from your operations. Be sure they understand your rules and your hazards to the extent necessary to protect them during their visit. Similarly, if they bring items or perform work potentially hazardous to your employees, be sure you and your employees are fully aware of the hazards and the needed controls.

A6. Audits

Safety and Environmental, Governmental Agencies, and our Customers may all conduct audits of Qualis' safety compliance. You are expected to support these efforts, as required. In general, Management and Officials should not discuss details of how processes or machines work and no demonstrations should be given to outside inspectors. Gratuitous comments or the voluntary operation of machinery by managers often leads to citations. A Government Inspector will consider any statement by a manager as an "admission by the Company".

Internally, the Safety and Environmental Office uses both memorandums (for minor discrepancies) and **Safety Inspection Finding Reports (SIFRs) (Qualis Form Number Qualis-2K-SIFR-001)** for major items. You, other managers, and the Safety Committee members may also generate SIFRs. In all cases, submit the original to the Safety and Environmental Office for numbering, distribution, and follow up. A copy of the SIFR form and its completion instructions can be obtained at the Safety and Environmental Office.

If you the actionee on a SIFR, you are expected to respond fully and on time. If more time is needed, request it!

B. Hazardous Work Area Managers and Supervisors

B1. Employee Protective Devices

You must assure your employees have and use protective devices appropriate for their job. This includes safety glasses, safety shoes, hearing protectors of suitable decibel range, face shields, helmets or hard hats, protective clothing (gloves, boots, aprons, gowns, work clothes, etc.), and respirators with proper filters for the hazard(s) involved. In audits, both you and your employee will be written up if they are not using required protective devices.

B2. New Machines, Equipment, Chemicals, Etc.

When you plan to add new equipment, processes, etc., be sure Facilities knows about it so they can do their reviews and analyses. Whenever a new (or heavily modified) item is put into operation in your area, be sure the Safety and Environmental Office has reviewed it for safety hazards, that appropriate safety controls are in place and operational before it enters into service, and that all affected employees have been trained and / or educated in its proper use and also in its potential or actual hazards and their control. As with all training and education, document it!

B3. Physical Capability

If your work areas have requirements that can be only performed by people meeting certain physical standards, you are responsible for assuring your employees meet these standards before you allow them to work. Examples are: respirator examinations to verify they can wear and use respirators; audio examinations if hearing is necessary to hear safety warnings; adequate physical mobility to be able to drive and pass fork lift driving tests; etc..

B4 Training

Your current employees, new hires, and transferees must all be trained and educated in regulatory required subjects and in the safety rules and hazards of your work areas. It is your responsibility to provide this training and education or have someone else (who is qualified) to provide the training and education. This is in addition to any company level training and education provided by the Safety and Environmental organization. Records of all training and education must be kept to prove each and every employee received them.

S. F. Pietrzak, Jr., Manager
Safety and Quality Control

Section 1.0 – General Applicability

1.1 General Requirements – 29CFR1903

The Occupational Safety and health Act requires that "every employer furnish a place of employment which is free from recognized hazards that are causing or likely to cause death or serious harm to his employees". It also requires that "employers comply with standards promulgated under the Act and that employees comply with rules, standards, regulations, and orders which are applicable to their own actions and conduct.

The 29CFR1910 Subparts and sections that follow in this Manual are the standards promulgated under the Act but the above clause always a applies also – even if no standard has been set or if a standard is not stringent enough to meet this general requirement. Each Manager and Supervisor must be alert to possible situations that could apply under the general requirements and promptly notify both their Management and the Safety and Environmental Office about them.

1.2 Recording and reporting Occupational Injuries and Illnesses – 29CFR1904

This requirement requires the reporting and recording of occupational accidents and illnesses. The required reports, forms, etc, are set forth in **Company Procedure Qualis-PP3-501**. All supervisors shall assure:

1. All work related accidents and illnesses are reported promptly per **Qualis Procedure Qualis-PP3-501**.
2. All reports are followed up within five (5) working days with a written Supervisor's Report per **Company Procedure Qualis-PP3-501**.
3. All investigations, corrective actions, and preventive actions are facilitated and accomplished.

Supervisors and Managers are also encouraged to use the Supervisor's Report to report on "near misses" – accidents that almost happened or almost injured someone. These can contribute greatly to our accident prevention efforts.

1.3 General: Egress – 29CFR1910.36

OSHA sets minimum requirements for exits from buildings. Compliance with structural requirements is the responsibility of the architect and Facilities. Managers are responsible for assuring their people are not working in and area when exits are being repaired or altered. Managers shall also assure the paths to every exit are continuously free of obstruction or impediments to full instant use in case of fire.

1.4 Means of Egress – 29CFR1910.37

OSHA sets rules for fire ratings of exits from one area to another, structural requirements, arrangements of exits, etc.. Compliance is the responsibility of the architect and Facilities. Other managers shall assure exit signs are not covered up, illumination is not burnt out, and that temporary partitions, etc. do not block normal exit paths.

1.5 Emergency and Fire Prevention Plans – 29CFR1910.38

Plans cover the design actions you and your employees must take to ensure employee safety from a fire, a tornado, and other emergencies. Written Emergency Action plans and Fire Prevention Plans are required and provide for special controls in high hazard areas. Every Manager and Supervisor of high hazard areas must understand these plans and be prepared to lead his or her employees into actions required by the Plan. For Huntsville, these Plans are combined and published as **Procedure Qualis-PP3-551 (Emergency Plan)**

All managers and supervisors are responsible for assisting in the safe and orderly evacuation of their personnel. Special attention must be given to ensuring that handicapped personnel receive all needed assistance in emergency situations. A "buddy system" is usually the best way of assuring this. Managers and supervisors of special control areas have specific duties set forth in these Plans and shall comply with them. These include reviewing, with each employee in special control areas, upon initial assignment, the applicable elements of the Plans and of the fire and health hazards of the materials and processes to which they are exposed. Each manager or supervisor of a special control area is responsible for assuring that all of his or her employees are safely evacuated or take shelter in an emergency. Rescue personnel (Fire Departments, etc.) shall be informed of personnel remaining in a facility or who unaccounted for. Instruct your employees that all evacuated personnel shall report to their supervisor or higher manager to facilitate this accounting effort.

Each Manager who has to have an employee designated to perform a specific and set special control function within these Plans (fire warden, critical operation shut down, etc.) shall establish who the employee's replacement is when the designated employee is absent for an extended period, transferred to a new area, etc..

Figure 1.5-1 provides emergency guides for supervisors and Managers of special control areas.

Figure 1.5-1

Guides for Managers / Supervisors on Emergency Planning and Control For Special Control Work Areas

1. You should insure the safe evacuation of or taking shelter by your people. If you have more than 20 employees or are frequently away from your work center, assign another responsible employee to guide duties and brief / train him or her on these very important duties.

2. During your communication meetings with your employees, you should cover evacuation routes (primary and secondary). Discuss the difference between a fire alarm and a tornado warning. Remember, you are responsible for your employee's safety.

3. When the alarm sounds, you should distinguish whether it is a fire alarm or tornado / severe weather alarm. Then organize a safe and orderly evacuation or taking of shelter. You are a guide and as such you should be sure all your people are accounted for. All employees should evacuate (fire alarm) or find shelter (tornado) except those who have other specific duties. There should be no running in the hallways / aisles and people should not wait to pick up personal items (e.g. coats, sweaters, etc.). Time is of the essence! It may also be necessary to reassure some employees that they will be safe to keep them from "panicking". It is important to keep the movement orderly to prevent accidents and injuries.

4. When your department has been evacuated, you should make a head-count to insure you have accounted for all your people!

5. If you have handicapped employees, a "buddy system" should be used to insure their safe evacuation.

6. The guides should not evacuate until they have insured all their people are evacuated.

7. If it is a fire alarm, your people should clear the building by not less than 200 feet to protect them from falling debris and / or flames.

1.6 Medical Services and First Aid – 29CFR1910.151

Qualis must ensure the ready availability of medical personnel for advice and consultation on matters of occupational health. An infirmary, clinic, or hospital in near proximity to the work place is used for treatment of all injured employees. In the absence of either, senior managers shall assure that a person or persons are adequately trained to render first aid and that first aid supplies, as approved by a consulting physician, are readily available. See 3.9.1 (C), Welding, and 2.3.2 (4), Open Surface Tanks for other first aid requirements.

In work areas where the eyes or body of any person may be exposed to injurious corrosive materials, managers must assure facilities for quick drenching or flushing of the eyes and body are provided within the work area for immediate emergency use. These must meet ANSI standards and be able to flow continuously for at least 15 minutes. Managers shall assure these facilities are always accessible and ready for use.

Additional medical controls are also specified under 2.1 (employee Protection), 2.2 (Chemicals), and 3.7 (Chemicals). Particularly, employee protection from Bloodborne Pathogens is a major concern. Supervisors and first aid personnel must be aware of these rules that are covered under 29CFR1910.1030 (See Section 2.1.2). The company shall supply first aid personnel with Personal Protection Equipment (PPE) per 29CFR1910.1030 including gloves, gowns, face shields, masks, and eye protection.

1.7 Portable / Fixed Fire Suppression Equipment – 29CFR1910.157-.163

Fire extinguishing systems are provided and installed by Facilities and must meet the applicable OSHA requirements. Managers must know the types, limitations, and proper uses of these equipments in their areas. Where portable fire extinguishers are provided for employee use, initial and annual training in their use is required through issuance of the **Portable Fire Extinguisher pamphlet Qualis-PP3-501-2**. Particular care must be taken to assure that, in rooms where a fixed gaseous agent (Halon) can be released, personnel know the suffocation hazards involved when these agents replace breathable air in the room. Exterior and interior signs are required, a separate Emergency Action Plan is needed, and a Pre-discharge alarm system is to be provided.

1.8 Fire Detection Systems – 29CFR1910.164

When required by another OSHA standard (if any), the Safety and Environmental Office will assure fire detection systems are installed, maintained, and tested per OSHA and NFPA rules.

1.9 Employee Alarm Systems – 29CFR1910.165

When required by another OSHA standard, Facilities will also provide employee alarm system(s) that meet OSHA requirements. Maintenance to OSHA requirements is the responsibility of Facilities and testing is the responsibility of the Safety and Environmental Office. When such a system is provided, Managers shall assure employees understand the type and meanings of alarms. When fire alarms sound, supervisors and managers must assure process operations are shut down if they could adversely affect fire or smoke containment or if they could increase personnel injuries if abandoned. **Procedure Qualis-PP2-501-3, Signals and Warning Systems**, describes the warning systems and warning signals at the Huntsville facilities.

1.10 Sanitation – 29CFR1910.141

Basic rules for housekeeping, refuse removal, vermin control, water supply, toilet facilities, washing facilities, change rooms, eating and drinking areas, and food handling are met by Facilities's facilities design, food service, and janitorial operations. Managers should keep their work places clean and promptly report any problems to Facilities for correction.

Section 2.0 – Manufacturing, Laboratory, Maintenance, and Other Hazardous Operations

2.1 Employee Protection

2.1.1 Personal Protective Equipment (General) – 29CFR1910.132

Managers shall assure a hazard analysis is performed of their work areas and documented results are on file. Managers shall assure appropriate protective equipment (such as those for eyes, face, head, and extremities; protection clothing; respiratory devices; protective shields and barriers) is provided, used and maintained in a sanitary and reliable condition. Employees should not have to provide their own items (except where Qualis **reimburses applicable costs for safety shoes and glasses** – See **Qualis-PP3-511**) (See section 3.1 also).

2.1.2 Bloodborne Pathogens – 29CFR1910.1030

Company Procedure Qualis-PP3-502 describes the Qualis Blood borne Pathogens Exposure control Program and a Bloodborne Exposure Control Plan (PP3-502-1) has been issued to assigned first aid personnel who are expected to be at exposure risk via the performance of their jobs. Each manager must be sure they do not assign any uncertified, untrained, or improperly protected employee to a job where occupational exposure is reasonably expected. OSHA defines Occupational Exposure as an occupational task where it can be "reasonable anticipated skin, eye, mucous membrane, or parenteral contact with blood or other potentially infectious material may result from the performance of an employee's duties".

Under the regulations exposure risks must be reduced to a minimum by engineering control, and extensive personnel protective equipment must be provided. In addition, special collection systems must be used to dispose of hazardous materials, needles, gloves, etc. and special disinfecting and house cleaning tasks must be performed in first aid areas.

Hepatitis B vaccinations must be given to employees with occupational exposure and an extensive medical program must be provided to any employee that is exposed to Bloodborne pathogen material. This includes testing of the source person within the limits of the law. Medical records are kept for the length of employment plus 30 years.

2.1.3 Access to Employee Exposure and Medical Records – 29CFR1910.1020

If the company has medical records on an employee, they must be kept on file for the duration of employment plus 30 years. Similarly, employee exposure records shall be maintained 30 years. The medical records are maintained by the Personnel Department, and the exposure records both by the Safety and Environmental Office. If not specifically monitored, the identity of an agent (an MSDS item), where it was used, and when it was used must be retained for 30 years. The Safety and Environmental Office keeps these records.

Employees or their designated representatives must have access to these records within 15 days of a request or be told of the reason for the delay and when they will be available. OSHA may also request specific records on an employee. Any such requests for historical information shall be forwarded to the Company's Legal Counsel who will assure all elements of the CFR are met.

Each applicable employee, at hire or assignment and annually, shall be informed of the existence, location, and availability of records, who is responsible for maintaining and providing access to the records, and that the employee has the rights of access to these records. A copy of 29CFR1910-1020 shall be provided to employees upon request to the Safety and Environmental Office.

2.2 Chemicals

2.2.1 Hazard Communication – 29CFR1910.1200

Company Procedure Qualis-PP#-521 describes the Qualis Hazard Communication Program. Each Manager is expected to train his or her employees, as required by that Procedure, in the hazards of chemicals used in their work areas. Managers are also required to maintain sub-sets of Material Safety Data Sheets covering those chemicals used in their work areas in a place easily accessible by the employees (See Qualis-PP4-561 for the Huntsville system). The Safety and Environmental Office will provide wall displays and loose leaf binders for this purpose. Managers shall also assure the Safety and Environmental Office is informed of any new chemical brought into the work area by a Manager or one of his or employees. Managers shall also control the transfer of chemicals by assuring all required markings and warnings are also transferred to the new containers as required by the Procedure.

2.2.2 DOT Marking Maintenance – 29CFR1910.1201

DOT required markings on hazardous materials packages must be maintained until the package is no longer hazardous. For items not being re-shipped, HAZ-COM (29cfr1910.1200) labels may replace DOT labels after receipt.

2.2.3 Process Safety Management – 29CFR1910.119

OSHA has significant management control requirements for facilities that have hazardous chemicals in significant quantities (For example, 10,000 pounds of flammable liquids or gasses, 500 pounds of Phosgene, etc.). The Safety and Environmental Office along with Facilities, must review any large quantity highly hazardous chemical usage to be sure OSHA thresholds are not exceeded for the specific highly hazardous chemicals listed in Table 2.2.3-1.

Very elaborate hazard analysis, procedures, and catastrophe plans are required if thresholds are exceeded.

Table 2.2.3-1

Appendix A to 29CFR1910.119 –
List of Highly Hazardous Chemicals, Toxics and Reactives (Mandatory)

This Appendix contains a listing of toxic and reactive highly hazardous chemicals, which present a potential for a catastrophic event at or above the threshold quantity.

Chemical name	CAS*	TQ**
Acetaldehyde	75-07-0	2500
Acrolein (2-Popenal)	107-02-8	150
Acrylyl Chlorde	814-68-6	250
Allyl Chlorid	107-05-1	1000
Allylamine	107-11-9	1000
Alkylaluminum	Varies	5000
Ammonia, Anhydrous	7664-41-7	10000
Ammonia solutions (greater than 44% ammonia by weight)	7664-41-7	15000
Ammonium Perchlorate	7790-98-9	7500
Ammonium Permanganate	7787-36-2	7500
Arsine (also called Arsenic Hydride)	7784-42-1	100
Bis(Chloromethyl) Ether	542-88-1	100
Boron Trichloride	10294-34-5	2500
Boron Trifluoride	7637-07-2	250
Bromine	7726-95-6	1500
Bromine Chloride	13863-41-7	1500
Bromine Pentafluoride	7789-30-2	2500
Bromine Trifluoride	7787-71-5	15000

Table 2.2.3-1, Continued

Chemical name	CAS*	TQ**
3-Bromopropyne (also called Propargyl Bromide)	106-96-7	100
Butyl Hydroperoxide(Tertiary)	75-91-2	5000
Butyl Perbenzoate(Tertiary)	614-45-9	7500
Carbonyl Chloride (see Phosgene)	75-44-5	100
Carbonyl Fluoride	353-50-4	2500
Cellulose Nitrate (concentration greater than 12.6% nitrogen)	9004-70-0	2500
Chlorine	7782-50-5	1500
Chlorine Dioxide	10049-04-4	1000
Chlorine Pentrafluoride	13637-63-3	1000
Chlorine Trifluoride	7790-91-2	1000
Chlorodiethylaluminum (also called Diethylaluminum Chloride)	96-10-6	5000
1-Chloro-2,4-Dinitrobenzene	97-00-7	5000
Chloromethyl Methyl Ether	107-30-2	500
Chloropicrin	76-06-2	500
Chloropicrin and Methyl Bromide mixture	None	1500
Chloropicrin and Methyl Chloride mixture	None	1500
Commune Hydroperoxide	80-15-9	5000
Cyanogen	460-19-5	2500
Cyanogen Chloride	506-77-4	500
Cyanuric Fluoride	675-14-9	100
Diacetyl Peroxide (concentration greater than 70%)	110-22-5	5000
Diazomethane	334-88-3	500
Dibenzoyl Peroxide	94-36-0	7500
Diborane	19287-45-7	100
Dibutyl Peroxide (Tertiary)	110-05-4	5000
Dichloro Acetylene	7572-29-4	250
Dichlorosilane	4109-96-0	2500
Diethylzinc	557-20-0	10000
Diisopropyl Peroxydicarbonate	105-64-6	7500
Dilauroyl Peroxide	105-74-8	7500
Dimethyldichlorosilane	75-78-5	1000
Dimethylhydrazine, 1,1-	57-14-7	1000
Dimethylamine, Anhydrous	124-40-3	2500
2,4-Dinitroaniline	97-02-9	5000
Ethyl Methyl Ketone Peroxide (also Methyl Ethyl Ketone Peroxide; concentration greater than 60%)	1338-23-4	5000
Ethyl Nitrite	109-95-5	5000
Ethylamine	75-04-7	7500
Ethylene Fluorohydrin	371-62-0	100
Ethylene Oxide	75-21-8	5000
Ethyleneimine	151-56-4	1000
Fluorine	7782-41-4	1000
Formaldehyde (Formalin)	50-00-0	1000
Furan	110-00-9	500

Table 2.2.3-1, Continued

Chemical name	CAS*	TQ**
Hexafluoroacetone	684-16-2	5000
Hydrochloric Acid, Anhydrous	7647-01-0	5000
Hydrofluoric Acid, Anhydrous	7664-39-3	1000
Hydrogen Bromide	10035-10-6	5000
Hydrogen Chloride	7647-01-0	5000
Hydrogen Cyanide, Anhydrous	74-90-8	1000
Hydrogen Fluoride	7664-39-3	1000
Hydrogen Peroxide (52% by weight or greater)	7722-84-1	7500
Hydrogen Selenide	7783-07-5	150
Hydrogen Sulfide	7783-06-4	1500
Hydroxylamine	7803-49-8	2500
Iron, Pentacarbonyl	13463-40-6	250
Isopropylamine	75-31-0	5000
Ketene	463-51-4	100
Methacrylaldehyde	78-85-3	1000
Methacryloyl Chloride	920-46-7	150
Methacryloyloxyethyl Isocyanate	30674-80-7	100
Methyl Acrylonitrile	126-98-7	250
Methylamine, Anhydrous	74-89-5	1000
Methyl Bromide	74-83-9	2500
Methyl Chloride	74-87-3	15000
Methyl Chloroformate	79-22-1	500
Methyl Ethyl Ketone Peroxide (concentration greater than 60%)	1338-23-4	5000
Methyl Fluoroacetate	453-18-9	100
Methyl Fluorosulfate	421-20-5	100
Methyl Hydrazine	60-34-4	100
Methyl Iodide	74-88-4	7500
Methyl Isocyanate	624-83-9	250
Methyl Mercaptan	74-93-1	5000
Methyl Vinyl Ketone	79-84-4	100
Methyltrichlorosilane	75-79-6	500
Nickel Carbonly (Nickel Tetracarbonyl)	13463-39-3	150
Nitric Acid (94.5% by weight or greater)	7697-37-2	500
Nitric Oxide	10102-43-9	250
Nitroaniline (para Nitroaniline)	100-01-6	5000
Nitromethane	75-52-5	2500
Nitrogen Dioxide	10102-44-0	250
Nitrogen Oxides (NO; NO(2); N2O4; N2O3)	10102-44-0	250
Nitrogen Tetroxide (also called Nitrogen Peroxide)	10544-72-6	250
Nitrogen Trifluoride	7783-54-2	5000
Nitrogen Trioxide	10544-73-7	250
Oleum (65% to 80% by weight; also called Fuming Sulfuric Acid)	8014-94-7	1000
Osmium Tetroxide	20816-12-0	100
Oxygen Difluoride (Fluorine Monoxide)	7783-41-7	100
Ozone	10028-15-6	100

Table 2.2.3-1, Continued

Chemical name	CAS*	TQ**
Pentaborane	19624-22-7	100
Peracetic Acid (concentration greater 60% Acetic Acid; also called Peroxyacetic Acid)	79-21-0	1000
Perchloric Acid (concentration greater than 60% by weight)	7601-90-3	5000
Perchloromethyl Mercaptan	594-42-3	150
Perchloryl Fluoride	7616-94-6	5000
Peroxyacetic Acid (concentration greater than 60% Acetic Acid; also called Peracetic Acid)	79-21-0	1000
Phosgene (also called Carbonyl Chloride)	75-44-5	100
Phosphine (Hydrogen Phosphide)	7803-51-2	100
Phosphorus Oxychloride (also called Phosphoryl Chloride)	10025-87-3	1000
Phosphorus Trichloride	7719-12-2	1000
Phosphoryl Chloride (also called Phosphorus Oxychloride)	10025-87-3	1000
Propargyl Bromide	106-96-7	100
Propyl Nitrate	627-3-4	2500
Sarin	107-44-8	100
Selenium Hexafluoride	7783-79-1	1000
Stibine (Antimony Hydride)	7803-52-3	500
Sulfur Dioxide (liquid)	7446-09-5	1000
Sulfur Pentafluoride	5714-22-7	250
Sulfur Tetrafluoride	7783-60-0	250
Sulfur Trioxide (also called Sulfuric Anhydride)	7446-11-9	1000
Sulfuric Anhydride (also called Sulfur Trioxide)	7446-11-9	1000
Tellurium Hexafluoride	7783-80-4	250
Tetrafluoroethylene	116-14-3	5000
Tetrafluorohydrazine	10036-47-2	5000
Tetramethyl Lead	75-74-1	1000
Thionyl Chloride	7719-09-7	250
Trichloro (Chloromethyl) Silane	1558-25-4	100
Trichloro (dichlorophenyl) Silane	27137-85-5	2500
Trichlorosilane	10025-78-2	5000
Trifluorochloroethylene	79-38-9	10000
Trimethyoxysilane	2487-90-3	1500

* Chemical Abstract Service Number
** Threshold Quantity in Pounds (Amount necessary to be covered by this standard)

[57 FR 6356, Feb. 24, 1992; corrected at 57 FR 7847, Mar. 4, 1992]

2.3 Airborne Containments

2.3.1 Air Containments – 29CFR1910.1000

Managers must assure that employee's exposure to many hazardous substances is limited per OSHA rules.

Under OSHA rules, Qualis must first try to bring these concentrations to acceptable limits by administrative or engineering controls. If controls are not feasible, then use of protective equipment to give equivalent protection is allowed. The specific equipment to be used must be approved by an Industrial Hygienist or other qualified person from the Safety and Environmental Office. If you plan to use any of these chemicals in a manner or quantity that MIGHT exceed the limits given in the tables, notify the Safety and Environmental Office for guidance and rules before starting their use!

OSHA's tables of chemicals are included in Appendix 4.1 and addressed below:

(1) Table Z-1
This table covers many chemicals that may be in work places. The meanings of the various columns on the Tables are explained in notes to the Tables.

(2) Table Z-2
This table is self-explanatory and allows some brief periods of higher concentrations of these chemicals.

(3) Table Z-3
This table lists some dust limits.

(4) Calculations
The OSHA regulations give five specific rules for testing and using test data to calculate whether we are in compliance. The Safety and Environmental Office will conduct these analyses, as well as its consultants in this area, and the area manager.

2.3.2 Ventilation – 29CFR1910.94

OSHA sets ventilation and related rules on several specialty areas.

(1) Abrasive Blasting

Breathing levels of dust must not exceed other OSHA standard for both operators and other workers in the area. If organic materials are combustible (walnut shells, etc.), special construction is required to reduce the danger of explosions or fire. Facilities must design and the Safety and Environmental Office must approve such installations. Blast-cleaning enclosures must be ventilated in a manner to cause airflows inward at all openings during blasting operations. Managers must assure that after blasting operations are complete that the exhaust systems run long enough to remove dusty air in the enclosure before unprotected personnel enter the area. Managers must also assure the static pressure drop of exhaust systems is checked routinely and cleaning is performed when checks indicate a partial blockage.

Managers must assure that their employees who are exposed to blasting dust wear only Bureau of Mines approved abrasive blasting respirators. Air supplies to abrasive respirators must meet ANSI Z9.2 requirements for purity. Air from common central compressors is not satisfactory without extensive additional filtering and treatment. Operators shall also be provided and use heavy canvas or leather gloves and aprons. Safety shoes are also required.

(2) Grinding, Polishing, and Buffing Operations

If grinding produces dust or particles exceeding other OSHA limits, separate exhaust systems are needed. Facilities must design and the Safety and Environmental Office must approve ventilation systems that meet the specific OSHA requirements for airflow, design, etc.. Managers shall assure their operations either does not require ventilation or that ventilation systems are installed and working properly.

(3) Spray Finishing Operations (Paint Booths)

All spray booth rooms must be designed and installed to OSHA and referenced NFPA and ANSI standards. Design and installation is the responsibility of Facilities with review by the Safety and Environmental Office. Regulations cover construction materials, ventilation, ducts, etc.. Managers must assure that the booths, rooms, related equipment, and safety devices are properly maintained, operational and not bypassed by operators.

(4) Open surface Tanks

This covers dip tanks, vapor degreasers, etc.. Again, the ventilation system must meet OSHA and referenced ANSI standards. Facilities is responsible for the design and installation of such systems with review by the Safety and

Environmental Office. OSHA specifically sets exhaust flow rates over tanks based on toxicity levels. Managers shall assure ventilation equipment is working properly and is not bypassed by operators. Each employee shall be instructed as to the hazards of their respective jobs, personnel protection requirements, and in first aid procedures applicable to these hazards. Managers must provide and assure use of protective footwear to keep feet dry in wet areas. Long gloves must also be provided and must be impervious to the liquid involved and must be replaced if corrosive or irritating contaminants get inside. If the employee may get wet, aprons, coats, etc. that are impervious to the liquid involved must be provided and worn. If splashing is possible, chemical goggles or face shields must be provided and worn. ash down provisions must be provided for employee use in case they become contaminated, and managers must assure their ease of access and operability.

Managers shall not allow employees to work using open tanks if they have a sore, burn, or other skin lesion, which requires a doctor's attention unless their return to work is authorized by a physician. Any smaller abrasion, cut, rash, open sore, which is found by managers or reported by employees, shall be treated by the Company First Aid facility. Managers must also provide locker space and require its use to prevent contamination of street clothing.

2.4 Machinery and Material Handling

2.4.1 Handling Material – General – 29CFR1910.176

Managers shall assure aisles are marked, adequate, and kept clear for mechanical handling equipment passage and use. Also assure materials are not stacked or stored in a manner that is unstable or where they could slide or collapse. Storage areas must be kept free of any accumulation of hazards – tripping, fire, explosion, or pest harborage.

2.4.2 Guarding Requirements – 29CFR1910.212

Managers shall ensure one or more methods of machine guarding are provided to protect the operator and other employees from hazards such as rotating parts, flying chips, sparks, etc.. Examples of guarding methods are barrier guards, two-handed tripping devices, electronic safety devices, etc.. Guards shall not be removed unless authorized by the Safety and Environmental Office. Guards shall be such as to keep the operator from having any part of his or her body in the danger zone during the machine operating cycle. Where appropriate, provide and require use of hand tools for the placing and removing of material in machines to keep the operator from having to place his or her hand in the danger zone.

If fans are used, the blades shall be guarded with openings no larger than ½ inch (in the smallest dimension) or shall be more than seven (7) feet above floor level.

2.4.3 Hand and Portable Powered Tools and Other Hand Held Equipment – General – 29CFR1910.242

Managers are responsible for the safe condition of tools and equipment used by the employees whether Company or employee owned.

2.4.4 Guarding of Portable Powered Tools – 29CFR1910.243

Managers shall assure any portable power tool is guarded to OSHA standards. In case of doubt, ask the Safety and Environmental Office for an evaluation. Facilities personnel using explosive actuated fastening tools shall receive and follow detailed OSHA rules for their use.

2.5 Confined Spaces

2.5.1 Confined Spaces – 29CFR1910.146

Managers shall assure no confined spaces exist or are created in their areas without the Safety and Environmental Office approval and the implementation of a written **permit system (see Qualis-PP3-532**), assistant programs, lifesaving equipment, etc.. Confined spaces are any that a person can get in to that are not designed for occupancy (i.e. tanks, sewer systems, pits, etc.) and have limited or restricted means of entry or exit.

Section 3.0 – Specialty Areas

3.1 Personal Protective Equipment

3.1.1 Eye and Face Protection – 29CFR1910.133

The company must provide eye and face protective equipment if there is a reasonable probability that an injury could be prevented by its use! Managers must make suitable types of protectors available to the employee and assure that the employees use them. Never send am unprotected employee into a hazardous environmental condition! Provide protection from the hazards of flying objects (thrown from machines), glare, liquids, injurious radiation or any combination of them.

Provided equipment must be safe, provide protection from the likely hazards, be comfortable (as possible), fit properly, be cleanable and disinfectable, and be clean and in good repair.

If corrective (prescription) lenses are required by the employee, they must be provided per **Qualis Procedure Qualis-PP3-511** or equipment that fits over the employee's own glasses shall be provided.

3.1.2 Respiratory Protection – 29CFR1910.134

When engineering controls cannot be maintained to control air contamination (dust. fogs, fumes, mists, gasses, smokes, sprays, vapors) below hazardous levels, appropriate respirators shall be provided to and used by employees. Qualis' **Respiratory Protective Program** is described in **Company Procedure Qualis-PP3-512**. Managers are responsible for providing equipment, use instructions, training, fitting (if applicable), and other information as required by the Procedure.

Only personnel who have been certified and who are wearing properly fitted devices shall be allowed to work in areas where air contamination is or could be present.

3.1.3 Head Protection – 29CFR1910.135

Workers in areas where impact and penetration from falling or flying objects is possible shall be provided and wear helmets meeting ANSI Z89.1. Similarly, workers that may be subject to electric shock and burn shall be provided insulate helmets.

3.1.4 Occupational Foot Protection – 29CFR1910.136

Workers requiring safety-toe footwear shall be provided footwear that meets ANSI Z41 per the provisions of Company Procedure Qualis-PP3-511.

3.1.5 Electrical Protective Devices – 29CFR1910.137

Electrical workers shall be provided rubber protective equipment such as gloves, mats, blankets, hoods, sleeves, and etc. meeting applicable OSHA and ANSI standards (see 3.5.5 also).

3.1.6 Hand Protection – 29CFR1910.138

Workers requiring hand protection shall be provided gloves of a material and construction that will protect hands from the hazards involved.

3.2 Noise Control

3.2.1 Occupational Noise Exposure – 29CFR1910.95

Hearing protection is required when sound levels exceed the following singly or in combination:

Duration per Day in Hours	dBA
8	90
6	92
4	95
3	97
2	100
1-1/2	102
1	105
½	110
¼ or less	115
impact / impulsive	140

Every employee subject to the above noise levels must be fully informed of the hazards; the features of various Company provided protective devices, their use and their care; and of the purpose of audiometric testing of their hearing levels.

The safety and Environmental Office is responsible for operating a hearing conservation program for employees in any area where the eight (8) hour dB level exceeds 85 dB. See Qualis' **Hearing Conservation Program, Company Procedure Qualis-PP#-503**.

Managers must have their work areas tested if they suspect sound levels exceed the above. If sound levels do exceed these levels, area Management and Facilities should first look at administrative or engineering controls to bring sound levels down. If reduction to safe levels is not fully achievable, hearing protective devices must be provided and used that reduce the perceived dB level below the above limits. Since different plugs and other devices have different dB reduction levels, Managers shall assure appropriate ones are used!

3.3 Radiation

3.3.1 Non-Ionizing Radiation (Electromagnetic Radiation) – 29CFR1910.97

If employee exposure to electromagnetic radiation (laser, radars, microwaves, etc.) is possible, the Safety and Environmental Office shall be notified and a

control program shall be developed, approved by the Safety and environmental Office, and be in place before employees are subjected to radiation.

OSHA requires employees protection from radio frequency radiation if the limit of ten (10) milliwatt / square centimeter is exceeded in any possible six (6) minute period either to the whole body or to a part of the body. Managers shall assure appropriate warning signs ("Warning: radio-Frequency Radiation / Hazard") with OSHA required visual features are posted in radio frequency radiation areas.

In laser operations, employee protection should be in accordance with ANSI Z 136.1, "safe Use of Lasers" requirements or with military equivalents to the ANSI specification. Warning signs shall be per ANSI or military requirements.

3.3.2 Ionizing Radiation – 29CFR1910.1096

Ionizing radiation is alpha, beta, gamma, X-ray, neutrons, high-speed electrons, protons, or other atomic particles usually associated with radioactivity. Operations involving radioactive materials or radiation must establish Restricted Areas, which are controlled to protect individuals from exposure to radiation or radioactive materials. Allowable dose rates are set, signage established, surveys required, personnel monitoring required, emergency warning signals required, and reporting of incidents are required by these OSHA Regulations.

Work involving source material, by-product materials, or special nuclear material under NRC or NRC agreement State licensing and 10CFR20, when meeting the license and 10CFR20, meets these OSHA requirements. Similarly, use of other sources that are registered or licensed by an agreement state, when meeting the State laws, meet these OSHA requirements.

Managers must notify the Safety and Environmental Office and the Qualis Radiation Safety Officer of any new radioactive related work being planned well before the start of work. Establishment of programs, procedures, licenses, etc. can take considerable time.

3.4 Control of Hazardous Energy (Lockout / Tagout)

3.4.1 Lockout / Tagout – 29CFR1910.147

Procedure Qualis-PP3-531 describes Qualis' **Lockout / Tagout Program** and shall be followed. Each manager responsible for employees who perform servicing and maintenance of machines and equipment shall assure his or her employees have been trained, certified, and use proper lockout / Tagout procedures. Lockout /

tagout shall protect employees from unexpected energization or release of stored energy.

Each manager is also responsible for assuring all employees who could be affected by a lockout / tagout are kept informed of lockout / tagout operations per the Procedure.

3.5 Electrical Energy

3.5.1 Design Safety Standards – 29CFR1910.302-.308

Architects and Facilities are responsible for the design, specification, and installation of electrical systems in accordance with OSHA requirements.

3.5.2 Training and Qualification – 29CFR1910.332

Managers must provide training to employees who face a risk of electrical shock that is not reduced to a safe level by proper electrical design and installation. Training is not required for people exposed to parts of electric circuits operating below 50 V to ground. Training may be required for electronic and electrical engineers, equipment assemblers, test technicians, electricians, repair and maintenance personnel, etc.. Only qualified persons (qualified by training) are to be permitted to work on or near exposed parts. Qualification training shall include the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment, the skills and techniques necessary to determine the normal voltage of exposed live parts, and the clearance distances specified by OSHA corresponding voltage levels. Training shall be in classrooms or on-the-job. The amount of training shall be commensurate with the risk to the employee. OSHA rules shall be fully covered in the training. Training must be documented.

3.5.3 Selection and Use of Work Practices – 29CFR1910.333

Managers shall provide and enforce safety related work practices to prevent electric shock or other injury to employees from direct or indirect electrical contacts. The practices must be consistent with the nature and extent of the hazard.

Managers shall assure that live parts are de-energized before work on or near them occurs (Exceptions may be allowed if de-energization creates other hazards that increase or add risk to employees). If not de-energized, other specific practices shall be used to protect employees as covered in 2 below.

1. Working on or near de-energized parts

If lockout / tagout has not occurred, treat parts as energized. Whenever possible, lockout / tagout **Procedure Qualis-PP3-531** shall be followed as well as the following:

a) Safe procedures for de-energizing circuits shall be determined before starting to de-energize items. Disconnect from all electrical energy sources. Control circuit devices (push buttons, selector switches, interlocks, etc.) are not to be the sole means of de-energization.

b) Operating controls shall be exercised to verify the equipment cannot be restarted.

c) Test circuit elements with test equipment to verify de-energization. If circuits are over 600 V nominal, the test equipment must be checked for proper operation immediately before and after use.

After repairs, a qualified person shall visually inspect and test to verify tools, jumpers, grounds and other devices have been removed and it is safe to re-energize the item.

2. Working on or near exposed energized parts

Only qualified persons may work on or near energized parts. On high voltage lines, even qualified persons shall keep a safe distance (see table below) unless special isolation and insulation practices are followed:

Volts	Minimum Approach Distance
300 V and less	Avoid Contact
to 750 V	1 foot
to 2 kV	1-1/2 feet
to 15 kV	2 feet
to 37 kV	3 feet
to 87.5 kV	3-1/2 feet
to 121 kV	4 feet
to 140 kV	4-1/2 feet

Managers shall assure adequate illumination is provided for workers to work safely. Employees many not reach blindly into areas that may contain energized parts. If work must be done in a confined space, managers shall

provide and assure the use of shields, barriers, or insulating materials to avoid inadvertent contact with energized parts. Doors, etc. shall be blocked open. If ladders are used, they shall be non-conductive if they could contact energized parts. Employees shall remove conductive articles of clothing (watch, rings, conductive thread containing cloth, etc.) before working on energized areas. Any temporarily defeated interlocks shall be returned to operable condition after work is completed.

3.5.4 Use of Equipment – 29CFR1910.334

1. Portable equipment
   Managers shall assure that portable equipment (cord and plug items) are properly handled, are not carried or lifted by their power cord, and that their cords are not stapled to walls or used in a way that could damage their outer insulation.

   Employees shall be instructed to visually inspect each item before use for external defects (loose parts, cord damage, etc.) or possible internal damage (dented covers, etc.). Remove defective items from service. Verify extension cords are of a size and grounding configuration compatible with the equipment. Only equipment suitable for wet area use shall be used in wet areas. Do not let employees plug / unplug equipment if their hands of the plugs are wet.

2. Power and Lighting Circuits
   Repetitive replacing of fuses or re-setting of circuit breakers shall not be permitted unless the Manager can be shown that it was not caused by a fault condition. No modification of over-current protection shall be allowed, even on a temporary basis.

3. Test Instruments
   Only qualified persons may perform testing work. All test instruments shall be visually inspected before use for defects and damage. If rejected, remove from service and keep any employee from using it until repairs and tests have rendered it safe for re-use.

4. Flammable / Ignitable Material
   Equipment used in flammable environments shall be safe for use in flammable environments. If flammable materials are present only occasionally,

managers shall keep electric equipment capable of igniting them from being used.

3.5.5 Safeguards for Personal Protection – 29CFR1910.335

Managers shall provide and assure the use of appropriate personnel protective equipment. It shall be in a safe, reliable condition before use. If the insulating capability is subject to damage, added protective covers shall be provided. Employees shall wear non-conductive headgear whenever there is danger of head injury due to shock reactions or from burns due to contacts with energized parts. Protective eye gear shall be used whenever electric arcs or flashes are possible or when flying objects from an electrical explosion are possible.

Insulated tools and handling equipment shall be used if tool or equipment contact with energized parts is possible. Safety ropes or hand-lines shall be non-conductive. In addition to the required use of shields, barriers or insulating materials by qualified employees, such items shall also be used to protect unqualified persons from contact with live parts.

Safety warning and alert systems shall be used to warn employees of electrical hazards. Safety signs, symbols, and prevention tags shall be used. Barricades shall also be used to prevent or limit employee access to exposed work areas. If necessary, managers shall station attendants to warn and protect other employees

3.6 Compress Gases

3.6.1 Compressed Gases (General) – 29CFR1910.101-.105

Managers must verify that gas cylinders are in a safe condition to the extent possible by visual inspection. Inspections for most cylinders are Qualis shall be per Compressed Gas Association pamphlets, and shall assure that pressure relief devices are installed and appear to be properly maintained. Managers shall assure acetylene cylinders are handled, stored, and utilized per CGAP G-1. Hydrogen systems of over 4,000 cubit feet must meet specific rules, as do oxygen systems with over 13,000 cubic feet. Nitrous oxide cylinders must be used per CGAP G-1.

3.6.2 Air Receivers – 29CFR1910.169

Facilities is responsible for providing and maintaining fixed air receivers (tanks) in compliance with OSHA and ASME codes. Managers are responsible for any portable air receivers they use. Contact the Safety and environmental Office for requirements before such systems are purchased, built, or used.

3.6.3 Liquefied Petroleum Gasses, Anhydrous Ammonia – 29CFR1910.110-.111

Any operations requiring use of liquefied petroleum gas or ammonia systems shall be designed and installed by facilities and reviewed by the Safety and Environmental Office to all OSHA rules before entering into use.

3.7 Chemicals

3.7.1 Occupational Exposure to Hazardous Chemicals in Laboratories – 29CFR1910.1450

Each manager responsible for a laboratory where hazardous chemicals are used shall either establish and publish a "Chemical Hygiene Plan" and designate a "Hygiene Officer" for that laboratory or shall use the standard "Chemical Hygiene Plan" (company Procedure Qualis-PP3-522) issued by the Safety and Environmental Office. Non-standard Plans shall fully comply with 29cfr1910.1450 and shall be approved by the Safety and Environmental Office. All laboratory personnel shall fully comply with the Plan's requirements and the manager shall enforce compliance.

The manager shall measure employee's exposure levels to chemicals if there is any reason to believe that exposure levels routinely reach OSHA action limit or the PEL for that chemical. If any action level is exceeded, routine-monitoring programs must be installed and employees notified of the results. Employees shall receive training on all chemicals present and when new ones are added. Training shall include detection information and protective measure that shall be used. Medical exams by licensed physicians at Company expense and on Company time shall be provided employees when signs or symptoms associated with chemical illness occur, when exposure levels are routinely at or above the action level or PEL, when medical controls are set by other OSHA standards (29CFR1910.1002, etc.) and whenever an "event" takes place (i.e. a spill, leak, explosion, etc.) that results in a likely hazardous exposure. Medical records shall be kept per 29CFR1910.1020.

3.7.2 Hazardous Waste Operations and Emergency Response – 29CFR1910.120

If Qualis becomes involved in a hazardous material site cleanup operation, treatment facilities, etc., many OSHA requirements apply. The safety and Environmental Office and the applicable manager(s) will work to develop, document, train, and control employees working on such sites.

states otherwise, all employees shall be evacuated from the danger area and no employee shall be allowed to assist the responsible activity (Fire Department, etc.) in handling the emergency. Evacuations shall be as covered in the emergency Plan

3.7.3 Asbestos – 29CFR1910.1001

OSHA requires that no employee be exposed to an airborne concentration of asbestos or asbestos forms or a concentration in excess of 0.1 fiber/cc of air as an eight (8) hour time-weighted average or 1 fiber/cc of air (averaged) over a 30-minute sample. If any manager suspects asbestos or similar fibers are present in a work place, notify the Safety and Environmental Office for verification, testing, air sampling, monitoring, posting of results, and corrective action. Certain flooring tiles and thermal insulation installed prior to 1980 is Presumed Asbestos Containing Material until proven otherwise. Areas with known or presumed asbestos containing materials will be identified, monitored, posted per OSHA regulations, and controlled. If required, respirators, protective work clothing and equipment, hygiene facilities, hazard communication to employees, housekeeping systems, medical surveillance, and record keeping systems in compliance with OSHA rules will be put into place. Employees or their representative may observe any monitoring.

3.7.4 Carcinogens – 29CFR1910.1003

OSHA has set rules for certain chemicals listed below. If these chemicals are used, specific plans and procedures shall be put into place to assure their safe use. Managers shall notify the Safety and Environmental Office prior to any use of the following chemicals:

Name	CAS Number
4-Nitrobipheny	92933
Alpha-Naphthylamine	134327
Methyl Chloromethyl Ether	107302
3,3'-Dichlorobenzidine (and its salts)	91941
Bis-Chloromethyl Ether	542881
Beta-Naphthylamine	91598
Benzidine	92875
4-Aminodiphenyl	92671
Ethyleneimine	151564

N-Nitrosodimethylamine 62759

3.7.5 Lead – 29CFR1910.1025

OSHA requires that no employee be exposed to an airborne concentration of lead over 50 micrograms per cubic meter averaged over an 8-hour period. If any operation involving lead is planned, notify the Safety and Environmental Office and Facilities so lead controls can be established and implemented.

3.8 Flammables / Explosives

3.8.1 Flammable and Combustible Liquids – 29CFR1910.106

The following definitions apply: Flammable liquids have a flash point below 100°F and are Class I liquids. Class I is sub-divided into 3 sub-classes (with Class IA being the most dangerous). Combustible liquids are Class II (with flash points between 100 - 140°F) and Class III (flash points over 140°F).

1.) Plant Use Controls

If you are planning to use flammable or combustible liquids in a manufacturing or laboratory operation, get advance approval from Facilities. Then, in addition to complying with all the rules in (2) through (9) below, managers of areas that use flammable or combustible liquids shall also assure compliance with the following:

a) Materials outside of a storage room or cabinet shall not exceed 25 gallons of Class IA; or 120 gallons of IB, C, II, or III if in containers; or 660 gallons if in a tank.
b) Areas where fluids are transferred from one container to another shall be separated from other operations in the building and shall have drainage controls to handle spills.
c) Liquids shall be kept in covered containers when not actually in use.
d) If spills could occur in use, safe and promptly available containment systems shall be in place.
e) Class I liquids cannot be used where open flames or other sources of ignition are in the possible fume or vapor path(s).
f) Transfers must be by a flammable material pump on the top of the container or a self-closing valve on gravity feed containers. Tilting of storage containers is not permitted.

g) Managers shall not allow employees to dispense Class I liquids form one container to another unless static grounds are installed that interconnect the two containers. Managers shall monitor operations to assure adequate precautions are taken to prevent other sources of ignition (open flames, lightening, smoking, cutting or welding, hot surfaces, frictional heat, static / electrical / mechanical sparks, spontaneous ignition, heat producing chemical reactions, radiant heat, etc.) from being a potential hazard.
h) Managers shall not move Flammable / Combustible liquid operations to a new area without permission of the Safety and Environmental Office and Facilities.
i) Managers shall assure good housekeeping is maintained at all times. Operating procedures shall minimize or eliminate any spills or leakages of Flammable / Combustible liquids. Spills shall be promptly cleaned up. Aisles shall be maintained both for safe egress and for use in fire fighting. Combustible waste shall be stored in covered metal receptacles and shall be disposed of daily in a safe and proper manner.

2.) Other Plant Controls

If any manager wants to install a process where flammable / combustible liquids are used in chemical processing operations, special facility construction rules must be met by Facilities. Facilities and the Safety and Environmental Office are also responsible for deciding if any plant area needs special fire control equipment or features to control the special hazards of the operations.

Facilities is responsible for assuring all electrical equipment and repair work meets OSHA requirements in areas where vapors could be present.

3.) Tanks (Fixed)

When tanks are used to store these liquids, Facilities is responsible for their design and installation (with the Safety and Environmental Office review) to OSHA regulations. This includes drainage and diking provisions to contain spills. Managers using such tanks shall be sure they are properly maintained and used and their employees do not bypass those safety features.

Section 3.0 – Specialty Areas

4.) Containers and Portable Tanks

Containers may not exceed 60 gallons / container and do include aerosols. Portable tanks may contain up to 660 gallons. Managers shall assure flammable and combustible liquids in containers or tanks are limited as follows:

Maximum Size Limits

Container	Class IA, B, C			Class II	Class III
	A	B	C		
Glass / Plastic	1 pint	1 quart	1 gallon	1 gallon	1 gallon
Metal (not DOT)	1 gallon	5 gallons	5 gallons	5 gallons	5 gallons
Safety Cans	2 gallons	5 gallons	5 gallons	5 gallons	5 gallons
Metal Drum (DOT)	60 gallons	60 gallons	60 gallons	60 gallons	60 gallons
Portable Tank	660 gallons	660 gallons	660 gallons	660 gallons	660 gallons

5.) Storage Cabinets

Managers must assure that no more that 60 gallons of Class I or II or 120 gallons of Class III are placed in a storage cabinet. Storage cabinets must meet stringent OSHA and NFPA standards and managers shall only purchase them with the approval of the Safety and Environmental Office.

6.) Inside Storage Rooms

If an inside storage room is needed, Facilities must design and build it for this purpose with review by the Safety and Environmental Office. Specific construction materials, diking, opening controls, etc. are required per OSHA / NFPA requirements. Managers must assure rooms are not used to store more than the following:

Automatic Fire Protection	Fire Rating	Maximum Size	Gallons/Square Feet of Floor Area
Yes	2 hours	500 sq/ft	10
No	2 hours	500 sq/ft	5

Yes	1 hour	150 sq/ft	4
No	1 hour	150 sq/ft	2

Section 3.0 – Specialty Areas

In addition, managers shall deep one clear aisle at least three (3) feet wide for access / escape. Do not double stack containers over 30 gallons in size. Do not dispense liquids in the room unless an approved pump (see the Safety and Environmental Office) or a self-closing faucet is used on the dispensing container.

7.) Other Storage Inside Buildings

Managers shall assure flammable or combustible liquids are not stored where they could limit use of exits, stairs, or aisles needed for safe egress of employees. Storage in office areas is prohibited except as needed for equipment operations or maintenance operations. Storage must be in (1) closed metal containers inside a storage cabinet or, (2) in safety cans, or (3) in an inside storage room that does not have a door into public areas of the building.

8.) Storage Outside of Work Buildings

If stored in a separate storage building, that building must be located and constructed by Facilities to OSHA rules. Managers will be notified of their special storage rules for these buildings, if any.

If not stored inside a storage building, location and capabilities shall be set by Facilities and the Safety and Environmental Office per OSHA requirements and must include drainage control provisions and security controls.

9.) Fire Controls

Any storage of any flammable or combustible liquid shall meet the following rules. Managers and supervisors shall enforce these rules.

a) Suitable fire extinguishers shall be available at the storage locations. A 12-B rated extinguisher must be not more than ten (10) feet from the door of an inside storage room. Any other Class I or II liquid storage areas in a building must have a 12-B unit not closer than ten (10) feet nor more that 25 feet from the area.
b) No smoking or open fires shall be permitted in the storage area.
c) Material that will react with water (dry acids, etc.) shall not be stored in the same room with flammable or combustible liquids.

3.8.2 Spray Finishing Using Flammables / Combustible Materials – 29CFR1910.107

Manufacturing managers shall assure the following rules are met in areas where spray-painting or similar combustible or flammable operations are performed.

1.) Spray booths and their ventilation systems must be designed, built, and installed to stringent OSHA standards (also see Subpart 2C). Facilities is responsible for these operations with the Safety and Environmental Office review. Managers shall not allow employees to use booths with non-functioning equipment or to bypass safety controls.
2.) Drying or curing equipment shall meet NFPA 86A.
3.) Only sufficient liquids for one (1) day / 1 shift should be allowed in the area. Bulk storage shall be in another building or isolated per earlier storage requirements.
4.) No glass or open containers shall be used.
5.) Transfer of liquids, mixing, etc. shall be only be done in a suitable mixing room or in the spray area. Ventilating systems must be in operations.
6.) Spray equipment must meet ASME Codes for pressure vessels if of a pressurized type. Controls must prevent over pressurization of hoses, pipes, and accessories.
7.) Spray equipment shall be inspected regularly (weekly or before each use) at the in-service maximum operating pressure.
8.) Whenever flammable / combustible liquids are transferred, both containers shall be bonded and grounded to prevent static electricity sparks (regardless of the class of the liquid!).
9.) Sprinkler systems shall be properly maintained, if installed, and an adequate supply of fire extinguishers shall be installed near all spraying areas.
10.) "No Smoking" signs, in large contrasting colors, shall be posted conspicuously at all spraying areas and paint storage rooms. Managers shall enforce compliance and shall use disciplinary action where needed.

In addition to the above rules, there are specific OSHA rules for electrostatic equipment, drying and curing ovens, power coating, and for spraying operations using dual component coatings (especially organic peroxides). Facilities and the Safety and Environmental Office are responsible for assuring their installation meets OSHA rules and for providing managers with supplemental guidance before such systems are used.

3.8.3 Dip tanks with Flammables or Combustible Liquids – 29CFR1910.108

Any dip tank system using flammable / combustible liquids must be designed or approved and installed by Facilities with review by the Safety and Environmental Office. Specific OSHA rules on ventilation, construction, control of ignition sources, automatic fire extinguishing systems, etc. must be covered. Managers are responsible for keeping tank areas completely free of combustible debris, providing waste cans for waste or rags, emptying cans at the end of every shift, conducting safety inspections or tests of covers, drains, valves, wiring equipment, grounding, ventilation, and fire extinguishing items; and getting any hazard repaired / replaced before allowing work to continue.

3.8.4 Dipping and Coating Operations – 29CFR1910.123-.126

Any process that involves a dip tank (with other than water and even if not flammable) must be designed by Facilities and reviewed by the Safety and Environmental Office for compliance with these rules. Dip tanks include vapor degreasers, passivation tanks, etc.. It also includes drying equipment used following dipping.

3.8.5 Explosive and Blasting Agents – 29CFR1910.109

OSHA's general rule for explosives is that "no person shall store, handle, or transport explosives or blasting agents when such storage, handling, or transportation of explosives or blasting agents constitutes and undue hazard to life". OSHA requires Class A, B, and C explosives (as classified by DOT) to be stored in magazines designed and constructed per OSHA rules. Facilities is responsible for magazine design and construction. Managers are responsible for assuring no explosive is brought into Qualis facilities without all proper controls. Explosive receipt, storage, handling, use and disposal must be in conformance with a Plan approved by the Safety and Environmental Office.

Small arms ammunition shall be separated from any flammable liquids, flammable solids, and from oxidizing materials by a fire-resistant wall of one (1) hour rating or by a distance of 25 feet.

3.9 Welding / Cutting

3.9.1 Welding and Cutting, General – 29CFR1910.252

1.) Fire Prevention and Protection

Managers must ensure fire prevention and protection for any welding operation, including that of repair subcontractors performing work on facilities, equipment, etc..

a) Move the welding to a safe area or move all fire hazards in the vicinity, if possible.

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b) If welding or fire hazards cannot be moved, use guards or shields to confine the heat, sparks, and slag, and to protect the fire hazard.
c) If you cannot do either of the above, welding shall not be allowed.

Other precautions managers shall take include:

a) Assure no opening exists where sparks, etc. could fall through to reach other combustible material.
b) Fire extinguishers must be maintained in a state of readiness for instant use. Buckets of water and sand as well as regular extinguishers may be used.
c) If welding is performed in an area where other than a minor fire could occur, firewatchers shall be assigned. They shall have extinguishers available and be trained in their use. They shall know how to sound an alarm in the event of a fire. They shall try to extinguish only those fires controllable by their extinguisher equipment – otherwise, sound the alarm. Firewatchers shall be maintained for at least ½ hour after completion of welding / cutting operation to detect smoldering fires.
d) Before cutting or welding is permitted in new areas, the area shall be inspected by the manager. He shall designate precautions before granting authority to perform welding or cutting (preferably in writing).
e) Do not allow welding in areas not authorized by management.
f) Do not allow welding in sprinkler-protected buildings when the sprinkler system is impaired.
g) Do not allow welding in the presence of explosive atmospheres.

h) Do not allow welding near storage of large quantities of readily ignitable materials (35 feet minimum rule).
i) Do not allow welding where heat can directly reach a combustible wall, ceiling, etc..

The Director of Facilities (or designated Facilities Supervisor) or a specifically designated manager at remote facilities are the only persons who can authorize cutting and welding operations (via a hot work permit) in areas not specifically designed for such processes. These personnel shall be fully aware of the OSHA rules and regulations beyond those stated in this Manual.

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2.) Protection of Personnel

Managers shall ensure welders working at heights are protected against falling. They shall also assure welding cables, etc. are kept clear of passageways, ladders, and stairways.

Welders, helpers, and attendants shall use helmets or hard shields if arcs are possible. Helmets shall protect the face, neck, and ears from direct radiant energy from the arc. Helmets and hard shields shall be an insulator for heat and electricity, shall not be readily flammable, and shall be capable of sterilization. Filters shall be used where needed to protect the eyes, shall meet ANSI Z87.1 standards, and shall be marked as to their shade. Goggles shall be used during gas welding and cutting operations.

Managers shall assure welders' booths have low reflectivity wall coatings (zinc oxide, lamp black) that absorb ultraviolet radiations. Booths and screens shall allow air circulation at floor level. Workers or others in adjacent areas shall be protected from rays by screens or shields or shall wear appropriate goggles. Appropriate clothing and other personal protective equipment as required and suitable to the work performed shall protect welders. Welding shall not be allowed in confined spaces except with special safety controls approved by the Safety and Environmental Office.

3.) Health Protection and Ventilation

Managers shall assure screens are arranged so no serious restriction of ventilation exists. If toxic fumes, gasses or dusts are generated that exceed OSHA air contamination levels, local exhaust or general ventilation systems shall be provided. Be aware that all welding may produce hazardous fumes and that some items contain cadmium and fluorides and that welded items may contain lead, zinc, mercury, etc.. See the weld material containers for precautions. Facilities is responsible for the facility designs for specified welding areas to meet OSHA ventilation requirements. If new materials are brought into work that may change contamination levels or types, Facilities shall be notified and facility modifications made accordingly.

Managers shall also assure no chlorinated hydrocarbons, trichlorethylene, or perchlorethylene fumes are present in welding areas (These chemicals are

sometimes used for degreasing, cleaning, etc.). These chemicals may break sown into toxic elements when exposed to welding.

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First aid equipment shall be available at all times in welding areas. First aid shall be rendered until medical attention can be provided. Get medical attention for all injuries as soon as possible.

3.9.2 Oxy-fuel Gas Welding and Cutting – 29CFR1910.253

Managers shall never allow mixtures of air/oxygen with fuel gasses except at the burner or in a standard torch. Compressed gas cylinders shall be legibly marked as to their contents and shall have a valve protective cap or other design to protect the valve unless of small size excepted by OSHA. Cylinders must be stored with valves closed and caps on and shall be at least 20 feet from highly combustible materials. Storage areas shall be assigned (not near stairways, gangways, or elevators) and cylinders shall be protected from being knocked over, hit by falling objects, or being tampered with by unauthorized personnel. Storage of fuel gas cylinders should not be inside buildings. Fuel and oxygen cylinders shall not be stored within 20 feet of each other or shall be separated by a ½ hour rated firewall at least five (5) feet high.

Managers shall assure oxygen cylinders are properly handled, kept grease free and that oxygen gas is not allowed to strike an oily substance.

Cylinders shall never be dropped, be allowed to strike each other, or be placed where welding sparks can hit them. Never use a tool to open or close a cylinder valve.

Their managers shall instruct operators in the safe handling, hookup, use and shutdown of cylinders.

3.9.3 Arc Welding and Cutting – 29CFR1910.254

Facilities is responsible for approving and installing all arc welding machinery to OSHA requirements. Managers shall assure machines are used properly and be aware that if more than one machine is used on a single structure, special electrical checks and hookups may be required.

Managers shall assure welders and maintenance personnel are acquainted with 29CFR1910.252 and .254 and if doing gas-shielded arc welding, are acquainted with AWS A6.1. Managers shall also assure all connections to machines are checked, the work lead is firmly attached, coiled cables are spread out (to prevent

overheating), machines are grounded, no cable splices are within ten (10) feet of the holder, all splices or connectors are proper and insulated, and the manufacturer's instructions on equipment use are being followed. Any equipment with a defect or safety hazard shall be disconnected until made safe.

3.9.4 Resistance Welding – 29CFR1910.255

Resistance welding machine approvals and installations shall be the responsibility of Facilities and the Safety and Environmental Office who will assure compliance to OSHA rules. Managers shall assure safeguards are not bypassed in use.

3.10 Shop Machinery and Material Handling

3.10.1 Woodworking Machinery – 29CFR1910.213

Machines and controls shall be approved by the Safety and Environmental Office and installed (if applicable) by Facilities to OSHA requirements. Managers shall assure machine usage does not defeat any safeguards and shall ensure saw blades and cutting edges are kept sharp and clean, bearings are free from wobble or lost motion, and machines are properly adjusted. Any defective parts shall be replaced before further use.

3.10.2 Abrasive Wheel Machinery – 29CFR1910.215

Abrasive wheels shall be guarded unless excepted by OSHA (internal part grinders, wheels 2 inches or smaller in diameter, etc,). Managers shall not allow guards to be removed unless authorized by the Safety and Environmental Office and shall adjust machinery and guards as needed for safe operations. Work rests shall be used to support work on offhand grinding machines and must be kept within a maximum of 1/8 inch form the wheel. These rests must be designed to prevent work from being jammed between the wheel and the rest (Note: Rests may be omitted if the work piece size is large enough that the side guard is sufficient to prevent work from jamming). Managers shall assure replacement wheels are inspected to verify that they are not cracked or broken before use. Replacement wheels shall be properly mounted and fastened. Any difference between original and replacement wheels shall be flagged, and the Safety and Environmental Office shall be requested to make an evaluation of the discrepancy per OSHA rules.

3.10.3 Mechanical Power Presses – 29CFR1910.217

Managers must assure orders for new mechanical power presses require OSHA design compliance. Facilities must approve the installation and must control

any modification to a press including its guarding systems. Managers shall establish die-setting procedures that comply with the safeguards specified by

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OSHA for point of operation protection of the operators. Safety blocks shall be provided and their use enforced whenever dies are being adjusted or repaired in the press. Die-setters shall not be required to reach into the point of operation or other hazard areas to lubricate material, punches, or dies.

Each manager shall ensure the following weekly inspections are performed on each press before use is continued:

1.) Inspect to ensure all parts, auxiliary equipment, and safeguards are in a safe operating condition and adjusted.
2.) Inspect and test the condition of the clutch / brake mechanism, anti-repeat features, and single stroke mechanisms.
3.) Certification records of each inspection and test, and also of all maintenance work shall include the date of the inspection, test or maintenances, the signature of the person who performed the work and the serial number or other identifier of the press.

Managers must also ensure the competency of the personnel maintaining, inspecting, or caring for a press. Operators must be trained and instructed in the safe method of work using the press, shall keep the work area clear with ample space for operations, and shall keep the floor free from obstructions, grease, iol, and water.

If a press uses electronic "presence sensing device initiation", additional rules also apply. The Safety and Environmental Office must approve specific procedures, to OSHA requirements, for this type installation. Operators of PSDI presses shall receive initial training and annual retraining. A written certification of training is required.

In case of an operator injury from a mechanical press, special accident reports from supervisors and Managers are required beyond those specified in 29CFR1904 and Qualis **Procedure Qualis-PP3-501**. Specific information required includes:

1.) Employee's name, injury, and task being performed.
2.) Type of clutch used on the press.

3.) Type of safeguards being used, if not an OSHA standard type, fully describe.
4.) Cause of the accident.

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5.) Type of feeding.
6.) Means used to activate press stroke.
7.) Number of operators required for the operation and the number of operators provided with controls and safeguards.

3.10.4 Forges – 29CFR1910.218

Managers must assure forges are installed, routinely inspected, maintained, and operated per Procedures meeting OSHA requirements for the type of forge. See Mechanical Power Presses also. Procedures must cover lockout / tagout, training, forge and guard inspections, maintenance and safety checks, blocking during die changes, etc.. Certifications of training and records of forge inspections are required (Also see 3.11.2 for access rules).

3.10.5 Jacks – 29CFR1910.177

Managers shall ensure employees using jacks are trained in proper jack use and inspect their jacks at least every six (6) months, after special work on it, when it has gone out of the work area and is returned, and if exposed to an abnormal load or shock. Tag defective jacks to prevent their use.

3.10.6 Servicing Large Tires – 29CFR1910.178

Facilities or outside maintenance firms shall service multi-piece or single piece rim wheels for large trucks, etc. This applies to vehicles whose tires are rated more than "LT" – light truck. If done by Facilities, specific written procedures, employee training, and facility set-ups are required and must be approved by the Safety and Environmental Office before use.

3.10.7 Powered Industrial Trucks (Fork lifts, etc.) – 29CFR1910.178

Facilities and the Safety and Environmental Office must approve the purchase of all new trucks to assure the trucks meet OSHA requirements. Managers must assure existing trucks are not modified or changed in any way that could affect capacity or safe operation without the Manufacturer's written prior approval. Original nameplates and updated plates and markings resulting from authorized modifications shall be kept in a legible condition. Managers must ensure that trucks are not used in explosive or flammable areas unless specifically built and certified for such uses.

If electric powered units are used, battery-charging installations shall be per OSHA rules. Manager shall assure brakes are locked before batteries are charged or changed out. No smoking is allowed in charging areas.

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Managers shall assure carbon monoxide gas from truck exhausts does not exceed OSHA air contamination limits in areas where trucks are used or they shall assure other types of trucks are used.

Only drivers that have been certified by the Safety and Environmental Office per **Qualis Procedure Qualis-PP3-533**, "**Powered Industrial Truck Training**" shall be permitted to drive forklifts and similar powered vehicles. These drivers shall follow all the safety rules set forth in the Fork Lift driver's training Procedure Qualis-PP3-533.

Managers shall assure that any power-operated industrial truck not in safe operating condition is removed from service. Every industrial truck shall be examined before each use, before each shift, or daily to be sure there are no adverse conditions affecting the safety of the vehicle. Repairs and work on industrial trucks shall only be performed by Facilities or by authorized subcontractors and only in safe locations. Facilities is responsible for assuring all repair work complies with OSHA rules.

3.10.8 Overhead and Gantry Cranes – 29CFR1910.179

Installation and maintenance of cranes is the responsibility of Facilities. Purchase of new cranes shall be to applicable OSHA and ANSI standards and must be pre-approved by Facilities. Facilities shall be sure the rated loads are marked on each side of the crane and if more that one lifting unit is installed, that each hoist has its rated load on it. If a crane needs to be modified, the modification must be pre-approved by Facilities and the Safety and Environmental Office. Modified cranes must have their new load rating approved by a qualified engineer or by the equipment manufacturer. Facilities is responsible for assuring all sheaves, ropes, etc. are of the proper design and rating for each crane.

Managers shall only permit designated personnel to operate a crane. Designated personnel shall be familiar with the controls, understand loads and obey the following rules:

- Hoist chains or ropes shall be free from kinks or twists and shall not be wrapped around the load.

- □ Attach loads to the load hook by means of slings or other approved devices.
- □ Be sure the sling clears all obstacles.
- □ Check that the load is will secured and properly balanced before lifting the load.

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- □ Check that multi-art lines are not twisted around each other.
- □ Be sure the hook is over the load to prevent swinging after the lift starts.
- □ Do not allow sudden acceleration or de-acceleration of the moving load.
- □ Be sure the load does not hit any obstacles.
- □ Do not use the crane for side pulls.
- □ Do not hoist, travel or lower any load is an employee is on the load.
- □ Do not carry loads over people.
- □ Test the brakes each time a load near rated capacity is lifted. Test by raising a few inches and then using the brakes to hold the load.
- □ Do not lower the loads to where less than two (2) wraps of rope remain on the hoisting drum.
- □ If two cranes are used on a single load, one operator shall be in charge of the operation and instruct all other personnel.
- □ Never leave the controls while a load is suspended.

Inspections and tests of cranes shall be performed prior to use or after set time periods. Managers responsible for cranes shall assure all required inspections and tests have been performed before allowing employees to use cranes.

1.) Initial Inspection
All new or altered cranes must be fully inspected for compliance to OSHA rules by Facilities and the Safety and Environmental Office prior to use.

2.) Frequent Inspections (Daily unless otherwise authorized by the Safety and Environmental Office)

   a) Check all functional operating mechanisms for maladjustment that interferes with proper operation and for excessive wear of components.
   b) Check for deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems,
   c) Visually inspect hooks for deformation or cracks. If a hook is deformed or cracked, notify the Safety and Environmental Office for special rules governing any further use of it.
   d) Visually inspect hoist chains, end connections, etc. for excessive wear, twist, distortion or stretch beyond the manufacturer's recommendations.

e) Check rope reeving for noncompliance with the manufacturer's requirements.

3.) Periodic Inspection by Facilities (Monthly unless otherwise authorized by the Safety and Environmental Office)

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a) A monthly certified record of visual inspection of ropes (reduction of diameter, broken wires, worn wires, corrosion, end connection problems, kinks, and birdcaging), hoist chains, and end connections (for excessive wear, twist, or distortion, or stretch) is required. This record must show the date of inspection, signature of the person performing the inspection, and an identifier of the crane, chain, or rope that was inspected.
b) Deformed, cracked, or corroded members.
c) Loose bolts or rivets.
d) Cracked or worn sheaves or drums.
e) Worn, cracked or distorted parts such as pins, bearings, shafts, gears, rollers, locking and clamping devices.
f) Load, wind, and other indicators for any significant inaccuracies over their full range.
g) Excessive wear on brake system parts, linings, paws, and ratchets.
h) Power plants for improper performance or noncompliance with applicable safety requirements.
i) Excessive wear of chain drive sprockets and excessive chain stretch.
j) Electrical apparatus condition, including signs of pitting or deterioration of controller contactors, limit switches, and pushbutton stations.

4.) Performance and Safety Tests

All new or altered cranes shall have a documented test report on file per OSHA rules. Test shall include hoisting and lowering, trolley travel, bridge travel, limit switches, locking, and safety devices.

5.) Reuse of Inactive Cranes

a) Certified and documented inspections, by a Facilities designee, of any rope that has been idle for a month or more is required before use.
b) All other inspections specified above shall be conducted on cranes that have been out of service for one (1) month or more before re-use.
c) Standby cranes shall be inspected at least semi-annually.

Preventive maintenance and other maintenance work shall be the responsibility of Facilities and shall be performed in accordance with OSHA rules. Defective hooks, chains, ropes, and other parts shall be replaced before crane reuse. All pendant control stations shall be kept clean and function labels kept legible.

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3.10.9 Slings – 29CFR1910.184

Managers shall assure the following sling use practices are followed:

1.) Do not use defective or damaged slings.
2.) Do not shorten slings with knots, bolts, or other makeshift devices.
3.) Do not use kinked legs.
4.) Do not load in excess of their rated capacity.
5.) Balance loads to prevent slippage.
6.) Securely attach slings to their loads.
7.) Pad or protect slings from sharp edges of loads.
8.) Keep loads clear of all obstructions.
9.) Keep all employees clear of loads about to be lifted or that are lifted.
10.) Keep hands and fingers from between slings and loads when the sling is being tightened around the load.
11.) Shock loading is prohibited.
12.) Do not forcibly pull slings from under a resting load.
13.) Have a competent person inspect slings and fittings every day before use.

Managers shall ensure the inspection personnel and sling sue personnel understand and follow the Sling Use Pamphlet (Qualis-PP3-534) issued by the Safety and Environmental Office.

3.11 Walking Surfaces, Ladders, and Lifts

3.11.1 Facilities – General – 29CFR1910.22

Good housekeeping practices shall be followed. Facilities shall be kept clean, orderly, and in a sanitary condition. Floors shall be clean, and, as practical, dry. If wet processes are used, false floors, platforms, mats, or other dry standing places shall be provided. Aisles shall be kept for forklifts that allow full maneuvering and turns. Usually three (3) feet wider than the load is adequate. Permanent aisles shall be marked (floor markings preferred). Allowable floor loading shall be posted on elevated floors, storage areas, etc..

3.11.2 Other Work Surfaces – 29CFR1910.30

Forging machines must be located to give ample room for handling work and cleaning the machine. Operators cannot stand in aisles.

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3.11.3 Guarding Floor and Wall Openings and Holes – 29CFR1910.23

OSHA's very specific rules for stairs and railings must be met. If any floor openings exist, they must be guarded or covered with manhole covers, gratings, etc.. Facilities has the responsibility of meeting all the responsibility of assuring moveable guards are not removed and that other falling hazards do not exist.

3.11.4 Fixed Industrial Stairs – 29CFR1910.24

OSHA sets specific standards for stair width, use angles, tread size, strength, railings, vertical clearances, etc.. These are the responsibility of Facilities.

3.11.5 Portable Ladders – 29CFR1910.25-.26

Any portable ladders shall meet OSHA standard, shall be properly maintained and used (within appropriate angles, etc.) and shall be inspected regularly. If defective, tag until destroyed. When used for access to a roof, the ladder must extent at least three (3) feet above the roof edge. You are responsible for your equipment, and you are responsible for its use. If you are going to purchase a ladder, contact the Safety and Environmental Office for full requirements.

3.11.6 Fixed Ladders – 29CFR1910.27

Fixed ladders shall meet specific OSHA rules. Facilities is responsible for compliance.

3.11.7 Scaffolding and Moveable Ladder Stands – 29CFR1910.28-.29

Scaffolding and moveable ladder stands shall meet specific OSHA rules. If you are going to purchase scaffolding or stands, contact the Safety and Environmental Office for full requirements. You are responsible for compliance to OSHA requirements on items you buy or use.

3.11.8 Platforms and Manlifts – 29CFR1910.66-.68

OSHA has specific physical requirements for powered platforms, Manlifts, and vehicle mounted work platforms. You have the responsibility of complying with these regulations when you acquire or use any of these items. Managers must be sure that personnel who use such items have been trained in their use,

safety hazards, and safety precautions. Written procedures on their use are also required and must be generated by the using manager if not provided by the manufacturer of the equipment. Contact the Safety and Environmental Office for full requirements if you buy or use such items.

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3.12 Safety Signs and Symbols

3.12.1 Safety Color Codes – 29CFR1910.144

Red shall identify fire protection equipment, danger signs, emergency stop bars and buttons on hazardous machinery, and safety cans or other containers of flammable liquids (flash point of 80˚ F or less). Flammable liquid containers shall also have a yellow band or the name of the contents conspicuously marked in yellow. Yellow shall be the basic color for designating caution and for marking physical hazards. Managers shall assure these color codes are not violated in their areas.

3.12.2 Specifications for Accident Prevention Signs / Tags – 29CFR1910.145

Managers shall assure signs are only ordered via the Safety and Environmental Office and installed by Facilities. The Safety and Environmental Office shall assure signs meet the specific OSHA requirements for each applicable type.

Appendix 4.1

29CFR1910.1000 Air Contaminants (Integrated) Federal and State Regulations, September 1999

Subpart Z – Toxic and hazardous Substances
29CFR1910.1000 Air contaminants
Table Z-1. – Limits for air contaminants

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Acetaldehyde.....	75-07-0	200	360	.....
Acetic acid.....	64-19-7	10	25	.....
Acetic anhydride.....	108-24-7	5	20	.....
Acetone.....	67-64-1	1000	2400	.....
Acetonitrile.....	75-05-8	40	70	.....
2-Acetylaminofluorene; see 1910.1014.....	53-96-3			
Acetylene dichloride; See 1,2-Dichloroethylene.				
Acetylene tetrabromide.	79-27-6	1	14	.....
Acrolein.....	107-02-8	0.1	0.25	.....
Acrylamide.....	79-06-1	.....	0.3	X
Acrylonitrile; see 1910.1045.....	107-13-1			
Aldrin.....	309-00-2	.....	0.25	X
Allyl alcohol.....	107-18-6	2	5	X
Allyl chloride.....	107-05-1	1	3	.....
Allyl glycidyl ether(AGE).....	106-92-3	(C)10	(C)45	.....
Allyl propyl disulfide.	2179-59-1	2	12	.....
alpha-Alumina.....	1344-28-1			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Aluminum Metal (as Al).	7429-90-5			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
4-Aminodiphenyl; see 1910.1011.....	92-67-1			
2-Aminoethanol; ..... see Ethanolamine.....				
2-Aminopyridine.....	504-29-0	0.5	2	.....
Ammonia.....	7664-41-7	50	35	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Ammonium sulfamate.....	7773-06-0			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
n-Amyl acetate.....	628-63-7	100	525	.....
sec-Amyl acetate.....	626-38-0	125	650	.....
Aniline and homologs...	62-53-3	5	19	X
Anisidine				
(o-,p-isomers).....	29191-52-4	.....	0.5	X
Antimony and compounds				
(as Sb).....	7440-36-0	.....	0.5	.....
ANTU (alpha				
Naphthylthiourea)....	86-88-4	.....	0.3	.....
Arsenic, inorganic				
compounds (as As);				
see 1910.1018.....	7440-38-2			
Arsenic, organic				
compounds (as As)....	7440-38-2	.....	0.5	.....
Arsine.....	7784-42-1	0.05	0.2	.....
Asbestos;				
see 1910.1001.....	(4)			
Azinphos-methyl.....	86-50-0	.....	0.2	X
Barium, soluble				
compounds (as Ba)....	7440-39-3	.....	0.5	.....
Barium sulfate.....	7727-43-7			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Benomyl.....	17804-35-2			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Benzene; See 1910.1028.	71-43-2			
See Table Z-2 for				
the limits				
applicable in the				
operations or				
sectors excluded				
in 1910.1028(d)				
Benzidine;				
See 1910.1010.....	92-87-5			
p-Benzoquinone;				
see Quinone.				
Benzo(a)pyrene; see				
Coal tar pitch				
volatiles.....				
Benzoyl peroxide.....	94-36-0	.....	5	.....
Benzyl chloride.....	100-44-7	1	5	.....
Beryllium and				
beryllium compounds				
(as Be).....	7440-41-7		(2)	.....
Biphenyl; see Diphenyl.				

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Bismuth telluride,				
Undoped	1304-82-1			
Total dust		.....	15	.....
Respirable fraction		.....	5	
Boron oxide	1303-86-2			
Total dust		.....	15	.....
Boron trifluoride	7637-07-2	(C)1	(C)3	
Bromine	7726-95-6	0.1	0.7	.....
Bromoform	75-25-2	0.5	5	X
Butadiene				
(1,3-Butadiene); See 29 CFR 1910.1051; 29 CFR 1910.19(1)	106-99-0	1 ppm/5 ppm STEL		.....
Butanethiol;				
see Butyl mercaptan.				
2-Butanone				
(Methyl ethyl ketone)	78-93-3	200	590	.....
2-Butoxyethanol	111-76-2	50	240	X
n-Butyl-acetate	123-86-4	150	710	.....
sec-Butyl acetate	105-46-4	200	950	.....
tert-Butyl-acetate	540-88-5	200	950	.....
n-Butyl alcohol	71-36-3	100	300	.....
sec-Butyl alcohol	78-92-2	150	450	.....
tert-Butyl alcohol	75-65-0	100	300	.....
Butylamine	109-73-9	(C)5	(C)15	X
tert-Butyl chromate				
(as CrO(3))	1189-85-1	.....	(C)0.1	X
n-Butyl glycidyl ether				
(BGE)	2426-08-6	50	270	.....
Butyl mercaptan	109-79-5	10	35	.....
p-tert-Butyltoluene	98-51-1	10	60	.....
Cadmium (as Cd);				
see 1910.1027	7440-43-9			
Calcium Carbonate	1317-65-3			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Calcium hydroxide	1305-62-0			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Calcium oxide	1305-78-8	.....	5	.....
Calcium silicate	1344-95-2			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Calcium sulfate	7778-18-9			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Camphor, synthetic	76-22-2	.....	2	.....
Carbaryl (Sevin)	63-25-2	.....	5	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Carbon black.....	1333-86-4	.....	3.5	.....
Carbon dioxide.....	124-38-9	5000	9000	.....
Carbon disulfide.....	75-15-0		(2)	.....
Carbon monoxide.....	630-08-050		55	.....
Carbon tetrachloride...	56-23-5		(2)	.....
Cellulose.....	9004-34-6			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Chlordane.....	57-74-9	.....	0.5	X
Chlorinated camphene...	8001-35-2	.....	0.5	X
Chlorinated diphenyl oxide.....	55720-99-5	.....	0.5	.....
Chlorine.....	7782-50-5	(C)1	(C)3	.....
Chlorine dioxide.....	10049-04-4	0.1	0.3	.....
Chlorine trifluoride...	7790-91-2	(C)0.1	(C)0.4	.....
Chloroacetaldehyde.....	107-20-0	(C)1	(C)3	.....
a-Chloroacetophenone (Phenacyl chloride)..	532-27-4	0.05	0.3	.....
Chlorobenzene.....	108-90-7	75	350	.....
o-Chlorobenzylidene malononitrile.....	2698-41-1	0.05	0.4	.....
Chlorobromomethane.....	74-97-5	200	1050	.....
2-Chloro-1,3-butadiene; See beta-Chloroprene.				
Chlorodiphenyl (42% Chlorine)(PCB)..	53469-21-9	.....	1	X
Chlorodiphenyl (54% Chlorine)(PCB)..	11097-69-1	.....	0.5	X
1-Chloro-2, 3-epoxypropane; See Epichlorohydrin.				
2-Chloroethanol; See Ethylene chlorohydrin				
Chloroethylene; See Vinyl chloride.				
Chloroform (Trichloromethane)...	67-66-3	(C)50	(C)240	.....
bis(Chloromethyl) ether; see 1910.1008.	542-88-1			
Chloromethyl methyl ether; see 1910.1006.	107-30-2			
1-Chloro-1-nitropropane	600-25-9	20	100	.....
Chloropicrin.....	76-06-2	0.1	0.7	.....
beta-Chloroprene.....	126-99-8	25	90	X
2-Chloro-6 (trichloromethyl) pyridine.....	1929-82-4			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Chromic acid and chromates (as CrO(3))	(4)		(2)	.....
Chromium (II) compounds (as Cr).....	7440-47-3	.....	0.5	.....
Chromium (III) compounds (as Cr)....	7440-47-3	.....	0.5	.....
Chromium metal and insol. salts (as Cr).	7440-47-3	.....	1	.....
Chrysene; see Coal tar pitch volatiles.....				
Clopidol.....	2971-90-6			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Coal dust (less than 5% SiO(2)), respirable fraction..			(3)	.....
Coal dust (greater than or equal to 5% SiO(2)), respirable fraction.....			(3)	.....
Coal tar pitch volatiles (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene.....	65966-93-2	.....	0.2	.....
Cobalt metal, dust, and fume (as Co).....	7440-48-4	.....	0.1	.....
Coke oven emissions; see 1910.1029.....				
Copper.....	7440-50-8			
Fume (as Cu).....		.....	0.1	.....
Dusts and mists (as Cu).....		.....	1	.....
Cotton dust (e), see 1910.1043.....		.....	1	.....
Crag herbicide (Sesone)	136-78-7			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Cresol, all isomers....	1319-77-3	5	22	X
Crotonaldehyde.....	123-73-9;2	6	4170-30-3	.....
Cumene.....	98-82-8	50	245	X
Cyanides (as CN).....	(4)	.....	5	X
Cyclohexane.....	110-82-7	300	1050	.....
Cyclohexanol.....	108-93-0	50	200	.....
Cyclohexanone.....	108-94-1	50	200	.....
Cyclohexene.....	110-83-8	300	1015	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Cyclopentadiene	542-92-7	75	200	
2,4-D (Dichlorophen-oxyacetic acid)	94-75-7		10	
Decaborane	17702-41-9	0.05	0.3	X
Demeton (Systox)	8065-48-3		0.1	X
Diacetone alcohol (4-Hydroxy-4-methyl-2-pentanone)	123-42-2	50	240	
1,2-Diaminoethane; see Ethylenediamine				
Diazomethane	334-88-3	0.2	0.4	
Diborane	19287-45-7	0.1	0.1	
1,2-Dibromo-3-chloropropane (DBCP); see 1910.1044	96-12-8			
1,2-Dibromoethane; see Ethylene dibromide				
Dibutyl phosphate	107-66-4	1	5	
Dibutyl phthalate	84-74-2		5	
o-Dichlorobenzene	95-50-1	(C)50	(C)300	
p-Dichlorobenzene	106-46-7	75	450	
3,3'-Dichlorobenzidine; see 1910.1007	91-94-1			
Dichlorodifluoromethane	75-71-8	1000	4950	
1,3-Dichloro-5,5-dimethyl hydantoin	118-52-5		0.2	
Dichlorodiphenyltrichloroethane (DDT)	50-29-3		1	X
1,1-Dichloroethane	75-34-3	100	400	
1,2-Dichloroethane; see Ethylene dichloride				
1,2-Dichloroethylene	540-59-0	200	790	
Dichloroethyl ether	111-44-4	(C)15	(C)90	X
Dichloromethane; see Methylene chloride				
Dichloromonofluoromethane	75-43-4	1000	4200	
1,1-Dichloro-1-nitroethane	594-72-9	(C)10	(C)60	
1,2-Dichloropropane; see Propylene dichloride				
Dichlorotetrafluoroethane	76-14-2	1000	7000	
Dichlorvos (DDVP)	62-73-7		1	X
Dicyclopentadienyl iron	102-54-5			
Total dust			15	
Respirable fraction			5	
Dieldrin	60-57-1		0.25	X

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Diethylamine.....	109-89-7	25	75	.....
2-Diethylaminoethanol..	100-37-8	10	50	X
Diethyl ether; see Ethyl ether.....				
Difluorodibromomethane.	75-61-6	100	860	.....
Diglycidyl ether (DGE).	2238-07-5	(C)0.5	(C)2.8	.....
Dihydroxybenzene; see Hydroquinone.....				
Diisobutyl ketone.....	108-83-8	50	290	.....
Diisopropylamine.....	108-18-9	5	20	X
4-Dimethylaminoazo-benzene; see 1910.1015.....	60-11-7			
Dimethoxymethane; see Methylal.....				
Dimethyl acetamide.....	127-19-5	10	35	X
Dimethylamine.....	124-40-3	10	18	.....
Dimethylaminobenzene; see Xylidine.....				
Dimethylaniline (N,N-Dimethylaniline)	121-69-7	5	25	X
Dimethylbenzene; see Xylene.....				
Dimethyl-1,2-dibromo-2, 2-dichloroethyl phosphate.....	300-76-5	.....	3	.....
Dimethylformamide.....	68-12-2	10	30	X
2,6-Dimethyl-4-heptanone; see Diisobutyl ketone....				
1,1-Dimethylhydrazine..	57-14-7	0.5	1	X
Dimethylphthalate.....	131-11-3	.....	5	.....
Dimethyl sulfate.....	77-78-1	1	5	X
Dinitrobenzene				
(all isomers).....			1	X
(ortho).....	528-29-0			
(meta).....	99-65-0			
(para).....	100-25-4			
Dinitro-o-cresol.....	534-52-1	.....	0.2	X
Dinitrotoluene.....	25321-14-6	.....	1.5	X
Dioxane (Diethylene dioxide).	123-91-1	100	360	X
Diphenyl (Biphenyl)....	92-52-4	0.2	1	.....
Diphenylmethane diisocyanate; see Methylene bisphenyl isocyanate.....				
Dipropylene glycol methyl ether.....	34590-94-8	100	600	X

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Di-sec octyl phthalate (Di-(2-ethylhexyl) phthalate)	117-81-7	.....	5	.....
Emery	12415-34-8			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Endrin	72-20-8	.....	0.1	X
Epichlorohydrin	106-89-8	5	19	X
EPN	2104-64-5	.....	0.5	X
1,2-Epoxypropane; see Propylene oxide				
2,3-Epoxy-1-propanol; see Glycidol				
Ethanethiol; see Ethyl mercaptan				
Ethanolamine	141-43-5	3	6	.....
2-Ethoxyethanol (Cellosolve)	110-80-5	200	740	X
2-Ethoxyethyl acetate (Cellosolve acetate)	111-15-9	100	540	X
Ethyl acetate	141-78-6	400	1400	.....
Ethyl acrylate	140-88-5	25	100	X
Ethyl alcohol (Ethanol)	64-17-5	1000	1900	.....
Ethylamine	75-04-7	10	18	.....
Ethyl amyl ketone (5-Methyl-3-heptanone)	541-85-5	25	130	.....
Ethyl benzene	100-41-4	100	435	.....
Ethyl bromide	74-96-4	200	890	.....
Ethyl butyl ketone (3-Heptanone)	106-35-4	50	230	.....
Ethyl chloride	75-00-3	1000	2600	.....
Ethyl ether	60-29-7	400	1200	.....
Ethyl formate	109-94-4	100	300	.....
Ethyl mercaptan	75-08-1	(C)10	(C)25	.....
Ethyl silicate	78-10-4	100	850	.....
Ethylene chlorohydrin	107-07-3	5	16	X
Ethylenediamine	107-15-3	10	25	.....
Ethylene dibromide	106-93-4		(2)	.....
Ethylene dichloride (1,2-Dichloroethane)	107-06-2		(2)	.....
Ethylene glycol dinitrate	628-96-6	(C)0.2	(C)1	X
Ethylene glycol methyl acetate; see Methyl cellosolve acetate				
Ethyleneimine; see 1910.1012	151-56-4			
Ethylene oxide;				

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
see 1910.1047.....	75-21-8			
Ethylidene chloride; see 1,1-Dichlorethane				
N-Ethylmorpholine.....	100-74-3	20	94	X
Ferbam.....	14484-64-1			
Total dust.....		.....	15	.....
Ferrovanadium dust.....	12604-58-9	.....	1	.....
Fluorides (as F).....	(4)	.....	2.5	.....
Fluorine.....	7782-41-4	0.1	0.2	.....
Fluorotrichloromethane (Trichloro-fluoromethane).....	75-69-4	1000	5600	.....
Formaldehyde; see 1910.1048.....	50-00-0			
Formic acid.....	64-18-6	5	9	.....
Furfural.....	98-01-1	5	20	X
Furfuryl alcohol.....	98-00-0	50	200	.....
Grain dust (oat, wheat barley).....	.....	.....	10	.....
Glycerin (mist).....	56-81-5			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Glycidol.....	556-52-5	50	150	.....
Glycol monoethyl ether; see 2-Ethoxyethanol..				
Graphite, natural respirable dust.....	7782-42-5		(3)	.....
Graphite, synthetic....				
Total dust.....		.....	15	.....
Respirable Fraction..		.....	5	.....
Guthion; see Azinphos methyl..				
Gypsum.....	13397-24-5			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Hafnium.....	7440-58-6	.....	0.5	.....
Heptachlor.....	76-44-8	.....	0.5	X
Heptane (n-Heptane)....	142-82-5	500	2000	.....
Hexachloroethane.....	67-72-1	1	10	X
Hexachloronaphthalene..	1335-87-1	.....	0.2	X
n-Hexane.....	110-54-3	500	1800	.....
2-Hexanone (Methyl n-butyl ketone).....	591-78-6	100	410	.....
Hexone (Methyl isobutyl ketone).....	108-10-1	100	410	.....
sec-Hexyl acetate.....	108-84-9	50	300	.....
Hydrazine.....	302-01-2	1	1.3	X
Hydrogen bromide.....	10035-10-6	3	10	.....
Hydrogen chloride.....	7647-01-0	(C)5	(C)7	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Hydrogen cyanide	74-90-8	10	11	X
Hydrogen fluoride (as F)	7664-39-3		(2)	.....
Hydrogen peroxide	7722-84-1	1	1.4	.....
Hydrogen selenide (as Se)	7783-07-5	0.05	0.2	.....
Hydrogen sulfide	7783-06-4		(2)	.....
Hydroquinone	123-31-9	.....	2	.....
Iodine	7553-56-2	(C)0.1	(C)1	.....
Iron oxide fume	1309-37-1	.....	10	.....
Isomyl acetate	123-92-2	100	525	.....
Isomyl alcohol (primary and secondary)	123-51-3	100	360	.....
Isobutyl acetate	110-19-0	150	700	.....
Isobutyl alcohol	78-83-1	100	300	.....
Isophorone	78-59-1	25	140	.....
Isopropyl acetate	108-21-4	250	950	.....
Isopropyl alcohol	67-63-0	400	980	.....
Isopropylamine	75-31-0	5	12	.....
Isopropyl ether	108-20-3	500	2100	.....
Isopropyl glycidyl ether (IGE)	4016-14-2	50	240	.....
Kaolin	1332-58-7			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Ketene	463-51-4	0.5	0.9	.....
Lead inorganic (as Pb); see 1910.1025	7439-92-1			
Limestone	1317-65-3			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Lindane	58-89-9	.....	0.5	X
Lithium hydride	7580-67-8	.....	0.025	.....
L.P.G. (Liquified petroleum gas)	68476-85-7	1000	1800	.....
Magnesite	546-93-0			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Magnesium oxide fume	1309-48-4			
Total Particulate		.....	15	.....
Malathion	121-75-5			
Total dust		.....	15	X
Maleic anhydride	108-31-6	0.25	1	.....
Manganese compounds (as Mn)	7439-96-5	.....	(C)5	.....
Manganese fume (as Mn)	7439-96-5	.....	(C)5	.....
Marble	1317-65-3			
Total dust		.....	15	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Respirable fraction..		.....	5	.....
Mercury (aryl and inorganic)(as Hg)....	7439-97-6		(2)	.....
Mercury (organo) alkyl compounds (as Hg)....	7439-97-6		(2)	.....
Mercury (vapor) (as Hg)	7439-97-6		(2)	.....
Mesityl oxide.....	141-79-7	25	100	.....
Methanethiol; see Methyl mercaptan.				
Methoxychlor.....	72-43-5			
Total dust.....		.....	15	.....
2-Methoxyethanol; (Methyl cellosolve)..	109-86-4	25	80	X
2-Methoxyethyl acetate (Methyl cellosolve acetate).....	110-49-6	25	120	X
Methyl acetate.....	79-20-9	200	610	.....
Methyl acetylene (Propyne).....	74-99-7	1000	1650	.....
Methyl acetylene propadiene mixture (MAPP).....		1000	1800	.....
Methyl acrylate.....	96-33-3	10	35	X
Methylal (Dimethoxy-methane)..	109-87-5	1000	3100	.....
Methyl alcohol.....	67-56-1	200	260	.....
Methylamine.....	74-89-5	10	12	.....
Methyl amyl alcohol; see Methyl Isobutyl carbinol.....				
Methyl n-amyl ketone...	110-43-0	100	465	.....
Methyl bromide.....	74-83-9	(C)20	(C)80	X
Methyl butyl ketone; see 2-Hexanone.....				
Methyl cellosolve; see 2-Methoxyethanol.				
Methyl cellosolve acetate; see 2-Methoxyethyl acetate.....				
Methyl chloride.....	74-87-3		(2)	.....
Methyl chloroform (1,1,1-Trichloro-ethane).....	71-55-6	350	1900	.....
Methylcyclohexane.....	108-87-2	500	2000	.....
Methylcyclohexanol.....	25639-42-3	100	470	.....
o-Methylcyclohexanone..	583-60-8	100	460	X
Methylene chloride.....	75-09-2		(2)	.....
Methyl ethyl ketone				

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
(MEK); see 2-Butanone				
Methyl formate.....	107-31-3	100	250	.....
Methyl hydrazine (Monomethyl hydrazine).....	60-34-4	(C)0.2	(C)0.35	X
Methyl iodide.....	74-88-4	5	28	X
Methyl isoamyl ketone..	110-12-3	100	475	.....
Methyl isobutyl carbinol.....	108-11-2	25	100	X
Methyl isobutyl ketone; see Hexone.....				
Methyl isocyanate.....	624-83-9	0.02	0.05	X
Methyl mercaptan.....	74-93-1	(C)10	(C)20	.....
Methyl methacrylate....	80-62-6	100	410	.....
Methyl propyl ketone; see 2-Pentanone.....				
alpha-Methyl styrene...	98-83-9	(C)100	(C)480	.....
Methylene bisphenyl isocyanate (MDI).....	101-68-8	(C)0.02	(C)0.2	.....
Mica; see Silicates....				
Molybdenum (as Mo).....	7439-98-7			
Soluble compounds....		.....	5	.....
Insoluble Compounds Total dust.....		.....	15	.....
Monomethyl aniline.....	100-61-8	2	9	X
Monomethyl hydrazine; see Methyl hydrazine.				
Morpholine.....	110-91-8	20	70	X
Naphtha (Coal tar).....	8030-30-6	100	400	.....
Naphthalene.....	91-20-3	10	50	.....
alpha-Naphthylamine; see 1910.1004.....	134-32-7			
beta-Naphthylamine; see 1910.1009.....	91-59-8			
Nickel carbonyl (as Ni)	13463-39-3	0.001	0.007	.....
Nickel, metal and insoluble compounds (as Ni).....	7440-02-0	.....	1	.....
Nickel, soluble compounds (as Ni)....	7440-02-0	.....	1	.....
Nicotine.....	54-11-5	.....	0.5	X
Nitric acid.....	7697-37-2	2	5	.....
Nitric oxide.....	10102-43-9	25	30	.....
p-Nitroaniline.....	100-01-6	1	6	X
Nitrobenzene.....	98-95-3	1	5	X
p-Nitrochlorobenzene...	100-00-5	.....	1	X
4-Nitrodiphenyl; see 1910.1003.....	92-93-3			
Nitroethane.....	79-24-3	100	310	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Nitrogen dioxide	10102-44-0	(C)5	(C)9	.....
Nitrogen trifluoride	7783-54-2	10	29	.....
Nitroglycerin	55-63-0	(C)0.2	(C)2	X
Nitromethane	75-52-5	100	250	.....
1-Nitropropane	108-03-2	25	90	.....
2-Nitropropane	79-46-9	25	90	.....
N-Nitrosodimethylamine; see 1910.1016				
Nitrotoluene				
(all isomers)		5	30	X
o-isomer	88-72-2			
m-isomer	99-08-1			
p-isomer	99-99-0			
Nitrotrichloromethane; see Chloropicrin				
Octachloronaphthalene	2234-13-1	.....	0.1	X
Octane	111-65-9	500	2350	.....
Oil mist, mineral	8012-95-1	.....	5	.....
Osmium tetroxide (as Os)	20816-12-0	.....	0.002	.....
Oxalic acid	144-62-7	.....	1	.....
Oxygen difluoride	7783-41-7	0.05	0.1	.....
Ozone	10028-15-6	0.1	0.2	.....
Paraquat, respirable dust	4685-14-7 1910-42-5 2074-50-2	.....	0.5	X
Parathion	56-38-2	.....	0.1	X
Particulates not otherwise regulated (PNOR)(f)				
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
PCB; see Chlorodiphenyl (42% and 54% chlorine)				
Pentaborane	19624-22-7	0.005	0.01	.....
Pentachloronaphthalene	1321-64-8	.....	0.5	X
Pentachlorophenol	87-86-5	.....	0.5	X
Pentaerythritol	115-77-5			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Pentane	109-66-0	1000	2950	.....
2-Pentanone (Methyl propyl ketone)	107-87-9	200	700	.....
Perchloroethylene (Tetrachloroethylene)	127-18-4		(2)	.....
Perchloromethyl Mercaptan	594-42-3	0.1	0.8	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Perchloryl fluoride....	7616-94-6	3	13.5	.....
Petroleum distillates (Naphtha)(Rubber Solvent).....		500	2000	.....
Phenol.....	108-95-2	5	19	X
p-Phenylene diamine....	106-50-3	.....	0.1	X
Phenyl ether, vapor....	101-84-8	1	7	.....
Phenyl ether-biphenyl mixture, vapor.....		1	7	.....
Phenylethylene; see Styrene.....				
Phenyl glycidyl ether (PGE).....	122-60-1	10	60	.....
Phenylhydrazine.....	100-63-0	5	22	X
Phosdrin (Mevinphos)...	7786-34-7	.....	0.1	X
Phosgene (Carbonyl Chloride).....	75-44-5	0.1	0.4	.....
Phosphine.....	7803-51-2	0.3	0.4	.....
Phosphoric acid.....	7664-38-2	.....	1	.....
Phosphorus (yellow)....	7723-14-0	.....	0.1	.....
Phosphorus pentachloride.....	10026-13-8	.....	1	.....
Phosphorus pentasulfide	1314-80-3	.....	1	.....
Phosphorus trichloride.	7719-12-2	0.5	3	.....
Phthalic anhydride.....	85-44-9	2	12	.....
Picloram.....	1918-02-1			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Picric acid.....	88-89-1	.....	0.1	X
Pindone (2-Pivalyl-1, 3-indandione).....	83-26-1	.....	0.1	.....
Plaster of paris.....	26499-65-0			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Platinum (as Pt).....	7440-06-4			
Metal.....		.....	.....	.....
Soluble Salts.....		.....	0.002	.....
Portland cement.....	65997-15-1			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Propane.....	74-98-6	1000	1800	.....
beta-Propriolactone; see 1910.1013.....	57-57-8			
n-Propyl acetate.....	109-60-4	200	840	.....
n-Propyl alcohol.....	71-23-8	200	500	.....
n-Propyl nitrate.....	627-13-4	25	110	.....
Propylene dichloride...	78-87-5	75	350	.....
Propylene imine.....	75-55-8	2	5	X
Propylene oxide.....	75-56-9	100	240	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Propyne; see Methyl acetylene.....				
Pyrethrum.....	8003-34-7	.....	5	.....
Pyridine.....	110-86-1	5	15	.....
Quinone.....	106-51-4	0.1	0.4	.....
RDX: see Cyclonite.....				
Rhodium (as Rh), metal fume and insoluble compounds.....	7440-16-6	.....	0.1	.....
Rhodium (as Rh), soluble compounds....	7440-16-6	.....	0.001	.....
Ronnel.....	299-84-3	.....	15	.....
Rotenone.....	83-79-4	.....	5	.....
Rouge.....				
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Selenium compounds (as Se).....	7782-49-2	.....	0.2	.....
Selenium hexafluoride (as Se).....	7783-79-1	0.05	0.4	.....
Silica, amorphous, precipitated and gel.	112926-00-8		(3)	.....
Silica, amorphous, diatomaceous earth, containing less than 1% crystalline silica	61790-53-2		(3)	.....
Silica, crystalline cristobalite, respirable dust.....	14464-46-1		(3)	.....
Silica, crystalline quartz, respirable dust.....	14808-60-7		(3)	.....
Silica, crystalline tripoli (as quartz), respirable dust.....	1317-95-9		(3)	.....
Silica, crystalline tridymite, respirable dust.....	15468-32-3		(3)	.....
Silica, fused, respirable dust.....	60676-86-0		(3)	.....
Silicates (less than 1% crystalline silica)				
Mica (respirable dust).....	12001-26-2		(3)	.....
Soapstone, total dust	.....		(3)	.....
Soapstone, respirable dust.....	.....		(3)	.....
Talc (containing asbestos): use				

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
asbestos limit: see 29 CFR 1910.1001.....			(3)	.....
Talc (containing no asbestos), respirable dust.....	14807-96-6		(3)	.....
Tremolite, asbestiform; see 1910.1001.....				
Silicon.....	7440-21-3			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Silicon carbide.....	409-21-2			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Silver, metal and soluble compounds (as Ag).....	7440-22-4	.....	0.01	.....
Soapstone; see Silicates.....				
Sodium fluoroacetate...	62-74-8	.....	0.05	X
Sodium hydroxide.....	1310-73-2	.....	2	.....
Starch.....	9005-25-8			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Stibine.....	7803-52-3	0.1	0.5	.....
Stoddard solvent.....	8052-41-3	500	2900	.....
Strychnine.....	57-24-9	.....	0.15	.....
Styrene.....	100-42-5		(2)	.....
Sucrose.....	57-50-1			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Sulfur dioxide.....	7446-09-5	5	13	.....
Sulfur hexafluoride....	2551-62-4	1000	6000	.....
Sulfuric acid.....	7664-93-9	.....	1	.....
Sulfur monochloride....	10025-67-9	1	6	.....
Sulfur pentafluoride...	5714-22-7	0.025	0.25	.....
Sulfuryl fluoride.....	2699-79-8	5	20	.....
Systox; see Demeton...				
2,4,5-T (2,4,5-tri-chlorophenoxyacetic acid).....	93-76-5	.....	10	.....
Talc; see Silicates...				
Tantalum, metal and oxide dust.....	7440-25-7	.....	5	.....
TEDP (Sulfotep).....	3689-24-5	.....	0.2	X
Tellurium and compounds (as Te)....	13494-80-9	.....	0.1	.....
Tellurium hexafluoride (as Te).....	7783-80-4	0.02	0.2	.....

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Temephos	3383-96-8			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
TEPP (Tetraethyl pyrophosphaate)	107-49-3	.....	0.05	X
Terphenylis	26140-60-3	(C)1	(C)9	.....
1,1,1,2-Tetrachloro-2, 2-difluoroethane	76-11-9	500	4170	.....
1,1,2,2-Tetrachloro-1, 2-difluoroethane	76-12-0	500	4170	.....
1,1,2,2-Tetrachloro- ethane	79-34-5	5	35	X
Tetrachoroethylene; See Perchloroethylene				
Tetrachloromethane; see Carbon tetrachloride.				
Tetrachloronaphthalene.	1335-88-2	.....	2	X
Tetraethyl lead (as Pb)	78-00-2	.....	0.075	X
Tetrahydrofuran	109-99-9	200	590	.....
Tetramethyl lead, (as Pb)	75-74-1	.....	0.075	X
Tetramethyl succinonitrile	3333-52-6	0.5	3	X
Tetranitromethane	509-14-8	1	8	.....
Tetryl (2,4,6-Trinitro- phenylmethyl- nitramine)	479-45-8	.....	1.5	X
Thallium, soluble compounds (as Tl)	7440-28-0	.....	0.1	X
4,4'-Thiobis(6-tert, Butyl-m-cresol)	96-69-5			
Total dust		.....	15	.....
Respirable fraction		.....	5	.....
Thiram	137-26-8	.....	5	.....
Tin, inorganic compounds (except oxides) (as Sn)	7440-31-5	.....	2	.....
Tin, organic compounds (as Sn)	7440-31-5	.....	0.1	.....
Titanium dioxide	13463-67-7			
Total dust		.....	15	.....
Toluene	108-88-3		(2)	.....
Toluene-2, 4-diisocyanate (TDI)	584-84-9	(C)0.02	(C)0.14	.....
o-Toluidine	95-53-4	5	22	X
Toxaphene; see Chlorinated camphene.				
Tremolite; see Silicates				

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Tributyl phosphate.....	126-73-8	.....	5	.....
1,1,1-Trichloroethane; see Methyl chloroform				
1,1,2-Trichloroethane..	79-00-5	10	45	X
Trichloroethylene.....	79-01-6		(2)	.....
Trichloromethane; see Chloroform				
Trichloronaphthalene...	1321-65-9	.....	5	X
1,2,3-Trichloropropane.	96-18-4	50	300	.....
1,1,2-Trichloro-1,2, 2-trifluoroethane....	76-13-1	1000	7600	.....
Triethylamine.....	121-44-8	25	100	.....
Trifluorobromomethane..	75-63-8	1000	6100	.....
2,4,6-Trinitrophenol; see Picric acid.....				
2,4,6-Trinitrophenyl-methyl nitramine; see Tetryl.....				
2,4,6-Trinitrotoluene (TNT).....	118-96-7	.....	1.5	X
Triorthocresyl phosphate.....	78-30-8	.....	0.1	.....
Triphenyl phosphate....	115-86-6	.....	3	.....
Turpentine.....	8006-64-2	100	560	.....
Uranium (as U).....	7440-61-1			
Soluble compounds....		.....	0.05	.....
Insoluble compounds..		.....	0.25	.....
Vanadium.....	1314-62-1			
Respirable dust (as V(2)O(5)).....		.....	(C)0.5	.....
Fume (as V(2)O(5))...		.....	(C)0.1	.....
Vegetable oil mist.....				
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Vinyl benzene; see Styrene.....				
Vinyl chloride; see 1910.1017.....	75-01-4			
Vinyl cyanide; see Acrylonitrile				
Vinyl toluene.....	25013-15-4	100	480	.....
Warfarin.....	81-81-2	.....	0.1	.....
Xylenes (o-, m-, p-isomers)..	1330-20-7	100	435	.....
Xylidine.....	1300-73-8	5	25	X
Yttrium.....	7440-65-5	.....	1	.....
Zinc chloride fume.....	7646-85-7	.....	1	.....
Zinc oxide fume.....	1314-13-2	.....	5	.....
Zinc oxide.....	1314-13-2			

Substance	CAS No. (C)	ppm (a)[1]	mg/m [3](b)[1]	Skin designation
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Zinc stearate.....	557-05-1			
Total dust.....		.....	15	.....
Respirable fraction..		.....	5	.....
Zirconium compounds (as Zr).....	7440-67-7	.....	5	.....

Footnote (1) The PELs are 8-hour TWAs unless otherwise noted; a (C) designation denotes a ceiling limit. They are to be determined from breathing-zone air samples.

Footnote (a) Parts of vapor or gas per million parts of contaminated air by volume at 25 degrees C and 760 torr.

Footnote (b) Milligrams of substance per cubic meter of air. When entry is in this column only, the value is exact; when listed with a ppm entry, it is approximate.

Footnote (c) The CAS number is for information only. Enforcement is based on the substance name. For an entry covering more than one metal compound measured as the metal, the CAS number for the metal is given - not CAS numbers for the individual compounds.

[54 FR 36767, Sept. 5, 1989; 54 FR 41244, Oct. 6, 1989; 55 FR 3724, Feb. 5, 1990; 55 FR 12819, Apr 6, 1990; 55 FR 19259, May 9, 1990; 55 FR 46950, Nov. 8, 1990; 57 FR 29204, July 1, 1992; 57 FR 42388, Sept. 14, 1992; 58 FR 35340, June 30, 1993; 61 FR 56746, Nov. 4, 1996; 62 FR 42018, August 4, 1997]

Appendix 4.1

Subpart Z – Toxic and hazardous Substances
29CFR1910.1000 TABLE Z-2

Table Z-2

TABLE Z-2

Substance	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
			Concentration	Maximum duration
Benzene(a) (Z37.40-1969)	10 ppm	25 ppm	50 ppm	10 minutes.
Beryllium and beryllium compounds (Z37.29-1970)	2 ug/m(3)	5 ug/m(3)	25 ug/m(3)	30 minutes.
Cadmium fume(b) (Z37.5-1970)	0.1 mg/m(3)	0.3 mg/m(3)	.....	
Cadmium dust(b) (Z37.5-1970)	0.2 mg/m(3)	0.6 mg/m(3)		
Carbon disulfide (Z37.3-1968)	20 ppm	30 ppm	100 ppm	30 minutes.
Carbon tetrachloride (Z37.17-1967)	10 ppm	25 ppm	200 ppm	5 min. in any 4 hrs.
Chromic acid and chromates (Z37-7-1971)	.....	1 mg/10 m(3)		
Ethylene dibromide (Z37.31-1970)	20 ppm	30 ppm	50 ppm	5 minutes.
Ethylene dichloride (Z37.21-1969)	50 ppm	100 ppm	200 ppm	5 min. in any 3 hrs.
Fluoride as dust (Z37.28-1969)	2.5 mg/m(3)	.....	.....	
Formaldehyde: see 1910.1048	.....	.....	.....	
Hydrogen fluoride				

Substance	8-hour time weighted average	Acceptable ceiling concentration	Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	
			Concentration	Maximum duration
(Z37.28-1969).....	3 ppm.....	.....	.....	
Hydrogen sulfide (Z37.2-1966).....	.....	20 ppm.....	50 ppm...	10 mins. Once only if no other meas. exp. Occurs.
Mercury (Z37.8-1971).....	.....	1 mg/10m(3)	.....	
Methylene chloride (Z37.18-1969).....	.....	.....	.....	
Methylene Chloride: see 1910.1052.....				
Organo (alkyl) mercury (Z37.30-1969).....	0.01mg/m(3)	0.04 mg/m(3)	.....	
Styrene (Z37.15-1969).....	100 ppm....	200 ppm....	600 ppm..	5 mins. in any 3 hrs.
Tetrachloroethylene (Z37.22-1967).....	100 ppm....	200 ppm....	300 ppm..	5 mins. In any 3 hrs.
Toluene (Z37.12-1967).....	200 ppm....	300 ppm....	500 ppm..	10 minutes
Trichloroethylene (Z37.19-1967).....	100 ppm....	200 ppm....	300 ppm..	5 mins. in any 2 hrs.

Footnote(a) This standard applies to the industry segments exempt from the 1 ppm 8-hour TWA and 5 ppm STEL of the benzene standard at 1910.1028.

Footnote(b) This standard applies to any operations or sectors for which the Cadmium standard, 1910.1027, is stayed or otherwise not in effect.

[62 FR 42018, August 4, 1997]

Section 4.0 – Appendix

Appendix 4.1

Subpart Z – Toxic and hazardous Substances
29CFR1910.1000 TABLE Z-3

Table Z-3

TABLE Z–3 MINERAL DUSTS

Substance	mppcf [a]	mg/m³
Silica:		
Crystalline		
Quartz (Respirable)	250 [b] / %SiO_2+5	10 mg/m³ [c] / % SiO_2 + 2
Quartz (Total Dust)		30 mg/m³ / % SiO_2 + 2
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz		
Tridymite: Use ½ the value calculated from the formulae for quartz		
Amorphous, including natural diatomaceous earth	20	80 mg/m³ / %SiO_2
Silicates (less than 1% crystalline silica):		
Mica	20	
Soapstone	20	
Talc (not containing asbestos)	20 [c]	
Talc (containing asbestos) Use asbestos limit.		
Tremolite, asbestiform (see 29 CFR 1910.1001).		
Portland cement	50	
Graphite (Natural)	15	
Coal Dust:		
Respirable fraction less than 5% SiO_2		2.4 mg/m³ [e]
Respirable fraction greater than 5% SiO_2		10 mg/m³ [e] / %SiO_2+2
Inert or Nuisance Dust: [d]		
Respirable fraction	15	5 mg/m³
Total dust	50	15 mg/m³

Note—Conversion factors - mppcf X 35.3 = million particles per cubic meter = particles per c.c.

[a] Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

[b] The percentage of crystalline silica in the formula is the amount determined from airborne samples, except in those instances in which other methods have been shown to be applicable.

[c] Containing less than 1% quartz; if 1% quartz or more, use quartz limit.

[d] All inert or nuisance dusts, whether mineral, inorganic, or organic, not listed specifically by substance name are covered by this limit, which is the same as the Particulates Not Otherwise Regulated (PNOR) limit in Table Z–1.

[e] Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC (now NRC) instrument. The respirable fraction of coal dust is determined with an MRE; the figure corresponding to that of 2.4 mg/m³ in the table for coal dust is 4.5 mg/m³.

Appendix 4.2

List of Qualis' Plans, Programs, and Procedures:

Qualis-2K-SIFR-001: Safety Inspection Findings Report (SIFR's)
Qualis-PP1: Company Policies
Qualis-PP1-325: Disciplinary Rules
Qualis-PP2: Company Procedures
Qualis-PP2-501-3: Signals and Warning System
Qualis-PP3: Safety and Environmental Procedures
Qualis-PP3-500: Safety and Environmental Compliance (Implementation of)
Qualis-PP3-501: Procedure: Record / Report, Occupational Injuries & Illnesses
Qualis-PP3-501: Supervisors Investigation Report
Qualis-PP3-501-1: General Safety Instruction Booklet for Employees
Qualis-PP3-502: Bloodborne Pathogen Exposure Control Program
Qualis-PP3-502-1: Bloodborne Pathogen Exposure Control Plan
Qualis-PP3-503: Hearing Conservation Program
Qualis-PP3-511: Reimbursement for Safety Glasses and Shoes
Qualis-PP3-512: Respiratory Protective Program
Qualis-PP3-521: Hazard Communication Program
Qualis-PP3-522: Chemical Hygiene Plan
Qualis-PP3-531: Lockout / Tagout Program
Qualis-PP3-532: Permit System
Qualis-PP3-533: Powered Industrial Truck Training
Qualis-PP3-534: Sling Use Pamphlet
Qualis-PP3-551: Emergency Plan
Qualis-PP4: Specific Procedures
Qualis-PP4-561: Material Safety Data Sheets (MSDS) Control and Distribution