CHAPTER II

SUBSTANCES WITH MANAGEMENT AND TECHNICAL SERVICES DIVISION SAMPLING METHODS OR SECONDARY SAMPLING METHODS

1. General

1.1 CHAPTER II generally includes substances with sampling and analytical information, which has been reviewed by LESS Methods listed under LESS1 are MIOSHA compliance and consultation sampling methods. For further explanation of individual fields of information, refer to specific items in Chapter I.

1.2 Secondary sampling methods generally are methods that have also been reviewed by LESS or are available. Methods that are not in general use by LESS have been excluded. Federal OSHA and NIOSH may have additional sampling and analytical methodologies.

1.3 Some substances may only include information listing the availability of detector tubes or direct reading instruments for monitoring. Tubes and instruments listed are not available from LESS unless specifically indicated. LESS does not certify nor endorse products of any manufacturer. Omission of other products does not imply unsatisfactory performance.

2. Substances

Acetic Acid

IMIS	**0020** CAS 64-19-7
SYN	Glacial acetic acid; Methane carboxylic acid; Ethanoic acid; Vinegar acid
NIOSH	RTECS AF1225000 DOT 2789 29
MIOSHA	FINAL RULE (Table G-1-A): TWA 10 ppm, 25 mg/m^3
DESC	Colorless liquid or solid with a strong vinegar-like odor. MW: 60 BP: 244F VP: 11mm MP: 62 F FP: 103 F
INCOM	Strong oxidizers, chromic acid, sodium peroxide, nitric acid, strong caustics
HLTH	Irritation-Eye, Nose, Throat, Skin---Marked (HE14) TDLO (oral, Human) 1470 µg/kg SKIN IRR: Yes (if concentrated).
SYMPT	Conjunctivitis lacrimation; nose, throat irritation; pharyngeal edema, chronic bronchitis; burns eyes, skin; skin sensitization; dental erosion; black skin, hyperkeratosis
ORGAN	Respiratory system, skin, eyes, teeth
LESS1	MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh) ANL SOLVENT: 0.01N NaOH MAX V: 48 Liters MAX F: 0.2 L/min ANL A: Ion Chromatography (IC) . REF: ***17 (OSH2004S025)*** SAE: 0.184 CLASS: ***Validated in-house*** NOTE: Submit as a separate sample.
SAM2	DET. TUBE: Dräger, 67-22101, 5-80 ppm FOXBORO SAPPHIRE: Det limit 0.15 ppm, long pathlength
WIPE	MEDIA: Whatman smear tab. SOLVENT: Deionized Water

Acetone

IMIS	**0040** CAS 67-64-1
SYN	2-Propanone; Dimethyl ketone; Composite Constituent: Rosin Core Solder Pyrolysis

Product
NIOSH RTECS AL3150000 DOT UN1090 flammable liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 750 ppm, 1800 mg/m^3
. STEL 1000 ppm, 2400 mg/m^3
DESC Colorless liquid with a fragrant, mint-like odor.
MW: 58 BP: 133 F VP (77 F): 266 mm MP: -169 F MOLFM: C_3H_6O
INCOM Oxidizing materials, acids
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
Nervous System Disturbances---Narcosis (HE8); LD50 (oral, rat) 9750 mg/kg
SYMPT Eye, nose, throat irritation; headaches, dizziness; dermatitis
ORGAN Respiratory system, skin
LESS1 MEDIA (8): CARBOSIEVE S-III (130/65 mg sections, 60/80 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 3 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 ***(OHL2005OOSHA84)*** SAE: 0.13 CLASS: Validated in-house
SAM2 DET. TUBE: Dräger, CH 22901, 100-12,000 ppm
FOXBORO SAPPHIRE: Det limit 5 ppm, short pathlength
WIPE No

Acrylamide
IMIS **0115** CAS 79-06-1
SYN Propenamide; Acrylamide monomer; Acrylic amide
NIOSH RTECS AS3325000 DOT UN2074 Poison
MIOSHA FINAL RULE (Table G-1-A) TWA (Skin) 0.03 mg/m^3
DESC Colorless Solid.
MW: 71 BP: Decomposes VP: 0.007 mm MP: 183 F
INCOM Strong oxidizers
HLTH Polyneuropathy, Dermatitis (HE7); Eyes, Skin Irritation (HE3)
Mutagen/Suspect carcinogen (HE2); LD50 (oral, rat) 170 mg/kg
IARC Group 2B, possibly carcinogenic to humans
SYMPT Ataxia; numb limbs, paresthesia; muscle weakness; absent deep tendon reflex; hand sweating; fatigue, lethargy; eye, skin irritation
ORGAN CNS, PNS, skin, eyes
LESS1 MEDIA (44): OSHA Versatile Sampler (OVS-7) - 13 mm XAD-7 tube (270/140 mg sections, 20/60 MESH) with glass fiber filter enclosed
ANL SOLVENT: (5:95) Methanol/Water
MAX V: 120 Liters MAX F: 1.0 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S018) CLASS: Partially Validated

Acrylic acid
IMIS **0117** CAS 79-10-7
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 10 ppm, 30 mg/m^3
HLTH LD50 (oral, rabbit) 340 mg/kg; SKIN IRR: Severe
LESS1 MEDIA (99): Two Chromosorb 108 Tubes in series (100 mg sections)
ANL SOLVENT: Methanol
MAX V: 24 Liters MAX F: 0.1 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S021) CLASS: Partially Validated

Acrylonitrile
IMIS **0120 (PEL); 0119 (CEILING); 0121 (ACTION LEVEL)** CAS 107-13-1

SYN Propenenitrile; AN; Vinyl cyanide
NIOSH RTECS AT5250000; 4291 DOT UN1093 Flammable liquid
MIOSHA FINAL RULE: Cancer Hazard (29 CFR 1910.1045)
. TWA 2 ppm, 4.34 mg/m^3
. ***CEILING*** 10 oon ir 21.7 mg/m^3 for 15 minute
. ACTION LEVEL 1 ppm TWA
DESC Colorless to pale yellow liquid with a pungent odor.
MW: 53 BP: 77.3 C VP: 83 mm MP: -83.5 C
INCOM Strong oxidizers (especially bromine), strong bases, copper, copper alloys, ammonia, amines
HLTH Reproductive Hazards (HE5); CNS Depression (HE7)
Chronic (Cumulative) Toxicity; LD50 (oral, rat) 82 mg/kg
Reproductive Hazards-Fertility impairment or teratogenesis
NTP Suspect Human Carcinogen
IARC Group 2A, probably carcinogenic to humans
SYMPT Asphyxia; eye irritation; headaches; sneezing; nausea, vomiting; weakness, light-headedness; skin vesiculation, scaling dermatitis; (carcinogenic)
ORGAN CVS, liver, kidneys, CNS, skin, brain tumor, lung and bowel cancer
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide/ Acetone (98:2)
MAX V: 20 Liters MAX F: 0.2 L/min (TWA)
MIN T: 15 Minutes MAX F: 0.5 L/min (Ceiling)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL20050NIOSH1604ISSUE2)*** SAE: 0.141
CLASS: Fully Validated
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.6 ppm, long pathlength
WIPE No

alpha-Alumina (Respirable Fraction)

IMIS **A201** CAS 1344-28-1
SYN Aluminum Oxide (2:3); alpha-Aluminum Oxide; beta-Aluminum Oxide; gamma-Aluminum Oxide; Aluminum Sesquioxide; alpha-Alumina (Total Dust) from 7/17 to 9/1/89
NIOSH RTECS BD1200000; 5474
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC MW: 101.96 MOLFM: Al_2O_3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MIN V: 408 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

alpha-Alumina (Total Dust)

IMIS **0160** CAS 1344-28-1; 112-62-9
SYN Al_2O_3; Corundum; alpha-Alumina (Aluminum Oxide) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Solid.
MW: 101.96 MOLFM: Al_2O_3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
WIPE: No

Aluminum (as Al), Metal (Respirable Fraction)

IMIS **A110** CAS 7429-90-5
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Explosive, Flammable, Safety (No adverse effects encountered when Good Housekeeping Practices are followed) (HE18)
IARC See Aluminum Production - Group 1, carcinogenic to humans
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MIN V: 408 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

Aluminum (as Al), Metal (Total Dust)
IMIS **A100** CAS 7429-90-5
MIOSHA FINAL RULE (Table Z-1-A): TWA 15 mg/m^3
DESC Solid.
HLTH Explosive, Flammable, Safety (No adverse effects encountered when Good Housekeeping Practices are followed) (HE18)
IARC See Aluminum Production - Group 1, carcinogenic to humans
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Aluminum (as Al), Pyro Powder
IMIS **A101** CAS 7429-90-5
SYN 217982
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Explosive, Flammable, Safety (No adverse effects encountered when Good Housekeeping Practices are followed) (HE18)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

Aluminum (as Al), Soluble Salts
IMIS **A103** CAS 7429-90-5
MIOSHA FINAL RULE (Table G-1-A): TWA 2 mg/m^3
DESC Solid.
HLTH Explosive, Flammable, Safety (No adverse effects encountered when Good Housekeeping Practices are followed) (HE18)
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Aluminum (as Al), Welding Fumes
IMIS **A102** CAS 7429-90-5
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Explosive, Flammable, Safety (No adverse effects encountered when Good Housekeeping Practices are followed) (HE18)

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC), filter, and 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

Ammonia

IMIS **0170** CAS 7664-41-7
SYN Anhydrous ammonia
NIOSH RTECS BO0875000 DOT 1005 15
MIOSHA FINAL RULE (Table G-1-A): STEL 35 ppm, ***27*** mg/m^3
DESC Colorless gas with a penetrating, pungent, suffocating odor. It can be a liquid when under pressure. Mixtures of air-ammonia may explode. UEL=25
MW: 17 BP: -28 F VP: >1 atm MP: -108 F
INCOM Strong oxidizers, calcium, hypochlorite bleaches, gold, mercury, silver, halogens
HLTH Respiratory Effects---Acute lung damage/edema (HE11)
Irritation-Eye, Nose, Throat, Bronchi, Skin---Marked (HE14)
SYMPT Eye, nose, throat irritation; dyspnea, broncospasms; chest pain; pulmonary edema; pink frothy sputum; skin burns; vesiculation
ORGAN Respiratory system, eyes
LESS1 MEDIA (50): Sulfuric Acid impregnated Carbon Bead ("Purosieve" Supelco ORBO-77 tube or equivalent)
MAX V: 7.5 Liters MAX F: 0.5 L/min (STEL)
ANL 1: Ion Chromatography; IC/Conductivity
. REF: 17 (OHL2003S009) SAE 0.08 CLASS: Validated in-house
NOTE: Store sample media in freezer until use. Submit as a separate sample.
SAM2 DET. TUBE: Dräger, CH 20501, 5-700 ppm
MIRAN SAPPHIRE: Det. Limit 0.7 ppm, long pathlength
WIPE No

Ammonium Chloride (Fume)

IMIS **0175** CAS 12125-02-9
MIOSHA FINAL RULE (Table G-1-A):
. TWA 10 mg/m^3
. STEL 20 mg/m^3
DESC Fume.
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
LD50 (oral, rat) 1650 mg/kg
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Ion Chromatography; IC/Conductivity
. REF: 17 (OHL2003S009) SAE 0.08 CLASS: Validated in-house
NOTE: Sample analyzed chromatographically only if the gross weight of the sample yields an air concentration greater than the PEL. When the analysis of the compound is requested an analysis is performed for total ammonia and reported as the compound. The analytical method does not distinguish between dust and fume.
WIPE MEDIA: Whatman smear tab. SOLVENT: Deionized Water

Ammonium Nitrate

IMIS **A613** CAS 6484-52-2
DESC May explode under high temperatures or confinement; however, not readily detonated.
HLTH Low toxicity

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE MEDIA: Whatman smear tab. SOLVENT: Deionized water

Ammonium Sulfamate (Respirable Fraction)

IMIS **A111** CAS 7773-06-0
SYN Ammate herbicide; Ammate
NIOSH RTECS WO6125000 DOT 9089 31
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Colorless, odorless solid.
MW: 114 BP: 392 F VP: approx. 0 mm MP: 268 F
INCOM Strong oxidizers, hot water
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
LD50 (oral, rat) 3900 mg/kg
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. An analysis of an ammonium compound is performed only if the gross weight of the sample yields an air concentration greater than the PEL. When the analysis of a compound is requested, an analysis for total ammonia is performed and reported as the compound. The analytical method does not distinguish between dust and fume.
WIPE No

Ammonium Sulfamate (Total Dust)

IMIS **0185** CAS 7773-06-0
SYN Ammate herbicide; Ammate; Ammonium Sulfamate prior to 9/1/89
NIOSH RTECS WO6125000 DOT 9089 31
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Colorless, odorless solid.
MW: 114 BP: 392 F VP: approx. 0 mm MP: 268 F
INCOM Strong oxidizers, hot water
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
LD50 (oral, rat) 3900 mg/kg
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. An analysis of an ammonium compound is performed only if the gross weight of the sample yields an air concentration greater than the PEL. When the analysis of a compound is requested, an analysis for total ammonia is performed and reported as the compound. The analytical method does not distinguish between dust and fume.
WIPE No

n-Amyl Acetate

IMIS **0190** CAS 628-63-7
SYN 1-Pentanol acetate; Acetic acid, pentyl ester
NIOSH RTECS AJ1925000; 2659 DOT UN1104 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 525 mg/m^3
DESC Colorless liquid with a banana oil odor.
MW: 130 BP: 295 F VP: 4 mm MP: -95 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Irritation-Eye, Nose, Throat- -Moderate (HE15)
CNS Depression (HE7)
SYMPT Eye, nose irritation; narcosis; dermatitis
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: Ship refrigerated

Antimony & Compounds (as Sb)
IMIS **0230** CAS 7440-36-0
NIOSH RTECS CC4025000 DOT 1549 60
MIOSHA FINAL RULE (Table G-1-A): TWA 0.5 mg/m^3
DESC Silvery-white solid.
MW: 122 BP: 2516 F MP: 1202 F
INCOM Oxidizers, acids, halogenated acids
HLTH Chronic (Cumulative) Toxicity---Cumulative heart and lung damage (HE3)
SYMPT Nose, throat, mouth irritation; coughing; dizziness; headaches; nausea, vomiting, diarrhea; cramps; insomnia; anorexia; skin irritation; inability to smell
ORGAN Respiratory system, CVS, skin, eyes
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE MEDIA: Whatman smear tab Filter. SOLVENT: Deionized water

Arsenic, Inorganic
IMIS **0260 (PEL); 0261 (ACTION LEVEL)** CAS 7440-38-2
SYN Includes Copper Acetoarsenite and all inorganic compounds containing arsenic except arsine, measured as (As)
NIOSH RTECS CG0525000 DOT 1557 53
MIOSHA FINAL RULE: Cancer Hazard (29 CFR 1910.1018)
TWA 10 ug/m^3 [R325.51604]
This section applies to all occupational exposures to inorganic arsenic except employee exposures in agriculture or treatment of wood with preservatives or the utilization of arsenically preserved wood.
DESC Solid.
HLTH Suspect Carcinogen (HE2); Cumulative systemic poison (HE3)
INGES ACUTE: Depends on salt, LDLO (man) 1.43 mg/kg Arsenic Trioxide
NTP Human Carcinogen
IARC Arsenic and Arsenic Compounds - Group 1, carcinogenic to humans
SYMPT Ulceration of nasal septum; dermatitis; gastrointestinal disturbances; peripheral

neuropathy; respiratory irritation; hyper pigmentation of skin; (carcinogenic)

ORGAN Liver, kidneys, skin, lungs, lymphatic system

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Atomic Absorption Spectroscopy; AAS/Hydride
. REF: 17 ***(OHL2002S010)*** SAE: 0.24 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

WIPE MEDIA: Whatman Smear Tab Filter. SOLVENT: Deionized water

Asbestos (all forms)

IMIS **9020** CAS 1332-21-4
NIOSH RTECS CI6475000 DOT 2212 31, 2590 31
MIOSHA FINAL RULES
Asbestos Standards for General Industry (R325.51311-.51312)
Asbestos Standards for Construction (R425.51301-.51302)
. TWA 0.1 F/cc
. ***Excursion Level*** 1.0 F/cc ***(30 minutes duration)***
DESC Fine, slender, flaxy fibers; resists fire and most solvents.
HLTH Cancer (HE1); Asbestosis (HE10)
NTP Human Carcinogen
IARC Group 1, carcinogenic to humans
SYMPT Dyspnea; interstitial fibrosis; restricted pulmonary functioning; finger clubbing; (carcinogenic)
ORGAN Lungs

LESS1 MEDIA (N): Mixed Cellulose Ester Filter (MCEF) 0.8 microns (open face) 25 mm cassette with 50 mm conductive cowl
MAX V: 1200 Liters MAX F: 16 L/min MIN F: 0.5 L/min (TWA)
MIN V: 48 Liters MAX F: 2.5 L/min MIN F: 1.6 L/min (***Excursion Level***)
ANL 1: Phase Contrast Microscopy; PCM
. REF: 17 (OHL2004M9020F0MCE)SAE: 0.25 CLASS: Validated in-house
NOTE: Do not request multiple analytes. Do not overload. If dust is high, reduce air volume to avoid overloading. A minimum of 2 blanks or 10% are required for every set. Pack to reduce shock.

LESS2 MEDIA: Bulk Samples
ANL 1: Polarized Light Microscopy; PLM
. REF: 17 ((OHL2004M9020B0XXXv010) CLASS: Validated in-house
NOTE: Collect sample in a 50mm x 9mm style polystyrene petri dish. Do not ship bulk samples with air samples. Seal securely to prevent escape of asbestos.

WIPE Bulk preferred. Do not use Whatman or other paper filters.

Barium (Insoluble Compounds)

IMIS **B102** CAS 7440-39-3

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. Solubility of the Barium compounds, if known, should be transmitted to LESS.

Barium (Soluble Compounds)

IMIS **0310** CAS 7440-39-3; 10361-37-2
SYN Varies depending upon specific compound.
NIOSH RTECS CQ8370000 DOT 1564 55
MIOSHA FINAL RULE (Table G-1-A): TWA 0.5 mg/m^3
DESC Appearance and odor vary depending upon specific compound.
HLTH Acute effects lung, gastrointestinal (HE4); Baritosis (HE10)
SYMPT Upper respiratory irritation; gastroenteritis; muscle spasms; slow pulse, extrasystoles; hypokalemia; irritates eyes; skin burns
ORGAN Heart, CNS, skin, respiratory system, eyes
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
CLASS: Partially Validated by NIOSH and OSHA
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. Solubility of the Barium compounds, if known, should be transmitted to LESS. Soluble means water-soluble.
WIPE MEDIA: Whatman smear tab filter. SOLVENT: Deionized water

Barium Sulfate (Respirable Fraction)

IMIS **B104** CAS 7727-43-7
SYN Actybaryte; Artificial Barite; Barium Sulphate; Sulfuric Acid, Barium Salt (1:1)
NIOSH RTECS CR0600000; 11862
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC MW: 233.40 MOLFM: $O_4S.Ba$
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MIN V: 408 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17(OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL 2: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. An elemental analysis is not performed for Barium if the gross weight of the sample yields a concentration below the standard for the air contaminant. If performed, Barium is reported as the compound.

Barium Sulfate (Total Dust)

IMIS **B101** CAS 7727-43-7
SYN Actybaryte; Artificial Barite; Barium Sulphate; Sulfuric Acid, Barium Salt (1:1)
NIOSH RTECS CR0600000; 11862
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC MW: 233.40 MOLFM: $O_4S.Ba$
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL 2: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. An elemental analysis is not performed for Barium if the gross weight of the sample yields a concentration below the standard for the air contaminant. If performed, Barium is reported as the compound.

Benzene

IMIS **0320** CAS 71-43-2
SYN Diesel Exhaust Component; Benzol; Cyclohexatriene
NIOSH RTECS CY1400000; 13487 DOT UN1114 Flammable Liquid
MIOSHA FINAL RULE: (Table G-1-A) Cancer Hazard
. TWA 1 ppm or 3.19mg/m^3
. STEL 5 ppm or 15.97mg/m^3
. ACTION LEVEL 0.5 ppm
NOTE: The benzene standard in R325.77101-115 applies to all occupational exposures to benzene except some subsegments of industry where exposures are consistently under the action level (i.e., distribution and sale of fuels, sealed containers, and pipelines, coke production, oil and gas drilling and production, natural gas processing, and the percentage exclusion for liquid mixtures); for the excepted subsegments, the benzene limits in Table G-2 apply.
Table G-2: TWA 10 ppm
. CEILING 25 ppm
. PEAK 50 ppm, maximum duration 10 min.
NOTE: This standard applies to the industry segments exempt from the 1 ppm 8-hour TWA and 5 ppm STEL of the benzene standard. This applies to any industry for which R325.77101-115 is stated or otherwise not in effect.
DESC Colorless liquid with an aromatic odor.
MW: 78 BP: 176 F VP: 75 mm MP: 42 F
INCOM Strong oxidizers; chlorine, bromine with iron
HLTH Suspect Leukemogen (HE2); Cumulative bone marrow damage (HE12)
TDLO (oral, human) 130 mg/mg
NTP Human Carcinogen
IARC Group 1, carcinogenic to humans
SYMPT Eye, nose, respiratory system irritation; giddiness; headaches; nausea; staggered gait; fatigue; anorexia; lassitude; dermatitis; bone marrow depression; abdomen pain; [carcinogenic]
ORGAN Blood, CNS, skin, bone marrow, eyes, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
MIN T: ***15*** Minutes MAX F: 0.2 L/min (Ceiling)
MIN T: 5 Minutes MAX F: 0.2 L/min (Peak)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 DET. TUBE: Dräger, 67 28561, 0.5-10 ppm
FOXBORO SAPPHIRE: Det. Limit 2 ppm, long pathlength
WIPE No

Beryllium and Beryllium Compounds (as Be)
IMIS **0360** CAS 7440-41-7
NIOSH RTECS DS1750000 DOT 1566 53
MIOSHA FINAL RULE (Table G-2):
. TWA 0.002 mg/m^3
. CEILING 0.005 mg/m^3
. PEAK 0.025 mg/m^3, maximum duration 30 min
DESC Solid.
HLTH Suspect Carcinogen (HE2); Cumulative lung damage (Berylliosis) (HE10)
NTP Suspect Human Carcinogen
IARC Group 2A, probably carcinogenic to humans
SYMPT Respiratory symptoms; weakness; fatigue; weight loss; (carcinogenic)
ORGAN Lungs, skin, eyes, mucous membranes

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns

MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 60 Liters ***TIME***: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
MAX V: 30 Liters MIN T: 15 Minutes MAX F: 2.0 L/min (Peak)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period for a time weighted average determination.

Bismuth
IMIS **B100** CAS 7440-69-6
DES Solid.
HLTH Respiratory Effects Other Than Irritation---Cumulative lung damage
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 200 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Bismuth Telluride, Se Doped
IMIS **0371** CAS 1304-82-1
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Cumulative lung damage (HE10)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric Analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminant, specific analysis will not be performed.
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. An elemental analysis for Bismuth is performed and reported as the compound.

Bismuth Telluride, Undoped (Respirable Fraction)
IMIS **B110** CAS 1304-82-1
SYN Bi_2Te_3
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Cumulative lung damage (HE10)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Cyclone
MAX V: 816 Liters MIN V: 408 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric Analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminant, specific analysis will not be performed. If the filter is not overloaded, samples may be collected up to an 8-hour period.
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated

NOTE: Submit as a separate sample. An elemental analysis for Bismuth is performed and reported as the compound.

Bismuth Telluride, Undoped (Total Dust)

IMIS **0370** CAS 1304-82-1
SYN Bi_2Te_3; Bismuth Telluride, Undoped prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC Solid.
HLTH Cumulative lung damage (HE10)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric Analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminant, specific analysis will not be performed. If the filter is not overloaded, samples may be collected up to an 8-hour period.
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. An elemental analysis for Bismuth is performed and reported as the compound.

Bisphenol A

IMIS **0372** CAS 80-05-7
SYN 4,4'-(1-Methylethylidene) bisphenol; 4,4'Isopropylidenediphenol; 2,2-bis (4-Hydroxyphenyl) propane
NIOSH RTECS SL6300000; 56959
LESS1 MEDIA (G): Glass Fiber Filter (37 mm)
ANL SOLVENT: Acetonitrile
MAX V: 360 Liters MAX F: 1.5 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S023) CLASS: Partially Validated by NIOSH

Boron Oxide (Total Dust)

IMIS **0380** CAS 1303-86-2
SYN Anhydrous boric acid; boric anhydride; boric oxide
NIOSH RTECS ED7900000
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Colorless, glassy granules or flakes with no odor.
MW: 70 BP: 4622 F VP: approx. 0 mm MP: 842 F
INCOM None hazardous
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Nasal irritation; conjunctivitis; erythema; low toxicity
ORGAN Skin, eyes
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (PVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liter MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: When the standard is the same as for inert dust, noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE MEDIA: Whatman smear tab SOLVENT: Deionized water

Butadiene

IMIS **0410** CAS 106-99-0
SYN 1,3-Butadiene; Divinyl; Biethylene
NIOSH RTECS EI9275000; 21332 DOT UN1010 Flammable Gas
MIOSHA FINAL RULE (Table G-1-A): TWA 1ppm or 2.2mg/m^3,
STEL 5ppm or 11.1mg/m^3
DESC Colorless gas with a mildly aromatic odor. Liquid at <24 F.
MW: 54 BP: 24 F VP: 910 mm MP: -164 F
INCOM Strong oxidizers, copper, copper alloys
HLTH Irritation-Eye, Nose, Throat---Mild (HE16)
NTP Suspect Human Carcinogen- Clear Animal Carcinogen (inhalation studies)
IARC Group 2B, possibly carcinogenic to humans (1,3-Butadiene)
SYMPT Eye, nose, throat irritation; drowsiness, light-headedness; frostbite (carcinogenic)
ORGAN Eyes, respiratory system, CNS
LESS1 MEDIA (14): Coated Charcoal Tube (100/50 mg sections, 20/40 mesh); Coating is 10% (w/w) 4-tert-Butylcatechol
ANL SOLVENT: Carbon Disulfide
MAX V: 3 Liter MAX F: 0.05 L/min (TWA & STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA56)*** SAE: 0.11 CLASS: Fully Validated
NOTE: Ship samples under refrigeration
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.35 ppm, long pathlength

***n*-Butane**
IMIS **0420** CAS 106-97-8
NIOSH RTECS EJ4200000; 21357 DOT UN1010 Flammable Gas
MIOSHA FINAL RULE (Table G-1-A): TWA 800 ppm, 1900 mg/m^3
DESC Gas MW: 58.12 MOLFM: C_4H_{10} BP: (-0.5 deg C)
HLTH Asphyxiant (HE17); Narcosis (HE8)
LESS1 MEDIA (8+8): Two Carbosieve III Tubes (130/65 mg sections, 60/80 mesh) in series
ANL SOLVENT: Carbon Disulfide
MAX V: 3.0 Liters MAX F: 0.05 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHAPV2010)*** CLASS: Partially Validated
SAM2 FOXBORO SAPPHIRE: Det. Limit 5 ppm, long pathlength

2-Butanone
IMIS **0430** CAS 78-93-3
SYN Methyl Ethyl Ketone; MEK; Ethyl Methyl Ketone; Methylethylketone; Composite Constituent
NIOSH RTECS EL6475000; 21754 DOT UN1193 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 200 ppm, 590 mg/m^3
. STEL 300 ppm, 885 mg/m^3
DESC Clear, colorless liquid with a fragrant, mint-like moderately sharp odor.
MW: 72 BP: 175 F VP: 70 mm MP: -123 F
INCOM Very strong oxidizers
HLTH Irritation-Eye, Nose, Throat---Moderate (HE15); Narcosis (HE8)
SYMPT Eye, nose irritation; headaches, dizziness; vomiting
ORGAN CNS, lungs
LESS1 MEDIA (8): Carbosieve S-III (130/65 mg sections)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 3 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA84)*** SAE: 0.12 CLASS: Validated by OSHA

LESS2 MEDIA: Anasorb CMS (not currently available at LESS)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 12 Liters MAX F: 0.05L/min
ANL 1: Gas Chromatography; GC/FID
REF: 17 (OHL2004S016) SAE: 0.12 CLASS: Validated in-house
NOTE: Used for AIHA proficiencies only.
SAM2 FOXBORO SAPPHIRE: Det. limit: 1.6ppm, long pathlength

2-Butoxyethanol

IMIS **0435** CAS 111-76-2
SYN Butyl cellosolve; Ethylene glycol monobutylether; Dowanol EB; Butyl oxitol; Jeffersol EB; Ektasolve EB; Ethylene glycol mono butyl ether; Ethylene glycol monobutyl ether; EGBE
NIOSH RTECS KJ8575000; 34274 DOT UN2369 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 25 ppm, 120 mg/m^3
DESC Colorless liquid with a mild odor.
MW: 118.20 BP: 171 C VP: 0.6 mm MP: -94 F MOLFM: $C_6H_{14}O_2$
INCOM Strong oxidizers and caustics
HLTH Anemia (HE12); Irritation-Eye, Nose, Throat-- Mild (HE16)
SYMPT Eye, nose, throat irritation; hemolysis, hemoglobinuria
ORGAN Liver, kidneys, lymphoid system, skin, blood, eyes, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride: Methanol
MAX V: 48 Liter MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA83)*** SAE: 0.15 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.25ppm, long pathlength
WIPE Wipe with charcoal pad, sealed in glass vial for shipment

n-Butyl Acetate

IMIS **0440** CAS 123-86-4
SYN Butyl Acetate; Butyl ethanoate; Acetic acid butyl ester
NIOSH RTECS AF7350000; 1829 DOT UN1123 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 150 ppm, 710 mg/m^3
. STEL 200 ppm, 950 mg/m^3
DESC Colorless liquid with a fruity odor.
MW: 116 BP: 260 F VP: 10 mm MP: -101 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Irritation-Eye, Nose, Throat-- Moderate (HE15); Narcosis (HE8)
SYMPT Headaches, drowsiness; eyes irritated, dry; respiratory system irritation
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: Ship refrigerated
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.18 ppm, long pathlength

n-Butyl Alcohol

IMIS **0460** CAS 71-36-3
SYN Butyl alcohol; 1-Butanol; Propylcarbinol; n-Butanol; BA
NIOSH RTECS EO1400000; 22020 DOT UN1120 Flammable Liquid

MIOSHA FINAL RULE (Table G-1-A): CEILING (Skin) 50 ppm, 150 mg/m^3
DESC Colorless liquid with a strong, characteristic odor.
MW: 74 BP: 244 F VP: 4.2 mm MP: -128 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin-Moderate (HE15); Narcosis (HE8)
SYMPT Eye, nose, throat irritation; headaches, vertigo, drowsiness; corneal inflammation, blurred vision, lacrimation, photophobia; dry, cracked skin
ORGAN Skin, eyes, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
ALT SOLVENT: (99:1) Carbon Disulfide/Isopropanol
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
MIN T: ***15*** Minutes MAX F: 0.2 L/min (Ceiling)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.25 ppm, long pathlength

sec-Butyl Alcohol
IMIS **0461** CAS 78-92-2
SYN 2-Butanol; Methyl ethyl carbinol; Butylene hydrate; 2-Hydroxybutane
NIOSH RTECS EO1750000; 22021 DOT UN1120 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 305 mg/m^3
DESC Colorless liquid with a strong, pleasant odor.
MW: 74 BP: 211 F VP: 13 mm MP: -175 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16); Narcosis (HE8)
SYMPT Eye irritation; narcosis; dry skin
ORGAN Eyes, skin, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
ALT SOLVENT: (99:1) Carbon Disulfide/Isopropanol
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

tert-Butyl Alcohol
IMIS **0462** CAS 75-65-0
SYN 2-Methyl-2-propanol; TBA; Trimethylcarbinol
NIOSH RTECS EO1925000; 22022 DOT UN1120 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 100 ppm, 300 mg/m^3
. STEL 150 ppm, 450 mg/m^3
DESC Colorless liquid with a camphor-like odor; solid in cold weather.
MW: 74 BP: 181 F VP: 31 mm MP: 77 F
INCOM Strong mineral acids, strong hydrochloric acid
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Narcosis (HE8)
SYMPT Drowsiness; skin, eye irritation; headaches; dizziness; dry skin
ORGAN Eyes, skin
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
ALT SOLVENT: (99:1) Carbon Disulfide/2-butanol
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1400ISSUE2)*** SAE: 0.12 CLASS:

Validated by NIOSH

NOTE: Ship cooled

SAM2 FOXBORO SAPPHIRE: Det. Limit 0.3ppm, long pathlength

Butyl Cellosolve Acetate

IMIS **0472** CAS 112-07-2

SYN Ethylene glycol monobutyl ether acetate; 2-Butoxyethanol acetate; 2-Butoxyethyl acetate; Acetic acid, 2-butoxyethyl ester; Ethylene glycol butyl ether acetate; Ektasolve EB Acetate

NIOSH RTECS KJ8925000; 34277

DESC Colorless liquid

MOLFM: $C_8H_{16}O_3$ MW: 160.211 ODTHRS: 0.1 ppm BP: 192 C

FP: 71 C (160 F) (closed cup); 88 deg C (190 F) (open cup)

LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)

ANL SOLVENT: (95:5) Methylene Chloride/Methanol

MAX V: 48 Liters MAX F: 0.1 L/min

ANL 1: Gas Chromatography; GC/FID

. REF: ***17 (OHL2005OOSHA83)*** SAE: 0.09 CLASS: Validated by OSHA

tert-Butyl Chromate (as CrO_3)

OSHA IMIS Code Number: ~~*0686*~~

IMIS Code history: used prior to 05/30/2006 and the Chromium (VI) standard

For more General Description information see Chromium (VI) (Hexavalent Chromium), chapter III.

IMIS ~~*0473*~~ used prior to 5/30/2006 CAS 1189-85-1

SYN Chromic acid; di-tert-Butyl ester; bis (tert-Butyl) chromate

NIOSH RTECS GB2900000

MIOSHA FINAL RULE (Table G-1-A): CEILING (Skin) 0.1 mg/m^3

DESC Liquid.

MW: 230 MP: 23 to 32 F

INCOM Reducing agents, moisture

HLTH Suspect Carcinogen (HE2); Irritation-Eye, Nose, Throat, Skin---Marked (HE14)

SYMPT Lungs, sinus cancer

ORGAN Respiratory system, skin, eyes, CNS

LESS1 MEDIA (L): Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns

MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)

ANL 1: Colorimetric (diphenylcarbazide)

. REF: 17 ***(OHL2004M0686SOPVCV010)*** SAE: 0.20CLASS: Validated by MDLEG

NOTE: Submit as a separate sample.

ANL 2: Ion Chromatography Post Column Derivatization UV-Vis Detector at 540 nm

. REF 2,7(OSHA ID-215) SAE: 0.18 CLASS: Fully Validated by OSHA

NOTE: Submit as a separate sample. The ion chromatography analysis is valence specific for hexavalent chromium (Cr^{+6}). Not currently available.

n-Butyl Glycidyl Ether

IMIS **0477** CAS 2426-08-6

SYN BGE; 1,2-Epoxy-3-butoxypropane

NIOSH RTECS TX4200000; 65318

MIOSHA FINAL RULE (Table G-1-A): TWA 25 ppm, 135 mg/m^3

DESC Pale yellow liquid.

MW: 130 BP: 327 F VP: 3 mm

INCOM Strong oxidizers and caustics

HLTH Chronic (Cumulative) Toxicity, mutagen (HE2)

Irritation-Eye, Nose, Throat, Skin---Mild (HE16)

SYMPT Eye, nose irritation; skin irritation, sensitization; narcosis
ORGAN Eyes, skin, respiratory system, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 30 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2002s001)*** SAE: 0.306 CLASS: Validated by NIOSH

Cadmium Dust (as Cd)

IMIS **0490** CAS 7440-43-9
NIOSH RTECS EU9800000 DOT 2570 53
MIOSHA FINAL RULE (Table G-1-A): TWA 0.005 mg/m^3
DESC Appearance and odor vary for specific compound.
INCOM Strong oxidizers, elemental sulfur, selenium, tellurium
HLTH Cumulative kidney and lung damage (HE3); Cumulative lung damage (HE10)
NTP Suspect Human Carcinogen
IARC Cadmium and Cadmium compounds - Group 2A, probably carcinogenic to humans
SYMPT Pulmonary edema; dyspnea, coughing, tight chest, substernal pain; headaches; chills, muscle aches; nausea, diarrhea; anosmia; emphysema; proteinuria; anemia; (carcinogenic)
ORGAN Respiratory system, kidneys, prostate, blood
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period when determining a TWA concentration. Analytical method does not distinguish between dust and fume.

Cadmium Fume (as Cd)

IMIS **0491** CAS 1306-19-0; 7440-43-9; 1306-19-0
SYN Cadmium Oxide
NIOSH RTECS EV1930000 DOT 2570 53
MIOSHA FINAL RULE (Table G-1-A) TWA 0.005 mg/m^3
DESC Finely divided solid particles dispersed in air.
HLTH Cumulative kidney and lung damage (HE3); Cumulative lung damage (HE10)
NTP Suspect Human Carcinogen
IARC Cadmium and Cadmium compounds - Group 2A, probably carcinogenic to humans
SYMPT Pulmonary edema; dyspnea, coughing, tight chest, substernal pain; headaches; chills, muscle aches; nausea, diarrhea; emphysema; proteinuria; anosmia; mild anemia; (carcinogenic)
ORGAN Respiratory system, kidneys, blood
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period when determining a TWA concentration. Analytical method does not distinguish between dust and fume.

Calcium Arsenate (as As)

IMIS **0500** CAS 7778-44-1
SYN Tricalcium arsenate; Tricalcium orthoarsenate; Cucumber dust
NIOSH RTECS CG0830000 DOT 1573 53
DESC Colorless, odorless solid
MW: 398 VP: 0 mm
HLTH Suspect carcinogen (HE2); Cumulative systemic poisoning (HE3)
NTP Suspect Human Carcinogen (Arsenic)
IARC Arsenic and Arsenic Compounds - Group 1, carcinogenic to humans
SYMPT Weakness; gastrointestinal tract; peripheral neuropathy; hyperpigmentation, palmar planter hyperkeratoses; dermatitis; (carcinogenic) In animals: liver damage
ORGAN Eyes, respiratory system, liver, skin, lymphatics, CNS
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Atomic Absorption Spectroscopy; AAS/Hydride
. REF: 17 ***(OHL2005S010)*** SAE: 0.24 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE MEDIA: Whatman Smear Tab Filter. SOLVENT: Deionized water

Calcium Carbonate (Respirable Fraction)
IMIS **C130** CAS 1317-65-3; 471-34-1
SYN Aragonite; Oyster Shells; Calcite; Chalk; Limestone; Marble; Marl; Travertine
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Nuisance Particulates (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MIN V: 408 Liter MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminate, LESS will not perform an elemental analysis.
ANL 2: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: An elemental analysis is performed for total calcium and reported as the compound.

Calcium Carbonate (Total Dust)
IMIS **0505** CAS 1317-65-3; 471-34-1
SYN Aragonite; Oyster Shells; Calcite; Chalk; Limestone; Marble; Marl; Travertine
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC Solid.
HLTH Nuisance Particulates (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminate, LESS will not perform an elemental analysis.
ANL 2: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: An elemental analysis is performed for total calcium and reported as the compound.

Calcium Cyanamide

IMIS **0510** CAS 156-62-7
MIOSHA FINAL RULE (Table G-1-A): TWA 0.5 mg/m^3
DESC Solid.
HLTH Irritation-Eye, Nose Throat, Skin---Moderate (HE15)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Calcium Hydroxide

IMIS **0515** CAS 1305-62-0
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
NOTE: The Final Rule Limit of 5 mg/m^3 may not be in effect as a result of reconsideration. Calcium hydroxide is covered by the exposure limits for particulates not otherwise regulated of 5-mg/m^3 respirable dust and 5-mg/m^3 total dust.
DESC Solid.
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Calcium Oxide

IMIS **0520** CAS 1305-78-8
SYN Quicklime; Pebble lime
NIOSH RTECS EW3100000 DOT 1910 60
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
NOTE: The Final Rule Limit TWA of 5 mg/m^3 may not be in effect as a result of reconsideration.
DESC White or gray, odorless solid.
MW: 56 BP: 5162 F VP: 0 mm MP: 4658 F
INCOM Water
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
SYMPT Irritates eyes, upper respiratory tract; ulcerated, perforated nasal septum; pneumonia; dermatitis; burns
ORGAN Respiratory system, skin, eyes
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17(OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an

elemental analysis is performed and reported as the compound.

Calcium Silicate (Respirable Fraction)

IMIS **C122** CAS 1344-95-2
SYN Silicic Acid, Calcium Salt: Calcium Pectolith; Grammite; Micro-Cell; Silene
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC White or slightly cream-colored, free-flowing powder.
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Calcium Silicate (Total Dust)

IMIS **C112** CAS 1344-95-2
SYN Silicic Acid, Calcium Salt: Calcium Pectolith; Grammite; Micro-Cell; Silene
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC White or slightly cream-colored, free-flowing powder.
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Calcium Sulfate (Respirable Fraction)

IMIS **C123** CAS 7778-18-9
SYN Sulfuric Acid, Calcium Salt (1:1); Crysalba; Drierite; Gibs; Thiolite
NIOSH RTECS WS6920000; 79856
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC White odorless powder or crystals, slightly soluble in water;
MP: 1450 C MW: 136.4 MOLFM: $CaSO_4$
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Calcium Sulfate (Total Dust)

IMIS **C104** CAS 7778-18-9
SYN Sulfuric Acid, Calcium Salt (1:1); Crysalba; Drierite; Gibs; Thiolite
NIOSH RTECS WS6920000; 79856
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC White odorless powder or crystals, slightly soluble in water
MP: 1450 C MW: 136.14 MOLFM: $CaSO_4$
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric

. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Carbon Black

IMIS **0527** CAS 1333-86-4
SYN Channel black; Lamp black; Furnace black; Thermal black; Acetylene black
NIOSH RTECS FF5800000
MIOSHA FINAL RULE (Table G-1-A): TWA 3.5 mg/m^3
DESC Black, odorless solid.
MW: 12 BP: 4200 C VP: approx. 0 mm MP: N.A.
INCOM Strong oxidizers, such as chlorates, bromates, nitrates
HLTH Cumulative lung damage (HE10); Cumulative heart damage (HE3)
IARC Group 2B, possibly carcinogenic to humans
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) Filter 5 microns pore size-closed face
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. If polyaromatic hydrocarbons (PAHs) are suspected to be present, take and submit separate samples on Glass Fiber Filters. See individual PAHs.

Carbon Dioxide

IMIS **0530** CAS 124-38-9
SYN Carbonic acid gas; Dry Ice; CO_2; Diesel Exhaust Component
NIOSH RTECS FF6400000 DOT 1013 21
MIOSHA FINAL RULE (Table G-1-A):
. TWA 10000 ppm, 18000 mg/m^3
. STEL 30,000 ppm, 54,000 mg/m^3
DESC Colorless, odorless gas; can be liquid or solid.
MW: 44 BP: -109 F MP: -109 F
INCOM Chemically active metals, such as sodium, potassium, hot titanium
HLTH Simple Asphyxiant (HE17)
SYMPT Headaches, dizziness, restlessness, paresthesis; dyspnea; sweating; malaise; increased heart rate, elevated blood pressure, pulse pressure; coma; asphyxia; convulsions; frostbite
ORGAN Lungs, skin, CVS
LESS1 See secondary sampling methods (SAM2)
SAM2 DET. TUBE: Dräger, CH 23501, 0.1-0.1-6% ***Vol.; Dräger 8101811, 100-3000ppm***
FOXBORO SAPPHIRE: Det. Limit 1ppm, short pathlength

Carbon Monoxide

IMIS **0560** CAS 630-08-0
SYN CO; Diesel Exhaust Component
NIOSH RTECS FG3500000 DOT 1016 18
MIOSHA FINAL RULE (Table G-1-A):
. TWA 35 ppm, 40 mg/m^3
. CEILING 200 ppm, 229 mg/m^3, maximum duration ***15*** min
DESC Colorless, odorless gas.
MW: 28 BP: -313 F VP: >1 atm MP: -326 F
INCOM Strong oxidizers
HLTH Asphyxiation, Chemical anoxia (HE17)

SYMPT Headaches; tachypnea; nausea; weakness, dizziness, confusion, hallucinations; cyanosis; depressed, ST of electrocardiogram; angina; syncope; frostbite
ORGAN CVS, lungs, blood, CNS
LESS1 Direct Reading: ***Quest Datalogger*** or Metrosonics Datalogger
SAM2 DET. TUBE: Dräger, CH 25601, 5-700 ppm Dräger, CH 29901, 0.3-7%, ***CH 20601, 10-3000ppm,*** FOXBORO SAPPHIRE: Det. Limit: 0.9ppm, long pathlength
WIPE No

Carbon Tetrachloride

IMIS **0570** CAS 56-23-5
SYN Tetrachloromethane
NIOSH RTECS FG4900000; 25036 DOT UN1846 Poison
MIOSHA FINAL RULE (Table G-1-A): TWA 2 ppm, 12.6 mg/m^3
DESC Colorless liquid with an ether-like odor.
MW: 154 BP: 170 F VP: 91 mm MP: -9 F
INCOM Chemically active metals, such as sodium, potassium, magnesium
HLTH Cumulative liver damage (HE3); Teratogen (HE5)
NTP Suspect Human Carcinogen
IARC Group 2B, possibly carcinogenic to humans
SYMPT CNS depression; nausea, vomiting; liver, kidney damage; skin irritation; (carcinogenic)
ORGAN CNS, eyes, lungs, liver, kidneys, skin
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 15 Liters MAX F: 0.2 L/min (TWA)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1003)*** SAE:0. 13 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit: 0.05ppm, long pathlength

Cellulose (Respirable Fraction)

IMIS **C124** CAS 9004-34-6
SYN Paper Fiber
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Cellulose (Total Dust)

IMIS **0575** CAS 9004-34-6
SYN Cellulose (Paper Fiber) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC Solid.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight

without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Chlorine

IMIS **0640** CAS 7782-50-5
NIOSH RTECS FO2100000 DOT 1017 20
MIOSHA FINAL RULE (Table G-1-A):
. TWA 0.5 ppm, 1.5 mg/m^3
. STEL 1 ppm, 3 mg/m^3
DESC Amber liquid or greenish-yellow gas with a characteristic, irritating odor.
MV: 70.9 BP: -29 F VP: >1 atm MP: -150 F
INCOM Combustible substances, finely divided metals
HLTH Lung Injury (HE11); Irritation-Eyes, Nose, Throat, Bronchi, Skin---Marked (HE14)
SYMPT Eye, nose, mouth burns; lacrimation; rhinorrhea; coughing, choking; nausea, vomiting; substernal pain; headache; dizziness, syncope; pulmonary edema; pneumonia; hypoxemia; dermatitis; eye skin burns
ORGAN Respiratory system
LESS1 See secondary sampling methods (SAM2)
SAM2 DET. TUBE: Dräger, 67 28411, 0.3-10 ppm
WIPE No

Chlorobenzene

IMIS **0620** CAS 180-90-7
SYN Monochlorobenzene; Chlorobenzol; Phenyl chloride; MCB
NIOSH RTECS CZ0175000; 13705 DOT UN1134 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 75 ppm, 350 mg/m^3
DESC Colorless liquid with a mild aromatic odor.
MW: 113 BP: 270 F VP: 8.8 mm MP: -47 F
INCOM Strong oxidizers
HLTH Cumulative Systemic Toxicity (HE3); Narcosis (HE8)
Irritation-Eyes, Nose, Skin---Moderate (HE15)
SYMPT Skin, eye, nose irritation; drowsiness, incoherentness; liver damage, lack of coordination; in animals: liver, lung, and kidney damage
ORGAN Respiratory system, eyes, skin, CNS, liver
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 40 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1003)*** SAE 0.08 CLASS: Validated in-house
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.4ppm, long pathlength

Chlorobromomethane

IMIS **0627** CAS 74-97-5
SYN Bromochloromethane; Methylene chlorobromide; CB; CBM; Halon 1011
NIOSH RTECS PA5250000; 47838 DOT UN1887 Keep Away From Food
MIOSHA FINAL RULE (Table G-1-A): TWA 200 ppm, 1050 mg/m^3
DESC Colorless to pale yellow liquid with a characteristic, sweet odor.
MW: 129 BP: 154 F VP: 117 mm MP: -126 F
INCOM Chemically active metals: calcium, powdered aluminum, zinc, and magnesium
HLTH Cumulative liver damage (HE3); Narcosis (HE8)
Irritation-Eyes, Throat---Mild (HE16)
SYMPT Disorientation, dizziness; irritated eyes, throat, skin; pulmonary edema
ORGAN Skin, liver, kidneys, respiratory system, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)

ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 8 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1003)*** SAE: 0.10 by NIOSH CLASS: Validated
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.4ppm, long pathlength

Chloroform

IMIS **0670** CAS 67-66-3
SYN Trichloromethane
NIOSH RTECS FS9100000; 25585 DOT UN1888 Poison
MIOSHA FINAL RULE (Table G-1-A): TWA 2 ppm, 9.78 mg/m^3
DESC Colorless liquid with a pleasant, sweet odor.
MW: 119 BP: 142 F VP: 160 mm MP: -82 F
INCOM Strong caustics, chemically active metals, such as aluminum, magnesium powder, sodium, potassium
HLTH Cumulative liver and kidney damage (HE3); Narcosis (HE8)
NTP Suspect Human Carcinogen
IARC Group 2B, possibly carcinogenic to humans
SYMPT Dizziness, mental dullness; nausea; headaches; fatigue; anesthesia; hepatomegaly; eye, skin irritation; [carcinogenic], disorientation
ORGAN Liver, kidneys, heart, eyes, skin
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1003)*** SAE: 0.10 by NIOSH CLASS: Validated
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.07, long pathlength

Chromic Acid & Chromates (as CrO_3)

OSHA IMIS Code Number: ~~0686~~
IMIS Code history: used prior to 05/30/2006 and the Chromium (VI) standard
For more General Description information see Chromium (VI) (Hexavalent Chromium), chapter III.

IMIS ***~~0686~~ used prior to 05/30/2006*** CAS 7789-12-0; 13530-65-9
SYN Chromic Acid (7738-94-5); Zinc Chromate (14018-95-2); Chromium ***(VI)*** Trioxide (1333-82-0) Barium Chromate (10294-40-3); Sodium Chromate (7775-11-3); Silver Chromate (7784-01-2); Potassium Chromate (7789-00-6); Strontium Chromate (7789-06-2); Potassium Dichromate (7778-50-9); Ammonium Dichromate (7789-09-5); Sodium Dichromate (10588-01-9); Calcium Chromate (13765-19-0); Lead Chromate (7758-97-6; 18454-12-1)
NIOSH RTECS GB2450000 DOT 1463 42; 1755 60
MIOSHA FINAL RULE (Table G-1-A): ***TWA: 5 µg/m^3***
DESC Appearance and odor vary depending upon specific compound.
INCOM Combustible, organic, or other readily oxidizable materials: paper, wood, sulfur, aluminum, plastics, etc.
HLTH Cumulative lung damage (HE10); Nasal perforation, ulceration (HE3)
IARC Chromium and Chromium Compounds - Group 1, carcinogenic to humans (Hexavalent Chromium Compounds)
SYMPT Respiratory, nasal septum irritation; leukocytosis, leukopenia, monocytosis, eosinophilia; eye injury, conjunctivitis; skin ulcer, sensitization dermatitis, liver, kidney damage
ORGAN Blood, respiratory system, liver, kidneys, eyes, skin
LESS1 MEDIA (L): Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns

MIN Vol: 100 L MAX F: 2.0 L/min (Ceiling)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Colorimetric (diphenylcarbazide)
. REF: 17 ***(OHL2004M0686SOPVCV010)*** SAE: 0.20 CLASS: Validated in-house
NOTE: Submit as a separate sample.
ANL 2: Ion Chromatography Post Column Derivatization UV-Vis Detector at 540 nm
. REF 2,7(OSHA ID-215) SAE: 0.18 CLASS: Fully Validated by OSHA
NOTE: Submit as a separate sample. The ion chromatography analysis is valence specific for hexavalent chromium (Cr^{+6}). Not currently available.

WIPE: MEDIA: Low Ash Polyvinyl Chloride (LAPVC) filter SOLVENT: Deionized Water

Chromium (II) Compounds (as Cr)

IMIS **C121** CAS 7440-47-3
SYN Chrome
NIOSH RTECS GB4200000; 25915
MIOSHA FINAL RULE (Table G-1-A): TWA 0.5 mg/m^3
DESC MW: 52.00 MOLFM: Cr
IARC Chromium and Chromium Compounds - Group 3, not Classifiable as to its carcinogenicity to humans
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Analytical methodology does not distinguish between valence states. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis for Chromium is performed and reported as the compound.

Chromium (III) Compounds (as Cr)

IMIS **C113** CAS 7440-47-3
SYN Chrome; Chromium Phosphate; Chromium Carbonate; Chromium Acetate
NIOSH RTECS GB4200000; 25915
MIOSHA FINAL RULE (Table G-1-A): TWA 0.5 mg/m^3
DESC MW: 52.00 MOLFM: Cr
IARC Chromium and Chromium Compounds - Group 3, not Classifiable as to its carcinogenicity to humans (Trivalent Chromium Compounds)
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Analytical methodology does not distinguish between valence states. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis for Chromium is performed and reported as the compound.

Chromium Metal (as Cr)

IMIS **0685** CAS 7440-47-3; 1308-38-9
SYN Chromium; Chromium Oxide; Chromium, Metal & Insoluble Salts prior to 9/1/89
NIOSH RTECS GB4200000
MIOSHA FINAL RULE (Table G-1-A): TWA 1.0 mg/m^3
DESC Appearance and odor vary depending upon specific compound.
INCOM Strong oxidizers

IARC Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Histologic fibrosis of lungs
ORGAN Respiratory system
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis is performed and reported as total chromium.

Chromium, Soluble Chromic, Chromous Salts (as Cr)
IMIS **0690** CAS 7440-47-3
SYN* Chromium Phosphate (7789-04-0); Chromium Carbonate (29689-14-3); Chromium Acetate (1066-30-4)
NIOSH RTECS GB4200000
DESC Appearance and odor vary depending upon specific compound.
INCOM Water
HLTH Cumulative lung damage (HE10); Dermatitis (HE3)
IARC Chromium and Chromium Compounds - Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Sensitization dermatitis
ORGAN Skin
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis for Chromium is performed and reported as the compound.

Coal Dust (<5% SiO_2, Respirable Quartz Fraction)
IMIS **9040** CAS 68131-74-8
MIOSHA FINAL RULE (Table G-1-A): TWA 2 mg/m^3
DESC Solid.
HLTH Pneumoconiosis (HE10)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: if the gross weight sample yields a concentration below the standard for the air contaminant, LESS performs no additional analysis. If a gravimetric analysis is not sufficient, LESS will perform an XRD analysis for quartz
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted***; use IMIS code S103***. For SiO_2, a high volume area or settled dust sample is preferred. ***Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for***

reference as a bulk; use IMIS S103. Clearly mark samples to be used for reference as a bulk ***use IMIS code S103***. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter, otherwise, submit as a separate filter.

BULK Submit bulk sample in separate package when quartz analysis is requested.

WIPE No

Coal Dust (> or = 5% SiO_2, Respirable Quartz Fraction)

IMIS **C120**

MIOSHA FINAL RULE (Table G-1-A): TWA 0.1 mg/m^3

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted ***with the IMIS code S103***. For SiO_2, a high volume area or settled dust sample is preferred. ***Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103.*** If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter, otherwise, submit as a separate filter.

WIPE No

Cobalt, Metal Dust & Fume (as Co)

IMIS **0720** CAS 7440-48-4

NIOSH RTECS GF8750000

MIOSHA FINAL RULE (Table G-1-A): TWA 0.05 mg/m^3

DESC Odorless, black solid or finely divided particulates.

INCOM Strong oxidizers

HLTH Asthma (HE9); Cumulative lung changes (HE10); Dermatitis (HE3)

SYMPT Coughing, dyspnea, decreased pulmonary functioning; low-weight; dermatitis; diffused nodular fibrosis; respiratory hypersensitivity

ORGAN Respiratory system, skin

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

Copper Dusts & Mists (as Cu)

IMIS **0730** CAS 7440-50-8

NIOSH RTECS GL5325000

MIOSHA FINAL RULE (Table G-1-A): TWA 1 mg/m^3

DESC Odorless solids.
MW: 63.55
INCOM Acetylene gas, magnesium metal
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Mucous membrane, nasal pharyngeal irritation; nasal perforation; eye irritation; metallic taste; dermatitis. In animals: lung, liver, kidney damage, anemia
ORGAN Respiratory system, skin, liver, increased risk of Wilson's disease, kidneys
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume.

Copper Fume (as Cu)
IMIS **0731** CAS 7440-50-8
NIOSH RTECS GL5325000
MIOSHA FINAL RULE (Table G-1-A): TWA 0.1mg/m^3
DESC Finely divided particulates.
MW: 63.55
INCOM Acetylene gas
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Respiratory Effects---Acute lung damage/edema (HE11)
SYMPT Metal fume fever; chills, muscle aches; nausea; fever; dry throat, coughing; weakness, lassitude; eye, upper respiratory tract irritation; metal or sweet taste; discolored skin, hair
ORGAN Respiratory system, skin, eyes, increased risk of Wilson's disease
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 OHL2002S010 SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume.

Cresol (All Isomers)
IMIS **0760** CAS 1319-77-3
SYN Cresylic acid; ortho-, meta-, or para-Cresol; 2-, 3-, or 4-Methyl phenol
NIOSH RTECS GO5950000; 27297 DOT UN2076 Poisons
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 5 ppm, 22 mg/m^3
DESC Colorless solid or liquid with a sweet, tarry odor.
MW: 108 BP: 191/202/202 F VP: 30 mm MP: 30/11/35.5 F
INCOM Strong oxidizers
HLTH Cumulative liver, cardiovascular, kidney damage (HE3); Acute Toxicity- (CNS) (HE4)
Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
SYMPT CNS effects; confusion, depression; respiratory failure, dyspnea, irregular and rapid respiration; weak pulse; skin, eye burns; dermatitis; lung, liver, kidney damage
ORGAN CNS, respiratory system, liver, kidneys, skin, eyes
LESS1 MEDIA (91): XAD-7 Tube (100/50 mg sections, 15/50 mesh)
ANL SOLVENT: Methanol
MAX V: 24 Liters MAX F: 0.1 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV

. REF: 17 (OHL2004S020) SAE: 0.14 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: (m-cresol) Det. Limit 0.4ppm, long pathlength

Cristobalite

IMIS **9015** CAS 14464-46-1
MIOSHA FINAL RULE (Table G-1-A): TWA 0.05 mg/m^3
DESC Solid.
HLTH Pneumoconiosis (HE10)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: X-Ray Diffraction
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 Validated: in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted ***use IMIS S103***. For SiO_2, a high volume area or settled dust sample is preferred. ***Send the bulk in a petri dish (½ full or more) or a 30ml vial(½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103.*** Any sample weight between 0.10 mg and 5.0 mg is acceptable (0.5 to 3.0 mg is preferred). If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter; otherwise, submit as a separate filter.

Cumene

IMIS **0780** CAS 98-82-8
SYN Isopropyl benzene; Isopropylbenzene; 2-Phenyl propane; Cumol
NIOSH RTECS GR8575000; 27617 DOT UN 1918 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 50 ppm, 245 mg/m^3
DESC Colorless liquid with a sharp, penetrating, aromatic odor.
MW: 120 BP: 306 F VP: 8 mm MP: -141 F
INCOM Oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Narcosis (HE8)
SYMPT Eye, mucous membrane irritation; headaches; dermatitis; narcosis; coma
ORGAN Eyes, upper respiratory system, skin, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 FOXBORO SAPPHIRE: Det. Limit: 1ppm, long pathlength
WIPE Wipe with charcoal pad, sealed in glass vial for shipment

Cyanide (as Cn)

IMIS **0790** CAS 57-12-5; 151-50-8; 143-33-9
SYN Potassium cyanide; Sodium cyanide DOT 1588 55
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 5 mg/m^3
DESC White solid with a faint almond odor.
INCOM Strong oxidizers, such as nitrates, chlorates, acids, acid salts
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14); Acute Toxicity (Cyanosis) (HE4)
SYMPT Asphyxia & death can occur; weakness; headache; confusion; nausea, vomiting;

incoherentness; rates in respiration, slow gasping respiration; eye, skin irritation
ORGAN CVS, CNS, liver, kidneys, skin
LESS1 MEDIA (M+MFGB): Mixed Cellulose Ester Filter (MCEF) 0.8 microns + Midget Fritted Glass Bubbler (MFGB) containing 10 mL of 0.1N NaOH
MAX V: 120 Liters MAX F: 1.0 L/min
ANL 1: Ion Specific Electrode; ISE
. REF: 17 (OHL 2003S007) SAE: 0.32 CLASS: Validated in-house
NOTE: Submit as a separate sample. If present, sulfide should be listed as an interferent. Particulate cyanide is collected on the filter. HCN, if present, is collected in the Midget Fritted Glass Bubbler. (See HCN – IMIS 1440).
Within 1 hour after the sample has been collected, transfer the filter to a screw cap vial containing 10 mL of 0.1 N NaOH.
Transfer the impinger solution to another clean, screw cap vial. Do not rinse the impinger.
NOTE: Samples must be analyzed as soon as possible.
WIPE MEDIA: Whatman smear tab NOTE: Handle same as filter.

Cyclohexane
IMIS **0810** CAS 110-82-7
SYN Hexahydrobenzene; Hexamethylene; Benzene hexahydride
NIOSH RTECS GU6300000; 28016 DOT UN1145 Flammable Gas
MIOSHA FINAL RULE (Table G-1-A): TWA 300 ppm, 1050 mg/m^3
DESC Colorless liquid with a mild, sweet odor.
MW: 84 BP: 177 F VP: 95 mm MP: 44 F
INCOM Oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Narcosis (HE8)
SYMPT Eye, respiratory system irritation; drowsiness; dermatitis; narcosis, coma; dizziness; nausea
ORGAN Eyes, respiratory system, skin, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 5 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1500Issue3)*** SAE: 0.11 CLASS: Validated by NIOSH
NOTE: Sample on separate media from other organics
SAM2 FOXBORO SAPPHIRE: Det. Limit: 6ppm, long pathlength

Cyclohexanone
IMIS **0830** CAS 108-94-1
SYN Pimelic ketone; Cyclohexyl ketone; Ketohexamethylene
NIOSH RTECS GW1050000; 28595 DOT UN1915 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 25 ppm, 100 mg/m^3
DESC Oily, white to slightly yellow liquid with a peppermint-like odor.
MW: 98 BP: 314 F VP: 2 mm MP: -53 F
INCOM Oxidizing agents, nitric acid
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Cumulative liver and kidney damage (HE3); Narcosis (HE8)
SYMPT Eye, mucous membrane irritation; narcosis; headache; coma; dermatitis
ORGAN Respiratory system, eyes, skin, CNS
LESS1 MEDIA (31): Chromosorb 106 Tube (100/50 mg sections, 60/80 mesh)
ANL SOLVENT: Carbon Disulfide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA01)*** SAE: 0.09 CLASS: Validated by OSHA

Cyclohexene

IMIS **0840** CAS 110-83-8
SYN Benzene tetrahydride; 1,2,3,4-Tetrahydrobenzene
NIOSH RTECS GW2500000; 28668 DOT UN2256 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 300 ppm, 1015 mg/m^3
DESC Colorless liquid with a sweetish odor.
MW: 82 BP: 181 F VP: 67 mm MP: -155 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Cumulative systemic toxicity (HE3); Narcosis (HE8)
SYMPT Skin, eye, respiratory system irritation; drowsiness
ORGAN Skin, eyes, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 7 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Cyclohexylamine

IMIS **0842** CAS 108-91-8
SYN Hexahydroaniline; Aminocyclohexane; Aniline Hexahydro; CHA;
Hexahydrobenzenamine, Aminohexahydrobenzene
NIOSH RTECS GX0700000; 28789 DOT UN2375 Flammable Liquid & Corrosive
MIOSHA FINAL RULE (Table G-1-A): TWA 10 ppm, 40 mg/m^3
DESC Liquid.
MW: 99.20 MOLFM: $C_6H_{13}N$
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Mutagen (HE2); CNS disturbances (HE7)
LESS1 MEDIA (89): Coated XAD-7 Tube (80/40 mg sections) Coating is 10% Phosphoric Acid
ANL SOLVENT: HNO_3/ EDTA buffer
MAX V: 120 Liters MAX F: 1.0 L/min
ANL 1: Ion Chromatography, IC
. REF: 17 ***(OHL2004SO27)*** ***CLASS: Validated in-house***

Diacetone Alcohol

IMIS **0860** CAS 123-42-2
SYN 4-Hydroxy-4-methyl-2-pentanone; 2-Methyl-2-pentanol-4-one
NIOSH RTECS SA9100000; 54828 DOT UN1148 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 50 ppm, 240 mg/m^3
DESC Colorless liquid with a mild odor.
MW: 116 BP: 328 F VP: 0.8 mm MP: -45 F
INCOM Strong oxidizers and alkalis
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Cumulative kidney damage (HE3)
SYMPT Eye, nose, throat, skin irritation; corneal tissue damage; narcosis
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
ALT SOLVENT: (95:5) Carbon Disulfide/Isopropanol
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Dibutyl Phthalate

IMIS **0864** CAS 84-74-2

SYN DBP; Dibutylphthalate; Di-n-Butyl Phthalate; o-Benzenecarboxylic Acid, Dibutyl Ester
NIOSH RTECS TI0875000; 59814
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Colorless, oily liquid with a very weak, aromatic odor.
MW: 278 BP: 635 F VP: <0.01 mm MP: -35 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Suspect teratogen (HE5); Irritation-Eyes, Throat---Mild (HE16)
SYMPT Nasal passages, upper respiratory, and stomach irritation; light sensitivity
ORGAN Respiratory system, GI tract
LESS1 MEDIA (45): OSHA Versatile Sampler (OVS-Tenax) - 13 mm tube (140/70 mg sections) with Glass Fiber Filter enclosed
ANL SOLVENT: Toluene
MAX V: 240 Liters MAX F: 1.0 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA104)*** SAE: 0.09 CLASS: Validated by OSHA

1,1-Dichloroethane

IMIS **1160** CAS 75-34-3
SYN Ethylidene chloride; 1,1-Ethylidene dichloride
NIOSH RTECS KI0525000; 33570 DOT UN2362 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 400 mg/m^3
DESC Colorless liquid with a chloroform-like odor.
MW: 99 BP: 135 F VP: 182 mm MP: -142 F
INCOM Strong oxidizers and caustics
HLTH Cumulative liver damage (HE3); Irritation-Eyes, Throat, Bronchi---Mild (HE16)
SYMPT CNS depression; skin irritation; drowsiness; unconsciousness; liver, kidney damage
ORGAN Skin, liver, kidneys
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 15 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1003)*** SAE: 0.09 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit: 0.4ppm, long pathlength

1,2-Dichloroethylene

IMIS **0870** CAS 540-59-0
SYN Acetylene dichloride; cis-Acetylene dichloride; Dioform; trans-Acetylene dichloride; sym-Dichloroethylene; Dichloroethylene
NIOSH RTECS KV9360000; 35539 DOT UN1150 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 200 ppm, 790 mg/m^3
DESC Colorless liquid with an ether-like, slightly acrid odor, like chloroform.
MW: 97 BP: 113 to 140 F VP: 180 to 265 mm MP: -56 to 115 F
INCOM Strong oxidizers
HLTH Narcosis (HE8); CNS effects (HE7)
SYMPT Eye, respiratory system irritation; CNS depression
ORGAN Respiratory system, eyes, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 5 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1003)*** SAE: 0.09 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit: 0.6ppm, long pathlength

Dicyclopentadiene

IMIS **0903** CAS 77-73-6
SYN Bicyclopentadiene; 1,3-Cyclopentadiene, dimer; DCPD
NIOSH RTECS PC1050000; 48495
MIOSHA FINAL RULE (Table G-1-A): TWA 5 ppm, 30 mg/m^3
DESC Liquid.
HLTH Cumulative kidney and liver damage (HE3); Headaches (HE7)
Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Dicyclopentadienyl Iron (Respirable Fraction)

IMIS **D100** CAS 102-54-5
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Explosive, Flammable (No adverse effects when Good Housekeeping Practices are used) (HE18)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride Filter, 5 micron, preceded by 10mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL 1: Inductively Coupled Argon Plasma; ICP/AES
. REF 17 (OHL2002S010) SAE: 013 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Dicyclopentadienyl Iron (Total Dust)

IMIS **0904** CAS 102-54-5
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Solid.
HLTH Explosive, Flammable (No adverse effects when Good Housekeeping Practices are used) (HE18)
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns or (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 013 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Diethanolamine

IMIS **D129** CAS 111-42-2
SYN 2,2'-Iminobisethanol; 2,2'-Iminodiethanol; Diethylolamine; Bis (2-hydroxyethyl) amine; 2,2'-Dihyroxydiethylamine; DEA
NIOSH RTECS KL2975000; 34503

MIOSHA FINAL RULE (Table G-1-A): TWA 3 ppm, 15 mg/m^3
DESC MW: 105.16 MP: 28 C BP: 268.8 C MOLFM: $C_4H_{11}NO_2$
LESS1 MEDIA (71): Coated XAD-2 Tube (80/40 mg sections, 20/60 mesh); coating is 10% (w/w) 1-Naphthylisothiocyanate (NITC)
ANL SOLVENT: Dimethylformamide
MAX V: 10 Liters MAX F: 0.1 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S022) CLASS: Partially Validated

Diethylene Glycol Monoethyl Ether
IMIS **D615** CAS 111-90-0
SYN Carbitol; Carbitol Cellosolve; Poly-Solv; Solvosol 2-(2-Ethoxyethoxy)-Ethanol
NIOSH RTECS KK8750000; 34453
DESC MW: 134.17 BP: 196 deg C MOLFM: $C_6H_{14}O_3$
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 10 Liters MAX F: 0.1 L/min (TWA)
MAX V: 1.5 Liters MAX F: 0.1 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA99)*** SAE: 0.103 CLASS: Validated by OSHA

Di- (2-Ethylhexyl) phthalate
IMIS **1015** CAS 117-81-7
SYN Phthalic Acid, Bis (2-Ethyl hexyl) Ester, Di-sec Octyl Phthalate
NIOSH RTECS TI0350000; 59804
MIOSHA FINAL RULE (Table G-1-A):
. TWA 5 mg/m^3
. STEL 10 mg/m^3
DESC Colorless, oily liquid with almost no odor.
MW: 390.62 BP: 727 F VP: <0.01 mm MP: -51 F MOLFM: $C_{24}H_{38}O_4$
INCOM Nitrates; strong oxidizers, acids, and alkalis
HLTH Irritation-Eyes, Nose, Throat-- Mild (HE16)
NTP Suspect Human Carcinogen
IARC Group 2B, possibly carcinogenic to humans
SYMPT Eye, mucous membrane irritation; nausea, diarrhea; (carcinogenic)
ORGAN Eyes, upper respiratory system, GI tract
LESS1 MEDIA (45): OSHA Versatile Sampler (OVS-Tenax) - 13 mm tube (140/70 mg sections) with Glass Fiber Filter enclosed
ANL SOLVENT: Toluene
MAX V: 240 Liters MAX F: 1.0 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA104)*** SAE: 0.09 CLASS: Validated by OSHA

Diethyl Phthalate
IMIS **0933** CAS 84-66-2
SYN Phthalic acid, diethyl ester; 1,2-Benzenedicarboxylic acid, diethyl ester; Ethyl phthalate; DEP
NIOSH RTECS TI1050000; 59820
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC FP: 40.5 C MW: 222.26 BP: 298 C MOLFM: $C_{12}H_{14}O_4$
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
LESS1 MEDIA (45): OSHA Versatile Sampler (OVS-Tenax) - 13 mm tube (140/70 mg sections) with Glass Fiber Filter enclosed

ANL SOLVENT: Toluene
MAX V: 240 Liters MAX F: 1.0 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA104)*** SAE: 0.09 CLASS: Validated by OSHA

Diisobutyl Ketone

IMIS **0924** CAS 108-83-8
SYN 2,6-Dimethyl-4-heptanone; sym-Diisopropyl-acetone; Isovalerone; Valerone
NIOSH RTECS MJ5775000; 39183 DOT UN1157 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 25 ppm, 150 mg/m^3
DESC Colorless liquid with a mild odor.
MW: 142 BP: 335 F VP: 1.7 mm MP: -43 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16); Narcosis (HE8)
SYMPT Eye, nose, throat irritation; headaches; dizziness; dermatitis; unconsciousness
ORGAN Respiratory system, skin, eyes
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 25 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Dimethylphthalate

IMIS **0950** CAS 131-11-3
SYN DMP; Dimethyl Phthalate
NIOSH RTECS TI1575000; 59828
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Colorless, oily liquid with a slight ester odor.
MW: 194 BP: 545 F VP: 1 mm at 212 F
INCOM Nitrates, strong oxidizers, alkalis, and acids
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Nasal passages, upper respiratory, and stomach irritation; eye pain
ORGAN Respiratory system, gastrointestinal tract
LESS1 MEDIA (45): OSHA Versatile Sampler (OVS-Tenax) - 13 mm tube (140/70 mg sections) with Glass Fiber Filter enclosed
ANL SOLVENT: Toluene
MAX V: 240 Liters MAX F: 1.0 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSH104)*** SAE: 0.09 CLASS: Validated by OSHA

Di-n-Octyl Phthalate

IMIS **1000** CAS 117-84-0
NIOSH RTECS TI1925000; 59830
LESS1 MEDIA (45): OSHA Versatile Sampler (OVS-Tenax) - 13 mm tube (140/70 mg sections) with Glass Fiber Filter enclosed
ANL SOLVENT: Toluene
MAX V: 240 Liters MAX F: 1.0 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA104)*** SAE: 0.09 CLASS: Validated by OSHA

Dipropylene Glycol Methyl Ether

IMIS **1014** CAS 34590-94-8
SYN Dipropylene glycol monomethyl ether; Dowanol 50B
NIOSH RTECS JM1575000; 32244
MIOSHA FINAL RULE (Table G-1-A):

. TWA (Skin) 100 ppm, 600 mg/m^3
. STEL (Skin) 150 ppm, 900 mg/m^3

DESC Colorless liquid with a weak odor.
MW: 148 BP: 374 F VP: 0.3 mm MP: -117 F

INCOM Strong oxidizers

HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Slight Narcosis (HE8)

SYMPT Eye, nose irritation; weakness, light-headedness, headaches

ORGAN Respiratory system, eyes

LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 10 Liters MAX F: 0.1 L/min (TWA)
MAX V: 1.5 Liters MAX F: 0.1 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA101)*** SAE: 0.08 CLASS: Validated by OSHA

Dust - Respirable Nuisance

IMIS **9130**

MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be **collected** up to an 8-hour period.

Dust, Total

IMIS **9135**

MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Emery (Respirable Fraction)

IMIS **E102** CAS 12415-34-8

MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3

DESC Mixture of Al_2O_3 and magnetite with or without hematite and varying in hardness according to iron oxide present

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Emery (Total Dust)

IMIS **1016** CAS 12415-34-8

MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Mixture of Al_2O_3 and magnetite with or without hematite and varying in hardness according to iron oxide present
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Epichlorohydrin
IMIS **0645** CAS 106-89-8
SYN 1-Chloro-2, 3-epoxy-propane; 2-Chloropropylene oxide; gamma- Chloropropylene oxide; Composite Constituent
NIOSH RTECS TX4900000; 65327 DOT UN2023 Poison, Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 2 ppm, 8 mg/m^3
DESC Colorless liquid with an irritating, chloroform-like odor.
MW: 93 BP: 239 F VP 13 mm MP: -72 F
INCOM Strong oxidizers and acids, caustics, zinc, aluminum, chlorides of iron and aluminum
HLTH Irritation-Eye, Skin---Marked/Skin sensitization (HE14)
Suspect Carcinogen/mutagen (HE2); Kidney and liver damage (HE3)
IARC Group 2A, probably carcinogenic to humans
SYMPT Nausea, vomiting; abdominal pain; respiratory distress, coughing; cyanosis; irritated eyes, skin with deep pain; (carcinogen)
ORGAN Respiratory system, lungs, skin, kidneys
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 30 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL20050NIOSH1010Issue2)*** SAE: 0.26 CLASS: Validated by NIOSH

Ethane
IMIS **1025** CAS 74-84-0
DESC Gas.
HLTH Explosive (HE18); Simple Asphyxiation (HE17) If Oxygen level is 18% by volume
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.3 ppm, long pathlength

Ethanolamine
IMIS **1030** CAS 141-43-5
SYN Ethylolamine; Monoethanolamine; beta-Aminoethyl alcohol; 2-Aminoethanol; 2-Hydroxyethylamine
NIOSH RTECS KJ5775000; 34181 DOT UN2491 Corrosive Material
MIOSHA FINAL RULE (Table G-1-A):
. TWA 3 ppm, 8 mg/m^3
. STEL 6 ppm, 15 mg/m^3
DESC Colorless liquid with a mild ammonia-like odor
MW: 61 BP: 338 F VP: <1 mm MP: 51 F MOLFM: C_2H_7NO
INCOM Strong oxidizers and acids
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Cumulative liver, lung and kidney damage (HE3); Narcosis (HE8)
SYMPT Respiratory system, skin, and eye irritation; lethargy
ORGAN Skin, eyes, respiratory system
LESS1 MEDIA (71): Coated XAD-2 Tube (80/40 mg sections, 20/60 mesh); coating is 10% (w/w) 1-Naphthylisothiocyanate (NITC)

ANL SOLVENT: Dimethylformamide
MAX V: 10 Liters MAX F: 0.1 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S022) CLASS: Partially Validated
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.7 ppm, long pathlength

2-Ethoxyethanol

IMIS **1033** CAS 110-80-5
SYN Ethylene glycol monoethyl ether; Cellosolve
NIOSH RTECS KK8050000; 34448 DOT UN1171; Combustible Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 200 ppm, 740 mg/m^3
DESC Colorless liquid with a sweetish odor.
MW: 90.1 BP: 275 F VP: 4 mm MP: -94 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Cumulative Blood Disturbances (HE12)
SYMPT In animals: pulmonary irritation; hematologic effects; liver, kidneys, lung damage; eye irritation
ORGAN In animals: lungs, eyes, blood, kidneys, and liver
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 48 Liters MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA79)*** SAE: 0.10 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: Det. Limit: 2.3ppm, short pathlength

2-Ethoxyethyl Acetate

IMIS **1037** CAS 111-15-9
SYN Cellosolve acetate; Glycol monoethyl ether acetate; Ethylene glycol monoethyl ether acetate
NIOSH RTECS KK8225000; 34449 DOT UN1172; Combustible Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 100 ppm, 540 mg/m^3
DESC Colorless liquid with a mild, non-residual odor.
MW: 132 BP: 313 F VP: 2 mm MP: -80 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
SYMPT Eye, nose irritation; vomiting; kidney damage; paralysis
ORGAN Respiratory system, eyes, gastrointestinal tract
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 48 Liters MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA79)*** SAE: 0.17 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: 0.15ppm, long pathlength

Ethyl Acetate

IMIS **1040** CAS 141-78-6
SYN Acetic ester; Acetic ether; Ethyl ethanoate
NIOSH RTECS AH5425000; 2357 DOT UN1173 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 400 ppm, 1400 mg/m^3
DESC Colorless liquid with a pleasant, fruity odor.
MW: 88 BP: 171 F VP: 76 mm MP: 117 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16) Odor (20); Mild Narcosis (HE8)
SYMPT Eye, nose, throat irritation; narcosis; dermatitis

ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
ALT SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: ***Samples should be stored at reduced temperature when not in transit***.
SAM2 FOXBORO SAPPHIRE: Det. Limit: 1.1 ppm, short pathlength

Ethyl Acrylate
IMIS **1050** CAS 140-88-5
SYN Ethyl propenoate; Acrylic Acid, Ethyl Ester; Ethoxy Carbonyl Ethylene; 2-Propenoic Acid, Ethyl Ester
NIOSH RTECS AT0700000; 4243 DOT UN1917 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA (Skin) 5 ppm, 20 mg/m^3
. STEL (Skin) 25 ppm, 100 mg/m^3
DESC Colorless liquid with a sharp, acrid odor.
MW: 100 BP: 99.4 C VP: 29.5 mm MOLFM: $C_6H_8O_2$
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14); Lung edema (HE11)
NTP Suspect Human Carcinogen
IARC Group 2B, possibly carcinogenic to humans
SYMPT Eye, respiratory system, and skin irritation
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (14): Charcoal Tube with 10% by weight 4-tert-butylcatecol (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
MAX V: 12 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA92)*** SAE: 0.08 CLASS: Validated by OSHA

Ethyl Alcohol
IMIS **1060** CAS 64-17-5
NIOSH RTECS KQ6300000; 35026 DOT UN1170 Flammable Liquid
SYN Ethanol; Ethyl Hydrate; Grain Alcohol; Methyl Carbinol; Jaysol; Anhydrol
MIOSHA FINAL RULE (Table G-1-A): TWA 1000 ppm, 1900 mg/m^3
DESC Liquid.
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Narcosis (HE8); Reproductive impairment (HE5)
LESS1 MEDIA (7+7): Two Anasorb 747 in series (400/200 mg sections)
ANL SOLVENT: (60:40) Dimethylformamide/Carbon Disulfide
MAX V: 12 Liter MAX F: 0.05 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA100)*** SAE: 0.08 CLASS: Validated by OSHA
NOTE: Separate tubes and seal each after sampling
SAM2 FOXBORO SAPPHIRE: Det. Limit 5 ppm, short pathlength

Ethyl Benzene
IMIS **1080** CAS 100-41-4
SYN Phenylethane; Ethylbenzol
NIOSH RTECS DA0700000 DOT 1175 26
MIOSHA FINAL RULE (Table G-1-A):
. TWA 100 ppm, 435 mg/m^3

. STEL 125 ppm, 545 mg/m^3
DESC Colorless liquid with an aromatic odor.
MW: 106 BP: 277 F VP: 7.1 mm MP: -139 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Narcosis (HE8)
SYMPT Eye, mucous membrane irritation; headaches; dermatitis; narcosis; coma
ORGAN Eyes, upper respiratory system, skin, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 24 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
LESS2 Media: Diffusive Sampler (SKC 575-002 Passive Sampler)
Sampling Time: 5 to 240 Minutes (TWA)
ANL SOLVENT: Carbon Disulfide
Sampling Time: 5 to 240 Minutes (TWA)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2002S001)*** CLASS: Fully Validated
SAM2 FOXBORO SAPPHIRE: Det. Limit 1.2 ppm, long pathlength

Ethyl 2-Cyanoacrylate
IMIS **E108** CAS 7085-85-0
SYN 2-Cyanoacrylate acid, Ethyl ester; Ethyl alpha-cyanoacrylate; 2-Propenoic acid, 2-cyano, ethyl ester
DESC Clear colorless liquid with irritating, sweet, ester-like odor.
MW: 125.14 BP (2.6-3.0 mm): 54-56 C VP: <2 mm at 25 C
LESS1 MEDIA (89): Coated XAD-7 Tube (80/40 mg sections, 20/60 mesh); coating is Phosphoric Acid.
ANL SOLVENT: 0.2% (v/v) Phosphoric Acid in Acetonitrile
MAX V: 12 Liters MAX F: 0.1 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S024) SAE: 0.10 CLASS: Validated by OSHA
NOTE: Samples must be kept at reduced temperature and shipped to **LESS** cold.

Ethylene Glycol
IMIS **1911** CAS 107-21-1
SYN Ethylene Glycol, Particulate prior to 9/1/89
NIOSH RTECS KW2975000; 35569
MIOSHA FINAL RULE (Table G-1-A): CEILING 50 ppm, 125 mg/m^3
DESC Liquid.
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
CNS depression (HE7)
LESS1 MEDIA (44): OSHA Versatile Sampler (OVS-7) - 13 mm XAD-7 tube (270/140 mg sections, 20/60 mesh) with a Glass Fiber Filter enclosed
ANL SOLVENT: Methanol
MIN V: ***30*** Liters MAX F: 2.0 L/min (Ceiling)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH5523)*** CLASS: Partially validated by NIOSH
NOTE: Ship cold to LESS for analysis.

Ethyl Ether
IMIS **1210** CAS 60-29-7
SYN Diethyl ether; Ethyl oxide; Ether; Diethyl oxide; 1,1'-Oxybisethane
NIOSH RTECS KI5775000; 33633 DOT UN1155 Flammable Liquid

MIOSHA FINAL RULE (Table G-1-A):
. TWA 400 ppm, 1200 mg/m^3
. STEL 500 ppm, 1500 mg/m^3
DESC Colorless liquid with a characteristic, sweet, ether odor.
MW: 74 BP: 95 F VP: 442 mm MP: -190 F
INCOM Strong Oxidizers
HLTH Narcosis (HE8) Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Dizziness; drowsiness; headaches; excited; narcosis; nausea, vomiting; eye, upper respiratory, and skin irritation
ORGAN CNS, skin, respiratory system, eyes
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: ***Carbon Disulfide***
MAX V: 3 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1610Issue3)***
SAE: 0.09 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit 1.8 ppm, short pathlength

Ethyl Methacrylate
IMIS E115 CAS 97-63-2
SYN Ethyl 2-Methylacrylate; Ethyl 2-Methyl-2-Propenoate
NIOSH RTECS OZ4550000; 47787 DOT UN2277 Flammable Liquid
DESC MW: 114.14 Density: 0.9135 FP: 21 C (70 F) BP: 117 C MOLFM: $C_6H_{10}O_2$
LESS MEDIA (11) Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHAPV2100)*** CLASS: Partially Validated

Ferric Chloride
IMIS **1265** CAS 7705-08-0
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume.

Ferrovanadium Dust
IMIS **1267** CAS 12604-58-9; 11147-86-7
NIOSH RTECS LK2900000
MIOSHA FINAL RULE (Table G-1-A):
. TWA 1 mg/m^3
. STEL 3 mg/m^3
DESC Dark, odorless solid particles.
VP: approx. 0 mm
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Eye, respiratory system irritation; in animals: bronchitis, pneumonitis
ORGAN Respiratory system, eyes
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)

ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Fibrous Glass Dust

IMIS **1300**
MIOSHA FINAL RULE (Table G-3):
5 mg/m^3 (respirable fraction)
15 mg/m^3 (total dust)
DESC A solid, usually transparent silicate formed by cooling a liquid to the solid state too rapidly for crystallization to occur.
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Fluorides (as F)

IMIS **1280** CAS 16984-48-8
NIOSH RTECS LM6290000
MIOSHA FINAL RULE (Table G-1-A): TWA 2.5 mg/m^3
DESC Appearance and odor vary depending upon specific compounds.
INCOM Strong acids
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Cumulative bone damage (HE3)
IARC Group 3, not Classifiable as to its carcinogenicity to humans (inorganic, used in drinking-water)
SYMPT Eye, respiratory system irritation; nausea, abdominal pain, diarrhea; excessive salivation, thirst, sweating; stiff spine; dermatitis; calcification of ligaments of ribs, pelvis
ORGAN Eyes, respiratory system, CNS, skeleton, kidneys, skin
LESS1 MEDIA (59): Silica Gel Tube (400/200 mg sections)
ANL SOLVENT: Carbonate/ Bicarbonate
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S012) SAE: 0.25 CLASS: Validated in-house
NOTE: Sample results represent soluble Fluoride only
Wipe MEDIA: Whatman smear tab SOLVENT: Deionized water

Formaldehyde

IMIS **1290 (TWA), 1291 (ACTION LEVEL), 1293 (STEL)**
CAS 50-00-0
SYN Methylene oxide; Formalin; Diesel Exhaust Component; Rosin Core Solder Pyrolysis Product
NIOSH RTECS LP8925000; 36172
DOT UN1198 ORM-A (Solution with flash pt. <141 deg F); UN2209 ORM-A (Solution with flash pt. >141 deg F)

MIOSHA FINAL RULE (R 325.51451-77)
. ACTION LEVEL 0.5 ppm or 0.61 mg/m^3
. TWA 0.75 ppm or 0.***9*** mg/m^3
. STEL 2 ppm (15 minutes) or 2.5 mg/m^3
DESC Colorless liquid or gas with a pungent odor.
MW: 30 BP: -19.5 C MP: 92 C
INCOM Strong oxidizers, alkalis, and acids; phenols; urea
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Mutagen (HE2); ACGIH: A2 (Suspect carcinogen)
NTP Suspect Human Carcinogen
IARC Group 2A, probably carcinogenic to humans
SYMPT Eye, nose, throat irritation; lacrimation; nose burns; coughing, bronchitis spasms, pulmonary irritation; dermatitis; nausea, vomiting; loss of consciousness; (carcinogenic)
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (52): Silica Gel (300/150 mg sections) with 2,4-dinitrophenylhydrazine
ANL SOLVENT: Acetonitrile
MAX V: 15 Liters MAX F: 1.5 L/min
Flow rate range is 0.1-1.5 LPM
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL 200***2***S017) SAE: 0.19 CLASS: ***Validated in-house***
NOTE: Ship cold.
SAM2 DET. TUBE: Dräger, 67 33081, 0.2-5 ppm
FOXBORO SAPPHIRE: Det. Limit 0.11, long pathlength
Screening device: Airscan formaldehyde exposure monitor, Crystal Diagnostics, 0-20 ppm.

Formic Acid
IMIS **1310** CAS 64-18-6
SYN Formic acid 85%; Formic acid 90%; Formic acid 95%; Hydrogen carboxylic acid; Methanoic acid
NIOSH RTECS LQ4900000 DOT 1779 60
MIOSHA FINAL RULE (Table G-1-A): TWA 5 ppm, 9 mg/m^3
DESC Colorless liquid, may be fuming with a pungent, penetrating odor.
MW: 46 VP: 23 to 33 mm
INCOM Strong oxidizers, strong caustics, concentrated sulfuric acid
HLTH Irritation-Eye, Nose, Throat, Skin—Marked (HE14); Mutagen (HE2)
SYMPT Eye irritation, lacrimation; nasal discharge; throat irritation, coughing, dyspnea; nausea; skin burns, dermatitis
ORGAN Respiratory system, skin, kidneys, liver, eyes
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 0.01N NaOH
MAX V: 48 Liters MAX F: 0.2 L/min
ANL A: Ion Chromatography; IC
. REF: ***17 (OHL2004S025)*** SAE: 0.184 CLASS: Partially Validated
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.12, long pathlength

Furfural
IMIS **1325** CAS 98-01-1
SYN 2-Furaldehyde; Furfuraldehyde; Fural; 2-Furancarboxaldehyde
NIOSH RTECS LT7000000; 36554 DOT 1199 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 2 ppm, 8 mg/m^3
DESC Colorless to light-brown liquid; darkens in light and air; has an odor like almonds.
MW: 96 BP: 323 F VP: 2 mm MP: -34 F
INCOM Strong acids, oxidizers

HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
CNS effects (HE7)
IARC Group 3, not Classifiable as to its carcinogenity to humans
SYMPT Eye, upper respiratory system irritation; headaches; dermatitis
ORGAN Eyes, respiratory system, skin
LESS1 MEDIA (21): Petroleum Base Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 180 Liters MAX F: 1 L/min
ANL: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA72)*** SAE: 0.09 CLASS: Validated by OSHA

Furfuryl Alcohol

IMIS **1330** CAS 98-00-0
SYN 2-Hydroxymethylfuran; 2-Furylmethanol
NIOSH RTECS LU9100000; 36944 DOT UN2874 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA (Skin) 10 ppm, 40 mg/m^3
. STEL (Skin) 15 ppm, 60 mg/m^3
DESC Amber liquid with a mildly irritating odor.
MW: 98.11 BP: 338 F VP: <1 mm MP: 6 F MOLFM: $C_5H_6O_2$
INCOM Strong oxidizers, strong acids, organic acids may lead to polymerization
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Narcosis (HE8)
SYMPT Dizziness; nausea, diarrhea, vomiting; respiratory depression; body temperature depression; diuresis; in animals: eye irritation; drowsiness
ORGAN Respiratory system
LESS1 MEDIA (47): Porapak Q Tube (150/75 mg sections)
ANL SOLVENT: Acetone
MAX V: 25 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH2505Issue2)*** SAE: 0.12 CLASS: Validated by NIOSH

Gallium

IMIS **G104** CAS 7440-55-3
SYN Gallium Metal, Liquid (DOT); Gallium Metal, Solid (DOT); UN 2803 (DOT)
NIOSH RTECS LW8600000
DESC Grayish metal;
MW: 69.72 BP: approx. 2400 C MP: 29.78 C MOLFM: Ga
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Gasoline

IMIS **1340** CAS 8006-61-9
NIOSH RTECS LX3300000; 37252 DOT UN1203 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 300 ppm, 900 mg/m^3
. STEL 500 ppm, 1500 mg/m^3
DESC Liquid.

HLTH Irritation- Eyes Nose, Throat---Mild (HE16)
CNS effects (HE7); Flammable (HE18)
IARC Group 2B, possibly carcinogenic to humans
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.1 L/min (TWA)
MAX V: 3 Liters MAX F: 0.1 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2004S014) CLASS: Validated in house
NOTE: Separately submit 5 mL of a clean bulk sample with little or no color to use as a standard.

Glutaraldehyde

IMIS **1361** CAS 111-30-8
SYN 1,5-Pentanedial
NIOSH RTECS MA2450000; 37713
MIOSHA FINAL RULE (Table G-1-A): CEILING 0.2 ppm, 0.8 mg/m^3
DESC MW: 100.13 MOLFM: $C_5H_8O_2$
LESS1 MEDIA (52): Silica Gel (300/150 mg sections) with 2,4-dinitrophenylhydrazine
ANL SOLVENT: Acetonitrile
MIN T: ***15*** Minutes MAX F: 0.5 L/min (Ceiling)
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL 2003S011) CLASS: Partially validated in-house
Note: Store tubes in freezer prior to use.

Glycerin Mist (Respirable Fraction)

IMIS **G115** CAS 56-81-5
NIOSH RTECS MA8050000; 37830
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Liquid.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Glycerin Mist (Total Dust)

IMIS **1363** CAS 56-81-5
NIOSH RTECS MA8050000; 37830
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Liquid.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Grain Dust (Oats, Wheat & Barley)

IMIS **G109**
SYN Grain Dust prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Noncompliance can be based on gross weight. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Graphite, natural respirable dust

IMIS **9090** CAS 7782-42-5
SYN Plumbago, Potelot; Corbo minerals; Black lead; Carburet of iron; Silver lead; Crayon noir
NIOSH RTECS VV7780000
MIOSHA FINAL RULE (Table G-1-A): TWA 2.5 mg/m^3
DESC A soft greasy-feeling solid platy mineral useful as a lubricant.
MW: 12 VP: approx 0 mm MP: 6040 F
INCOM Very strong oxidizers, such as fluorine, chlorine trifluoride, potassium peroxide
HLTH Cumulative lung damage (Pneumoconiosis) (HE10)
SYMPT Coughing, dyspnea, black sputum, pulmonary functioning affected, fibrosis
ORGAN Respiratory system, CVS
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: If the free silica exceeds 1%, apply the Free Silica standard. If the free silica is <1%, apply the Natural Graphite standard. If filter is not overloaded, samples may be collected up to an 8-hour period. Submit bulk sample in separate package when request for silica analysis is made.

Graphite, Synthetic (Respirable Fraction)

IMIS **G100** CAS 7782-42-5
SYN NDS
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Nuisance particulate (Accumulation in Lungs) (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) 5 microns proceeded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: When standard is the same as for inert dust, noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Graphite, Synthetic (Total Dust)

IMIS **1366** CAS 7782-42-5
SYN NDS; Graphite (Synthetic) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Solid.

HLTH Nuisance particulate (Accumulation in Lungs) (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: When standard is the same as for inert dust, noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Gypsum (Respirable Fraction)
IMIS **G101** CAS 13397-24-5
SYN Natural Calcium Sulfate; $CaSO_4.2H_2O$
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC A soft mineral usually found in wallboard. See also plaster of paris.
HLTH Nuisance particulate (Accumulation in Lungs) (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Gypsum (Total Dust)
IMIS **1367** CAS 13397-24-5
SYN Natural Calcium Sulfate; $CaSO_4.2H_2O$
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC A soft mineral usually found in wallboard. See also plaster of paris.
HLTH Nuisance particulate (Accumulation in Lungs) (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Helium
IMIS **1400** CAS 7440-59-7
DESC Gas.
HLTH Simple Asphyxiation (HE17) If Oxygen level is 18% by volume
LESS1 Field Analysis. Measure % oxygen present with oxygen meter.
WIPE No

Heptane
IMIS **1371** CAS 142-82-5
SYN Normal heptane; n-Heptane; Dipropyl methane
NIOSH RTECS MI7700000 DOT 1206 27
MIOSHA FINAL RULE (Table G-1-A):
. TWA 400 ppm, 1600 mg/m^3
. STEL 500 ppm, 2000 mg/m^3
DESC Colorless liquid with a mild, gasoline-like odor.
MW: 100.23 BP: 98.4 F MP: -90.7 F
INCOM Strong oxidizers

HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
CNS effects (HE7); Narcosis (HE8)
SYMPT Light-headedness, giddiness; stupor; no appetite, nausea; dermatitis; chemical pneumonia; unconsciousness
ORGAN Skin, respiratory system, PNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 4 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 FOXBORO SAPPHIRE: Det. Limit 10 ppm, long pathlength

Hexamethylene Diisocyanate

IMIS **1377** CAS 822-06-0, 11142-52-2
SYN HDI; 1,6-Hexamethylene Diisocyanate; 1,6-Diisocyanatohexane; Desmodur N
NIOSH RTECS MO1740000; 39495 DOT UN2281 Poison
DESC Liquid. MW: 168.22 MOLFM: $C_8H_{12}N_2O_2$
HLTH Respiratory Sensitization (Asthma)
LESS1 MEDIA (I): Glass Fiber Filter (37 mm) coated with 1.0 mg of 1-(2-pyridyl) piperazine
ANL SOLVENT: Acetonitrile/Methyl Sulfoxide (9:1)
MAX V: ***15*** Liters MAX F: 1.0 L/min (TWA)
NOTE: To comply with the 1989 PEL changes, the air volume can be increased to 240 L to sample for the OSHA TWA-PEL.
ANL 1: High Performance Liquid Chromatography; HPLC/UV/Fluorescence
. REF: 17 (OHL 2004S011) SAE: 0.18 CLASS: Validated in-house
NOTE: Obtain filters from LESS and refrigerate until use. Collect samples open-face. After sampling protect from light, store and ship cold.

Hexane

IMIS **1380** CAS 110-54-3
SYN n-Hexane; Hexyl hydride; Normal hexane
NIOSH RTECS MN9275000; 39449 DOT UN1208 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 50 ppm, 180 mg/m^3
DESC Colorless liquid with a mild gasoline-like odor.
MW: 86 BP: 156 F VP: 124 mm MP: -139 F
INCOM Strong oxidizers
HLTH Nervous System Disturbances---Polyneuropathy (HE7)
Nervous System Disturbances---Narcosis (HE8)
SYMPT Light-headedness; nausea; headaches; numbness, muscle weakness; eye, nose irritation; dermatitis; chemical pneumonia; giddiness
ORGAN Skin, eyes, respiratory system, lungs
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 4 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 DET. TUBE: Dräger, 67 28391, 100-3,000 ppm
FOXBORO SAPPHIRE: Det. Limit 0.25 ppm, long pathlength

Hexane, (Isomers other than n-Hexane)

IMIS **H146**
NIOSH RTECS MN9275000; 39449 DOT UN1208 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 500 ppm, 1800 mg/m^3

. STEL 1000 ppm, 3600 mg/m^3
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 5 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1500)*** CLASS: Partially Validated by NIOSH/OSHA

2-Hexanone

IMIS **1690** CAS 591-78-6
SYN Methyl butyl ketone; Butyl methyl ketone; Methyl n-butyl ketone; MBK
NIOSH RTECS MP1400000; 39693
MIOSHA FINAL RULE (Table G-1-A): TWA 5 ppm, 20 mg/m^3
DESC Colorless liquid with a characteristic odor.
MW: 100 BP: 262 F VP: 3 mm MP: -71 F
INCOM Strong oxidizers
HLTH Polyneuropathy (HE7)
Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
SYMPT Eye, nose irritation; peripheral neuropathy; weakness; paresthesia; dermatitis; headaches; drowsiness
ORGAN CNS, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Hexone

IMIS **1385** CAS 108-10-1
SYN 4-Methyl-2-pentanone; Methyl isobutyl ketone; Isobutyl methyl ketone; MIBK
NIOSH RTECS SA9275000; 54842 DOT UN1245 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 50 ppm, 205 mg/m^3
. STEL 75 ppm, 300 mg/m^3
DESC Colorless liquid with a pleasant odor.
MW: 100 BP: 244 F VP: 15 mm MP: -119 F
INCOM Strong Oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Narcosis (HE8)
SYMPT Mucous membrane, eye irritation; headaches; narcosis, coma; dermatitis
ORGAN Respiratory system, eyes, skin, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 25 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: Ship refrigerated
LESS2 MEDIA: Anasorb CMS (not currently available at LESS)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 12 Liters MAX F: 0.05L/min
ANL 1: Gas Chromatography; GC/FID
REF: ***17(OHL2005OOSHA1004)*** SAE: 0.12 CLASS: Fully Validated
NOTE: Used for AIHA proficiencies only.

SAM2 FOXBORO SAPPHIRE: Det. Limit 0.35ppm, long pathlength

n-Hexyl Acetate

IMIS **H158** CAS 142-92-7
SYN 1-Hexyl Acetate; Hexyl Alcohol, Acetate; Hexyl Ethanoate; Acetic Acid, Hexyl Ester
NIOSH RTECS AI0875000; 2408
DESC MW: 144.24 BP: 168-170 C MOLFM: $C_8H_{16}O_2$
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Hydrogen

IMIS **1410** CAS 1333-74-0
DESC Gas.
HLTH Simple Asphyxiation (HE17) If Oxygen level is 18% by volume; Explosive (HE18)
LESS1 Field analysis. 1) Measure % oxygen present with oxygen meter.
2) Measure combustibility with combustible gas meter.
SAM2 DET. TUBE: Dräger, 8101511, 0.2-2%
WIPE No

Hydrogen Bromide

IMIS **1420** CAS 10035-10-6
SYN Anhydrous hydrobromic acid; HBr
NIOSH RTECS MW3850000 DOT 1048 15
MIOSHA FINAL RULE (Table -1-A): CEILING 3 ppm, 10 mg/m^3
DESC Colorless gas with an irritating, sharp odor; liquid under pressure.
MW: 81 BP: -88 F VP: >1 atm MP: -124 F
INCOM Strong oxidizers, strong caustics, metals, moisture
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute lung damage (HE11)
SYMPT Eye, nose, throat irritation; skin, eye burns
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (59): Silica Gel Tube (400/200 mg sections, ORBO-53 or equiv.)
ANL SOLVENT: Carbonate/ Bicarbonate
MIN V: 1.0 Liters MAX F: 0.5 L/min (Ceiling)
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S012) SAE: 0.165 CLASS: Validated in-house
NOTE: Phosphoric, nitric, hydrobromic, hydrochloric, and sulfuric acids may be submitted on the same tube. When analysis of a compound is requested, an analysis for Bromide is performed and reported as the compound.
WIPE No

Hydrogen Chloride

IMIS **1430** CAS 7647-01-0
SYN Anhydrous hydrogen chloride; Hydrochloric acid, anhydrous; HCl
NIOSH RTECS MW4025000 DOT 1050 15
MIOSHA FINAL RULE (Table G-1-A): CEILING 5 ppm, 7 mg/m^3
DESC Colorless gas with an irritating, pungent odor.
MW: 37 BP: -121 F VP: >1 atm MP: -173 F
INCOM Most metals, alkali or active metals
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Lung edema (HE11); Dental erosion (HE3)
SYMPT Nose, throat, laryngeal inflammation; coughing, throat burns, choking; eye, skin burns;

dermatitis; In animals: laryngeal spasms, pulmonary edema
ORGAN Respiratory system, skin, eyes
LESS1 MEDIA (59): Silica Gel Tube (400/200 mg sections, ORBO-53 or equivalent)
ANL SOLVENT: Carbonate/Bicarbonate
MIN V: 1.5 liters MAX F: 0.5 L/min (Ceiling)
ANL1: Ion chromatography; IC
. REF: 17 (OHL 2002S012) SAE: 0.119 CLASS: Validated in-house
NOTE: Phosphoric, nitric, hydrobromic, hydrochloric and sulfuric acids may be submitted on the same tube. When analysis of a compound is requested, an analysis for Chloride is performed and reported as the compound.
SAM2 DET. TUBE: Dräger, CH 29501, 1-10 ppm

Hydrogen Cyanide

IMIS **1440** CAS 74-90-8
SYN Hydrocyanic acid; Prussic acid; Formonitrile; HCN
NIOSH RTECS MW6825000 DOT 1613 55
MIOSHA FINAL RULE (Table -1-A): STEL (Skin) 4.7 ppm, 5 mg/m^3
DESC Colorless or pale blue liquid or gas with a bitter almond odor.
MW: 27 BP: 79 F VP: 620 mm MP: 3 to 7 F
INCOM Bases, such as caustics, amines
HLTH Acute Systemic Toxicity (HE4); Cumulative systemic toxicity (Cyanosis) (HE3)
SYMPT Asphyxia & death at high levels; weakness; headaches; confusion; nausea, vomiting; increased rate & depth of respiration, or slow & gasping respiration
ORGAN CNS, CVS, liver, kidneys
LESS1 MEDIA (M+MFGB): Mixed Cellulose Ester Filter (MCEF) 0.8 microns + Midget Fritted Glass Bubbler (MFGB) containing 10 mL of 0.1N NaOH
MAX V: 120 Liters MAX F: 1.0 L/min (TWA)
MAX V: 15 Liters MAX F: 1.0 L/min (STEL)
ANL 1: Ion Specific Electrode; ISE
. REF: ***17 (OHL2003S007)*** SAE: 0.25 CLASS: Validated by OSHA
NOTE: If present, sulfide should be listed as an interferent. Particulate cyanide is collected on a filter, (CN – IMIS 0790). HCN is collected in the MFGB.
Within 1 hour after the sample has been collected, transfer the filter to a screw cap vial containing 10 mL of 0.1 N NaOH.
Transfer the impinger solution to another clean, screw cap vial. Do <u>not</u> rinse the impinger.
NOTE: Samples must be analyzed as soon as possible.
SAM2 DET. TUBE: Draeger, CH 25701, 2-150 ppm
MSA, 93262, 0-80 ppm
MIRAN 1A: MIN. Det. Con. 1.7 ppm at 3.0 µm
WIPE No

Hydrogen Fluoride

IMIS **1460** CAS 7664-39-3
SYN Anhydrous hydrofluoric acid; HF-A; HF
NIOSH RTECS MW7875000 DOT 1052 15
MIOSHA FINAL RULE (Table G-1-A): TWA 3 ppm. STEL 6 ppm
DESC Colorless, fuming liquid or gas with a strong, irritating odor.
MW: 20 BP: 67 F VP: 760 mm MP: -118 F
INCOM Metals, concrete, glass, ceramics
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute lung damage (HE11); Cumulative bone damage (HE3)
SYMPT Eye, nose, throat irritation; pulmonary edema; skin, eye burns; nasal congestion; bronchitis
ORGAN Eyes, respiratory system, skin

LESS1 MEDIA (59): Silica Gel (400/200 mg sections, ORBO-53 or equivalent)
ANL SOLVENT: Carbonate/Bicarbonate
MAX V: 100 Liters MAX F: 0.5 L/min (TWA)
MAX V: 7.5 Liters MAX F: 0.5 L/min (STEL)
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S012) SAE: 0.234 CLASS: Validated in-house
NOTE: Phosphoric, nitric, hydrobromic, hydrochloric, and sulfuric acids may be submitted on the same tube. When analysis of a compound is requested, an analysis for Fluoride is performed and reported as the compound.
WIPE No

Hydrogen Sulfide

IMIS **1480** CAS 7783-06-4
SYN Sulfuretted hydrogen; Hydrosulfuric acid; Hepatic gas
NIOSH RTECS MX1225000 DOT 1053 13
MIOSHA FINAL RULE (Table G-1-A):
. TWA 10 ppm, 14 mg/m^3
. STEL 15 ppm, 21 mg/m^3
DESC Colorless gas with a strong odor of rotten eggs; liquid at high pressure, low temperature MW: 34 BP: -76 F VP: 20 atm MP: -117 F
INCOM Strong oxidizers, metals
HLTH Acute systemic toxicity (HE4); CNS effects (HE7)
Irritation-Eye, (Conjunctivitis), Lungs---Moderate (HE15)
SYMPT Apnea; coma; convulsions; irritated eyes, conjunctivitis pain, lacrimation, photophobia, corneal vesiculation; respiratory system irritation; dizziness; headaches; fatigue; insomnia; GI disturbances
ORGAN Respiratory system, eyes
LESS1 See secondary sampling method (SAM2)
SAM2 DET. TUBE: Dräger, 8101831, 1-200 ppm

Hydroquinone

IMIS **1490** CAS 123-31-9
SYN Quinol; 1,4-Dihydroxybenzene; 1,4-Benzenediol
NIOSH RTECS MX3500000; 41010 DOT UN2662 Keep Away From Food
MIOSHA FINAL RULE (Table G-1-A): TWA 2.0 mg/m^3
DESC Light tan, light gray, or colorless crystals.
MW: 110 BP: 285-287 C VP: <0.001 mm MP: 170-171 C
INCOM Strong oxidizers
HLTH Cumulative Corneal damage (HE3); Mutagen (HE2)
CNS effects (HE7); Suspect Teratogen (HE5)
IARC Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Irritation of eyes, conjunctivitis keratitis; excitement; colored urine; nausea; dizziness; suffocation, rapid breathing; muscle twitches, delirium; collapse
ORGAN Eyes, respiratory system, skin, CNS
LESS1 MEDIA (89): Coated XAD-7 (80/40 mg sections; 20/60mesh). Coating is 10% Phosphoric Acid
ANL SOLVENT: Methanol
MAX V: 20 Liters MAX F: 0.2 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S019) CLASS: Partially Validated

Iron (Bulk)

IMIS **I200** CAS 7439-89-6
IARC Iron and Steel Founding - Group 1, carcinogenic to humans
LESS1 MEDIA Bulk Samples

ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Iron Oxide Fume

IMIS **1520** CAS 1309-37-1
SYN Ferric oxide fume; Iron Oxide Fume (as Fe_2O_3) prior to 9/1/89
NIOSH RTECS NO7400000 DOT 1376 37
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Red-brown fume with a metallic taste.
MW: 160 VP: 0 mm MP: 2850 F
INCOM Calcium hypochloride
HLTH Lung changes (Siderosis) (HE10)
SYMPT Benign pneumoconiosis; X-ray shadows indistinguishable from fibrotic pneumoconiosis
ORGAN Respiratory system
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Iron Salts, Soluble (as Fe)

IMIS **1522**
MIOSHA FINAL RULE (Table -1-A): TWA 1 mg/m^3
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume.

Isobutyl Acetate

IMIS **1534** CAS 110-19-0
SYN 2-Methylpropyl acetate; beta-Methylpropyl ethanoate; Acetic acid isobutyl ester
NIOSH RTECS AI4025000; 2452 DOT UN1213 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 150 ppm, 700 mg/m^3
DESC Colorless liquid with a pleasant, fruity odor.
MW: 116 BP: 118 C VP: 13 mm MP: -99 C
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
CNS effects (HE7)
SYMPT Headaches; drowsiness; eye, upper respiratory, and skin irritation; anesthesia
ORGAN Skin, eyes, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: Ship refrigerated

Isobutyl Alcohol

IMIS **1536** CAS 78-83-1
SYN Isobutanol; IBA; 2-Methyl-1-propanol; Isopropylcarbinol
NIOSH RTECS NP9625000; 44119 DOT UN1212 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 50 ppm, 150 mg/m^3
DESC Colorless liquid with a mild, non-residual odor.
MW: 74 BP: 226 F VP: 9 mm MP: -162 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
SYMPT Eye, throat irritation; headaches; drowsiness; skin irritation, cracking
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (99:1) Carbon Disulfide/Isopropanol
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Isophorone

IMIS **1538** CAS 78-59-1
SYN 3,5,5-Trimethyl-2-cyclohexene-1-one
NIOSH RTECS GW7700000; 28779
MIOSHA FINAL RULE (Table G-1-A): TWA 4 ppm, 23 mg/m^3
DESC Colorless or pale liquid with a camphor-like odor.
MW: 138 BP: 419 F VP: 0.2 mm MP: 17 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute CNS effects (HE4); Chronic CNS effects (HE7)
SYMPT Eye, nose, throat irritation; narcosis; dermatitis; headaches; dizziness
ORGAN Respiratory system, skin
LESS1 MEDIA (21): Petroleum Base Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
ALT SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 25 Liters MAX F: 1.0 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH2508ISSUE2)*** SAE: 0.10 CLASS: Validated by NIOSH

Isophorone Diisocyanate

IMIS **1539** CAS 4098-71-9
SYN IPDI
NIOSH RTECS NQ9370000; 44211 DOT UN2290 Poison
MIOSHA FINAL RULE (Table G-1-A):
. TWA (Skin) 0.005 ppm
. STEL (Skin) 0.02 ppm
DESC Liquid.
MW: 222.30
HLTH Respiratory sensitization (HE9)
Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
LESS1 MEDIA (I): Glass Fiber Filter (37 mm) coated with 1.0 mg 1-(2-Pyridyl) piperazine
ANL SOLVENT: 90/10 (v/v) Acetonitrile/Dimethylsulfoxide
MAX V: 60 Liters MAX F: 1.0 L/min (TWA)
MAX V: 15 Liters MAX F: 1.0 L/min (STEL)
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL 2004S011) SAE: 0.14 CLASS: Validated by in-house

NOTE: Obtain filters from LESS and refrigerate coated filters until use. Collect samples open-face. After sampling protect from light, store and ship cold.

Isopropyl Acetate

IMIS **1540** CAS 108-21-4
SYN Isopropyl ester of acetic acid; sec-Propyl acetate
NIOSH RTECS AI4930000; 2460 DOT UN1220 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 250 ppm, 950 mg/m^3
. STEL 310 ppm, 1185 mg/m^3
DESC Colorless liquid with a fruity odor.
MW: 102 BP: 194 F VP: 43 mm MP: -92 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Eye, nose irritation; narcosis; dermatitis; skin irritation
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 9 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Isopropyl Alcohol

IMIS **1560** CAS 67-63-0
SYN Isopropanol; IPA; 2-Propanol; sec-Propyl alcohol
NIOSH RTECS NT8050000; 44675 DOT UN1219 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 400 ppm, 980 mg/m^3
. STEL 500 ppm, 1225 mg/m^3
DESC Colorless liquid with an odor of rubbing alcohol.
MW: 60 BP: 180 F VP: 33 mm MP: -128 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
Narcosis (HE8)
IARC Isopropyl Alcohol Manufacture (Strong-Acid Process)-Group 1, carcinogenic to humans
SYMPT Mild eye, nose, throat irritation; drowsiness; dizziness; headaches; dry cracking skin; gastrointestinal cramps; nausea, diarrhea
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (99:1) Carbon Disulfide/2-Butanol
MAX V: 6 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: ship cooled
LESS2 MEDIA (7+7): Two Anasorb 747 in series (400/200 mg sections)
ANL SOLVENT: (60:40) Dimethylformamide/Carbon Disulfide
ANL 1: Gas Chromatography; GC/FID
. REF: 2(OSHA 109) CLASS: Validated by OSHA
NOTE: Separate tubes and seal each after sampling. Not currently done.
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.3 ppm, long pathlength

Kaolin (Respirable Fraction)

IMIS **K100** CAS 1332-58-7
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC A mineral dust formed by weathering of aluminum silicates, particularly feldspar. It is a component of clay.
HLTH Nuisance particulates accumulation in lungs (Kaolinosis) (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Kaolin (Total Dust)

IMIS **1568** CAS 1332-58-7
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC A mineral dust formed by weathering of aluminum silicates, particularly feldspar. It is a component of clay.
HLTH Nuisance particulates accumulation in lungs (Kaolinosis) (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Kerosene

IMIS **K107** CAS 8008-20-6
SYN Coal Oil
NIOSH RTECS OA5500000; 45592 DOT UN1223 Flammable Liquid
DESC BP: 175-325
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 20 Liters MAX F: 0.2 L/min
ANL: Gas Chromatography; GC/FID
. REF: 17 (OHL2004S014) SAE: 0.08 CLASS: Validated in house
NOTE: Separately submit 5 mL of a clean bulk sample with little or no color to use as a standard.

L.P.G.

IMIS **1803** CAS 68476-85-7
SYN LPG; Bottled gas; Liquefied Petroleum Gas; (see related, Propane)
NIOSH RTECS SE7545000; 55311 DOT UN1075 Flammable Gas
MIOSHA FINAL RULE (Table G-1-A): TWA 1000 ppm, 1800 mg/m^3
DESC Colorless, odorless gas (foul-smelling odorant added).
MW: 42 to 58 BP: -40 to 31 F VP: 2.1 to 8.6 atm
INCOM Strong oxidizers
HLTH Explosive (HE18); Asphyxiants (HE17); Narcosis (HE8)
SYMPT Light-headedness, drowsiness
ORGAN Respiratory system, CNS
LESS1 Combustible Gas Meter

Lead, Inorganic (as Pb)

IMIS **1591 (PEL); 1592 (ACTION LEVEL)**
CAS 7439-92-1; 1317-36-8; 7758-97-6; 3687-31-8; 7645-25-2; 7784-40-9; 18454-12-1
SYN Synonyms vary depending upon specific compound.
NIOSH RTECS OF7525000 DOT 2291 53
MIOSHA FINAL RULE: (R 325.51901 et seq.)
. TWA 50 µg/m^3
. ACTION LEVEL 30 µg/m^3
NOTE: This applies to all occupational exposure to lead, except the construction industry or to agricultural operations.
DESC Varies depending upon specific compound.
INCOM Strong oxidizers, hydrogen peroxide; active metals: sodium, potassium
HLTH Cumulative blood effects (HE12)
Cumulative neurological effects (HE7); Reproductive Hazards (HE5)
IARC Lead and Lead Compounds, Inorganic - Group 2B, possibly carcinogenic to humans
SYMPT Lassitude; weakness; insomnia; facial pallor; eye irritation: anorexia, low-weight, malnutrition; constipation, abdominal pain, colic; hypotension, anemia; gingival lead line; tremors, paralysis of wrist, ankles; encephalopathy; neuropathy
ORGAN GI tract, CNS, kidneys, blood, gingival tissue
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE MEDIA: Whatman Smear Tab filter. SOLVENT: Deionized Water

Lead Arsenate (as As)

IMIS **Use Arsenic, Inorganic (0260)**
CAS 3687-31-8; 7645-25-2; 7748-40-9
SYN Lead metaarsenate; Lead orthoarsenate; Lead diorthoarsenate; Lead mono-orthoarsenate; Lead pyroarsenate
NIOSH RTECS CG0990000 DOT 1617 53
MIOSHA STANDARD: (Arsenic, Inorganic)
DESC Odorless, colorless solid.
INCOM None hazardous
HLTH Cumulative organ toxicity (HE3)
IARC Arsenic and Arsenic Compounds - Group 1, carcinogenic to humans
Lead and Lead Compounds, Inorganic - Group 2B, possibly carcinogenic to humans
SYMPT Arsenic intoxication; nausea, diarrhea; inflammation of mucous membranes, skin; pigmentation; lead intoxication; abdominal pain, low-appetite, constipation; fatigue, weakness, nervousness, neurologic; paresthesia; [carcinogenic]
ORGAN GI tract, CNS, kidneys, blood, gingival tissue, lymphatics, skin
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Atomic Absorption Spectroscopy; AAS/Hydride
. REF: 17 (I-5) SAE: 0.24 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE MEDIA: Whatman Smear Tab filter. SOLVENT: Deionized Water

Lead Chromate (as CrO_3)
OSHA IMIS Code Number: ~~0686~~

IMIS Code history: used prior to 05/30/2006 and the Chromium (VI) standard
For more General Description information see Chromium (VI) (Hexavalent Chromium), chapter III.

IMIS **Use Chromic Acid & Chromates (as CrO3) (~~0686~~)**
CAS 7758-97-6; 18454-12-1
DESC Solid.
IARC Lead and Lead Compounds, Inorganic - Group 2B, possibly carcinogenic to humans
Chromium and Chromium Compounds - Group 1, carcinogenic to humans (Hexavalent Chromium Compounds)
LESS1 MEDIA (L): Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Colorimetric (diphenylcarbazide)
. REF: 17 (OHL2004M0686SOPVC) SAE: 0.20 CLASS: Validated in-house
NOTE: Submit as a separate sample.
ANL A: Ion Chromatography Post Column Derivatization UV-Vis Detector at 540 nm
. REF 2,7(OSHA ID-215) SAE: 0.18 CLASS: Fully Validated by OSHA
NOTE: Submit as a separate sample. The ion chromatography analysis is valence specific for hexavalent chromium (Cr^{+6}). Not currently available.
WIPE: MEDIA: Low Ash Polyvinyl Chloride (LAPVC) filter SOLVENT: Deionized Water

Limestone (Respirable Fraction)
IMIS **L100** CAS 1317-65-3
SYN Calate; $CaCO_3$
NIOSH RTECS EV9580000; 23087
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Inert sedimentary mineral, principally $CaCO_3$ formed in marine environments by chemical or biochemical action. See also Dolomite.
HLTH Nuisance particulates accumulation in lungs (HE19)
Vapors or gases (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MIN V: 408 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminant, the more specific analysis for Calcium will not be performed.
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Not validated
NOTE: An elemental analysis is performed for total Calcium and reported as the compound.

Limestone (Total Dust)
IMIS **1593** CAS 1317-65-3
SYN Calate; $CaCO_3$; Limestone prior to 9/1/89
NIOSH RTECS EV9580000; 23087
MIOSHAFINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC Inert sedimentary mineral, principally $CaCO_3$ formed in marine environments by chemical or biochemical action. See also Dolomite.
HLTH Nuisance particulates accumulation in lungs (HE19)
Vapors or gases (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for

the air contaminate, the more specific analysis for Calcium will not be performed.
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Not Validated
NOTE: An elemental analysis is performed for total Calcium and reported as the compound.

Magnesite (Respirable Fraction)

IMIS **M113** CAS 13717-00-5; 546-93-0
SYN Magnesium Carbonate; $MgCO_3$
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Nuisance particulates accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Magnesite (Total Dust)

IMIS **1615** CAS 13717-00-5; 546-93-0
SYN Magnesium Carbonate; $MgCO_3$
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC Solid.
HLTH Nuisance particulates accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Magnesium

IMIS **M100** CAS 7439-95-4
DESC MW: 24 Combustible at 650 C, flammable, dangerous fire hazard
HLTH Lung effects (HE11)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Samples may be collected up to an 8-hour period, if the filter is not overloaded.

Magnesium Oxide Fume (Total Particulate)

IMIS **1610** CAS 1309-48-4
SYN Magnesia fume; Magnesium Oxide Fume prior to 9/1/89
NIOSH RTECS OM3850000 DOT 1418 40
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC White fume
MW: 40 BP: 6480 F VP: approx. 0 mm MP: 5072 F
INCOM Chlorine trifluoride

HLTH Lung effect (Fume fever) (HE11)
SYMPT Eye, nose irritation; flu like fever; coughing, chest pain (metal fume fever)
ORGAN Respiratory system, eyes
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Samples may be collected up to an 8-hour period, if the filter is not overloaded. Analytical method does not distinguish between dust & fume. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Manganese Compounds (as Mn)
IMIS **M112** CAS 7439-96-5
MIOSHA FINAL RULE (Table G-1-A): CEILING 5 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Samples may be collected up to an 8-hour period, if the filter is not overloaded. When analysis of a compound is requested, an elemental analysis is performed and reported as the element.

Manganese Fume (as Mn)
IMIS **1620** CAS 7439-96-5
SYN Mn; Manganese prior to 9/1/89
NIOSH RTECS OO9275000
MIOSHA FINAL RULE (Table G-1-A):
. TWA 1 mg/m^3
. STEL 3 mg/m^3
DESC Gray solid.
MW: 55 BP: 3806 F VP (2240 F): 1 mm MP: 2273 F
INCOM Variable
HLTH Cumulative CNS damage (HE7); Lung damage (HE10)
SYMPT Parkinson's; asthenia, insomnia, mental; metal fume fever; dry throat, coughing, tight chest, dyspnea, rales; lower-back pain; vomiting, malaise; fatigue
ORGAN Respiratory system, CNS, blood, kidneys
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 Liters (STEL)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Samples may be collected up to an 8-hour period, if the filter is not overloaded. Analytical method does not distinguish between dust & fume.

Manganese Tetroxide (as Mn)
IMIS **M101** CAS 1317-35-7
SYN Manganese Oxide; Trimanganese Tetroxide
NIOSH OP0895000

MIOSHA FINAL RULE (Table G-1-A): TWA 1 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Analytical method does not distinguish between dust and fume. When an analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

Marble (Respirable Fraction)
IMIS **M114** CAS 1317-65-3
SYN Calcium Carbonate
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Marble is a metamorphosed crystalline limestone composed of grains of calcite or, more rarely, calomite.
HLTH Nuisance particulates accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Marble (Total Dust)
IMIS **1626** CAS 1317-65-3
SYN Calcium Carbonate
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC Marble is a metamorphosed crystalline limestone composed of grains of calcite or, more rarely, clalomite.
HLTH Nuisance particulates accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Mercury (Vapor) (as Hg)
IMIS **1631** CAS 7439-97-6
SYN Quicksilver; Mercury, Inorganic (as Hg) prior to 9/1/89
NIOSH RTECS OV4550000 DOT 2024 53; 2025 53; 2809 60
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 0.05 mg/m^3
NOTE: Vapor only.
DESC Silvery, mobile, odorless liquid.
MW: 201 BP: 674 F VP: 0.0012 mm MP: -38 F
INCOM Acetylenes, ammonia gases
HLTH Acute and Cumulative CNS damage (HE7); Gastrointestinal effects/Gingivitis (HE3)
SYMPT Coughing, dyspnea, chest pain, bronchitis pneumonia; tremors; insomnia; irritability, indecision; headaches; fatigue, weakness; stomatitis; salivation; GI disturbances, anorexia, low weight; proteinuria; eye, skin irritation

ORGAN Skin, respiratory system, CNS, kidneys, eyes
LESS1 Unavailable at this time. See Secondary sampling method (SAM2).
SAM2 Jerome Mercury Vapor Analyzer - Model 411, 0.001-0.5 mg/m^3
Jerome Mercury Dosimeter - Model 412 (for use with Model 411)
All of the above are available from LESS.

Mesityl Oxide

IMIS **1635** CAS 141-79-7
SYN 4-Methyl-3-penten-2-one; Isobutenyl methyl ketone; Methyl isobutenyl ketone; Isopropylidene acetone
NIOSH RTECS SB4200000; 54967 DOT UN1229 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 15 ppm, 60 mg/m^3
. STEL 25 ppm, 100 mg/m^3
DESC Clear, pale yellow, or colorless liquid with a strong peppermint odor.
MW: 98 BP: 266 F VP: 8 mm MP: -51 F
INCOM Oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Eye, skin, and mucous membrane irritation; narcosis, coma; In animals: CNS effects
ORGAN Eyes, skin, respiratory system, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ANL SOLVENT: (99:1) Carbon Disulfide/Methanol
MAX V: 25 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Methacrylic acid

IMIS M339 CAS 79-41-4
SYN 2-Methylacrylic acid; alpha-Methacrylic acid; 2-Methylpropenoic acid; 2-Methylene propionic acid
NIOSH RTECS OZ2975000; 47768 DOT UN2531 Corrosive
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 20 ppm, 70 mg/m^3
DESC MW: 86.09 MP: 16 deg C BP: 163 deg C
LESS1 MEDIA (99): Two Chromosorb 108 Tubes in series (100 mg sections)
ANL SOLVENT: Methanol
MAX V: 24 Liters MAX F: 0.1 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
REF: 17 (OHL2004S021) CLASS: Partially Validated

Methane

IMIS **1640** CAS 74-82-8
DESC Gas.
HLTH Explosive (HE18); Asphyxiant (HE17) If Oxygen level is 18% or less by volume
SAM2 FOXBORO SAPPHIRE: Det. Limit 1.5 ppm, long pathlength

2-(2-Methoxyethoxy) Ethanol

IMIS **M328** CAS 111-77-3
SYN Methyl Carbitol; Diethylene Glycol Methyl Ether; Dowanol DM; Diethylene Gylcol Monomethyl Ether; Poly-Solv DM; Polysolv DM
NIOSH RTECS KL6125000; 34540
DESC MW: 120.17 BP: 193 C MOLFM: $C_5H_{12}O_3$
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections; 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol

MAX V: 10 Liters MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17(OHL2005OOSHA99)*** CLASS: Not Validated

Methyl Acrylate

IMIS **1653** CAS 96-33-3
SYN Methyl propenoate; Acrylic Acid, Methyl Ester; 2-Propenoic Acid, Methyl Ester
NIOSH RTECS AT2800000; 4266 DOT UN1919 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 10 ppm, 35 mg/m^3
DESC Clear, colorless liquid with a sharp, sweet, fruity odor.
MW: 86 BP: 176 F VP: 68.2 mm MP: -130 F MOLFM: $C_4H_6O_2$
INCOM Nitrates, oxidizers, peroxides, polymerizers, strong alkalis, moisture
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute lung damage (HE4); Cumulative lung, liver and kidney damage (HE3)
IARC Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Eye, upper respiratory, and skin irritation
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (14): Charcoal Tube coated 10% with 4-tert-butylcatechol (110/55 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
MAX V: 12 Liters MAX F: 0.05 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA92)*** SAE: 0.09 CLASS: Validated by OSHA
. NOTE: Samples should be stored at reduced temperature when not in transit.
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.07 ppm, long pathlength

Methyl Alcohol

IMIS **1660** CAS 67-56-1
SYN Methanol; Wood alcohol; Columbian spirits; Carbinol
NIOSH RTECS PC1400000; 48518 DOT UN1230 Flammable Liquid, Poison
MIOSHA FINAL RULE (Table G-1-A):
. TWA (Skin) 200 ppm, 260 mg/m^3
. STEL (Skin) 250 ppm, 325 mg/m^3
DESC Colorless liquid with a characteristic, pungent odor.
MW: 32 BP: 148 F VP: 97 mm MP: -144 F
INCOM Strong oxidizers
HLTH Cumulative CNS effects (HE7); Narcosis (HE8)
Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT Eye irritation; headaches; drowsiness, light-headedness; nausea, vomiting; visual disturbance, eye burns; digestive disturbance; failure of vision
ORGAN Eyes, skin, CNS, GI tract
LESS1 MEDIA (7): Two Anasorb 747 Tubes in series (first 400mg,second 200mg) See NOTE.
ANL SOLVENT: (40:60) Carbon Disulfide: Dimethylformamide
MAX V: 5.0 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17(OHL2005OOSHA91)*** SAE: 0.09 CLASS: Validated by OSHA
NOTE: Separate tubes and seal each after sampling.
LESS2 MEDIA: Silica Gel Tube (100/50 mg)
ANL SOLVENT: Water/ IPA (95:5)
MAX V: 5 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography, GC/FID
. REF: ***17 (OHL2005ONIOSHISSUE3)*** SAE: 0.162 CLASS: Fully Validated
NOTE: Store at 5 deg C

SAM2 DET. TUBE: Dräger, CH 29701, 100-3,000 ppm
FOXBORO SAPPHIRE: Det. Limit 0.7 ppm, long pathlength

Methyl (n-amyl) ketone

IMIS **1675** CAS 110-43-0
SYN n-Amyl methyl ketone; 2-Heptanone; Methyl n-Amyl Ketone; MAK
NIOSH RTECS MJ5075000; 39158 DOT UN1110 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 465 mg/m^3
DESC Clear, colorless liquid with a mild banana oil-like odor.
MW: 114 BP: 304 F VP: 2 mm MP: -31 F
INCOM Strong acids, alkalis, oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Narcosis (HE8)
SYMPT Eye, mucous membrane irritation; headaches; narcosis, coma; dermatitis
ORGAN Eyes, skin, respiratory system, CNS, PNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
ALT SOLVENT: (99:1) Carbon Disulfide/Methanol
MAX V: 25 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE: 0.08 CLASS: Validated in-house

Methyl Cellosolve

IMIS **0590** CAS 109-86-4
SYN 2-Methoxyethanol; Glycol monomethyl ether; Ethylene glycol monomethyl ether; Methyl oxitol; Ektasolve; Jeffersol EM
NIOSH RTECS KL5775000; 34535 DOT UN1188; Combustible Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 25 ppm, 80 mg/m^3
DESC Colorless liquid with a mild, non-residual odor.
MW: 76 BP: 256 F VP: 6 mm MP: -121 F
INCOM Strong oxidizers and caustics
HLTH Blood disorders (HE12); CNS effects (HE7); Suspect reproductive effects (HE5)
SYMPT Headaches; drowsiness; weakness, ataxia, tremors; somnolence; anemic pallor; eye irritation
ORGAN CNS, blood, skin, eyes, kidneys
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol (v/v)
MAX V: 48 Liters MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA79)*** SAE: 0.10 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.15 ppm, long pathlength

Methyl Cellosolve Acetate

IMIS **1170** CAS 110-49-6
SYN 2-Methoxyethyl acetate; Glycol monomethyl ether acetate; Ethylene glycol monomethyl ether acetate
NIOSH RTECS KL5950000; 34536 DOT UN1189 Flammable Liquid
MIOSHA FINAL RULE (Table-1-A): TWA (Skin) 25 ppm, 120 mg/m^3
DESC Colorless liquid with a mild, ether-like odor.
MW: 118 BP: 293 F VP: 2 mm MP: -85 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Blood disorders (HE12); CNS effects (HE7); Kidney damage (HE3)
SYMPT Kidney damage; brain damage; eye irritation; in animals: eye, nose, throat irritation; narcosis

ORGAN Kidneys, brain, CNS, PNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol (v/v)
MAX V: 48 Liters MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA79)*** SAE: 0.11 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.14 ppm, long pathlength

Methyl Chloroform
IMIS **1720** CAS 71-55-6
SYN 1,1,1-Trichloroethane; Composite Constituent
NIOSH RTECS KJ2975000; 34070 DOT UN2831 Keep Away From Food
MIOSHA FINAL RULE (Table G-1-A):
. TWA 350 ppm, 1900 mg/m^3
. STEL 450 ppm, 2450 mg/m^3
DESC Colorless liquid with mild, chloroform like odor.
MW: 133 BP: 165 F VP: 100 mm MP: -36 F
INCOM Strong caustics, strong oxidizers; chemically active metals, such as aluminum, magnesium powders, sodium, potassium
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16); Narcosis (HE8)
IARC Group 3, not Classifiable as to its carcinogenicity to humans (1,1,1-Trichloroethane)
SYMPT Headaches; lassitude; CNS depression; poor equilibrium; eye irritation; dermatitis; cardiac arrhythmias
ORGAN Skin, CNS, CVS, eyes
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1003)*** SAE: 0.16 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.15ppm, long pathlength

Methylene bisphenyl isocyanate
IMIS **1073** CAS 101-68-8
SYN 4,4-Diphenylmethane diisocyanate; Methylene bis (4-phenyl isocyanate); 4,4-Diisocyanatodiphenyl-methane; MDI; Methylene Bis (Phenyl Isocyanate)
NIOSH RTECS NQ9350000; 44210 DOT UN2489 Keep away from food,
MIOSHA FINAL RULE (Table G-1-A): CEILING 0.02 ppm, 0.2 mg/m^3
DESC White to light yellow flakes; odorless.
MW: 250 BP: 342 F VP: 0.05 mm MP: 99 F
INCOM Strong alkalis, acids, alcohol
HLTH Asthma (HE9); Irritation-Eye, Nose, Throat, Skin--Marked (HE14)
IARC Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Eye, nose, throat irritation; coughing, pulmonary secretions, chest pain, dyspnea, asthma
ORGAN Respiratory system, eyes
LESS1 MEDIA (I): Glass Fiber Filter (37 mm) coated with 1.0 mg 1-(2-Pyridyl) piperazine
ANL SOLVENT: 90:10 (v/v) Acetonitrile/Dimethyl Sulfoxide
MIN V: ***15*** Liters MAX F: 1.0 L/min (Ceiling)
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL 2004S011) SAE: 0.18 CLASS: Validated in-house
NOTE: Obtain treated filter from LESS and refrigerate until use. Collect samples open-face. After sampling protect from light, store and ship cold.

Methylene Chloride

IMIS **1730** CAS 75-09-2
SYN Methylene dichloride; Dichloromethane; Composite Constituent
NIOSH RTECS PA8050000; 47881 DOT UN1593 Flammable Liquid
MIOSHA FINAL LIMITS (Table G-1-A):
. TWA 25 ppm, 87 mg/m^3
. STEL 125 ppm, 434 mg/m^3
. Action Level 12.5 ppm
DESC Colorless liquid with a chloroform-like odor.
MW: 85 BP: 104 F VP: 350 mm MP: -142 F
INCOM Strong oxidizers and caustics; chemically active metals, such as aluminum or magnesium powders, sodium, potassium
HLTH Chemical anoxia (Metabolic conversion to CO) (HE17); Mutagen (HE2)
Cumulative liver damage (HE3); CNS effects/Narcosis (HE8)
NTP Suspect Human Carcinogen
IARC Group 2B, possibly carcinogenic to humans (Dichloromethane)
SYMPT Fatigue, weakness, sleepiness, light-headedness; numb limbs, tingling; nausea; eye, skin irritation; vertigo; worsened angina
ORGAN Skin, CVS, eyes, CNS
LESS1 MEDIA (8): Carbosieve S-III (130/65 mg sections) (ORBO 91 or equivalent)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liters MAX F: 0.05 L/min (TWA)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA84)*** SAE: 0.12 CLASS: Validated in-house
SAM2 FOXBORO SAPPHIRE: Det. Limit 4 ppm, short pathlength

Methyl Isoamyl Ketone

IMIS **1776** CAS 110-12-3
SYN 5-methyl-2-Hexanone; MIAK
NIOSH RTECS MP3850000; 39729 DOT UN2302 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 50 ppm, 240 mg/m^3
DESC MW: 114.21 FP: 110 C BP: 144 C MOLFM: $C_7H_{14}O$ ODRTHRS: 0.012 ppm
HLTH Irritation-Eye, Throat---Marked (HE14); CNS effects (HE8)
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL: Gas Chromatography; GC-FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: Ship immediately after sampling. Delay-store at reduced temperature. Storage in refrigerator on receipt.

Methyl Methacrylate

IMIS **1774** CAS 80-62-6
SYN Methacrylic acid, methyl ester
NIOSH RTECS OZ5075000; 47796 DOT UN1247 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 410 mg/m^3
DESC Colorless liquid with an acrid, fruity odor.
MW: 100 BP: 212 F VP: 35 mm MP: -54 F
INCOM Nitrates, oxidizers, peroxides, polymerizers, strong alkalis, moisture
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
Mutagen (HE2); Suspect teratogen (HE5)
IARC Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Eye, nose, throat irritation; dermatitis; narcosis
ORGAN Eyes, upper respiratory system, skin

LESS1 MEDIA (14): Charcoal Tube coated 10% with 4-tert-butylcatechol (110/55 mg sections, 20/40 mesh)
ANL SOLVENT: Toluene
MAX V: 3 Liters MAX F: 0.05 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA89)*** SAE: 0.10 CLASS: Validated by OSHA
. NOTE: Samples should be stored at reduced temperature when not in transit.
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.4 ppm, long pathlength

1-Methyl-2-Pyrrolidinone

IMIS **M139** CAS 872-50-4
SYN NMP; N-Methylpyrrolidinone; N-Methyl-2 Pyrrolidinone; 1-Methyl-5-Pyrrolidinone; Methylpyrrolidone; N-Methylpyrrolidone; N-Methyl-2-Pyrrolidone; Composite Constituent
NIOSH RTECS UY5790000; 74457
DESC MW: 99.15 Density: 1.033 BP: 202 FP: 86
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Methylene Chloride/Methanol (95:5)
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography, GC/FID
. REF: ***17 (OHL2005OOSHAV2043)*** CLASS: Partially Validated

alpha-Methyl Styrene

IMIS **1782** CAS 98-83-9
SYN 1-Methyl-1-phenylethylene; AMS
NIOSH RTECS WL5250000; 79131
MIOSHA FINAL RULE (Table G-1-A):
. TWA 50 ppm, 240 mg/m^3
. STEL 100 ppm, 485 mg/m^3
DESC Colorless liquid with a characteristic odor.
MW: 118 BP: 329 F VP: 1.9 mm MP: -9 F
INCOM Oxidizers, peroxides, halogens, catalysts for vinyl or ionic polymers; aluminum, iron chloride
HLTH Irritation-Eyes, Nose, Throat---Mild (HE15)
CNS effects (HE7); Narcosis (HE8)
SYMPT Eye, nose, throat irritation; drowsiness; dermatitis
ORGAN Eyes, respiratory system, skin
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) CS2/DMF
MAX V: 30 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17(OHL2001s001)*** SAE: 0.169 CLASS: Partially Validated

Mica

IMIS **9075** CAS 12001-26-2
SYN Muscovite; Amber mica; Roscoelite; Lipidolite; Phlogopite; Biotite; Zinnwaldite; Fluorophlogopite; Margarite
NIOSH RTECS VV8760000
MIOSHA FINAL RULE (Table G-1-A): TWA 3 mg/m^3
DESC Colorless, odorless flakes or sheets with <1% quartz.
MW: 797 VP: approx. 0 mm
INCOM None
HLTH Accumulation in lungs (Pneumoconiosis) (HE10)
SYMPT Pneumoconiosis by X-ray, coughing, dyspnea; weakness; weight loss

ORGAN Lungs
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric analysis followed by X-ray Diffraction
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminate, the XRD analysis will not be performed.
BULK Submit bulk sample in separate mailing container at time air samples are submitted. Indicate on sample sheet that a bulk sample has been submitted ***with the S103 IMIS code***. Analysis is for Quartz.
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted; use IMIS S103. For SiO_2, a high volume area or settled dust sample is preferred. ***Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more).*** Clearly mark samples to be used for reference as a bulk, use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter, otherwise, submit as a separate filter.
WIPE No

Mineral Wool Fiber
IMIS **1781**
DESC Solid fibers similar to fiberglass lint but more irregular in shape.
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
LESS MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Molybdenum (as Mo), Insoluble Compounds (Total Dust)
IMIS **1790** CAS 7439-98-7
NIOSH RTECS QA4680000; 48763
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Varies depending upon specific compound.
INCOM Strong oxidizers
HLTH Cumulative liver and kidney damage/Blood disorders (HE3)
Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT In animals: eye, nose, throat irritation; weight loss; anorexia, diarrhea; listlessness; liver, kidney damage
ORGAN None known in humans
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) Filter
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminate, LESS will not analyze for the specific metal.

ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

Molybdenum (as Mo), Soluble Compounds

IMIS **1791** CAS 7439-98-7
NIOSH RTECS QA4680000; 48793
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Varies depending on specific compound.
INCOM Alkali metals; sodium, potassium, molten magnesium
HLTH Cumulative liver and kidney damage/Blood disorders (HE3)
Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
SYMPT In animals: loss of appetite, anorexia; incoordination; eye, nose, throat irritation; dyspnea; anemia; colic; gout
ORGAN Respiratory system; in animals: kidneys, blood
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Water Extraction
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Morpholine

IMIS **1797** CAS 110-91-8
SYN Tetrahydro-1,4-oxazine; Diethyleneimide oxide
NIOSH RTECS QD6475000; 49285 DOT UN2054 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA (Skin) 20 ppm, 70 mg/m^3
. STEL (Skin) 30 ppm, 105 mg/m^3
DESC Colorless liquid with a weak, ammonia-like odor.
MW: 87 BP: 263 F VP: 7 mm MP: 23 F
INCOM Strong acids, strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Cumulative liver and kidney damage (HE3)
SYMPT Vision disturbance; nose irritation; coughing, respiratory irritation; eye, skin irritation; liver, kidney damage
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (55): Silica Gel Tube (150/75 mg sections, 20/40 mesh)
ANL SOLVENT: HNO_3/ EDTA buffer
MAX V: 20 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Ion Chromatography, IC
. REF: ***17 (OHL2004S029)*** ***CLASS: Partially validated in-house***

Naphtha (VM & P)

IMIS **V109** CAS 8032-32-4
SYN Ligroin; Benzine (Light Petroleum Distillate); Benzoline; Canadol; Varnish Makers & Painters Naphtha; Petroleum Ether; Petroleum Distillate Naphtha
NIOSH RTECS OI6180000; 46323 DOT UN1271 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 300 ppm, 1350 mg/m^3
. STEL 400 ppm, 1800 mg/m^3
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide

MAX V: 20 Liters MAX F: 0.2 L/min (TWA)
MIN T: 15 minutes MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2004S014) SAE: 0.14 CLASS: Validated in house
NOTE: Separately submit 5 mL of a clean bulk sample with little or no color to use as a standard.

Neon

IMIS **1850** CAS 7440-01-9
DESC Gas
HLTH Simple asphyxiation (HE17) If Oxygen is 18% by volume
LESS1 Field analysis. Measure % oxygen present with oxygen meter.

Nickel, Metal and Insoluble compounds (as Ni)

IMIS **1840** CAS 7440-02-0
MIOSHA FINAL RULE (Table G-1-A): TWA 1 mg/m^3
HLTH Cumulative lung damage (HE10); Dermatitis (HE3)
IARC Nickel and Nickel Compounds - Group 1, carcinogenic to humans
SYMPT Headache, vertigo; nausea, vomiting, epigastric pain; substernal pain; coughing, hyperpnoea; cyanosis; weakness; leucocytosis; pneumonitis; delirium, convulsions; (carcinogenic)
ORGAN Lungs, paranasal sinus, CNS
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

Nickel, Soluble Compounds (as Ni)

IMIS **1842** CAS 7440-02-0
NIOSH RTECS QR5950000 DOT 1378 32
MIOSHA FINAL RULE (Table G-1-A): TWA 0.1 mg/m^3
DESC Appearance and odor wary depending upon specific compound
INCOM Strong acids, sulfur, Nickel nitrate; wood, other combustibles
HLTH Cumulative lung damage (HE10); Dermatitis (HE3)
NTP Suspect Human Carcinogen
IARC Nickel and Nickel Compounds - Group 1, carcinogenic to humans
SYMPT Headache, vertigo; nausea, vomiting, epigastric pain; substernal pain; coughing, hyperpnoea; cyanosis; weakness; leucocytosis; pneumonitis; delirium, convulsions; (carcinogenic)
ORGAN Lungs, paranasal sinus, CNS
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

Nitric Acid

IMIS **1860** CAS 7697-37-2
SYN Aqua fortes; White fuming nitric acid (WFNA); Red fuming nitric acid (RFNA); Hydrogen nitrate
NIOSH RTECS QU5775000 DOT 2032 44

MIOSHA FINAL RULE (Table G-1-A):
. TWA 2 ppm, 5 mg/m^3
. STEL 4 ppm, 10 mg/m^3
DESC Colorless, yellow, or red fuming liquid with an acrid, suffocating odor.
MW: 63 BP: 183 to 251 F MP: -42 to -61 F
INCOM Combustible organics, oxidizable matter; wood, turpentine, metal powder, hydrogen sulfide, etc.; strong bases
HLTH Acute lung damage (HE4)
Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
SYMPT Eye, mucous membrane, skin irritation; delayed pulmonary edema; pneumonitis; bronchitis; dental erosion
ORGAN Eyes, respiratory system, skin, teeth
LESS1 MEDIA (59): Silica Gel Tube (400/200 mg sections, ORBO-53 or equiv.)
ANL SOLVENT: Carbonate/Bicarbonate
MAX V: 100 Liters MAX F: 0.5 L/min (TWA)
MAX V: 7.5 Liters MAX F: 0.5 L/min (STEL)
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S012) SAE: 0.187 CLASS: Validated in-house
NOTE: Phosphoric, nitric, hydrobromic, hydrochloric, and sulfuric acids may be submitted on the same tube. When analysis of a compound is requested, an analysis for nitrate is performed and reported as the compound.

Nitric Oxide
IMIS **1890** CAS 10102-43-9
SYN Nitrogen monoxide; Diesel Exhaust Component
NIOSH RTECS QX0525000 DOT 1660 20
MIOSHA FINAL RULE (Table G-1-A): TWA 25 ppm, 30 mg/m^3
DESC Colorless gas with a sharp, sweet odor; brown at high concentrations in air.
MW: 30 BP: 241 F MP: -263 F
INCOM Combustible matter, chlorinated hydrocarbons, ammonia, carbon disulfide, metals, fluorine, ozone
HLTH Methemoglobinemia (HE13); CNS effects (HE7); Delayed lung damage (HE10)
SYMPT Eye, nose, throat irritation; drowsiness; unconsciousness
ORGAN Respiratory system
LESS1 MEDIA (41): Two Glass Tubes each containing 400 mg Triethanolamine-impregnated Molecular Sieve separated by an Oxidizer tube containing 1g of a chromate compound
Note: If sampling for both NO_2 and NO is necessary, two separate pumps and sampling devices should be used. The differences in OSHA Final Rule PELs (NO_2 is a STEL and NO is a TWA PEL) and flow rates dictates a need for a singular assessment of NO_2. Nitric oxide is collected at a flow rate not to exceed 0.025 L/min and a three-tube device must be used. Nitrogen dioxide can be collected at this flow rate; however, a longer sampling time will be necessary to collect a detectable amount of NO_2 than for a short-term measurement. Also, NO_2 concentrations may vary widely during sampling periods as long as 4 hours for NO. The three-tube sampling device will not reflect the varying concentration. Therefore, it is recommended to sample at 0.2 L/min for 15-min intervals using a single or two-section tube, MEDIA (40) for NO_2. A separate three-tube device and pump is then used for NO sampling. The front tube of the device can be submitted for NO_2 analysis; however, results from this front section may not represent short-term exposures.
MAX V: 6.0 Liters MAX F: 0.025 L/min
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S018) SAE: 0.197 CLASS: Validated in-house
NOTE: Submit as a separate sample. First TEA tube collects nitrogen dioxide (NO_2), second TEA tube collects nitric oxide (NO). Carefully label tubes before shipping to LESS. Do not submit oxidizer tube to LESS.
SAM2 DET. TUBE: Dräger, CH 31001, 2-100 ppm

Nitrogen

IMIS **1900** CAS 7727-37-9
DESC Gas
HLTH Simple Asphyxiation (HE17) If Oxygen is 18% by volume.
LESS1 Field analysis. Measure % oxygen with oxygen meter.

Nitrogen Dioxide

IMIS **1903** CAS 10102-44-0
SYN Nitrogen tetroxide; NO_2; Dinitrogen tetroxide; Nitrogen peroxide; Diesel Exhaust Component
NIOSH RTECS QW9800000 DOT 1067 20
MIOSHA FINAL RULE (Table G-1-A): STEL 1 ppm, 1.8 mg/m^3
DESC Dark brown, fuming liquid or gas with a pungent, acrid odor.
MW: 46/92 BP: 70 F VP: 720 mm MP: 12 F
INCOM Combustible matter, chlorinated hydrocarbons, ammonia, carbon disulfide
HLTH Cumulative lung damage (Bronchitis, Emphysema) (HE10)
Lung damage (HE11); Irritation-Eyes, Nose---Moderate (HE15)
SYMPT Coughing, mucoid frothy sputum, dyspnea, chest pain, pulmonary edema; cyanosis; tachypnea; tachycardia; eye irritation
ORGAN Respiratory system, CVS
LESS1 MEDIA (40 or 41): One glass tube with 400 mg Triethanolamine- impregnated Molecular Sieve for NO_2 only or two glass tubes each containing 400 mg Triethanolamine-impregnated Molecular Sieve separated by an Oxidizer tube containing 1 gm of a Chromate compound if collecting Nitric Oxide also.
Note: If sampling for both NO_2 and NO is necessary, two separate pumps and sampling devices should be used. The differences in OSHA Final Rule PELs (NO_2 is a STEL and NO is a TWA PEL) and flow rates dictates a need for a singular assessment of NO_2. Nitric oxide is collected at a flow rate not to exceed 0.025 L/min and a three-tube device must be used. Nitrogen dioxide can be collected at this flow rate; however, a longer sampling time will be necessary to collect a detectable amount of NO_2 than for a short-term measurement. Also, NO_2 concentrations may vary widely during sampling periods as long as 4 hours for NO. The three-tube sampling device will not reflect the varying concentration. Therefore, it is recommended to sample at 0.2 L/min for 15-min intervals using a single or two-section tube for NO_2. A separate three-tube device and pump is then used for NO sampling. The front tube of the device can be submitted for NO_2 analysis; however, results from this front section may not represent short-term exposures.
MAX V: 6.0 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S018) SAE: 0.197 CLASS: Validated in-house
NOTE: Submit as a separate sample. Sample for 30 minutes if possible. First TEA tube collects NO_2, second TEA tube collects NO. Carefully label tubes before shipping to LESS. Reduce flow to 0.025 L/min. if also collecting Nitric Oxide. Use #40 for NO_2 only, sampling train #41 for NO and NO_2. Do not submit oxidizer tube to LESS.
SAM2 DET. TUBE: Dräger, CH 30001, 0.5-25 ppm
WIPE No

Nitrogen Trifluoride

IMIS **1907** CAS 7783-54-2
NIOSH RTECS QX1925000 DOT 2451 15
MIOSHA FINAL RULE (Table G-1-A): TWA 10 ppm, 29 mg/m^3
DESC Colorless gas with a moldy odor.
MW: 71 BP: -200 C VP: >1 atm MP: -340 F
INCOM Water, oil, grease; oxidizable materials; ammonia, carbon monoxide, methane, hydrogen, hydrogen sulfide, active metals; oxides
HLTH Methemoglobinemia (HE13); Cumulative liver damage (HE3)
MPT None known in humans; In animals: methemoglobinemia; anoxia, cyanosis; weakness,

dizziness, headaches; liver, kidney injury
ORGAN None known in humans; in animals: blood
LESS1 Field analysis. Use FOXBORO SAPPHIRE
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.04 ppm, long pathlength
WIPE No

Nonane

IMIS **N807** CAS 111-84-2
NIOSH RTECS RA6115000; 52100 DOT UN1920 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 200 ppm, 1050 mg/m^3
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1500)*** SAE: 0.11
CLASS: Validated by NIOSH

Octane

IMIS **1957** CAS 111-65-9
SYN Normal octane
NIOSH RTECS RG8400000; 52798 DOT UN1262 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 300 ppm, 1450 mg/m^3
. STEL 375 ppm, 1800 mg/m^3
DESC Colorless liquid with a gasoline-like odor.
MW: 114 BP: 258 F VP: 11 mm MP: -70 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16); Narcosis (HE8)
SYMPT Eye, nose irritation; drowsiness; dermatitis; chemical pneumonia
ORGAN Skin, eyes, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 4 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1500)*** SAE: 0.10 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.35 ppm, long pathlength

Oil Mist (Mineral)

IMIS **5010** CAS 8012-95-1
SYN Mist of white mineral petroleum oil; Petroleum-base cutting oil; Heat-treating oil; Hydraulic oil; Cable oil; Lubricating oil
NIOSH RTECS PY8030000 DOT 1270 27
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Mist with an odor like burned lube oil.
INCOM None hazardous
HLTH Explosive, Flammable (No adverse effects when Good Housekeeping Practices are used) (HE18); Accumulation in lungs (Pneumonitis) (HE10)
IARC Mineral Oils, Untreated and mildly treated oils - Group 1, carcinogenic to humans
Mineral Oils, Highly refined oils - Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT None reported
ORGAN Respiratory system, skin
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 100 Liters MAX F: 2.0 L/min

ANL 1: Gravimetric
. REF: (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Infrared; FTIR
. REF: 2 (OSHA ID-178SG) CLASS: Partially Validated by OSHA
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. Collect a sample of the ***clean, unused,*** bulk ***oil*** substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted. Cutting oils may contain nitrosamines. Only analyzed for oil if TWA is greater than 2.5 mg/m^3.

WIPE No.

Oxygen

IMIS **X100** CAS 7782-44-7

LESS1 Field analysis. Use portable direct-reading oxygen monitor.

Palladium

IMIS **P116** CAS 7440-05-3

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Particulates not otherwise regulated (Respirable Fraction)

IMIS **9130**

SYN Dust (Respirable Nuisance) prior to 9/1/89; PNO

MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3

DESC Nuisance dust includes but is not limited to inert particulates, glass fibrous or dust, mineral wool fiber, inert organic dust, and inert mineral dust, provided that these inert particulates contain less than 1 % free Silica.

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Particulates not otherwise regulated (Total Dust)

IMIS **9135**

SYN Dust, (Total) prior to 9/1/89; PNO

MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3

DESC Nuisance dust includes but is not limited to inert particulates, glass fibrous or dust, mineral wool fiber, inert organic dust, and inert mineral dust, provided that these inert particulates contain less than 1% free Silica.

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up

to an 8-hour period.

Pentaerythritol (Respirable Fraction)

IMIS **P157** CAS 115-77-5
NIOSH RTECS RZ2490000; 54598
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Pentaerythritol (Total Dust)

IMIS **1987** CAS 115-77-5
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Solid
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Pentane

IMIS **1990** CAS 109-66-0
SYN n-Pentane
NIOSH RTECS RZ9450000; 54625 DOT UN1265 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 600 ppm, 1800 mg/m^3
. STEL 750 ppm, 2250 mg/m^3
DESC Colorless liquid with a gasoline-like odor.
MW: 72 BP: 97 F VP: 426 mm MP: -200 F
INCOM Strong oxidizers
HLTH Flammable (HE18); Narcosis (HE8)
SYMPT Drowsiness; eye, nose irritation; dermatitis; chemical pneumonia
ORGAN Skin, eyes, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 2 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2001s001)*** SAE: 0.09 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit 6 ppm, long pathlength

2-Pentanone

IMIS **2010** CAS 107-87-9
SYN Methyl propyl ketone; Ethyl acetone; MPK
NIOSH RTECS SA7875000; 54790 DOT UN1249 Flammable Liquid

MIOSHA FINAL RULE (Table G-1-A):
. TWA 200 ppm, 700 mg/m^3
. STEL 250 ppm, 875 mg/m^3
DESC Water-white liquid with a characteristic ketone odor.
MW: 86 BP: 216 F VP: 27 mm MP: -108 F
INCOM Oxidizing agents
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Narcosis (HE8)
SYMPT Eye, mucous membrane irritation; headaches; dermatitis; narcosis, coma
ORGAN Respiratory system, eyes, skin, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house

Perchloroethylene
IMIS **2020** CAS 127-18-4
SYN Tetrachloroethylene prior to 9/1/89
NIOSH RTECS KX3850000; 35592 DOT UN1897 Keep Away From Food
MIOSHA FINAL RULE (Table G-1-A): TWA 25 ppm, 170 mg/m^3
DESC Colorless liquid with an odor like ether or chloroform.
MW: 166 BP: 250 F VP: 14 mm MP: -8 F
INCOM Strong oxidizers, chemically active metals, such as barium, lithium, beryllium
HLTH Cumulative liver and CNS damage (HE3); Narcosis (HE8); Mutagen (HE2)
NTP Suspect Human Carcinogen
IARC Group 2A, probably carcinogenic to humans (Tetrachloroethylene)
SYMPT Eye, nose, throat irritation; nausea; flushed face, neck; vertigo, dizziness, incoordination; headaches; somnolence; skin erythema; liver damage; (carcinogenic)
ORGAN Liver, kidneys, eyes, upper respiratory system, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 12 Liters MAX F: 0.05 L/min (TWA)
ANL 1: Gas Chromatography; GC/FID
. REF: 2 (OSHA 1001) SAE: 0.099 CLASS: Fully Validated
SAM2 DET. TUBE: Dräger, 8101501, 2 to 300 ppm
FOXBORO SAPPHIRE: Det. Limit 0.09 ppm, long pathlength

Perlite (Respirable Fraction)
IMIS **P101** CAS 93763-70-3
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC A hydrous glassy volcanic rock expanded at 1400-2500 F to form thin flakes useful for their lightweight.
HLTH Nuisance particulates-Accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Perlite (Total Dust)
IMIS **2035** CAS 93763-70-3

SYN Perlite (Less than 1 % Quartz) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC A hydrous glassy volcanic rock expanded at 1400-2500 F to form thin flakes useful for their lightweight.
HLTH Nuisance particulates-Accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Petroleum Distillates (Naphtha)
IMIS **2037**
SYN Rubber solvent (Naphtha)
NIOSH RTECS SE7449000; 55307 DOT UN1268 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 400 ppm, 1600 mg/m^3
DESC BP: 45-95 C
INCOM Strong oxidizers
HLTH Irritation-Eye, Throat---Mild (HE16); Narcosis (HE8)
SYMPT Dizziness, drowsiness; headache; nausea; eye, nose, throat irritation; dry cracked skin
ORGAN Skin, eyes, respiratory system, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 20 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2004S014) SAE: 0.14 CLASS: Validated in house
NOTE: Separately submit 5 mL of a clean bulk sample with little or no color to use as a standard.

pH Determination
IMIS **P200**
LESS1 MEDIA: Bulk analysis.
. REF: 17 (OHL2003S008) SAE 0.08 CLASS: Validated in-house
NOTE: Use pH meter or indicator strips. LESS requires about 20 mL of aqueous solution or 10 g of inorganic material to perform an analysis. Organic solutions are inappropriate for pH determination.

Phenol
IMIS **2040** CAS 108-95-2
SYN Carbolic acid; Monohydroxy benzene
NIOSH RTECS SJ3325000; 56393 DOT UN1671 (Solid) Poison; 2821 55
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 5 ppm, 19 mg/m^3
DESC Colorless to pink solid or thick liquid with a characteristic, sweet, tarry odor.
MW: 94 BP: 359 F VP: 0.36 mm MP: 106 F
INCOM Strong oxidizers, calcium hypochlorite
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute and Chronic systemic toxicity (HE4)
SYMPT Eye, nose, throat irritation; anorexia, weight loss, weakness, muscle aches, pain; dark urine; cyanosis; liver, kidney damage; skin burns, dermatitis; ochronosis; tremors, convulsions, twitching
ORGAN Liver, kidneys, skin
LESS1 MEDIA (91): XAD-7 Tube (100/50 mg sections, 15/50 mesh)
ANL SOLVENT: Methanol

MAX V: 24 Liters MAX F: 0.1 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL2004S020) SAE: 0.09 CLASS: ***Validated in-house***
ANL 2: Gas Chromatography; GC/FID

Phosphoric Acid

IMIS **2085** CAS 7664-38-2
SYN White phosphoric acid; Orthophosphoric acid; 85% Phosphoric acid; Metaphosphoric acid
NIOSH RTECS TB6300000 DOT 1805 60
MIOSHA FINAL RULE (Table G-1-A): TWA 1 mg/m^3
. STEL 3 mg/m^3
DESC Viscous, colorless, odorless liquid; solidifies at <70 F.
MW: 98 BP: 500 F VP: 0.03 mm MP: 70 F
INCOM Strong caustics, most metals
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
SYMPT Upper respiratory tract, eye, skin irritation; skin, eye burns; dermatitis
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (59): Silica Gel Tube (400/200 mg sections, ORBO-53 or equiv.)
ANL SOLVENT: Carbonate/Bicarbonate
MAX V: 100 Liters MAX F: 0.5 L/min (TWA)
MAX V: 7.5 Liters MAX F: 0.5 L/min (STEL)
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S012) SAE: 0.19 CLASS: Validated in-house
NOTE: Phosphoric, nitric, hydrobromic, hydrochloric, and sulfuric acids may be submitted on the same tube. When analysis of a compound is requested, an analysis for Phosphate is performed and reported as the compound.

Plaster of Paris (Respirable Fraction)

IMIS **P102** CAS 26499-65-0
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC A slightly hydrated calcium sulfate in powdered form, which makes a quick setting paste when mixed with water.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Plaster of Paris (Total Dust)

IMIS **2127** CAS 26499-65-0
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC A slightly hydrated calcium sulfate in powdered form, which makes a quick setting paste when mixed with water.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up

to an 8-hour period.

Portland Cement (Respirable Fraction)

IMIS **P104** CAS 65997-15-1
SYN Hydraulic cement; Cement; various trademark names are used
NIOSH RTECS VV8770000
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Fine grey powder used for the manufacture of concrete.
MW: Variable VP: approx. 0 mm
INCOM None hazardous
HLTH Nuisance particulate (HE19) if quartz content is less than 1%.
Irritation-Eye, Nose---Mild (HE16)
SYMPT Eye, nose irritation; coughing, expectoration, exertional dyspnea, wheezing, chronic bronchitis; dermatitis
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric analysis followed by X-ray Diffraction
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Gravimetric analysis is used to determine compliance with respirable Portland cement standard. Following this analysis, LESS can perform X-ray diffraction analysis of respirable Quartz. Compliance can then be determined for both standards. If filter is not overloaded, samples may be collected up to an 8-hour period. Submit bulk sample in separate mailing container at time air samples are submitted.
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted use IMIS S103. For SiO_2, a high volume area or settled dust sample is preferred. Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter; otherwise, submit as a separate filter.

Portland Cement (Total Dust)

IMIS **0577** CAS 65997-15-1
SYN Hydraulic cement; Cement; various trademark names are used; portland cement (less than 1% Crystalline Silica) prior to 9/1/89
NIOSH RTECS VV8770000
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Fine grey powder used for the manufacture of concrete.
MW: Variable VP: approx. 0 mm
INCOM None hazardous
HLTH Nuisance particulate (HE19) if quartz content is less than 1%.
Irritation-Eye, Nose---Mild (HE16)
SYMPT Eye, nose irritation; coughing, expectoration, exertional dyspnea, wheezing, chronic bronchitis; dermatitis
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA: (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min

ANL 1: Gravimetric analysis followed by X-ray Diffraction
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

Potassium Dichromate

OSHA IMIS Code Number: ~~0686~~

IMIS Code history: used prior to 05/30/2006 and the Chromium (VI) standard

For more General Description information see Chromium (VI) (Hexavalent Chromium), chapter III.

IMIS **Use Chromic acid & Chromates (as CrO_3), ~~0686~~**
CAS 7778-50-9
LESS1 MEDIA (L): Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Gravimetric
. REF: (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Colorimetric (diphenylcarbazide)
. REF: 17 (OHL2004M0686SOPVC) SAE: 0.20 CLASS: Validated in-house
NOTE: Submit as a separate sample.
ANL 2: Ion Chromatography Post Column Derivatization UV-Vis Detector at 540 nm
. REF 2,7(OSHA ID-215) SAE: 0.18 CLASS: Fully Validated by OSHA
NOTE: Submit as a separate sample. The ion chromatography analysis is valence specific for hexavalent chromium (Cr^{+6}). Not currently available.

Potassium Hydroxide

IMIS **2140** CAS 1310-58-3
MIOSHA FINAL RULE (Table G-1-A): CEILING 2 mg/m^3
DESC Solid
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
MAX V: ***30*** Liters MAX F: 2.0 L/min (Ceiling)
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF**:** 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. Sodium hydroxide may be analyzed ***from*** the same filter. When analysis of the compound is requested, an elemental analysis is performed and reported as the compound.
WIPE MEDIA: Whatman smear tab. SOLVENT: Deionized water

Propane

IMIS **2150** CAS 74-98-6
SYN Dimethyl methane; LPG; (see related, L.P.G.)
NIOSH RTECS TX2275000; 65285
DOT UN1978 Flammable Gas; UN1075 Flammable Gas
MIOSHA FINAL RULE (Table G-1-A): TWA 1000 ppm, 1800 mg/m^3
DESC Colorless, odorless gas when pure (foul-smelling odorant often added).
MW: 44.09 BP: -42 C VP (20 C): 8.6 atm MP: -306 F MOLFM: C_3H_8
INCOM Strong oxidizers
HLTH Explosive (HE18); CNS effects (HE7); Asphyxiant (HE17)
SYMPT Dizziness, disorientation, excitability; frostbite
ORGAN CNS
LESS1 MEDIA: (8+8): CARBOSIEVE S-III (130/65 mg sections, 60/80 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
REC V: 5 Liters REC F: 0.1 L/min
. REF: ***17 (OHL2005OOSHAPV2077)*** CLASS: Partially validated by OSHA
SAM2 Combustible Gas Meter (Quest Multilog 2000)
FOXBORO SAPPHIRE: Det. Limit 20 ppm, long pathlength

n-Propyl Acetate

IMIS **2180** CAS 109-60-4
SYN Propylacetate; Acetic acid, n-propyl ester
NIOSH RTECS AJ3675000; 2737 DOT UN1276 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 200 ppm, 840 mg/m^3
. STEL 250 ppm, 1050 mg/m^3
DESC Colorless liquid with a mild, fruity odor.
MW: 102 BP: 215 F VP: 25 mm MP: -140 F
INCOM Nitrates; strong oxidizers, alkalis, and acids
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16); Narcosis (HE8)
SYMPT Eye, nose, throat irritation; narcosis; dermatitis
ORGAN Respiratory system, eyes, skin, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: Ship refrigerated

Propyl Alcohol

IMIS **2170** CAS 71-23-8
SYN n-Propyl alcohol; 1-Propanol; Ethyl carbinol
NIOSH RTECS UH8225000; 68537 DOT UN1274 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 200 ppm, 500 mg/m^3
. STEL 250 ppm, 625 mg/m^3
DESC Colorless liquid with a mild, non-residual, alcoholic odor.
MW: 60 BP: 207 F VP: 15 mm MP: -195 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
Narcosis (HE8); Suspect carcinogen (HE2)
SYMPT Mild eye, nose, throat irritation; dry cracking skin; drowsiness; headaches; ataxia; GI pain; abdominal cramps, nausea, vomiting, diarrhea
ORGAN Skin, eyes, respiratory system, GI tract
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: 99:1 Carbon Disulfide: Dimethylformamide
ALT SOLVENT: (99:1) Carbon Disulfide/Isopropanol
MAX V: 10 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
NOTE: Submit as a separate sample.
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.6 ppm, long pathlength

Propylene Glycol Monomethyl Ether

IMIS **2210** CAS 107-98-2; 1320-67-8
SYN Propylene Glycol Methyl Ether; PGME; 1-Methoxy-2-propanol; Methoxypropanol, alpha isomer
NIOSH RTECS UB7700000; 66775
MIOSHA FINAL RULE (Table G-1-A):
. TWA 100 ppm, 360 mg/m^3
. STEL 150 ppm, 540 mg/m^3
DESC MW: 90.14 MOLFM: $C_4H_{10}O_2$

HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Acute kidney and lung damage (HE4); Mutagen/Suspect carcinogen (HE2)
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 10 Liters MAX F: 0.1 L/min (TWA)
MAX V: 1.5 Liters MAX F: 0.1 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA99)*** SAE: 0.103 CLASS: Validated by OSHA

Propylene Glycol Monomethyl Ether Acetate
IMIS **P218** CAS 108-65-6
SYN 2-Acetoxy-1-methoxypropane; PGMEA; Methoxypropyl Acetate, alpha isomer; 1-Methoxy-2-propyl Acetate; Propylene Glycol Methyl Ether Acetate
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (95:5) Methylene Chloride/Methanol
MAX V: 10 Liters MAX F: 0.1 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA99)*** SAE: 0.10 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.07ppm, long pathlength

Qualitative Mass-Spec Analysis
IMIS **M125**
BULK Limit the amount of bulk submitted to 1 gram or 1 mL.

Qualitative Microscopy
IMIS **S325**
LESS1 NOTE: Call lab for specific application. Phase Contrast, Polarized Light, and Dispersion Stain analysis are available.

Quartz
IMIS **9010** CAS 14808-60-7
MIOSHA FINAL RULE (Table G-1-A): TWA 0.1 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted; use IMIS S103. For SiO_2, a high volume area or settled dust sample is preferred. ***Send the bulk in a petri dish (at least ½ full or more) or 30 ml vial (½ full or more).*** Clearly mark samples to be used for reference as a bulk; use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter, otherwise, submit as a separate filter.
WIPE No

Rouge (Respirable Fraction)

IMIS **R102** CAS 1309-37-1
SYN Iron (III) Oxide
NIOSH RTECS NO7400000; 44061
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Rouge (Total Dust)
IMIS **2229** CAS 1309-37-1
SYN Iron (III) Oxide
NIOSH RTECS NO7400000; 44061
MIOSHA INAL RULE (Table G-1-A): TWA 10 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Silica, Amorphous, Diatomaceous Earth (<1% Crystalline Silica)
IMIS **S122** CAS 61790-53-2
SYN Kieselguhr; (1) TSCA, Diatomite; Silicon dioxide (amorphous); Diatomaceous silica;
MIOSHA FINAL RULE (Table G-1-A): TWA 6 mg/m^3
DESC A soft siliceous solid composed of skeletons of small prehistoric aquatic plants. Contains primarily silica.
IARC Silica - Group 3, not Classifiable as to its carcinogenicity to humans (Amorphous Silica)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Silica, Amorphous, Precipitated and Gel
IMIS **9050** CAS 112926-00-8, 7699-41-4, 112945-52-5
SYN Aerosil, silica aerogel, silicic anhydride, hydrated amorphous silica, Hi-sil. Silica (amorphous) prior to 9/1/89
NIOSH RTECS VV7310000; 77717 DOT 1346 32
MIOSHA FINAL RULE (Table G-1-A): TWA 6 mg/m^3
DESC Colorless to gray, odorless powder.
MW: 60 VP: approx. 0 mm MP: 3100 F
INCOM Fluorine, oxygen difluoride, chlorine trifluoride
HLTH Explosive, Flammable (No adverse effects when Good Housekeeping Practices are used) (HE18); Possible Pneumoconiosis (HE10)
IARC Silica - Group 3, not Classifiable as to its carcinogenicity to humans (Amorphous Silica)

SYMPT Pneumoconiosis
ORGAN Respiratory system
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
NOTE: Amorphous Silica does not diffract x rays; evaluate gravimetrically. If quartz is suspected, submit a respirable sample for quartz (9010)
LESS2 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
WIPE No

Silica, Crystalline Cristobalite, Respirable Dust

IMIS 9015 CAS 14464-46-1
SYN Cristobalite prior to 9/1/89; Silica, Crystalline Cristobalite (as Quartz), Respirable Dust prior to 4/30/90
MIOSHA FINAL RULE (Table G-1-A): TWA 0.05 mg/m^3
DESC Solid.
HLTH Pneumoconiosis (HE10)
IARC Silica - Group 2A, probably carcinogenic to humans (Crystalline Silica)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted; use IMIS S103. For SiO_2, a high volume area or settled dust sample is preferred. If submitting high volume sample, collect at least 5 grams of dust. Clearly mark samples to be used for reference as a bulk use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter; otherwise, submit as a separate filter.

Silica, Crystalline Quartz (as Quartz), Respirable Dust

IMIS **9010** CAS 14808-60-7
SYN Silica (Quartz, respirable) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 0.1 mg/m^3
DESC Solid. MW: 60.09
HLTH Pneumoconiosis (Silicosis) (HE10)
IARC Silica- Group 1- carcinogenic to humans (crystalline Silica) vol 68
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min

ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL 1: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: For silica, a high volume area or settled dust sample is preferred, use IMIS S103. ***Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103.*** Clearly mark samples to be used for reference as a bulk; use IMIS S103. If a high volume area or settled dust is not available, collect a bulk sample, and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted; use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter.

WIPE No

Silica, Crystalline Tridymite, Respirable Dust

IMIS **9017** CAS 15468-32-3
SYN Tridymite prior to 9/1/89; Silica, Crystalline Tridymite (as Quartz) Respirable Dust prior to 4/30/90
MIOSHA FINAL RULE (Table G-1-A): TWA 0.05 mg/m^3
IARC Silica - Group 2A, probably carcinogenic to humans (Crystalline Silica)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Confirmation of tridymite by X-ray Diffraction is not currently available.
WIPE No

Silica, Crystalline Tripoli (as Quartz), Respirable Dust

IMIS **S114** CAS 1317-95-9
SYN Tripoli; Silica, Crystalline-Tripoli
NIOSH RTECS VV7336000; 77722
MIOSHA FINAL RULE (Table G-1-A): TWA 0.1 mg/m^3
IARC Silica - Group 2A, probably carcinogenic to humans (Crystalline Silica)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 CLASS: Validated in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted; use IMIS S103. For SiO_2, a high volume area or settled dust sample is preferred. ***Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more).*** Clearly mark samples to be used for reference as a bulk, use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter,

otherwise, submit as a separate filter.
WIPE No

Silica, Fused (Respirable Dust)

IMIS **9013** CAS 60676-86-0
SYN Silica (Fused) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 0.1 mg/m^3
DESC Solid.
HLTH Pneumoconiosis (HE10)
IARC Silica - Group 3, not Classifiable as to its carcinogenicity to humans (Amorphous **Silica)**
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
NOTE: Fused silica does not diffract X-rays; evaluate gravimetrically. ***. If quartz is suspected, submit a respirable sample to LESS for quartz (9010) analysis.***
ANL A: X-Ray Diffraction
. REF: 17 (OHL2004M9010X0PVC) SAE: 0.18 Validated: in-house
NOTE: Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted use IMIS S103. For SiO_2, a high volume area or settled dust sample is preferred. Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter; otherwise, submit as a separate filter.
WIPE No

Silica (Quartz, non-respirable)

IMIS **S103** CAS 14808-60-7
DESC Solid.
HLTH Pneumoconiosis (HE10)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
ANL A: X-ray Diffraction; XRD
. REF: 17 (OHL2004M9010X0PVC) CLASS: Validated in-house
NOTE: The lab does not recommend taking non-respirable quartz samples to quantify quartz. Total dust sample results are semi-quantitative. Use IMIS S103 for submitting bulk samples or high volume samples to confirm the presence of quartz when sending IMIS 9010 respirable samples to the laboratory. Collect a sample of the bulk substance and send to the lab in a separate mailing container at the time the air samples are submitted. Indicate on the sample sheet that a bulk sample has been

submitted ***use IMIS S103***. For SiO_2, a high volume area or settled dust sample is preferred. ***Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103.*** Clearly mark samples to be used for reference as a bulk. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate).

WIPE No

Silicon (Respirable Fraction)

IMIS **S120** CAS 7440-21-3

MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3

DESC Solid.

HLTH Nuisance particulate-Accumulation in lungs (HE19)

LESS2 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone

MAX V: 816 Liters MAX F: 1.7 L/min

ANL 1: Gravimetric

. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

NOTE: If quartz is suspected, It is suggested that a respirable quartz sample be submitted to the laboratory to determine applicability of quartz standard (IMIS 9010). Submit bulk sample in separate mailing container at time air samples are submitted. Indicate on the sample sheet that a bulk sample has been submitted use IMIS S103. For SiO_2, a high volume area or settled dust sample is preferred.

Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter; otherwise, submit as a separate filter.

WIPE No

Silicon (Total Dust)

IMIS **2235** CAS 7440-21-3

MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3

DESC Solid.

HLTH Nuisance particulate-Accumulation in lungs (HE19)

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns

MAX V: 960 Liters MAX F: 2.0 L/min

ANL 1: Gravimetric

. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

NOTE: It is suggested that a respirable quartz sample be submitted to the laboratory to determine applicability of quartz standard ***(IMIS 9010)***. Submit bulk sample in separate mailing container at time air samples are submitted. ***Indicate on the sample sheet that a bulk sample has been submitted use IMIS S103. For***

SiO_2, a high volume area or settled dust sample is preferred. Send the bulk in a petri dish (½ full or more) or 30 ml vial (½ full or more). Clearly mark samples to be used for reference as a bulk; use IMIS S103. If they are present in the work environment, the following major interferences should be noted: aluminum phosphate, feldspars (microcline orthoclase, plagioclase), graphite, iron carbide, lead sulphate, micas (biotite, muscovite), montmorillonite, potash, sillimanite, silver chloride, talc and zircon (zirconium silicate). Quartz and cristobalite may be submitted on the same filter; otherwise, submit as a separate filter.

Silicon Carbide (Respirable Fraction)

IMIS **S123** CAS 409-21-2
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Nuisance particulate-Accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE No

Silicon Carbide (Total Dust)

IMIS **2236** CAS 409-21-2
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Solid.
HLTH Nuisance particulate-Accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
WIPE No

Silver, Soluble Compound (as Ag)

IMIS **2240** CAS 7440-22-4
NIOSH RTECS VW3500000
MIOSHA FINAL RULE (Table G-1-A): TWA 0.01 mg/m^3
DESC Solid. Appearance, odor, and properties vary depending upon specific compound.
INCOM Acetylene, ammonia, hydrogen peroxide
HLTH Cumulative skin pigmentation and organ accumulation (HE3)
SYMPT Blue-gray eyes, nasal septum, throat, skin; skin irritation, ulceration; GI disturbances
ORGAN Nasal septum, skin, eyes
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Water extraction
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

Silver, as Metal Compound (as Ag)

IMIS **2240** CAS 7440-22-4
NIOSH RTECS VW3500000
MIOSHA FINAL RULE (Table G-1-A): TWA 0.01 mg/m^3
DESC Solid. Appearance, odor, and properties vary depending upon specific compound.
INCOM Acetylene, ammonia, hydrogen peroxide
HLTH Cumulative skin pigmentation and organ accumulation (HE3)
SYMPT Blue-gray eyes, nasal septum, throat, skin; skin irritation, ulceration; GI disturbances
ORGAN Nasal septum, skin, eyes
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

Soapstone (Respirable Fraction)
IMIS **S121**
SYN Massive talc; Steatite
NIOSH RTECS VV8780000
MIOSHA FINAL RULE (Table G-1-A): TWA 3 mg/m^3
DESC Odorless solid; <10% tremolite, <1% silica, crystalline.
MW: 379 VP: approx. 0 mm
INCOM None hazardous
HLTH Pneumoconiosis (HE10)
SYMPT Coughing, dyspnea; digital clubbing; cyanosis; basal crackles; acute right heart strain or chronic right ventricular hypertrophy; coronary pulmonale
ORGAN Lungs, CVS
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Soapstone (Total Dust)
IMIS **9085**
SYN Massive talc; Steatite
NIOSH RTECS VV8780000
MIOSHA FINAL RULE (Table G-1-A): TWA 6 mg/m^3
DESC Odorless solid; <10% tremolite, <1% silica, crystalline.
MW: 379 VP: approx. 0 mm
INCOM None hazardous
HLTH Pneumoconiosis (HE10)
SYMPT Coughing, dyspnea; digital clubbing; cyanosis; basal crackles; acute right heart strain or chronic right ventricular hypertrophy
ORGAN Lungs, CVS
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up

to an 8-hour period.

Sodium & compounds

IMIS Use Sodium Hydroxide, 2260 CAS 7440-23-5
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Water extraction
MAX V: ***30*** Liters MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.
WIPE MEDIA: Whatman smear tab SOLVENT: Deionized water

Sodium Bisulfite

IMIS **S050** CAS 7631-90-5
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. An analysis is performed for total Na and reported as the compound.
WIPE: MEDIA: Whatman smear tab SOLVENT: Deionized water

Sodium Carbonate

IMIS **S330** CAS 497-19-8
SYN Disodium Carbonate; Soda Ash; Carbonic Acid, Disodium Salt
NIOSH RTECS VZ4050000
DESC MW: 105.99
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Sodium Chromate

OSHA IMIS Code Number: ~~0686~~
IMIS Code history: used prior to 05/30/2006 and the Chromium (VI) standard
For more General Description information see Chromium (VI) (Hexavalent Chromium), chapter III.

IMIS Use Chromic Acid & Chromates (as CrO_3), ***~~0686~~***
CAS 7775-11-3
LESS1 MEDIA (L): Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Colorimetric (diphenylcarbazide)
. REF: 17 (OHL2004M0686SOPVC) SAE: 0.20 CLASS: Validated in-house
NOTE: Submit as a separate sample.
ANL 2: Ion Chromatography Post Column Derivatization UV-Vis Detector at 540 nm
. REF: 2,7(OSHA ID-215) SAE: 0.18 CLASS: Fully Validated by OSHA

NOTE: Submit as a separate sample. The ion chromatography analysis is valence specific for hexavalent chromium (Cr^{+6}). Not currently available.

WIPE: MEDIA: Low Ash Polyvinyl Chloride (LAPVC) filter SOLVENT: Deionized Water

Sodium Dichromate

OSHA IMIS Code Number: ~~0686~~

IMIS Code history: used prior to 05/30/2006 and the Chromium (VI) standard

For more General Description information see Chromium (VI) (Hexavalent Chromium), chapter III.

IMIS **Use Chromic acid & Chromates (as CrO_3), ~~0686~~**

CAS 10588-01-9

LESS1 MEDIA (L): Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Colorimetric (diphenylcarbazide)
. REF: 17 (OHL2004M0686SOPVC) SAE: 0.20 CLASS: Validated in-house
NOTE: Submit as a separate sample.
ANL 2: Ion Chromatography Post Column Derivatization UV-Vis Detector at 540 nm
. REF: 2,7(OSHA ID-215) SAE: 0.18 CLASS: Fully Validated by OSHA
NOTE: Submit as a separate sample. The ion chromatography analysis is valence specific for hexavalent chromium (Cr^{+6}). Not currently available.

WIPE: MEDIA: Low Ash Polyvinyl Chloride (LAPVC) filter SOLVENT: Deionized Water

Sodium Hydroxide

IMIS **2260** CAS 1310-73-2

SYN Caustic soda; Soda; Lye

NIOSH RTECS WB4900000 DOT 1823 60

MIOSHA FINAL RULE (Table G-1-A): CEILING 2 mg/m^3

DESC Colorless, odorless solid.
MW: 40 BP: 2534 F VP: approx. 0 mm MP: 590 F

INCOM Water, acids, flammable liquids, organic halogens, metals: aluminum, tin, zinc, nitromethane and nitro compounds

HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)

SYMPT Nose irritation; pneumonitis; eye, skin burns; temporary loss of hair

ORGAN Eyes, respiratory system, skin

LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Water extraction
MAX V: ***30*** Liters MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample. If the filter is not overloaded, samples may be collected up to an 8-hour period. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound.

WIPE MEDIA: Whatman smear tab SOLVENT: Deionized water

Sodium Metabisulfite

IMIS **S112** CAS 7681-57-4

SYN Disodium Pyrosulfite; NA 2693; Sodium Metabisulphite; Sodium Pyrosulfite; Disodium Salt Pyrosulfurous Acid

NIOSH RTECS UX8225000; 73359

MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3

DESC MW: 190.10 MOLFM: $O_5S_2.2Na$

LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
MAX V: 960 Liters MAX F: 2.0 L/min

ANL 1: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Analysis performed for soluble sodium and reported as the compound. Submit as a separate sample.

WIPE MEDIA: Whatman smear tab SOLVENT: Deionized water

Starch (Respirable Fraction)

IMIS **S124** CAS 9005-25-8
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Starch (Total Dust)

IMIS **2263** CAS 9005-25-8
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
DESC Solid.
HLTH Nuisance particulate (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Stoddard Solvent

IMIS **2270** CAS 8052-41-3
SYN Dry cleaning safety solvent; Mineral spirits
NIOSH RTECS WJ8925000; 78819
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 525 mg/m^3
DESC Colorless liquid with a kerosene-like odor.
MW: approx. 144 BP: 302 to 392 F VP: approx. 2 mm
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16); Narcosis (HE8)
SYMPT Eye, nose, throat irritation; dizziness; dermatitis
ORGAN Skin, eyes, respiratory system, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 20 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2004S014) SAE: 0.16 CLASS: Validated in house
NOTE: Separately submit 5 mL of a clean bulk sample with little or no color to use as a standard.

Styrene

IMIS **2280** CAS 100-42-5
SYN Phenylethylene; Vinylbenzene; Cinnamene; Styrene monomer

NIOSH RTECS WL3675000; 7911 DOT UN2055 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 50 ppm, 215 mg/m^3
. STEL 100 ppm, 425 mg/m^3
DESC Colorless liquid with a sweet, aromatic odor at low concentrations; sharp, penetrating, disagreeable odor at higher levels.
MW: 104 BP: 145-146 C VP: >1 atm MP: -30.6 C
INCOM Oxidizers, catalysts for vinyl polymers; peroxides, strong acids, aluminum chloride
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
CNS effects (HE7); Narcosis (HE8); Mutagen (HE2)
IARC Group 2B, possibly carcinogenic to humans
SYMPT Eye, nose irritation; drowsiness, weakness; unsteady gait; narcosis; defatting dermatitis
ORGAN CNS, respiratory system, eyes, skin
LESS1 MEDIA (14): Coated Charcoal Tube (100/50 mg sections, 20/40 mesh) with 10% 4-tert-butylcatechol
ANL SOLVENT: Toluene
MAX V: 12 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005OOSHA89)*** SAE: 0.10 CLASS: Validated by OSHA
. NOTE: Samples should be stored at reduced temperature when not in transit.
SAM2 DET. TUBE: Dräger, 67 23301, 10-200 ppm
FOXBORO SAPPHIRE: Det. Limit 0.6 ppm, long pathlength

Sucrose (Respirable Fraction)
IMIS **S130** CAS 57-50-1
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Sucrose (Total Dust)
IMIS **2285** CAS 57-50-1
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Sulfur
IMIS **S101** CAS 7704-34-9
SYN Flowers of Sulfur; Flour sulfur; Brimstone
NIOSH RTECS WS4250000
DESC yellow fine grained powder
MW: 32.06 Flash point: >180 (as dust) MOLFM: S
HLTH Nuisance particulate (HE19; Chronic toxicity – skin sensitization,

permanent eye damage (HE3)

As Respirable Fraction:

LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

As Total Dust:

LESS2 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

WIPE No

Sulfur Dioxide

IMIS **2290** CAS 7446-09-5
NIOSH RTECS WS4550000 DOT 1079 16
MIOSHA FINAL RULE (Table G-1-A):
. TWA 2 ppm, 5 mg/m^3
. STEL 5 ppm, 10 mg/m^3
DESC Colorless liquid or gas with a characteristic, pungent odor; can be liquid at <14 F
MW: 64 BP: 14 F VP: >1 atm at 20 C MP: -104 F
INCOM Powdered and alkali metals such as sodium, potassium
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14); Mutagen (HE2) Bronchoconstriction (HE4); Suspect reproductive effects (HE5)
SYMPT Eye, nose, throat irritation; rhinorhea; choking, coughing; reflex bronchoconstriction; eye, skin burns
ORGAN Respiratory system, skin, eyes
LESS1 MEDIA (6): Anasorb 747 (100/50 mg sections) coated with KOH
ANL SOLVENT: Carbonate/Bicarbonate
MAX V: 12 Liters MAX F: 0.1 L/min (TWA)
MAX V: 1.5 Liters MAX F: 0.1 L/min (STEL)
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2003S005) SAE: 0.14 CLASS: Fully Validated
NOTE: A Prefilter is necessary when particulate sulfate is present in the work place. Use SKC 225-1708 Teflon filters.
SAM2 DET. TUBE: Dräger, 67 27101, 0.1-3 ppm
FOXBORO SAPPHIRE: Det. Limit 1.2 ppm, long pathlength
WIPE No

Sulfuric Acid

IMIS **2310** CAS 7664-93-9
SYN Oil of vitriol
NIOSH RTECS WS5600000 DOT 1831 39
MIOSHA FINAL RULE (Table G-1-A): TWA 1 mg/m^3
DESC Colorless to dark brown, oily liquid; odorless.
MW: 98 BP: 518 F VP: <0.001 mm MP: 37 F
INCOM Organics: chlorates, carbides, fulminates, picrates, and metals
HLTH Irritation-Eye, Nose, Throat, Bronchi, Skin---Marked (HE14)

Cumulative lung damage (HE10); Dental erosion (HE3)
SYMPT Eye, nose, throat irritation; pulmonary edema, bronchitis, emphysema; conjunctivitis; stomatitis; dental erosion; tracheobronchitis; skin, eye burns; dermatitis
ORGAN Respiratory system, eyes, skin, teeth
LESS1 MEDIA (59): Washed Silica Gel Tube (400/200 mg sections, ORBO-53 or equiv.)
ANL SOLVENT: Carbonate/Bicarbonate
MAX V: 100 Liters MAX F: 0.5 L/min
ANL 1: Ion Chromatography; IC
. REF: 17 (OHL 2002S012) SAE: 0.194 CLASS: Validated by NIOSH
NOTE: Phosphoric, nitric, hydrobromic, hydrochloric, and sulfuric acids may be submitted on the same tube. When analysis of a compound is requested, an analysis for Sulfate is performed and reported as the compound.
WIPE MEDIA: Whatman smear tab SOLVENT: Deionized water

Talc (Containing asbestos)
IMIS **9031** CAS 14807-96-6
SYN Talc, Fibrous Tremolite (see Asbestos) prior to 9/1/89
MIOSHA FINAL RULE: Cancer & Lung Disease Hazard (29 CFR 1910.1001)
. TWA 0.***1*** F/cc
. ***Excursion Limit*** 1.0 F/cc ***(30 minutes duration)***
DESC Solid
HLTH Lung cancer (HE1)
IARC Group 1, carcinogenic to humans
LESS1 MEDIA (N): Mixed Cellulose Ester Filter (MCEF) 0.8 microns (open face) 25 mm cassette with 50 mm conductive cowl
MAX V: 1200 Liters MAX F: 16 L/min MIN F: 0.5 L/min (TWA)
MIN V: 48 Liters MAX F: 2.5 L/min MIN F: 1.6 L/min (***Excursion Level***)
ANL 1: Phase Contrast Microscopy; PCM
. REF: 17 (OHL2004M9020F0MCE)SAE: 0.25 CLASS: Validated in-house
NOTE: Do not request multiple analytes. Do not overload. If dust is high, reduce air volume to avoid overloading. A minimum of 2 blanks or 10% are required for every set. Pack to reduce shock.
LESS2 MEDIA: Bulk Samples
ANL 1: Polarized Light Microscopy; PLM
. REF: 17 (OHL2004M9020B0XXXv010) CLASS: Validated in-house
NOTE: Collect sample in a 50mm x 9mm style polystyrene petri dish. Do not ship bulk samples with air samples. Seal securely to prevent escape of asbestos.
WIPE Bulk preferred. Do not use Whatman or other paper filters.

Talc (Containing no asbestos), Respirable Dust
IMIS **9030** CAS 14807-96-6
SYN Hydrous magnesium silicate; Non-fibrous talc; Non-asbestiform talc; Fibrous Non-Tremolite Talc; Steatite talc; Talc (Total) prior to 9/1/89
NIOSH RTECS VV7720000
MIOSHA FINAL RULE (Table G-1-A): TWA 2 mg/m^3
DESC Odorless solid.
MW: 295 VP: approx. 0 mm MP: 1652 to 1832 F
INCOM None hazardous
HLTH Pneumoconiosis (Talcosis) (HE10)
IARC Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Fibrotic pneumoconiosis
ORGAN Lungs, CVS
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns with 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min

ANL 1: Gravimetric Analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight. If the filter is not overloaded, samples may be collected up to an 8-hour period. Sample may be submitted to LESS for a Quartz analysis, if the gross weight of the sample yields a concentration above the standard for the air contaminant.
WIPE No

Tantalum (metal, oxide dusts)
IMIS **2325** CAS 7440-25-7
NIOSH RTECS WW5505000
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid. Appearance, odor, and properties vary depending upon specific compound.
INCOM Strong oxidizers
HLTH Apparent low toxicity (HE19)
SYMPT None known in humans; in animals: pulmonary irritation
ORGAN None known in humans
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

Tetrahydrofuran
IMIS **2390** CAS 109-99-9
SYN Diethylene oxide; Tetramethylene oxide; THF
NIOSH RTECS LU5950000; 36922 DOT UN2056 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 200 ppm, 590 mg/m^3
. STEL 250 ppm, 735 mg/m^3
DESC Colorless liquid with an ether-like odor.
MW: 72 BP: 151 F VP: 145 mm MP: -163 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Narcosis (HE8); Mutagen (HE2)
SYMPT Eye, upper respiratory irritation; nausea; dizziness; headaches
ORGAN Eyes, skin, respiratory system, CNS
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 9 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1609Issue2)*** SAE: 0.16 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.5 ppm, long pathlength

Tin, inorganic compounds (except oxides) (as Sn)
IMIS **2430** CAS 7440-31-5
NIOSH RTECS XP7320000
MIOSHA FINAL RULE (Table G-1-A): TWA 2 mg/m^3
DESC Solid. Appearance, odor, and properties vary depending upon specific compound.
INCOM Chlorine, turpentine; for stannic chloride: water, alcohols, and amines
HLTH Acute systemic toxicity (HE4); Chronic systemic toxicity (HE3)
Irritation-Eyes, Nose, Throat, Skin---Mild (HE16)
SYMPT Eye, skin irritation
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns

MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Tin may be requested with two of the following elements: Cadmium; Lead; Antimony; Silver. Otherwise, submit as a separate sample.

Titanium

IMIS **T103** CAS 7440-32-6
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: When standard is the same as for inert dust, noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Titanium Dioxide (Total Dust)

IMIS **2440** CAS 13463-67-7
SYN Rutile; Anatase; Brookite
NIOSH RTECS XR2275000 DOT 2546 37
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC White powder, odorless.
MW: 80 VP: approx 0 mm
INCOM None hazardous
HLTH Nuisance particulate-Accumulation in lungs (HE19)
SYMPT Slight lung fibrosis
ORGAN Lungs
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: When standard is the same as for inert dust, noncompliance can be based on gross weight without analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Toluene

IMIS **2460** CAS 108-88-3
SYN Toluol; Phenyl methane; Methylbenzene
NIOSH RTECS XS5250000; 82955 DOT UN1294 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 100 ppm, 375 mg/m^3
. STEL 150 ppm, 560 mg/m^3
DESC Colorless liquid with an aromatic odor like benzene.
MW: 92 BP: 231 F VP: 22 mm MP: -139 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Narcosis (HE8)
SYMPT Fatigue, weakness; confusion, euphoria, dizziness; headaches; dilated pupils, lacrimation; nervousness; muscle fatigue; insomnia; paresthesia; dermatitis;

photophobia
ORGAN CNS, liver, kidneys, skin
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 8 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 DET. TUBE: Dräger, 8101661, 5-300 ppm
FOXBORO SAPPHIRE: Det. Limit 1 ppm, long pathlength

Toluene-2, 4-Diisocyanate (TDI)

IMIS **2470** CAS 584-84-9
SYN 2,4-Tolylene diisocyanate; TDI; 2,4-TDI; Toluene-2,4-Diisocyanate prior to 9/1/89
NIOSH RTECS CZ6300000; 13829 DOT UN2078; Poison; Hz Cl 6.1; Pkg Gr I
MIOSHA FINAL RULE (Table G-1-A):
. TWA 0.005 ppm, 0.04 mg/m^3
. STEL 0.02 ppm, 0.15 mg/m^3
DESC Colorless, yellow, or dark liquid or solid with a sweet, fruity, pungent odor.
MW: 174 BP: 484 F VP: approx. 0.04 mm MP: 71 F
INCOM Strong oxidizers, water, acids, bases, amines, etc., cause foam and spatter
HLTH Asthma (HE9); Dermatitis (HE3)
Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
IARC Group 2B, possibly carcinogenic to humans (Toluene Diisocyanates)
SYMPT Nose, throat irritation; choking, paroxysmal coughing; chest pain, retrosternal soreness; nausea, vomiting, abdominal pain; bronchial spasms, pulmonary edema, dyspnea; asthma; conjunctivitis, lacrimation; dermatitis, skin sensitization
ORGAN Respiratory system, skin
LESS1 MEDIA (I): Glass Fiber Filter (37 mm) coated with 1.0 mg 1-(2-Pyridyl) piperazine
ANL SOLVENT: 9/1 (v/v) Acetonitrile/Dimethyl Sulfoxide
MAX V: 240 Liters MAX F: 1.0 L/min (TWA)
MAX V: 15 Liters MAX F: 1.0 L/min (STEL)
ANL 1: High Performance Liquid Chromatography; HPLC/UV
. REF: 17 (OHL 2004S011) SAE: 0.18 CLASS: Validated in-house
NOTE: Obtain filters from LESS and refrigerate until used. Collect samples open-face. After sampling protect from light, store and ship cold.

Toluene-2, 6-Diisocyanate

IMIS **T177** CAS 91-08-7
SYN 2,6-TDI; TDI; Composite Constituent
NIOSH RTECS CZ6310000; 13830 DOT UN2078 Poison; Hz Cl 6.1; Pkg Gr II
DESC Liquid.
HLTH Respiratory sensitization (asthma) (HE9)
IARC Group 2B, possibly carcinogenic to humans (2,6-Toluene diisocyanate)
LESS1 MEDIA (I): Glass Fiber Filter (37 mm) coated with 1.0 mg 1-(2 pyridyl) piperazine
MAX V: 240 Liters MAX F: 1.0 L/min
ANL 1: High Performance Liquid Chromatography; HPLC/UV/FLU
. REF: 17 (OHL 2004S011) SAE: 0.18 CLASS: Validated in-house
NOTE: Obtain filters from LESS and refrigerate until used. Collect samples open-face. After sampling protect from light, store and ship cold.

Total Fibers

IMIS **T110**
LESS1 MEDIA (N): Mixed Cellulose Ester Filter (MCEF) 0.8 microns (open face) 25 mm cassette with 50 mm conductive cowl

MAX V: 1200 Liters MAX F: 16 L/min MIN F: 0.5 L/min (TWA)
MIN V: 48 Liters MAX F: 2.5 L/min MIN F: 1.6 L/min (STEL)
ANL 1: Phase Contrast Microscopy; PCM
. REF: 17 (OHL2004M9020F0MCE) SAE: 0.25 CLASS: Validated in-house
NOTE: Do not request multiple analytes. Do not overload. If dust is high, reduce air volume to avoid overloading. A minimum of 2 blanks or 10% are required for every set. Pack to reduce shock.

Tremolite

IMIS **T111**
MIOSHA FINAL RULE (Rule 2205) CAS 14567-73-8
. TWA 0.***1*** F/cc
. ***Excursion Limit*** 1.0 F/cc ***(30 minutes duration)***
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron, preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period.

1,1,2-Trichloroethane

IMIS **2495** CAS 79-00-5
SYN Vinyl trichloride; beta-Trichloroethane
NIOSH RTECS KJ3150000; 34071 DOT 2831 74
MIOSHA FINAL RULE (Table G-1-A): TWA (Skin) 10 ppm, 45 mg/m^3
DESC Colorless liquid with a sweet odor like chloroform.
MW: 133 BP: 236 F VP: 19 mm MP: -34 F
INCOM Strong oxidizers and caustics; chemically active metals, such as aluminum, magnesium powders, sodium, potassium
HLTH Cumulative liver damage (HE3); Narcosis (HE8)
IARC Group 3, not Classifiable as to its carcinogenicity to humans
SYMPT Eye, nose irritation; CNS depression; liver, kidney damage
ORGAN CNS, eyes, nose, liver, kidneys
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OH2005LOOSHA1003)*** SAE: 0.10 CLASS: Validated by OSHA
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.25 ppm, long pathlength

Trichloroethylene

IMIS **2490** CAS 79-01-6
SYN Ethylene trichloride; Triclene
NIOSH RTECS KX4550000; 35597 DOT UN1710 Keep Away From Food
MIOSHA FINAL RULE (Table G-1-A):
. TWA 50 ppm, 270 mg/m^3
. STEL 200 ppm, 1080 mg/m^3
DESC Colorless liquid, unless dyed, with a sweet odor like chloroform.
MW: 131 BP: 188 F VP: 58 mm MP: -123 F
INCOM Strong caustics; when acidic, reacts with aluminum; chemically active metals; barium, lithium, sodium, magnesium, titanium
HLTH Narcosis (HE8); Cumulative systemic toxicity (HE3)
Mutagen/Suspect carcinogen (HE2); Suspect teratogen (HE5)
IARC Group 2A, probably carcinogenic to humans
SYMPT Headaches; vertigo; visual disturbance; tremor; somnolence; nausea, vomiting; eye

irritation; dermatitis; cardiac arrhythmias; paresthesia
ORGAN Respiratory system, heart, liver, kidneys, CNS, skin
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 30 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 DET. TUBE: Dräger, ***8101881***, ***50-500***ppm
FOXBORO SAPPHIRE: Det. Limit 4 ppm, short pathlength

1,1,2-Trichloro-1,2,2-Trifluoroethane

IMIS **2485** CAS 76-13-1
SYN Freon 113; TTE
NIOSH RTECS KJ4000000; 34080 DOT 1078 12
MIOSHA FINAL RULE (Table G-1-A):
. TWA 1000 ppm, 7600 mg/m^3
. STEL 1250 ppm, 9500 mg/m^3
DESC Colorless, nearly odorless, volatile liquid; at high concentrations odor like carbon tetrachloride.
MW: 187 BP: 118 F VP 284 mm MP: -31 F
INCOM Chemically active metals: calcium, powdered aluminum, zinc, magnesium, beryllium; contact alloys >2% Mg decomposes
HLTH Narcosis (HE8); Irritation-Throat (HE16)
SYMPT Throat irritation; drowsiness; dermatitis; in animals: cardiac arrhythmia
ORGAN Skin, heart
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liters MAX F: 0.05 L/min (TWA)
MAX V: 0.75 Liters MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1020Issue2)*** SAE: 0.141 CLASS: Validated by NIOSH
NOTE: Ship refrigerated

Triethanolamine

IMIS **T185** CAS 102-71-6
SYN Tri- (2-hydroxyethyl) amine; Tri (hydroxyethyl) amine; Trolamine; TEA; Nitrilo-2, 2', 2"-Triethanol; Daltogen; Triethylolamine
NIOSH RTECS KL9275000; 34632
LESS1 MEDIA (G): 37 mm Glass Fiber Filter
ANL SOLVENT: HNO_3 / EDTA buffer
MAX V: 120 Liters MAX F: 1.0 L/min
ANL 1: Ion Chromatography, IC
. REF: ***17 (OHL2004S026)*** CLASS: ***Partially validated in-house***

Triethylamine

IMIS **2480** CAS 121-44-8
NIOSH RTECS YE0175000; 84562 DOT UN1296 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 10 ppm, 40 mg/m^3
. STEL 15 ppm, 60 mg/m^3
DESC Colorless liquid with a fishy odor.
MW: 101 BP: 193 F VP: 54 mm MP: -175 F MOLFM: $C_6H_{15}N$
INCOM Strong oxidizers and acids

HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Lung edema (HE11); Corneal damage (HE3)
SYMPT Eye, respiratory system, skin irritation
ORGAN Respiratory system, eyes, skin
LESS1 MEDIA (89): Coated XAD-7 Tube (80/40mg sections) Coating is 10% Phosphoric Acid
ANL SOLVENT: ***HNO_3/EDTA***
MAX V: 20 Liters MAX F: 0.2 L/min
ANL 1: Ion Chromatography, IC
. REF: ***17 (OHL2004S028)*** CLASS: Not Validated
NOTE: The previous Alumina tubes were re-evaluated due to concerns with the collection efficiency. The collection efficiency had diminished from when the original work on Alumina was done.

Trimethylbenzene

IMIS **2505** CAS 25551-13-7
SYN Mesitylene; 1,2,4-Trimethylbenzene (95-63-6); 1,2,3-Trimethylbenzene (526-73-8); 1,3,5-Trimethylbenzene (108-67-8); Hemimellitene; Pseudocumene; Diesel Exhaust Component
NIOSH RTECS DC3220000; 14506 DOT UN2325 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 25 ppm, 125 mg/m^3
DESC Liquid.
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Cumulative CNS effects (HE7); Anemia (HE12)
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.1 L/min
ANL: Gas Chromatography; GC/FID
. REF: ***17 (OHLONIOSH1020)*** SAE 0.08 CLASS: Validated in-house

Tungsten (as W) Insoluble Compounds

IMIS **2536** CAS 7440-33-7
MIOSHA FINAL RULE (Table G-1-A). TWA 5 mg/m^3
. STEL 10 mg/m^3
DESC Solid.
HLTH Apparent low toxicity/lung accumulation (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL 2: Inductively Coupled Argon Plasma; ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample.

Tungsten (as W) Soluble Compounds

IMIS **2537** CAS 7440-33-7
MIOSHA FINAL RULE (Table G-1-A): . TWA 1 mg/m^3
. STEL 3 mg/m^3
DESC Solid.
HLTH Acute CNS effects (Metabolic Poison) (HE4)
LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)
ANL 1: Inductively Coupled Argon Plasma; ICP-AES

. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample.

Turpentine

IMIS **2540** CAS 8006-64-2
SYN Gumspirits; Spirits of turpentine; Steam distilled turpentine; Gum turpentine; Pinene; Terpene
NIOSH RTECS YO8400000; 85323 DOT UN1299 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 560 mg/m^3
DESC Colorless liquid with a characteristic paint odor
MP: approx. 136 BP: 302 to 356 F VP: 5 mm MP: -58 to -76 F
INCOM Strong oxidizers, chlorine
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Cumulative kidney damage (HE3); CNS effects (HE7)
SYMPT Eye, nose, throat irritation; headaches; vertigo; hematuria, albuminuria; skin irritation, sensitization
ORGAN Skin, eyes, kidneys, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 10 Liters MAX F: 0.2 L/min
ANL 1: Gas chromatography; GC/FID
. REF: 17 (OHL2004S014) SAE: 0.09 CLASS: Validated in house
NOTE: Separately submit 5 mL of a clean bulk sample with little or no color to use as a standard.

Vanadium

IMIS **V125** CAS 7440-62-2
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP/DCP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Submit as a separate sample.

Vanadium fume (as V_2O_5)

IMIS **2571** CAS 1314-62-1
SYN Vanadium pentoxide fume
NIOSH RTECS YW2460000 DOT 2862 55
MIOSHA FINAL RULE (Table G-1-A): TWA 0.05 mg/m^3
DESC Solid. Finely divided particulate dispersed in air.
MW: 182 BP: 3182 F VP: approx. 0 mm MP: 1274 F
INCOM None hazardous
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute and chronic bronchial damage (HE11 and HE10)
SYMPT Eye irritation; green tongue, metallic taste; throat irritation, coughing, fine rales, wheezing, bronchitis, dyspnea; eczema
ORGAN Respiratory system, skin, eyes
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP/DCP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Analytical method does not distinguish between dust and fume. When analysis

of a compound is requested, an elemental analysis is performed and reported as the compound.

Vanadium, Respirable Dust (as V_2O_5)

IMIS **2570** CAS 1314-62-1
SYN Vanadium pentoxide dust
NIOSH RTECS YW2450000 DOT 2862 55
MIOSHA FINAL RULE (Table G-1-A): TWA 0.05 mg/m^3
DESC Solid Yellow-orange powder or dark gray flakes, odorless.
MW: 182 BP: 3182 F VP: approx. 0 mm MP: 1274 C
INCOM None hazardous
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute and chronic bronchial damage (HE11) and (HE10)
SYMPT Eye irritation; green tongue, metal taste; throat irritation; coughing; fine rales, wheezing, bronchitis, dyspnea; eczema
ORGAN Respiratory system, skin, eyes
LESS1 MEDIA (L): Tared Low Ash Poly Vinyl Chloride Filter (LAPVC) 5.0 microns with 10mm Nylon Cyclone
MAX V: 816 Liters MIN V: 408 Liters MAX F: 1.7 L/min (TWA)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma; ICP/DCP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Analytical method does not distinguish between dust and fume. When analysis is requested, an elemental analysis is performed and reported as the compound. Submit as a separate sample.

Vegetable Oil Mist (Respirable Fraction)

IMIS **V127** CAS 68956-68-3
SYN Oil Mist (Vegetable) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Vegetable Oil Mist (Total Dust)

IMIS **V126** CAS 68956-68-3
SYN Oil Mist (Vegetable) prior to 9/1/89
MIOSHA FINAL RULE (Table G-1-A): TWA 15 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Vinyl Acetate

IMIS **2572** CAS 108-05-4
SYN Acetic acid, vinyl ester; Acetic acid, ethenyl ester; Ethenyl acetate

NIOSH RTECS AK0875000; 2865 DOT UN1301 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 10 ppm, 30 mg/m^3
. STEL 20 ppm, 60 mg/m^3
DESC Clear, colorless liquid with pleasant, sweet to sharp irritating odor
MW: 86.09 BP: 72.7 deg C
HLTH Irritation-Eye, Nose, Throat, Skin---Mild (HE16)
IARC Group 2B, probably carcinogenic to humans (vol 63)
LESS1 MEDIA (5): Carboxen 564 carbon molecular sieve tubes (160/80 mg sections)
ANL SOLVENT: (95:5) (v/v) Methylene Chloride/Methanol
MAX V: 24 Liters MAX F: 0.1 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OHL2005ONIOSH1453Issue2)*** SAE: 0.10 CLASS: Validated by NIOSH
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.04 ppm, long pathlength

Vinyl Chloride
IMIS **2580 (PEL); 2579 (ACTION LEVEL)** CAS 75-01-4
SYN Chloroethylene
NIOSH RTECS KU9625000 DOT 1086 17
MIOSHA FINAL RULE: Cancer-Suspect Agent (Rule 2260)
. TWA 1 ppm, 2.5 mg/m^3
. ACTION LEVEL 0.5 ppm
. STEL 5 ppm, 12.8 mg/m^3
DESC Colorless gas; liquefies in a freezing mixture.
MW: 62.5 BP: 7 F VP: 2580 mm MP: -245 F
INCOM Copper oxidizing materials
HLTH Liver Cancer (HE1)
NTP Human Carcinogen
IARC Group 1, carcinogenic to humans
SYMPT Weakness; abdominal pain, GI bleeding; hepatomegaly; pallor or cyanosis of extremities; (carcinogenic)
ORGAN Liver, CNS, blood, respiratory system, lymphatic system
LESS1 MEDIA (8): Carbosieve S-III (130/65 mg sections, 60/80 mesh)
ANL SOLVENT: (99:1, v/v) Carbon Disulfide/Dimethylformamide
MAX V: 3 Liter MAX F: 0.05 L/min (TWA)
MIN T: 15 min MAX F: 0.05 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: ***17 (OH2005LOOSHA75)*** SAE: 0.12 CLASS: Validated by OSHA
NOTE: Submit as a separate sample. Refrigerate samples and analyze as soon as possible.
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.6 ppm, long pathlength

Vinylidene Chloride
IMIS **2583** CAS 75-35-4
SYN 1,1-Dichloroethene; 1,1-Dichloroethylene
NIOSH RTECS KV9275000; 35537 DOT UN1303 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 1 ppm, 4 mg/m^3
DESC Liquid.
HLTH Cumulative liver and kidney damage (HE3)
IARC Group 3, not Classifiable as to its carcinogenicity to humans (1,1-Dichloroethylene)
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: Carbon Disulfide
MAX V: 7 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID

. REF: ***17 (OHL2004S013)*** SAE: 0.186 CLASS: Validated by OSHA
NOTE: Submit as a separate sample.
SAM2 FOXBORO SAPPHIRE: Det. Limit 0.2 ppm, long pathlength

Vinyl Toluene
IMIS **2582** CAS 25013-15-4
SYN Methylstyrene; Tolylethylene; ortho, meta & para-vinyltoluene (mixed isomers)
NIOSH RTECS WL5075000; 79130 DOT UN2618 Flammable or Combustible Liquid
MIOSHA FINAL RULE (Table G-1-A): TWA 100 ppm, 480 mg/m^3
DESC Colorless liquid with a strong, disagreeable odor.
MW: 118 BP: 334 F VP: 1.1 mm MP: -106 F
INCOM Oxidizing agents, catalysts for vinyl polymerization, such as peroxides, strong acids, aluminum chloride
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
CNS effects (HE7)
SYMPT Eye, skin, upper respiratory irritation; drowsiness
ORGAN Eyes, skin, respiratory system
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 24 Liters MAX F: 0.2 L/min
ANL 1: Gas Chromatography; GC/FID
. REF: 1 (NIOSH 1501) SAE: 0.10 CLASS: Validated by NIOSH

VM&P Naphtha, See Naphtha, VM&P

Welding Fumes (Total Particulate)
IMIS **2587**
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Fume.
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15)
Acute and chronic toxicity from metal oxides (HE11 and HE3)
LESS1 MEDIA (L/W): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns or (W): Polyvinyl Chloride (PH-PVC) 5.0 microns, 25 mm
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Wollastonite
IMIS **W101** CAS 13983-17-0
IARC Group 3, not CLASSifiable as to its carcinogenicity to humans
For Respirable Fraction:
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
For Total Dust:
LESS2 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min

ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
For Fiber Count.

LESS3 MEDIA (N): Mixed Cellulose Ester Filter (MCEF) 0.8 microns (open face) 25 mm cassette with 50 mm conductive cowl
MAX V: 1200 Liters MAX F: 16 L/min MIN F: 0.5 L/min (TWA)
MIN V: 48 Liters MAX F: 2.5 L/min MIN F: 1.6 L/min (STEL)
ANL 1: Phase Contrast Microscopy; PCM
. REF: 17 (OHL2004M9020F0MCE) SAE: 0.25 CLASS: Validated in-house
NOTE: Do not request multiple analytes. Do not overload. If dust is high, reduce air volume to avoid overloading. A minimum of 2 blanks or 10% are required for every set. Pack to reduce shock.

Wood Dust, all soft and hard woods, except Western Red Cedar

IMIS **W103**
MIOSHA FINAL RULE (Table G-1-A):
. TWA 5 mg/m^3
. STEL 10 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Wood Dust, Hardwood

IMIS **9210**
SYN Oak; Beech; Maple; Mahogany; Walnut; Sapele
DESC Particulates produced by cutting or machining wood having high density and low void volume.
HLTH Lung damage (HE10); Dermatitis (HE3); Suspect carcinogen (HE2)
IARC Group 1, carcinogenic to humans
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Wood Dust, Softwood

IMIS **9211**
SYN Redwood; Teak
DESC Particulates produced by cutting or machining wood having a low density and high void volume.
HLTH Nuisance particulate (Accumulation in lungs) (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight

without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Wood Dust, Western Red Cedar

IMIS **W102**
MIOSHA FINAL RULE (Table G-1-A): TWA 2.5 mg/m^3
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

Xylene

IMIS **2590** CAS 1330-20-7
SYN o-, m-, and p-Isomers; Xylol; Dimethylbenzene
NIOSH RTECS ZE2100000; 88404 DOT UN1307 Flammable Liquid
MIOSHA FINAL RULE (Table G-1-A):
. TWA 100 ppm, 435 mg/m^3
. STEL 150 ppm, 655 mg/m^3
DESC Colorless liquid with aromatic odors (pure p-xylene is a solid at <55 F)
MW: 106 BP: 292/282/281 F VP: 7/9/9 MP: -12/-54/55 F
INCOM Strong oxidizers
HLTH Irritation-Eye, Nose, Throat, Skin---Moderate (HE15); Narcosis (HE8)
SYMPT Dizziness, excitement, drowsiness, incoordination, staggering gait; eye, nose, throat irritation; corneal vacuolization; anorexia; nausea, vomiting, abdominal pain; dermatitis
ORGAN CNS, eyes, GI tract, blood, liver, kidneys, skin
LESS1 MEDIA (11): Charcoal Tube (100/50 mg sections, 20/40 mesh)
ANL SOLVENT: (99:1) Carbon Disulfide/Dimethylformamide
MAX V: 23 Liters MAX F: 0.2 L/min (TWA)
MAX V: 3 Liters MAX F: 0.2 L/min (STEL)
ANL 1: Gas Chromatography; GC/FID
. REF: 17 (OHL2002S001) SAE 0.08 CLASS: Validated in-house
SAM2 ***DET. TUBE: Dräger, 6733161, 10-400ppm***

Zinc

IMIS **Z100** CAS 7440-66-6
DESC Solid.
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Respiratory Effects---Acute lung damage/edema (HE11)
Chronic (Cumulative) Toxicity-Suspect Carcinogen or mutagen
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
ANL A: Inductively Coupled Argon Plasma: ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Zinc Bromide

IMIS **Z101** CAS 7699-45-8
As Total Dust:
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric

. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.
As Respirable Fraction:

LESS2 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: Standard is for inert dust; noncompliance can be based on gross weight without additional analysis. If the filter is not overloaded, samples may be collected up to an 8-hour period.

WIPE MEDIA: Whatman Smear Tab SOLVENT: Deionized Water

Zinc Chloride Fume

IMIS **2611** CAS 7646-85-7
SYN Zinc Chloride
NIOSH RTECS ZH1400000 DOT 2331 60
MIOSHA FINAL RULE (Table G-1-A):
. TWA 1 mg/m^3
. STEL 2 mg/m^3
DESC White fume with an acrid odor.
MW: 136 BP: 1350 F MP: 541 F
INCOM None hazardous
HLTH Irritation-Eye, Nose, Throat, Skin---Marked (HE14)
Acute lung damage (HE11); Mutagen (HE2)
SYMPT Conjunctivitis; nose, throat irritation; coughing, copious sputum, dyspnea, chest pain, pulmonary edema, bronchial pneumonia, pulmonary fibrosis; acute right heart strain or chic right ventricular hypertrophy; fever; cyanosis; tachypnea; skin, eye burns and irritation
ORGAN Respiratory system, skin, eyes

LESS1 MEDIA (M): Mixed Cellulose Ester Filter (MCEF) 0.8 microns
ANL SOLVENT: Deionized Water
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)
ANL 1 Inductively Coupled Argon Plasma: ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Analytical method does not distinguish between dust and fume. When analysis of a compound is requested, an elemental analysis is performed and reported as the compound. Analysis is for water-soluble compounds and reported as ZnCl2.

Zinc Chromate

IMIS **2612** CAS 13530-65-9; 14018-95-2
SYN Chromic Acid, Zinc Salt
MIOSHA FINAL RULE (Table G-1-A): CEILING 0.1 mg/m^3
DESC Solid.
HLTH Mutagen (HE2)
IARC Chromium and Chromium Compounds - Group 1, carcinogenic to humans (Hexavalent Chromium Compounds)

LESS1 MEDIA (L): Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MIN T: ***15*** Minutes MAX F: 2.0 L/min (Ceiling)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house

ANL A: Colorimetric (diphenylcarbazide)
. REF: 17 (OHL2004M0686SOPVC) SAE: 0.20 CLASS: Validated in-house
NOTE: Submit as a separate sample.
ANL 2: Ion Chromatography Post Column Derivatization UV-Vis Detector at 540 nm
. REF 2,7(OSHA ID-215) SAE: 0.18 CLASS: Fully Validated by OSHA
NOTE: Submit as a separate sample. The ion chromatography analysis is valence specific for hexavalent chromium (Cr^{+6}). Not currently available.

WIPE: MEDIA: Low Ash Polyvinyl Chloride (LAPVC) filter
SOLVENT: Deionized Water

Zinc Oxide Fume

IMIS **2610** CAS 1314-13-2
NIOSH RTECS ZH4810000 DOT 1436 32
MIOSHA FINAL RULE (Table G-1-A): .TWA 5 mg/m^3
.STEL 10 mg/m^3
DESC White fume.
MW: 81 BP: Sublimes MP: <3272 F
INCOM Chlorinated rubber
HLTH Acute systemic toxicity (Metal fume fever) (HE4); Mutagen (HE2)
SYMPT Sweet metallic taste; dry throat, cough; chills, fever; tight chest, dyspnea, rales, low pulmonary functioning; headaches; blurred vision; muscle cramps, lower back pain; nausea, vomiting; fatigue, lassitude, malaise
ORGAN Respiratory system
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminate, analysis for metal will not be performed.
ANL 1 Inductively Coupled Argon Plasma: ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated
NOTE: Analytical method does not distinguish between dust and fume. When the analysis of a compound is requested and elemental analysis is performed and reported as the compound.

Zinc Oxide (Respirable Fraction)

IMIS **Z103** CAS 1314-13-2
SYN Amalox; Calamine
NIOSH RTECS ZH4810000; 88637
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC MW: 81.37 MOLFM: OZn
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 microns preceded by a 10 mm Nylon cyclone.
MAX V: 816 Liters MAX F: 1.7 L/min
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminate, analysis for metal will not be performed.
ANL 1 Inductively Coupled Argon Plasma: ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Zinc Oxide (Total Dust)

IMIS **Z102** CAS 1314-13-2

SYN Amalox; Calamine
NIOSH RTECS ZH4810000; 88637
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC MW: 81.37 MOLFM: OZn
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 microns
MAX V: 960 Liters MIN V: 480 Liters MAX F: 2.0 L/min (TWA)
MAX V: 30 Liters MAX F: 2.0 L/min (STEL)
ANL 1: Gravimetric analysis
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the gross weight of the sample yields a concentration below the standard for the air contaminate, analysis for metal will not be performed.
ANL 1 Inductively Coupled Argon Plasma: ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Zinc Stearate (Respirable Fraction)
IMIS **Z104** CAS 557-05-1
MIOSHA FINAL RULE (Table G-1-A): TWA 5 mg/m^3
DESC Solid
HLTH Nuisance particulate-accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter 5 micron preceded by 10 mm Nylon Cyclone
MAX V: 816 Liters MAX F: 1.7 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Metal analysis will be performed only if the gross weight of the sample yields an air concentration greater than the PEL. When the analysis of a compound is requested, an analysis is performed for total Zinc and reported as the compound. The analytical method does not distinguish between dust and fume.
ANL 1 Inductively Coupled Argon Plasma: ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated

Zinc Stearate (Total Dust)
IMIS **2616** CAS 557-05-1
MIOSHA FINAL RULE (Table G-1-A): TWA 10 mg/m^3
DESC Solid
HLTH Nuisance particulate-accumulation in lungs (HE19)
LESS1 MEDIA (L): Tared Low Ash Polyvinyl Chloride (LAPVC) filter, 5 micron
MAX V: 960 Liters MAX F: 2.0 L/min
ANL 1: Gravimetric
. REF: 17 (OHL2004S015) SAE: 0.10 CLASS: Validated in-house
NOTE: If the filter is not overloaded, samples may be collected up to an 8-hour period. Metal analysis will be performed only if the gross weight of the sample yields an air concentration greater than the PEL. When the analysis of a compound is requested, an analysis is performed for total Zinc and reported as the compound. The analytical method does not distinguish between dust and fume.
ANL 1 Inductively Coupled Argon Plasma: ICP-AES
. REF: 17 (OHL2002S010) SAE: 0.13 CLASS: Fully Validated