Oil Red O

Material Safety Data Sheet

Hazard Alert Code Key:	**EXTREME**	**HIGH**	**MODERATE**	**LOW**

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

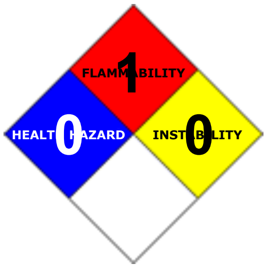
PRODUCT NAME

Oil Red O

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800

EMERGENCY

ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

C26-H24-N4-O, "1-(2, 5-dimethyl-4-(2, 5-dimethylphenylazo)phenylazo)-2-naphthol", "2-naphthalenol, 1-[2-[4-[2-", (dimethylphenyl)diazenyl]dimethylphenyl]diazenyl]-, "heptyl-1-[2, 5-dimethyl-4-(2-methylphenylazo)]phenylazo-2-naphthol", "D&C Red No. 18", "C.I. 26125"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min Max
Flammability:	1	
Toxicity:	0	
Body Contact:	0	
Reactivity:	1	
Chronic:	3	

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

May cause CANCER.
* (limited evidence).

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion".

This is because of the lack of corroborating animal or human evidence.

EYE

■ Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windburn).

Slight abrasive damage may also result.

SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models).

Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models).

Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

CHRONIC HEALTH EFFECTS

■ There is ample evidence that this material can be regarded as being able to cause cancer in humans based on experiments and other information.

Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

Many azo dyes (aromatic amines) have been found to cause cancer in laboratory animals, affecting the liver, bladder and gut. Specific toxicity effects in humans have not been established, but some dyes are known to cause mutations. Benzidine and its metabolic products have been detected in the urine of workers exposed to direct azo dyes. An epidemiological study of silk dyers and painters with multiple exposures to benzidine-based and other dyes indicate a strong association with bladder cancer.

Not all azo dyes cause genetic damage; only those that contain either phenylenediamine or benzidine in the molecule cause mutations. Also, the potential to cause genetic toxicity is affected by many function groups such as NO2, CH3 and NH2.

Many aromatic amines cause cancer and/or mutations. This appears to involve bioactivation by various tissues and / or bacteria.

The azo dyes which are simpler in structure have a specific group that is the responsible for any cancer-causing activity - this group undergoes biochemical oxidation and further reaction to form reactive electrophiles. The DNA adducts formed in this way have been identified. However, this activity is not found in all azo compounds, and, subtle changes to structure can change the cancer-causing activity of the compound, thereby reducing or eliminating it. Complex dyes with more than one azo linkage (double bond between two nitrogen atoms) may be metabolised to produce toxic cancer-causing aromatic amines, such as benzidine.

The bioactivation of the cancer-causing aromatic amines is generally believed to occur in two steps: N-hydroxylation catalysed by cytochrome P450 (a liver enzyme) to give N-hydroxylarylamines, and subsequent o-acetylation dependent on acetyl-CoA. The N-acetoxy esters formed by acetylation. The N-acetoxy esters formed by acetylation of hydroxylamines are reactive species with affinity for electrons, which give rise to covalent DNA-adduct, probably via the loss of a negative ion, yielding a nitrenium ion.

In the past, azo colourants based on benzidine, 3,3'-dichlorobenzidine, o-tolidine (3,3-dimethylbenzidine) and o-dianisidine (3,3'-dimethoxybenzidine) have been synthesized in large amounts and numbers.. Studies in exposed workers have demonstrated that the azoreduction of benzidine-based dyes occurs in humans. The metabolic conversion of benzidine-, 3,3'-dimethylbenzidine and o-tolidine-based dyes to their cancer-causing amine precursors in animal testing is a general phenomenon which must be considered for all members in this class of chemicals.

Azo dyes containing phenylenediamine cause mutations in certain experiments, most likely due to the formation of oxidised p-phenylenediamine. P-phenylenediamine is oxidised in the liver by microsomal enzymes (S9). Pure p-phenylenediamine does not cause mutations, but once oxidized, it does. Changing the moieties that can be metabolized to p-phenylenediamine by sulfonation,

carboxylation or forming a complex with copper eliminates the mutation-causing properties.
The bioavailability of azo dyes also determines whether they are converted metabolically to cancer-causing substances. As most azo pigments are based on 3,3'-dichlorobenzidine, much of the experimental data are focused on this group. Long-term animal testing did not show that 3,3-dichlorobenzidine-based pigments caused cancer. Therefore, it is very unlikely that occupational exposure to insoluble azo pigments would be associated with a substantial risk of bladder cancer in humans. According to current EU regulations, azo dyes based on benzidine, o-dianisidine and o-tolidine have been classified as Category 2 cancer-causing sustances, that is, "substances which should be regarded as causing cancer in humans". This is not so for 3,3'-dichlorobenzidine-based azo pigments.
It is also postulated that some of the aromatic amines metabolically produced from azo dyes may be responsible for inducing autoimmune diseases such as lupus. This is probably because lupus-inducing drugs are amines in nature. They also have similar metabolic activation pathways as the precursors of bladder cancer-causing agents, the difference being that the latter interact with DNA to form covalent adducts which produce mutations, while the former interact with DNA to provoke immune responses.
Azo dyes are widely used in industry. A large amount of these dyes are discharged into streams and rivers, and they are considered environment pollutants. Some of these compounds may accumulate into food chains, and eventually reach the human body through swallowing. Intestinal bacteria and to a lesser extent, the liver enzymes, are responsible for the breakdown of azo dyes into aromatic amines. Some of the normal bacteria that reside in the bladder can metabolically activate aromatic amines that are produced from azo dyes which are precursors of cancer-causing substances. The addition of the nitro-group to these aromatic amines would convert them into direct mutation-causing substances.
These findings may also partly explain the close relationship between chronic infection and cancer development.
Skin bacteria are thought to be responsible for the breakdown of certain azo dyes to produce cancer-causing substances; of importance are dye-stuffs found in cosmetics, hair dyes, textiles and tattoo inks.
Several laboratory and animal studies suggest that certain azo dyes may be reductively broken down when applied to the skin in the presence of oxygen. Results obtained with the various azo dyes suggest that reductive breakdown to aromatic amines must be considered a significant degradation pathway. It is generally thought about 30% of the dye may be broken down in this manner.
From the available literature on this chemical class of azo dyes, it can be deduced that all azo dyes which are split into cancer-causing arylamines have the potential to cause cancer.
Both water-soluble and fat-soluble azo dyes of this class have been shown experimentally to undergo breakdown to potentially cancer-causing substances.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
Oil Red O	1320-06-5	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

EYE

If this product comes in contact with eyes:

- Wash out immediately with water.
- If irritation continues, seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs:

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear passage of breathing.
- If irritation or discomfort persists seek medical attention.

NOTES TO PHYSICIAN

■ Treat symptomatically.
Periodic medical surveillance should be carried out on persons in occupations exposed to the manufacture or bulk handling of the product and this should include hepatic function tests and urinalysis examination. [ILO Encyclopaedia].

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Negligible
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	Not available

Lower Explosive Limit (%): Not available

EXTINGUISHING MEDIA
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.
- Use water delivered as a fine spray to control fire and cool adjacent area.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
- Combustible solid which burns but propagates flame with difficulty; it is estimated that most organic dusts are combustible (circa 70%) - according to the circumstances under which the combustion process occurs, such materials may cause fires and / or dust explosions.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds.; once initiated, however, larger particles up to 1400 microns diameter will contribute to the propagation of an explosion.
- In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL).are applicable to dust clouds but only the LEL is of practical use; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the "Minimum Explosible Concentration", MEC)
- A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), nitrogen oxides (NOx), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.

FIRE INCOMPATIBILITY
- Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
- Clean up waste regularly and abnormal spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.

MAJOR SPILLS
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
- Prevent, by all means available, spillage from entering drains or water courses.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS
- Polyethylene or polypropylene container.
- Check all containers are clearly labelled and free from leaks.

STORAGE REQUIREMENTS
- Store in original containers.
- Keep containers securely sealed.

- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- Oil Red O: CAS:1320-06-5 CAS:59459-22-2 CAS:8004-57-7 CAS:29063-38-5 CAS:50926-91-5 CAS:86003-57-8

PERSONAL PROTECTION

RESPIRATOR

- Particulate. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

HANDS/FEET

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocaoutchouc

OTHER

- Employees working with confirmed human carcinogens should be provided with, and be required to wear, clean, full body protective clothing (smocks, coveralls, or long-sleeved shirt and pants), shoe covers and gloves prior to entering the regulated area. [AS/NZS ISO 6529:2006 or national equivalent]
- Employees engaged in handling operations involving carcinogens should be provided with, and required to wear and use half-face filter-type respirators with filters for dusts, mists and fumes, or air purifying canisters or cartridges. A respirator affording higher levels of protection may be substituted. [AS/NZS 1715 or national equivalent]
- Emergency deluge showers and eyewash fountains, supplied with potable water, should be located near, within sight of, and on the same level with locations where direct exposure is likely.
- Prior to each exit from an area containing confirmed human carcinogens, employees should be required to remove and leave protective clothing and equipment at the point of exit and at the last exit of the day, to place used clothing and equipment in impervious containers at the point of exit for purposes of decontamination or disposal. The contents of such impervious containers must be identified with suitable labels. For maintenance and decontamination activities, authorized employees entering the area should be provided with and required to wear clean, impervious garments, including gloves, boots and continuous-air supplied hood.
- Prior to removing protective garments the employee should undergo decontamination and be required to shower upon removal of the garments and hood.
- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.

ENGINEERING CONTROLS

■ Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Does not mix with water.

State	Divided solid	Molecular Weight	408.49
Melting Range (°F)	248 (decomposes)	Viscosity	Not Applicable
Boiling Range (°F)	Not applicable	Solubility in water (g/L)	Immiscible
Flash Point (°F)	Not Available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	248	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Negligible
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapour Density (air=1)	Not applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

APPEARANCE

Powder; does not mix with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

STORAGE INCOMPATIBILITY

- Toxic gases are formed by mixing azo and azido compounds with acids, aldehydes, amides, carbamates, cyanides, inorganic fluorides, halogenated organics, isocyanates, ketones, metals, nitrides, peroxides, phenols, epoxides, acyl halides, and strong oxidising or reducing agents.
- Flammable gases are formed by mixing azo and azido compounds with alkali metals.
- Explosive combination can occur with strong oxidising agents, metal salts, peroxides, and sulfides
- Azo, diazo and azido compounds can detonate especially where organic azides have been sensitised by the addition of metal salts or strong acids.
- Avoid reaction with oxidising agents

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

Oil Red O

TOXICITY AND IRRITATION

■ Detailed analysis of molecular structure indicates that the azo colourant can split off cancer-causing arylamines.
The azo linkage, a double bond between two nitrogen atoms, is considered the most unstable part of an azo dye. This bond is easily broken down by not only enzymes, but heat or light. Breakdown results in the release of component amines. The ultimate degradation pathway of the dyes is dependent on solubility in water. For example, the azo linkage in many azo pigments is not available for breakdown by enzymes in the cell due to its poor water solubility, but is broken down by normal bacteria in the gut.
After the azo linkage is broken, the component aromatic amines. Of these, 22 are recognised as potentially causing cancer in humans, and several in animals. Sulfonation of the dye promotes excretion, thus reducing toxicity.
The component amines which may be released by azo dyes are mostly aromatic amines (compounds where an amine group or amine-

generating group (s) are connected to an aryl moiety). In general, aromatic amines known to cause cancer may be grouped into five groups:

- anilines, e.g. o-toluidine.
- Extended anilines, e.g. benzidine.
- Fused ring amines, e.g. 2-naphthylamine.
- Aminoazo and other azo compounds, e.g. 4-(phenylazo)aniline.
- Heterocyclic amines.

The aromatic amines containing moieties of anilines, extended anilines and fused ring amines are components of most industrially important azo dyes.
Reductive fission of azo group, by bacteria in the gut or by enzymes in and outside the liver can cause benzidine-based aromatic amines to be released, which have been detected in the urine in humans. The release of these amines has been associated with mutations and cancer in laboratory animal testing. Research shows that there are indications that occupational exposure to benzidene-based azo colourants can increase the chances of developing bladder cancer.
The acute toxicity of azo dyes is low. Red azoic dyes have been linked to allergic contact dermatitis in heavily exposed workers. Furthermore, textiles coloured with disperse azo dyes have caused allergic dermatitis in a few cases.
No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

No data

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
Oil Red O	No Data Available	No Data Available		

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: DOT, IATA, IMDG

Section 15 - REGULATORY INFORMATION

Oil Red O (CAS: 1320-06-5, 59459-22-2, 8004-57-7, 29063-38-5, 50926-91-5, 86003-57-8) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Guidelines", "Canada - Alberta Ambient Air Quality Objectives", "Canada - British Columbia Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada Domestic Substances List (DSL)", "Canada National Pollutant Release Inventory (NPRI)", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - Michigan Exposure Limits for Air Contaminants", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US Clean Air Act (CAA) National Ambient Air Quality Standards (NAAQS)", "US FDA CFSAN Color Additive Status List 2", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

Section 16 - OTHER INFORMATION

Ingredients with multiple CAS Nos

Ingredient Name	CAS
Oil Red O	1320-06-5, 59459-22-2, 8004-57-7, 29063-38-5, 50926-91-5, 86003-57-8

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

■ For detailed advice on Personal Protective Equipment, refer to the following U.S. Regulations and Standards:
OSHA Standards - 29 CFR:
1910.132 - Personal Protective Equipment - General requirements
1910.133 - Eye and face protection
1910.134 - Respiratory Protection
1910.136 - Occupational foot protection
1910.138 - Hand Protection
Eye and face protection - ANSI Z87.1
Foot protection - ANSI Z41
Respirators must be NIOSH approved.

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