DERMATITIS: CAUSES AND PREVENTION
By Quaker Safety, Health and Environmental Group

KEEPING SKIN HEALTHY

(WHEN WORKING WITH COOLANTS) From steel plants to manufacturing plants, farms and laboratories, every day, in almost every business, industry, and home, our hands are exposed to hundreds of potential skin hazards. These hazards can cause cuts, abrasions and bruises, as well as dermatitis.

Skin can get a beating in industrial workplaces. It can get knocked, scraped and jabbed. It can come in contact with chemicals, harsh substances, oils, dirt, heavy grease, and bacteria. Daily work activities can compromise the skin’s system of renewal and protection, leaving the body vulnerable to a variety of infections and diseases.

SKIN ANATOMY

The skin is made of three primary layers - epidermis, dermis, and the subcutaneous. These layers work in conjunction with each other to offer protection, good skin health and the renewal of skin cells.

The epidermis is the thin outer layer of skin that is visible to the human eye and provides the first barrier of protection from the invasion of foreign substances into the body. It is important to keep the epidermis healthy to keep out irritants and protect the body from chemicals and bacteria.

The dermis is the layer of living skin beneath the epidermis. It contains immune cells that are involved in the defense against foreign invaders passing through the epidermis.

Beneath the dermis is the subcutaneous layer, which contains hair follicles, sweat glands, blood vessels and nerves.

DERMATITIS

Dermatitis is an inflammatory response of the skin. The condition is usually reversible when a person is no longer exposed to whatever combination of factors is causing the dermal response. Some individuals may be at higher risk for developing dermatitis; they may be very sensitive to various substances and need to avoid exposure to specific agents. It should be noted that there may not be a single identifiable source of skin irritation, but rather a confluence of several things. Dermatitis can be caused by a wide variety of workplace and other environments:

» Chemical Agents - solvents, corrosives, etc.
» Physical Agents - cold, heat, wet environments
» Mechanical Agents - cuts, abrasions
» Biological Agents - bacteria, fungi
» Botanical Agents - poison ivy, etc.
» Other contributors

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irritants is generally greater in women than men because they tend to have drier skin and a slightly higher pH. Poor hand hygiene and wearing wet or soiled gloves also increases the chance of dermatitis development. People with a history of hay fever, sinusitis, or asthma are also generally more susceptible to dermatitis problems.

**TYPES OF CONTACT DERMATITIS**

In industrial/manufacturing settings, many everyday chemicals and substances can cause a reaction when they come into contact with the epidermis - contact dermatitis. Such substances include: acids, alkalis, oils, greases, solvents, detergents, plastics, and resins.

**IRRITANT CONTACT DERMATITIS** - is caused by contact of the skin with some irritant. In machining or grinding operations, it may be caused by any of several possibilities or combination of factors, such as:

- Higher-than-recommended metal removal fluid concentrations
- High alkalinity of in-use fluid which can remove natural skin oils
- Metal processing aids such as degreasers, cleaners, or rust inhibitors
- Metal shavings or fines contained in the fluid which may abrade the skin
- Prolonged contact with lubricants
- Tramp oils (e.g., hydraulic fluids, gear or spindle oils, way lubes, grease)
- Hand washing with abrasive soaps, solvents, or with water that is excessively hot or cold
- Seasonal conditions (e.g., winter dryness)
- Other contaminants (e.g. water in an oil-based system)
DERMATITIS: CAUSES AND PREVENTION

Allergic Contact Dermatitis - is an immune system response that arises in some people who are allergic to a contaminant or ingredient in the MRF such as:

- Metal contaminants, such as chromium, cobalt, or nickel
- Some biocides or odorants

While some “dermatitis problems” are attributed to individual sensitivities, a search of the literature reveals very few instances of true allergic contact sensitivity to industrial lubricants.

PREVENTION OF CONTACT DERMATITIS

WORKER CONTACT PREVENTION - If contact with the fluid cannot be avoided, personal protective equipment (PPE) should be used. The Quaker SDS recommends the use of gloves and other personal protective equipment. The use of gloves and PPE is one of the easiest ways to prevent skin irritation. An impervious apron and gloves made of a material such as nitrile or PVC should be considered.

GLOVES – The proper glove for both the fluid and the job must be worn. Gloves should be changed routinely, especially when/if the inside becomes wet. Gloves should be checked periodically for cuts, tears and leaks. Disposable or washable cotton inner gloves could also be considered to eliminate perspiration. (Use caution when using gloves around rotating or moving machinery.)

If you need assistance in picking the correct glove for use with a particular coolant and in a particular operation, please feel free to contact Kitty Strang at 610.832.4304.

Where possible, avoid contact with lubricants, fluid residues, and soaked rags or clothing. Clothing and rags should be cleaned as needed. Shop rags should be free of abrasive dirt, metal fines and contaminant chemicals.

SKIN CARE REGIMEN - It is more advantageous if the skin care products are integrated from the same manufacturer, and based on the types of ‘cleaning’ needed. It is important to select the appropriate type of barrier cream, cleanser, and conditioning cream based on the oil/water solubility of the coolant and the work environment.

Barrier creams act as a preventive measure against irritants. They should be selected on the basis of the chemicals with which the worker comes into contact – different creams for different applications. Cleansers should not be too abrasive. Use cleansers strong enough to clean the hands and be able to be used repeatedly throughout the day without damaging the skin. DO NOT use solvents or other materials not designed to be skin cleaners – they dry out and damage the skin. Use moisturizers for mild dryness or chapping. The natural oils keep the skin healthy and help avoid chafing where the skin begins to break down and skin problems can occur.

Although barrier creams and moisturizing creams protect the skin, they must be viewed as supplements only. They do not replace good personal hygiene or the use of chemical protective gloves where appropriate.

The skin care regimen can be very specific as follows:

BEFORE WORK - Barrier cream – used to help protect skin integrity in areas where protective clothing is not possible. Apply to clean dry skin before starting work and apply after each break. If wearing gloves, it is not necessary to apply to the hands. Barrier cream should be used on clean, dry healthy skin only. Consult a physician prior to using a barrier cream on skin that is being treated with a topical medication. Note: barrier creams are a preventive measure and not a treatment for dermatitis.
DERMATITIS: CAUSES AND PREVENTION

SKIN CLEANING - Cleanser - use for cleaning the skin at breaks, before lunch and after work. A non-abrasive and non-solvent cleanser is recommended. Apply cleanser to hands, rub in well and use warm water to cleanse, rinse well, and dry thoroughly.

SKIN CONDITIONING - Moisturizer - used to moisturize and condition the skin. Apply to clean, dry hands. Rub in thoroughly especially around the fingernails.

If dermatitis occurs, employees should seek medical treatment. Dermatitis should not be considered an expected or acceptable part of the job.

SKIN CARE PRODUCTS

Information about skin care products can be obtained from an internet search of industrial skin care. Several web addresses are also listed below.

- stokoskincare.com
- meyerlab.com
- zep.com
- international.gojo.com
- dermashieldusa.com

FOR METALWORKING FLUID SYSTEMS – OPTIMIZE OPERATING PARAMETERS

» Maintain MRF concentration within manufacturer's recommendations. High concentrations can raise skin irritation potential
» Control MRF contamination, both tramp oil and microbiological
» Control system parameters like fluid flow rates, pressure, etc.
» Ensure that skimmers operate correctly
» Ensure that the washer temperatures are correct
» Check that splash guards are in place and functional (keeping fluids inside the machine)
» Check that rubber closure guards are intact and there is no leakage
» Computer programs - need to time the operation to turn off fluid before raising the splash guard
» Others - ventilation units functional per set parameters

If you have any additional questions, please feel free to contact the Safety, Health & Environmental Group at 610.832.4000.

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