

BP OIL -- TOLEDO REFINERY

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- 1.0 Scope This document will help guide supervisors who manage jobs that involve work during the winter months or in cold environments.
- 2.0 Workplace Description Almost all petroleum refinery processes occur outdoors. As the outside air temperature falls during the winter months, the risk of cold stress related situations may occur.
- Cold ambient temperatures during winter months can create cold stress hazards. Contact with bare skin to metal during cold temperatures may lead to frost bite.
- Immersion into cold water such which may occur during dives at the Water Intake and Water Pump Station may attribute to cold stress.
- Extended work in the Drum Retain Building - Cold Storage area may attribute to cold stress.
- 2.0 Definitions
1. **Hypothermia:** Occurs when the internal body temperature drops to or below 95°F. Normal muscular and brain functions are impaired. Hypothermia usually happens at very cold temperatures, but can also occur in cooler temperatures, if an individual is submersed in water or becomes chilled from rain.
 2. **Frostbite:** is the actual freezing of tissue. Exposed skin is susceptible to frostbite when the air temperature is below 0°F or when there are high winds combined with cold temperatures. Frostbite can lead to tissue damage, scarring, and possible amputation.
 3. **Trench Foot:** results from prolonged exposure of the lower extremities to cold 32°F to 50°F and moisture. There are no formations of ice crystals in the tissue. It usually develops slowly, over a period of hours to days.
 4. **Wind Chill Advisory:** Issued when wind chill temperatures are expected to be 10-29 degrees Fahrenheit below zero.
- 3.0 Controls
1. Adequate layers of insulating dry clothing to maintain core temperatures above 96.8°F should be worn by workers if work is performed in air temperatures below 40°F.
 2. If fine work is to be performed with bare hands for more than 10 to 20 minutes in an environment below 60.8°F, special provisions should be established for keeping the workers' hands warm. For this purpose, warm air jets radiant heaters, or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30.2°F.

3. Supervisor should monitor the ambient air temperature and when cold surfaces below 19.4°F are within reach, a warning should be given to each worker to prevent inadvertent contact by bare skin.
4. If the air temperature is 0°F or less, hands should be protected by insulated gloves. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the insulated gloves.
5. If work is performed in an environment below 39.2°F and the air velocity at the job site is increased by wind then the cooling effect of the wind should be reduced by shielding the work area or by wearing wind break garments.
6. If work is performed in an environment below 39.2°F and only light work is involved and if the clothing on the worker may become wet on the jobsite, the outer layer of the clothing in use may be of a type impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outerwear should be changed as it becomes wetted. The outer garments should include provisions for easy ventilation in order to prevent wetting of inner layers by sweat.
7. Workers handling evaporative liquids (gasoline, alcohol or cleaning fluids) at air temperatures below 39.2°F should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

4.0 Work Practices

1. If work is performed continuously in the cold below 19.4°F, heated warming shelters should be made available nearby. Workers should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter.
2. During periods of work in a cold environment workers should drink warm sweet drinks. The intake of coffee should be avoided.
3. During extremely cold periods such as when a Wind Chill Advisory is issued for our area, workers should be under constant protective observation (buddy system or supervision) when possible.
4. To treat frostbite, cover or bathe the part with warm (90°-100°F) water – never use hot water. Continue warm water treatment until normal color and sensation return. Never rub a frostbitten area with snow or coarse cloths. After thawing, dry and cover the part carefully and obtain medical care.
5. The work rate should not be so high as to cause heavy sweating that will result in wet clothing; if heavy work must be done, rest periods should be taken in heated shelters and opportunity for changing into dry clothing should be provided.

The following tables can be used as a reference to help determine the risk of cold stress injury using ambient air temperature and wind speed. The first table is used to determine risk of injury to extremities, while the second table is used to determine injury to the face.

The cooling power of wind (°F)

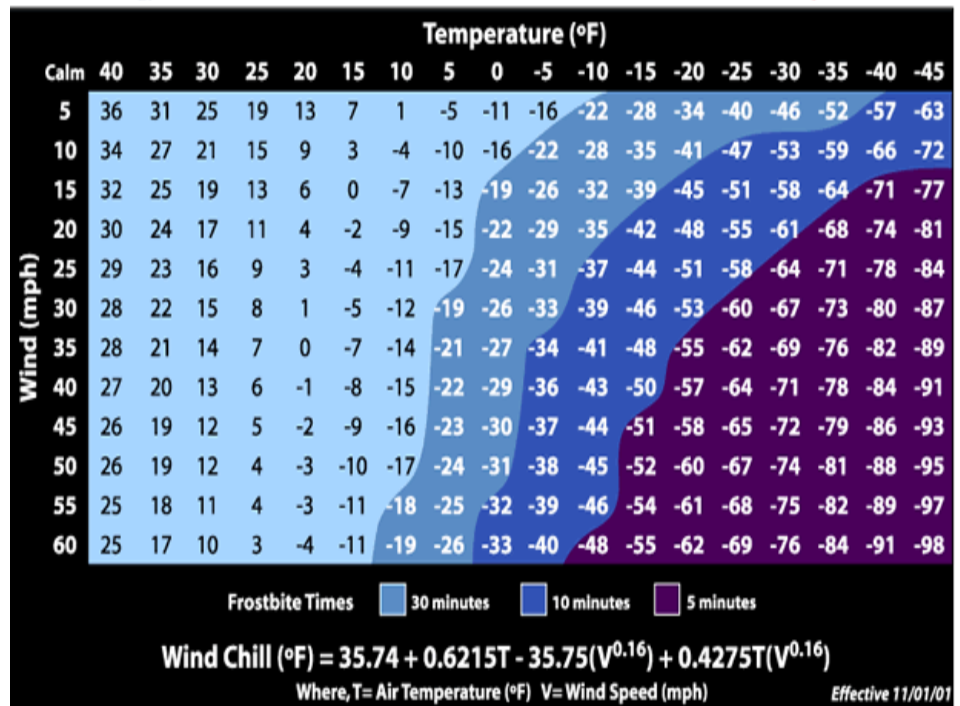
Estimated wind speed (in mph)	Actual temperature reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent chill temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	LITTLE DANGER In < 1hr with dry skin. Maximum danger of false sense of security.			INCREASING DANGER Danger from freezing of exposed flesh within one minute.				GREAT DANGER Flesh may freeze within 30 seconds.				
Trenchfoot and immersion foot may occur at any point on this chart.												

Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36° C (96.8° F) per cold stress TLV.

(ACGIH TLVs and BEIs, 2011)



NWS Windchill Chart



(National Weather Service 2001)

Work Load Examples

Light	Moderate	Heavy
Adjusting equipment (light arm/hand work)	Using a hand wrench	Shoveling
Using table saw	Prying	Firefighting
Painting	Loosening	Manually chipping
Occasional walking	Using a broom	Consistently lifting heavy objects
Driving	Wire brushing	Digging
	Removing insulation	Sawing by hand
	Light pushing and pulling	Impact Wrenching
	Welding	Erect a scaffold

Revision history

The following information documents at least the last 3 changes to this document, with all the changes listed for the last 6 months.

Date	Revised By	Changes
12/20/2012	Matthew T. Grimes	Initial Issuing. MOC# M20126162-001
11/25/2014	Matthew T. Grimes	Added verbiage to clarify extremely cold periods. Added definition for Wind Chill Advisory. Minor formatting changes. Minor grammatical changes for clarity.

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