

<i>E&B Oilfield Services Inc.</i>	Activity: Pipeline Technition / Pipeline Pigging Colder Weather Injuries		Doc No:	HAZ-ID
			Initial Issue Date	4/1/2015
			Revision Date:	4/1/2016
HAZARD IDENTIFICATION AND ASSESSMENT			Revision No.	1
			Next Revision Date:	4/1/2017
Preparation: Jessica Lee	Authority: Danny Abegglen	Issuing Dept: Safety	Page:	1 of 4

Purpose

- **Frostbite, Hypothermia and other colder weather related injuries or illnesses (staying warm)**

Key Responsibilities

- E & B Will provide employees with the appropriate training to avoid injuries and health problems that are associated with the cold.
- Making sure you are prepared for colder weather
- Knowing what to do if you ever run into a situation where you get frostbite, hypothermia or other colder weather related injuries.

Hazard and Risk Identification

- Direct Cold Related Health Problems
 - Hypothermia: Hypothermia, a drop in the body's internal temperature below 95oF, is a threat in frigid weather but can also strike at moderate temperatures. It is a medical emergency with a high fatality rate.
 - Frostbite: Skin, muscle, blood vessels, and nerves freeze and form ice crystals. Blood vessels become blocked with tissue debris that causes more damage. Frostbite is often irreversible and amputation is sometimes required. If the injured site heals, the victim may suffer chronic pain or numbness, excessive sweating, abnormal skin color, and joint pain. The feet, hands, ears, nose, cheeks, and penis are the most frequently injured sites
 - Immersion foot: If part of the body is covered with water or wet mud that is just above freezing, the area may become chronically swollen, weak, and sensitive to the cold.
 - Chilblain: Red, swollen skin, usually on hands and feet, that feels hot, tender, and itchy after cold exposure.

Risk Assessment

Hazards are classified and ranked based on severity. The program identifies hazards are classified/prioritized and addressed based on the risk associated with the task. (See the risk analysis matrix outlining severity and probability).

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CONSEQUENCE					PROBABILITY				
Severity	People	Assets	Environment	Reputation	A	B	C	D	E
					Not Done	Rarely	Once a week	Several Times in a Week	Multiple Times in a Day
0	No health effect	No damage	No effect	No impact					x
1	Slight health effect	Slight damage	Slight effect	Slight impact		X			
2	Minor health effect	Minor damage	Minor effect	Limited impact		X			
3	Major health effect	Localized damage	Localized effect	Considerable impact		X			
4	Single fatality	Major damage	Major effect	National impact	X				
5	Multiple fatalities	Extensive damage	Massive effect	Global impact	X				
Key	Manage for continuous improvement (Low)		Incorporate risk reduction measures (Medium)			Intolerable (High)			

Risk Controls/Methods to Ensure Identified Hazards Are Addressed and Mitigated

The following describes how identified hazards are addressed and mitigated:

- 1. Keep Track of the Temperature and Air Movement and Link to an Action Program
 - Indoors: Readings of temperature and air movement should be taken in all cold work areas at the start, middle, and end of each shift, at least every four hours
 - Outdoors: The weather report can be used.
 - Wind Chill Chart: Where there is air movement from wind, ventilation or travel in an open vehicle like a forklift, the wind chill index should be used to evaluate the hazard, rather than the air temperature. The wind chill index takes into account the wind blowing the heat away from the body.
- 2. Raise the Temperature The first line of defense against cold is to warm things up. A refrigerated room can be kept at the maximum allowable temperature. Outdoor work can be postponed to a warmer day, using weather forecasts for planning. Warm air jets, radiant heaters, and contact warm plates can be provided for spot heating. Infrared radiant heaters warm people and objects but not the air and therefore may be cost-effective in warehouses, loading docks, and other large, unheated indoor spaces.
- 3. Use Warming Shelters Heated tents, cabins, break rooms, etc. should be available to workers. The colder the temperature and the higher the wind speed, the more often special warm-up breaks should be taken in these shelters. Breaks should be at least 20 minutes to allow for re-warming. The onset of heavy shivering, frost nip or minor frostbite, the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the warming shelter.
- 4. Control Effects of Air Movement An increase of just one mph (88 fpm) in wind speed can double the chance of cold injury. Wind can be blocked by wind shields. In refrigerated rooms, air speed can be

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minimized as much as possible by properly designed air distribution systems and should not exceed 2.3 mph (200 fpm). Special wind-protective clothing can be provided.

- 5. Stay Dry Heavy sweating will result in wet clothing. The work rate should be fast enough to keep warm, but not so fast as to cause heavy sweating. Clothing that has become wet either from sweating, rain, snow, or other water source should be changed. When entering a heated shelter, snow or frost on clothing should be brushed off before it melts, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation. Snow should be kept out of clothing, boots and gloves.
- 6. Wear Loose-fitting, Layered Protective Clothing Protection should be loose-fitting with at least three layers so as to trap air and provide insulation. At the same time, it is important that protection be permeable to perspiration. Only if very light work is involved should the outer layer of body protection be waterproof. Desirable features in cold weather clothing include hand-warmer pockets, hoods, Velcro® adjustable cuffs, removable linings, and easy control of openings at neck, underarms, and wrists to regulate ventilation of interior space.
 - Three layers of body, hand, foot, and head protection should be used!
 - Inner wicking layer: An inner layer of protection made of a wicking material, such as cotton or polypropylene, will help to draw moisture away from the skin.
 - Middle insulating layer: Wool, down, fleece or other material with loft will hold the body's heat without adding weight. Protective clothing has improved with the introduction of synthetic fabrics that are lighter, more insulating, and faster-drying than wool, for example, polyester fleece like Polartec.
 - Outer layer for wind and water protection: Water-repellent outer fabrics will let air pass through them and can be changed as they become too wet. There are now waterproof fabrics that are also breathable, for example, Gore-Tex.® This layer may also need to be resistant to oil, fire, chemicals, or abrasion.
 - Hand protection: Protection of the hands is important not only to prevent injury but also to maintain dexterity and prevent accidents. Layer with glove liners, gloves, then mittens. For jobs requiring dexterity, there are fingerless gloves with attached mittens that can be temporarily folded back. The ACGIH recommends gloves if the air temperature falls below 60.8 oF for sedentary, 39.2 oF for light, and 19.4 oF for moderate work. If fine work is to be performed with bare hands for more than 10-20 minutes, special provisions such as warm air jets, radiant heaters, or contact warm plates should be made. Below 0 oF, the ACGIH recommends mittens which protect better than gloves. Machine controls and tools for use in cold conditions should be designed so they can be handled without removing the mittens. Metal handles should be covered by thermal insulating material at temperatures below 30.2 oF. Warning signs should be placed on cold surfaces below 20 oF.
 - Foot protection: The feet and toes are highly susceptible to cold injury. Layer with sock liners, woolen or polyester socks, then waterproof insulated boots. Military vapor-barrier boots and Native Alaskan-inspired mukluk boots are models of good boots. Removable felt liners should be used in boots and removed daily for complete drying. Socks should be changed if damp. Boots may need to have a steel-toe if crushing hazards are present. Tightfitting shoes should be avoided because they restrict blood circulation and don't allow air to be trapped in socks for insulation.
 - Head and face protection: Hats, hoods, and masks not only prevent frostbite to the cheeks, ears and nose but also conserve heat loss from the head. Forty percent of heat loss is through the head. Removing headgear is an important way to decrease body temperature when overheated.

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- 7. Have a Change of Clothing for an Emergency In case of wetting or excessive sweating, a complete change of clothing, shoes, hat, gloves, etc., should be available.
- 8. Eat and Drink Well Workers can prepare for work in the cold by eating a high calorie diet to maintain a larger reserve of stored energy. Dehydration or the loss of body fluids can be a problem in the cold. Warm, sweet drinks, and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee, tea, cola, and alcohol should be limited.
- 9. Use a Buddy System The ACGIH recommends that below 10.4 oF workers should be under constant protective observation by a co-worker or supervisor. New employees should not be required to work full-time in the cold during the first days on the job until they become accustomed to the working conditions and required protective clothing.
- 10. Prepare for Vehicle Breakdowns Workers who must travel in cold weather should be supplied with extra warm clothing, gloves, and blankets, as well as normal vehicle emergency supplies
- 11. Worker Education Workers exposed to cold should receive initial and annual training regarding the health effects of cold exposure, proper rewarming procedures, recognition and first aid for frostbite and hypothermia, required protective clothing, proper use of warming shelters, the buddy system, vehicle breakdown procedures, and proper eating and drinking habits for working in the cold.
- 12. Medical Checkups Workers should be checked by a physician to assure that they are not suffering from diseases or taking medications which interfere with normal body temperature regulation or reduce tolerance for cold environments.
- 13. Proper Medical Treatment Treatment of cold-related health problems in a medical facility can make the difference between full recovery and lifelong problems. Treatment for frostbite involves rapid rewarming of the affected parts in 104- 108 of water and oral and topical therapy to limit inflammation. Treatment for hypothermia involves whole body re-warming from the inside out, not immersion or exercise. Because internal organs, including the heart, are cold, people suffering from hypothermia are at increased risk of heart attacks. Helpful measures (until transport to a medical facility) include moving the worker to a warm, dry location, warm liquids, removing wet clothing, adding layers of dry clothing, placing the victim in a pre-warmed sleeping bag, preferably with a warm person, and heat packs in the armpits, neck, chest, and groin. Severe hypothermia can mimic death. Victims should receive medical care even if they show no signs of life

JSA Sample

The following describes how identified hazards are addressed and mitigated:

Basic Job Step	Potential Injury or Hazards	Mitigation / Tools
Working in the cold	Frostbite	Prepare yourself for weather conditions