



# EXTREME COLD CONDITIONS

## TOOLBOX TALK: Extreme Cold Conditions

RATTLIR Safety Series – "Strike Before It Bites"

### Purpose

During extreme winter events, such as polar vortex conditions, power plants operate under NERC cold weather standards requiring continuous availability and reliability. These conditions may expose workers to air temperatures well below 0°F with high wind chills. This toolbox talk highlights hazards associated with extreme cold conditions, early warning signs, exposure limitations by hazard zone, and safe practices to protect personnel.

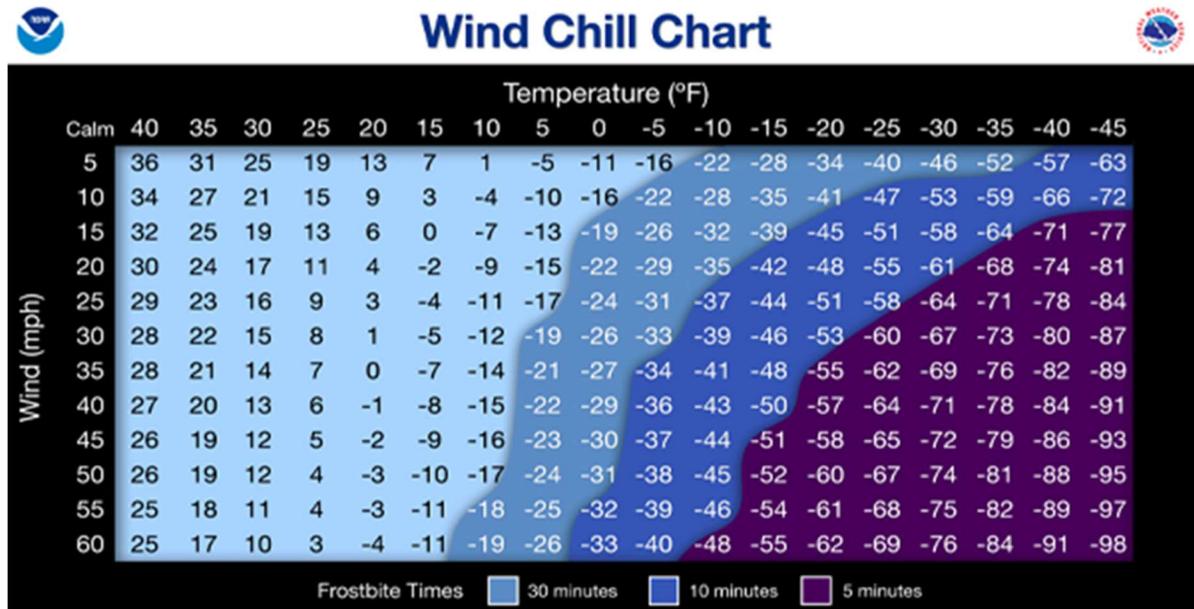


Figure 1 – Extreme Cold Hazard Illustration

### Extreme Cold Hazards

- NERC cold weather alerts require maintaining full operational capability, often requiring outdoor corrective work.



# EXTREME COLD CONDITIONS

- Workers may be exposed to extreme temperatures, severe wind chills, blowing snow, and ice-covered surfaces.
- Frostbite can occur in minutes when wind chills reach -20°F or lower.
- Cold-related cognitive impairments can affect judgment, reaction time, and coordination.

## **Recognizing Early Symptoms of Cold Stress**

- Uncontrollable shivering or lack of shivering (late-stage hypothermia).
- Numbness in fingers, toes, ears, or nose.
- Slurred speech, confusion, or difficulty concentrating.
- Bluish or pale skin, waxy appearance on exposed areas.
- Reduced dexterity or slow, clumsy movements.

## **Exposure Limitations by Hazard Zone (Wind Chill-Based)**

### Extreme Danger Zone (Below -48°F)

- Frostbite possible in under 5 minutes.
- Nonessential outdoor work should stop immediately.
- Only emergency tasks permitted with full face protection and heated shelters nearby.
- Work/rest cycles should not exceed 5 minutes outdoors.
- Tools and equipment may fail due to extreme brittleness.

### Danger Zone (-28°F to -47°F)

- Frostbite possible in 10 minutes.
- Outdoor tasks must be short, preplanned, and supported by warming shelters every 10–15 minutes.
- Insulated gloves, windproof layers, and full-face protection required.
- Exposure without appropriate PPE can quickly impair coordination and judgment.

### Warning Zone (-13°F to -27°F)

- Frostbite possible in 30 minutes.
- Outdoor work allowed but requires warming breaks at least every 30 minutes.



# EXTREME COLD CONDITIONS

- Workers should rotate duties to limit exposure.
- Tools may stiffen; hydraulic and pneumatic systems may respond slowly.

## Caution Zone (32°F to -12°F)

- Cold stress risk increases; frostbite possible with prolonged exposure.
- Workers should wear insulated gloves, head/neck protection, and wind-resistant layers.
- Watch for numbness and reduced dexterity.
- Expect ice buildup on steps, ladders, platforms, and walkways.

## **Safe Work Practices in Extreme Cold**

- Use layered clothing with moisture-wicking base layers and insulated outer protection.
- Wear insulated gloves, balaclavas, and windproof outer garments.
- Limit exposure time – establish warm-up breaks based on wind chill conditions.
- Avoid sweating; moisture increases heat loss.
- Use hand warmers, heated shelters, and warming stations.
- Inspect tools and equipment for brittleness or ice buildup.
- Communicate frequently and monitor each other for signs of cold stress.

## **Operational Considerations During NERC Cold Weather Events**

- Cold weather readiness plans must be followed for turbines, boilers, HRSGs, and auxiliary equipment.
- Frozen instrumentation lines, stiff valves, and brittle cabling are common failure points.
- Mechanical systems may require longer warm-up times or modified startup procedures.
- Workers may need to perform urgent outdoor tasks during extreme conditions; plan for exposure limits.

## **Discussion Questions**

- Do you understand the different wind chill hazard zones and their exposure limits?
- Are you equipped with appropriate PPE and aware of required warm-up rotations for today's conditions?
- Do you understand how extreme cold affects plant operations and equipment reliability?



# EXTREME COLD CONDITIONS

## **RATTLIR Takeaway**

Extreme cold impacts both workers and equipment. Understanding hazard zones, wind chill effects, PPE requirements, and exposure limits ensures workers stay safe while supporting plant reliability during NERC cold weather events. RATTLIR strikes before it bites by promoting disciplined cold-weather readiness and proactive operational planning.