UNIT EIGHT – ADVERSE WEATHER

In this unit, there is information on adverse weather conditions, driving techniques, and information pertinent to School Bus Driving in all weather conditions experienced in Colorado.

Becoming aware of the effects on the performance of the vehicle and the proper procedures to counter the effects of the conditions will provide the understanding required to respond correctly. Slow down, pull over, or make the decision to reschedule. Safety must be the driver's primary concern.

WIND

Strong winds affect the handling of a school bus. It may be harder to steer and stay within the lane of travel during high winds. Wind gusts can push on the side of the bus, causing it to thrust sideways. In extreme situations, roof hatches have popped open and ripped off. Extreme wind may also cause difficulty keeping the bus in the proper lane of traffic. Overcompensated steering can cause the bus to tip over or leave the lane of travel. Wind may blow around debris that can hit the bus causing damage or injuries.

Strong winds increase just prior to, and in the beginning of a change in weather. During thunderstorms, dust storms, and blizzards, visibility can be severely impaired. Operators should be cautious when crossing bridges and overpasses, driving between hills, exiting tunnels, on open straight-aways, and when passing high-profile vehicles.

Tips for driving in strong winds:

- **Grip -** Keep a strong grip on the steering wheel. Anticipate wind gusts.
- **Speed Reduction -** Reduce speed to lessen the effect of the wind, or pull off the road and wait.
- **Pull Over -** Pull onto a solid shoulder, side road, or parking lot.
- **Call -** Contact Dispatch to convey the situation and ask for instructions.
- **Observe Surroundings -** Watch for blowing debris, falling trees or power lines. Reduced visibility may occur from blowing dust, sand, or snow.
- **Prepare -** Always be prepared for the unexpected.

TORNADOS

A tornado is a violently rotating column of air. In the northern hemisphere, tornados rotate counterclockwise. They develop in warm, moist air, in advance of an eastward moving cold front. Most tornados move southwest to northeast. The average forward speed of a tornado is 30 mph, but can be up to 70 mph. When the

temperature is between 65 and 84 degrees and the dew point is above 50, the dangers of a tornado are at the highest. They often accompany severe thunderstorms. Tornados are common in eastern Colorado. Though they are rare, tornados are possible in the mountains, foothills, and western valleys.

Tornado Signs:

- Green-colored Sky
- Hail
- Wall Cloud
- Funnel Cloud

Many say a tornado sounds like a freight train approaching. If a tornado does not appear to be moving, it may be coming toward you. If you are in the bus and see a tornado, evacuate to a safe location, preferably a building. When in a building, go to an interior room or basement, away from windows, and have all passengers sit and cover their heads with their hands. When in the direct path of a sighted tornado and shelter in a building is not available and an evacuation is ordered, escort passengers to a nearby ditch, culvert, or depression. Direct all passengers to lie face down on the ground with their hands covering their head. They should be far enough away so the bus cannot topple on them. Avoid areas that are subject to flash floods. Never go under a bridge or overpass. This area can become the equivalent of a wind tunnel.

Microburst's and Macroburst's

Microburst's and Macroburst's are intense, localized downdrafts of air that spread on the ground causing rapid changes in wind direction and speed. They are capable of producing winds of more than 100 mph that can cause significant damage. A macroburst can cause more damage to a widespread area than a microburst. They are hard to detect, so be careful when thunderstorms and high winds are in the area. Keep a tight grip on the steering wheel and pay attention to weather watches and warnings.

LIGHTNING

Sudden storms can produce lightning. If a severe storm produces lightning, the safest place is in the bus. Avoid touching metal objects or pulling over in high-risk areas (canyons, near power lines, or tall trees).

WATER ON ROADWAYS

Water on brake drums will reduce braking efficiency. A light application of the brakes can prevent excessive water between the drum and brake pads. During excessively wet conditions or after passing through standing water, it may be necessary to apply the brakes slightly for a short distance to dry them out and restore normal braking.

Never attempt to drive in flowing water, as the depth and force of the current is unknown. Dangers may not be visible. There may be debris, downed power lines, or washed out portions of the road.

SLIPPERY SURFACES

Bus braking or steering cannot occur unless there is traction. Road conditions may reduce traction and require slower speeds. When slick road conditions exist, it will take longer to stop and be harder to steer the bus without skidding. Slippery surfaces can more than double stopping distances.

Common Slippery Surfaces:

- **Shaded Areas** - Shady parts of the road may remain icy and slippery long after open areas have melted and dried.
- **Bridges** - When the temperature drops, bridges will freeze before roads. Be especially careful when the temperature is near freezing (32° F).
- **Snow** - There are different types of snow that provide different levels of traction. The most traction comes either from dry granular or very cold snow. Packed snow may provide better traction than freshly fallen snow. As variations in temperature occur, at or near the freezing/melting point (32°F), vehicles will have the least amount of traction. This presents the most dangerous road conditions of ice on snow, or snow on ice.

Roads are most hazardous when snow or ice begins to melt. Take extra caution on packed snow or icy roads when the outside temperature is near the melting/freezing point (32° F).

Black Ice - When the temperature is below freezing and the road appears wet, it could be black ice. This is a thin layer of transparent ice that can be present anywhere, especially in high-traffic intersections and windswept areas.

Hail - While similar to ice, hail provides a unique set of hazardous circumstances. Hail on roadways can produce an extremely slippery and uneven road surface. Large hail can break the windshield and windows. Children should protect themselves from flying glass should a window break.

Rain - When it starts to rain, the water mixes with oil and other road grime making the road very slippery. Standing water on the roadway may lead to additional challenges such as hydroplaning.

Hydroplaning - Hydroplaning can occur on any wet road surface. The first 10 minutes of a light rain can be the most dangerous. When a tire encounters more water than it can scatter, water pressure in the front of the wheel pushes water under the tire, thus separating the tire from the road surface with a thin film of water. The result is loss of traction, steering, braking, and power control.

How to avoid hydroplaning:

- Slow down when roads are wet. The faster the speed, the harder it is for tires to scatter water properly.
- Stay away from puddles and standing water.
- Do not use cruise control, if equipped.
- Drive in a lower gear.
- Avoid hard braking.
- Try to avoid making sharp or quick turns.

Mud/Mudslides - Wet, non-paved or paved roads where excessive mud is present can be slippery and may be virtually impassable.

Heat - Excessive heat may cause the tar in the road pavement to rise to the surface. These areas can become soft or slippery.

Other - Anti-icing and de-icing materials used on roadways (i.e. gravel, magnesium chloride, and salt) to improve traction. In some instances, these materials can decrease traction.

If the bus is equipped with a retarder, see Unit Seven for detail concerning retarder use on slippery surfaces.

SKIDS

A skid happens when a vehicle's tires lose traction on the road. Some common ways this can happen are:

- **Over-braking** - Either braking too hard and locking up the wheels or using the retarder when the road is slippery.
- **Over-steering** - When the operator turns the wheels sharper than the bus can turn at a given moment.
- **Over-acceleration** – When the drive wheels spin due to too much power sent from the operator.
- **Driving too fast** - Serious skids result from driving too fast for road conditions. Operators who adjust their driving to the conditions do not over-accelerate and do not have to over-brake or over-steer from gaining too much speed.

Drive-Wheel Skids

The most common skid is one where the rear wheels lose traction through excessive braking or acceleration. Rear wheel braking skids occur when the rear drive wheels lock. This usually happens on slippery surfaces. Because locked wheels have less traction than rolling wheels, the rear wheels usually slide sideways in an attempt to "catch up" with the front wheels. In a bus, the vehicle will slide sideways into a "spin out".

To correct a drive-wheel skid:

- Stop accelerating.
- Stop braking to allow the rear wheels to roll again.
- Turn into the direction of the skid by looking where you want the bus to go.
- Counter-steer after control of the bus resumes by turning the steering wheel in the direction desired.

Front-Wheel Skids

Driving too fast and having inadequate tread depth on the front tires causes most front-wheel skids. In this type of skid, the front of the bus tends to go in a straight line regardless of how much the steering wheel is turned. This causes extreme difficulty (if not impossibility) when steering around a curve or turn.

To correct a front-wheel skid, release the accelerator and do not brake. This will allow the front wheels to turn again and regain traction.

Learning to stay off the brake and react quickly during a skid takes a lot of practice. The best place to practice this is on a large driving range or "skid pad".

WINTER DRIVING

Weather conditions can be unpredictable, placing extra demands on the bus and operator. Always be prepared for winter roads and adjust speed to the existing conditions. Three key elements to safe winter driving are to stay alert, slow down, and stay in control. Drive according to highway and weather conditions. Some bridges and overpasses in Colorado are heated or have de-icing sprayers. This creates an abrupt change in road conditions. Scan ahead and be aware of these locations.

In winter and especially during poor weather conditions, it takes longer to stop on a slippery road. It is important to leave plenty of space between the bus and the vehicle ahead to avoid sudden braking situations. A guide to safe spacing in these conditions is to double the “four – five second rule”.

Using a lower gear than you normally would for the type of road helps the driver maintain control of the vehicle in winter driving conditions.

Be aware that snow on the road may be slippery, drifted, or hard-packed. It can also be smooth, soft, rutted, or slick-tracked. Slick track happens when traffic has packed the snow enough to cause icy conditions. Because the bus usually tracks wider than the preceding vehicles that formed the hard pack, ruts or slick tracks, maintaining control may be difficult. Rather than allowing the bus to sway back and forth between the two narrow tracks or ruts, adjust lane positioning to ride in the untracked snow within the lane. Riding outside of the tracks or ruts will help to maintain speed and steering control.

Wet snow can cause slushy roads. Heavy slush can build up in the wheel wells of the bus and can affect steering. Remember to look ahead to recognize hazards in plenty of time to respond.

REDUCED VISIBILITY

School Bus Operators can expect to experience any and all of the following driving hazards that may result in reduced visibility. The most important response is to slow down. Maintain a speed that allows safe continuation in these conditions:

Fog	Terrain
Sun	Smoke
Dust	Hail/Graupel
Rain	Darkness
Snow	Light variations
Debris	Vegetation

ADDITIONAL HINTS AND REMINDERS

- Check road conditions prior to departure.
- Speed should be conservative when conditions are less than perfect. Maintain a speed that allows you to stop quickly in the event of the unexpected.
- Know your limits and the bus's limits. Pull off to a safe location rather than continuing in adverse or unsafe conditions.
- Test traction and braking ability in a safe location free from traffic or other hazards.
- False shoulders exist in all seasons (i.e. snow, tall grasses and heavy rains). Be aware of your surroundings at all times.
- Increase following distance.