

# Locomotive Awareness and Response



## BNSF HAZMAT

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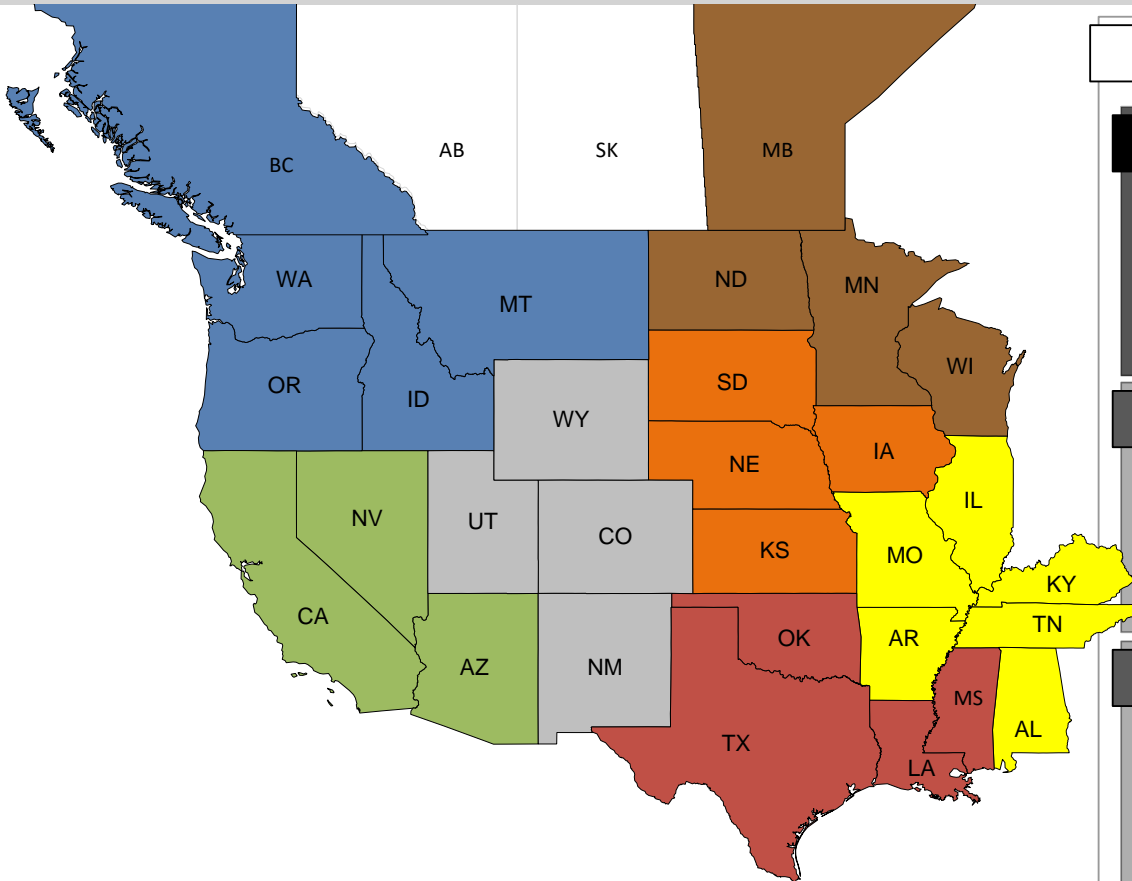


# Who and What We Are.....



- **32,500 Miles of Track, 44,000+ employees**
- **Operating in 28 States, 3 Canadian Provinces**
- **Over 8,000 Locomotives**
- **Operating approximately 1,600 trains per day**
- **2019 – 1.6 Million Hazardous Material Shipments**
- **2019 Capital Investment of \$3.57 Billion**

# HAZMAT Region Map



## HazMat - System Wide

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### Paul Hester

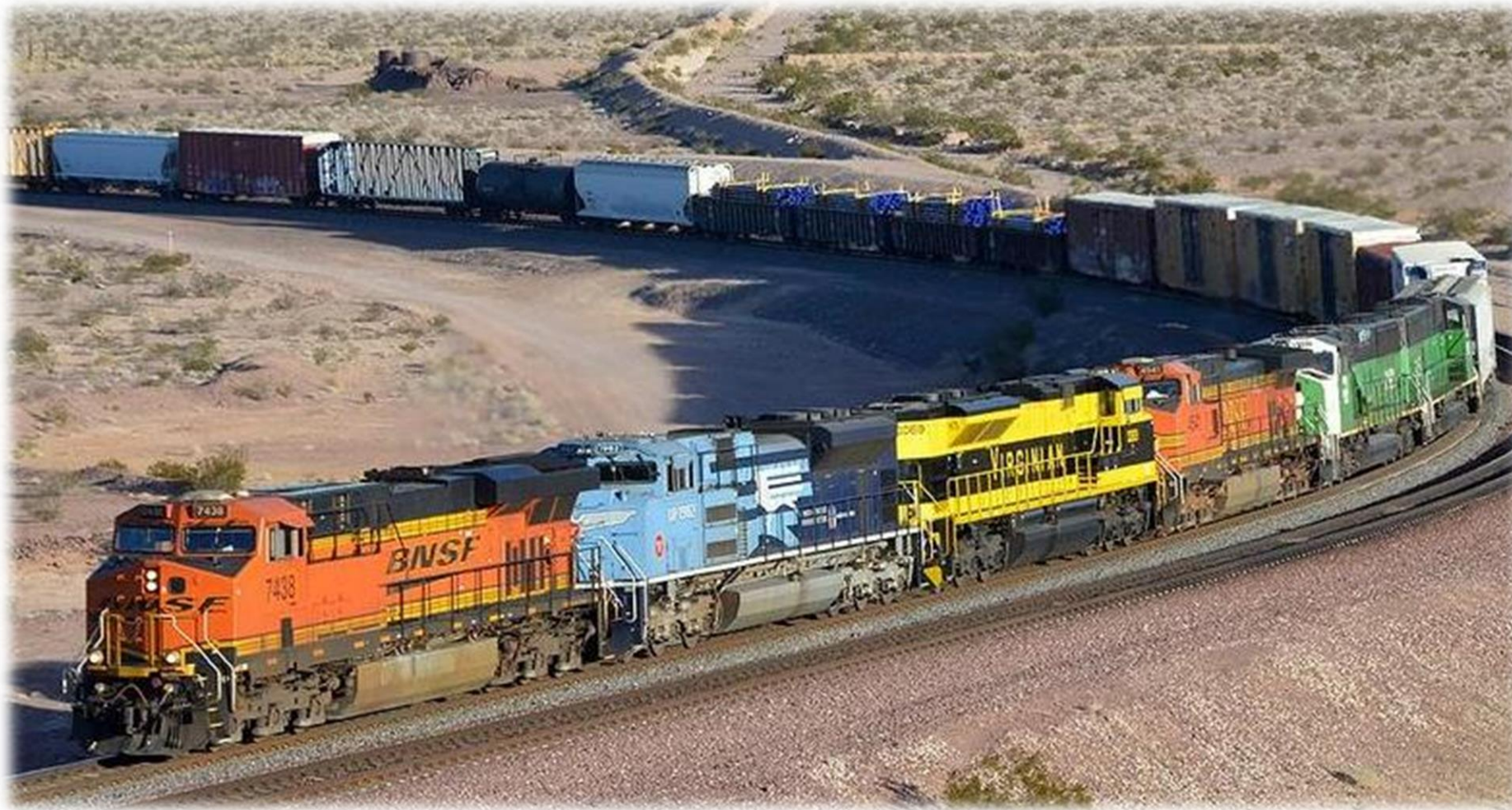
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**BNSF HAZMAT REGION MAP**

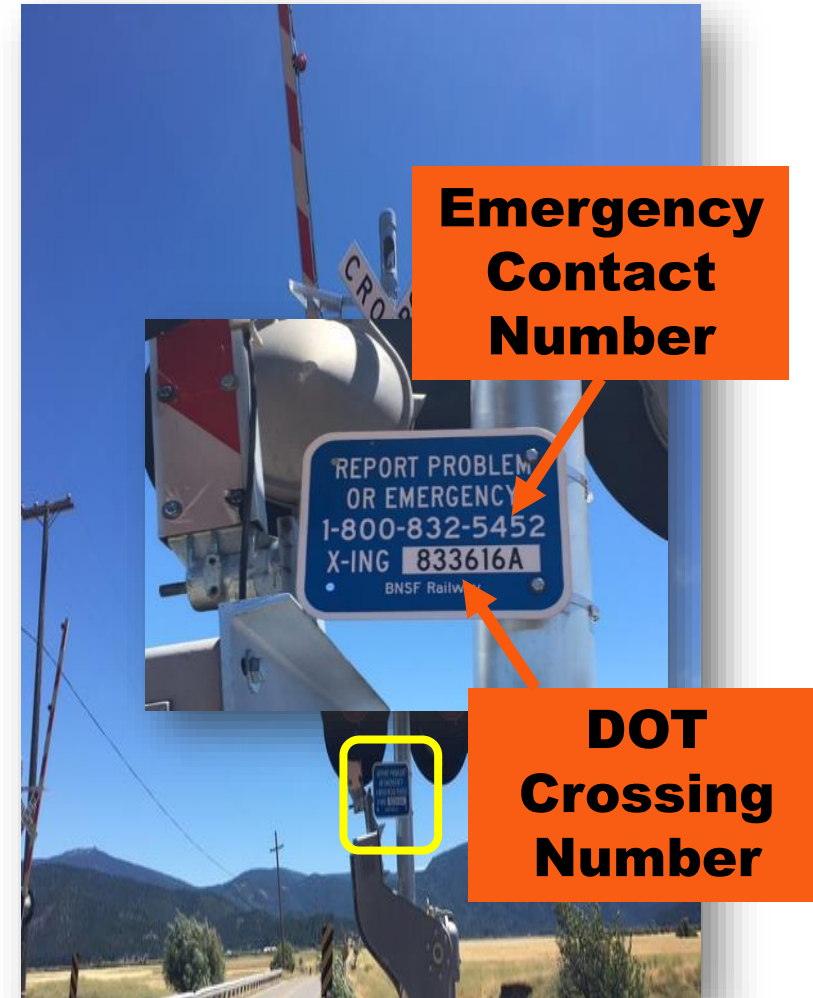
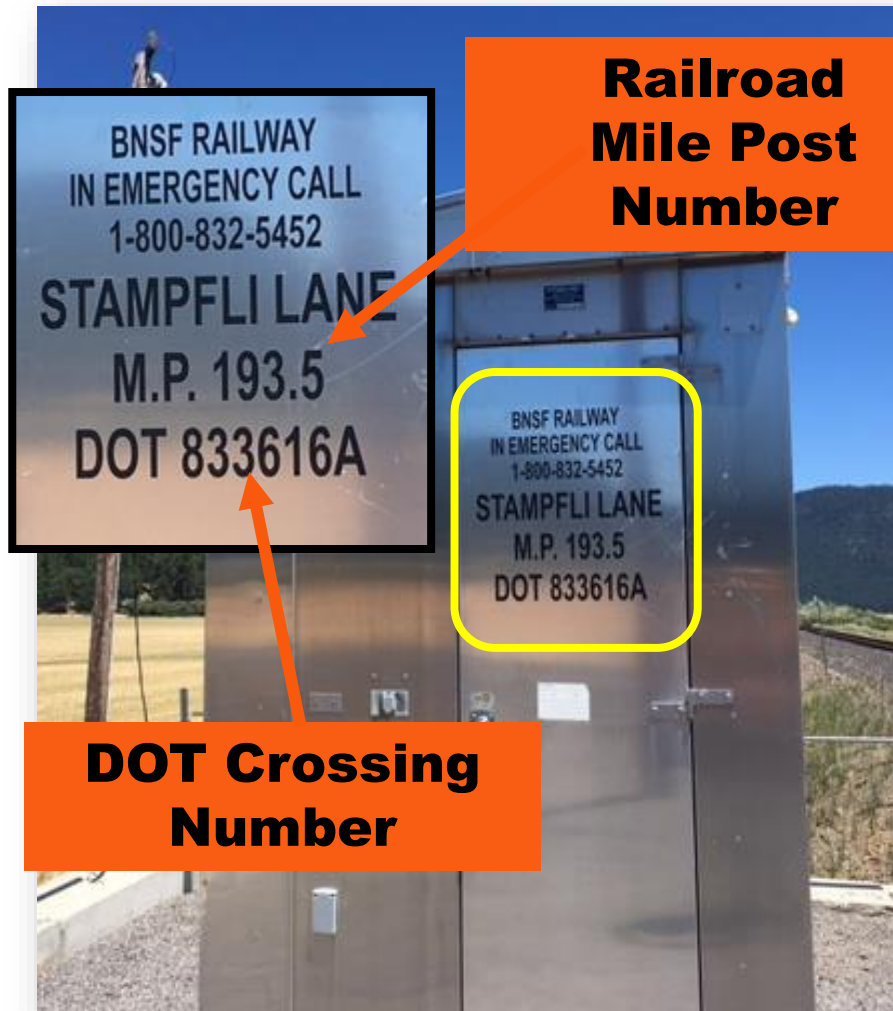


# How do You Know Who's Track it is?



# Rail Crossing Information

Call the railroad and report your location and situation.





# Locomotives



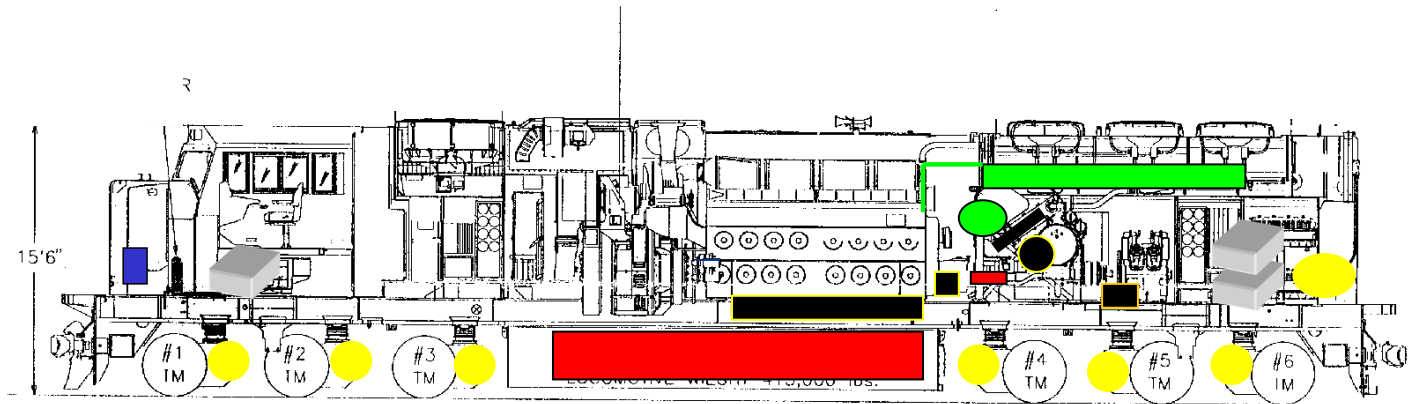
- Hybrid Diesel electric powered.
- Locomotives are connected with air and electrically.
- Distributive power rear / middle units operated by remote control.
- 2-Person Crew – Engineer & Conductor.
- Other locomotives may contain personnel (Deadheading).
- 4400 Horsepower 150,000 Pound-feet of torque
- Operating RPM range 200-1050.
- Weight 420,000 lb.
- 5000 kw of electrical power.
- Can move 1 Ton of freight 500 miles on 1 gallon of diesel.

# Spills / Leaks

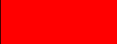
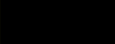






Green	Cooling Water
Red	Diesel Fuel
Black	Lube Oil
Clear	Battery Acid
Blue	Toilet Tank Fluid
Yellow Tint	Compressor/Gear Oil

# Liquid Locations & Capacities



- ***Diesel Fuel 5000 Gallon***
- ***Cooling Water 400 Gallons***
- ***Engine Lube Oil 350-400 Gallons***
- ***Battery Acid 30 Gallons***
- ***Toilet Chemical 15 Gallons***
- ***Compressor Oil 10 Gallons***
- ***Traction Motor Gear Oil 40 Gallons***

	<b>Diesel Fuel</b>		<b>Lube Oil</b>
	<b>Cooling Water</b>		<b>Battery Acid</b>
	<b>Toilet Chemical</b>		<b>Compressor/gear Oil</b>



# Locomotive Compartments

*Engine*

*Cab*

*Traction Motors  
& Fuel Tank*





# Locomotive Compartments



## Cab

- Location of crew and operating controls
- Low voltage wiring
- Glass built with a special glazing material
- Toilet compartment



## Cab entry/exit doors exterior



**Front**



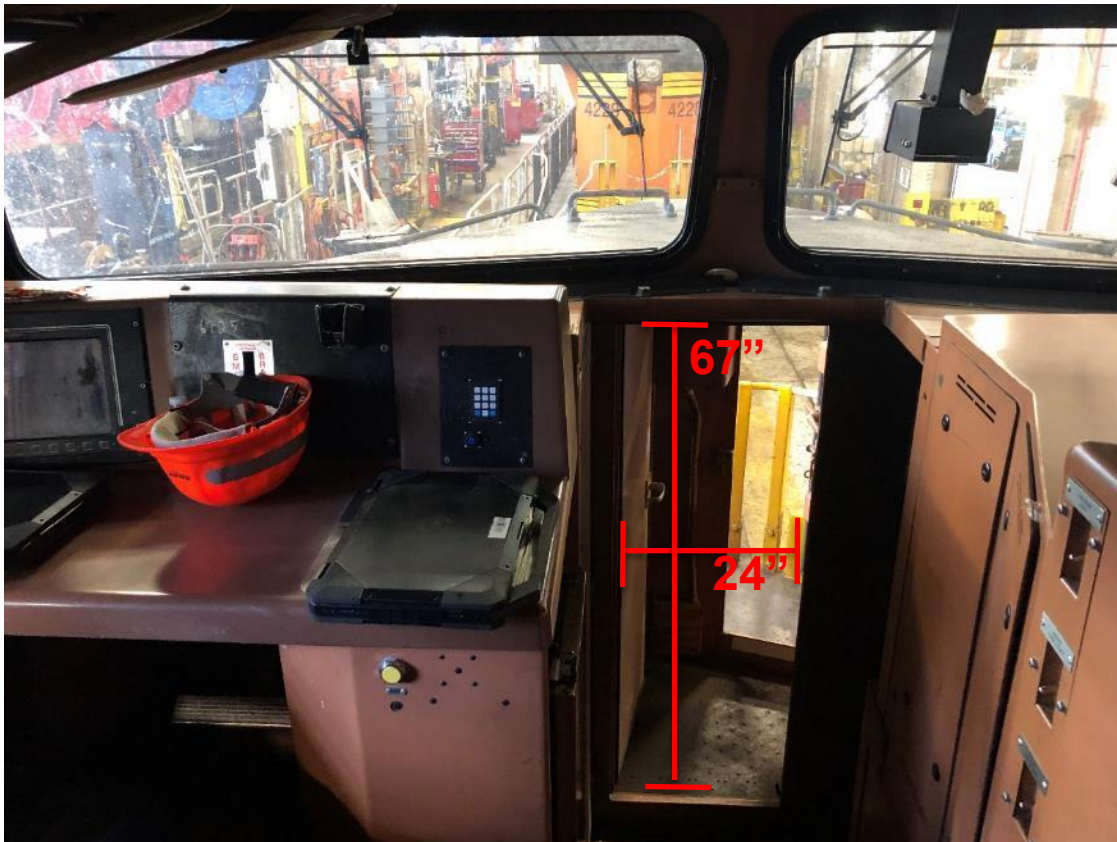
**Rear**

## Front Entry Way





## Cab entry/exit doors interior



**Front**



**Rear**

## Crew Location



***Engineers Seat***



***Conductors Seat***





## ***Conductors Side Window***

- ***Windows slides all the way forward and backward***
  - ***Possibly the best options for extricating a unconscious person***
- ***Widest opening in the Locomotive Cab***
  - ***33" X 24" opening***

# Extricating



*Slide a patient down a ladder on  
a stretcher*





# Cab Back Wall





# Locomotive Cab Controls



**Display Screens**

**Throttle Control**

**For/Rev Control**

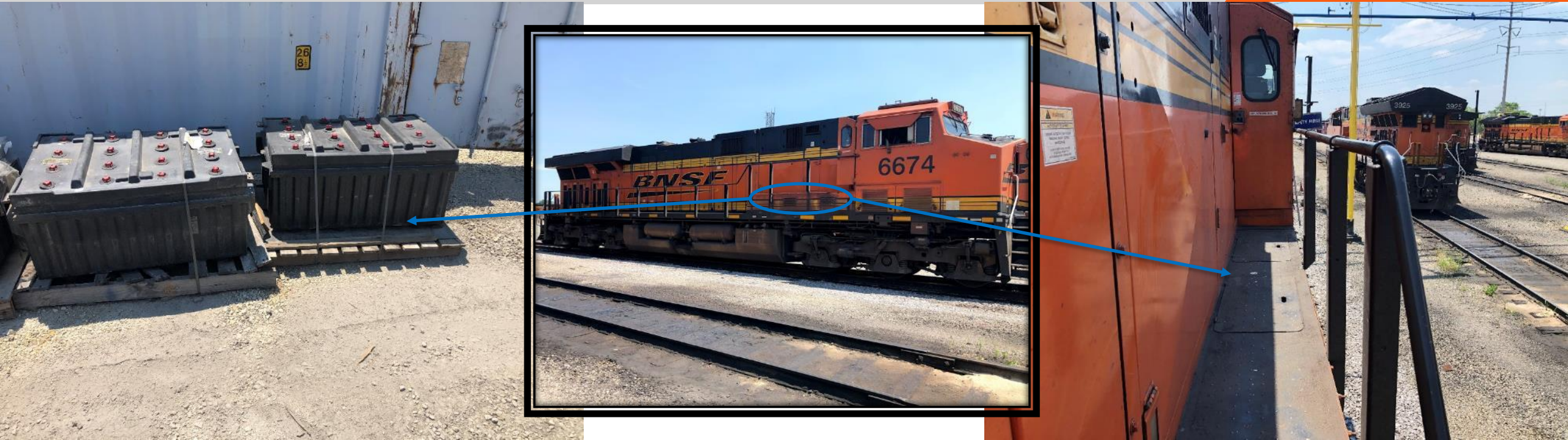


**Air Brake  
Controls**

***Do not manipulate or bump into the Air Brake Controls!***



# Batteries



- **Two 32 volt (64 total) 3200 amp lead acid batteries**
  - **Contains 30 gallons of Sulfuric Acid**
- **Over-charged lead acid battery can produce hydrogen sulfide**



# Locomotive Engine Compartments

*Engine*

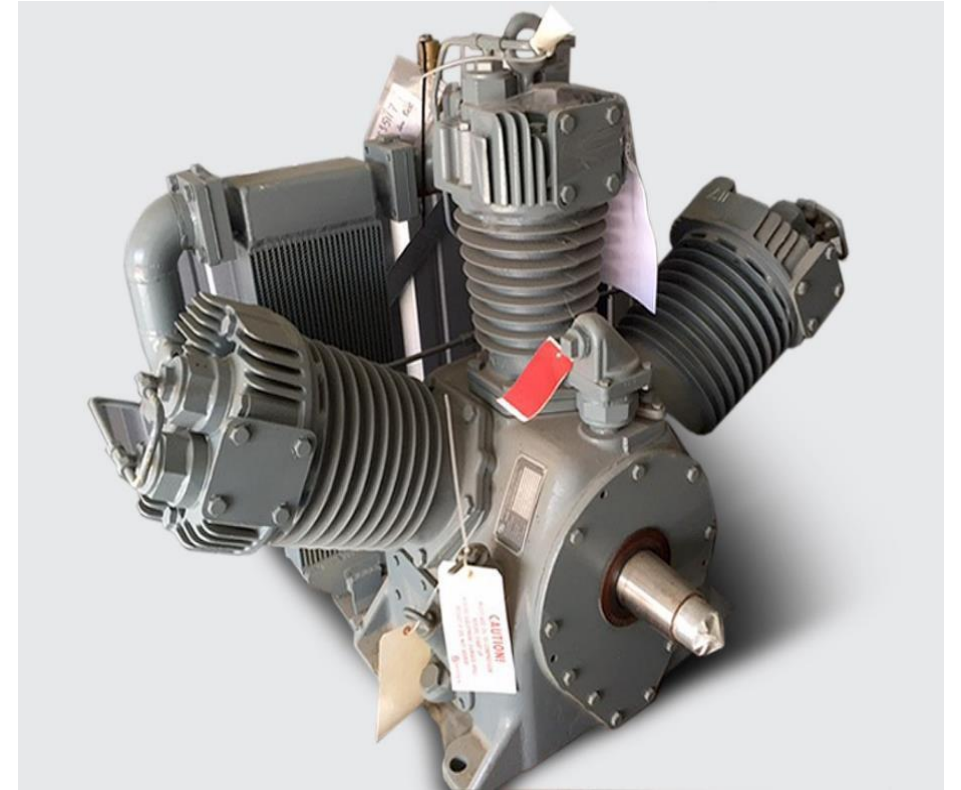




# Locomotive Engine Compartment



# Air Compressor



- **High Volume High pressure 2 stage Compressor**
- **Electrically driven or direct shaft driven**
  - **Up to 160 PSI**
  - **10 Gallons for oil**



# Radiators



- ***Radiators are located in the roof above the compressor***
- ***Contains up to 400 Gallons of green died H2O not antifreeze***



# Engine Room



**Engine**

**Alternator/Generator**

**Retention tank / Belly Pan  
holds 400 gallons**



# Engine & Alternator/Generator



**Turbocharger**

**Exhaust**

**High Presser fuel lines  
20,000 PSI**

**Low Presser fuel  
pump 14 GPM**

**Power Assembly  
Contains Piston,  
injector, and all  
valves.**



- **600-3000 Volts**
- **Up to 1500 Amps**
- **Power output can power a neighborhood of 1000 houses**



# High Voltage Room

*Door located behind cab rear door*  
*Some will have a barrier across*



*Invertor stacks store a HUGE amount of stored electricity*



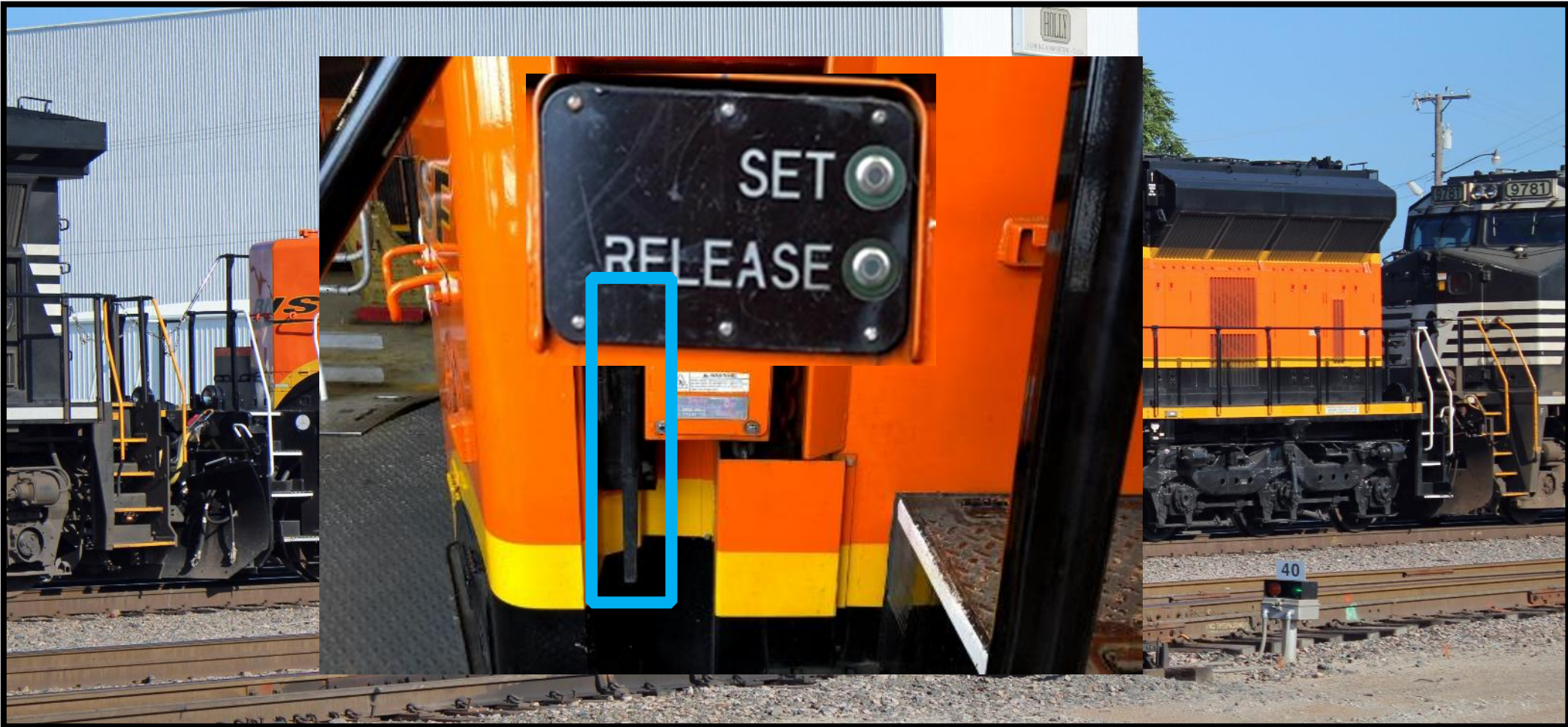


# Hand Breaks





# Hand Breaks



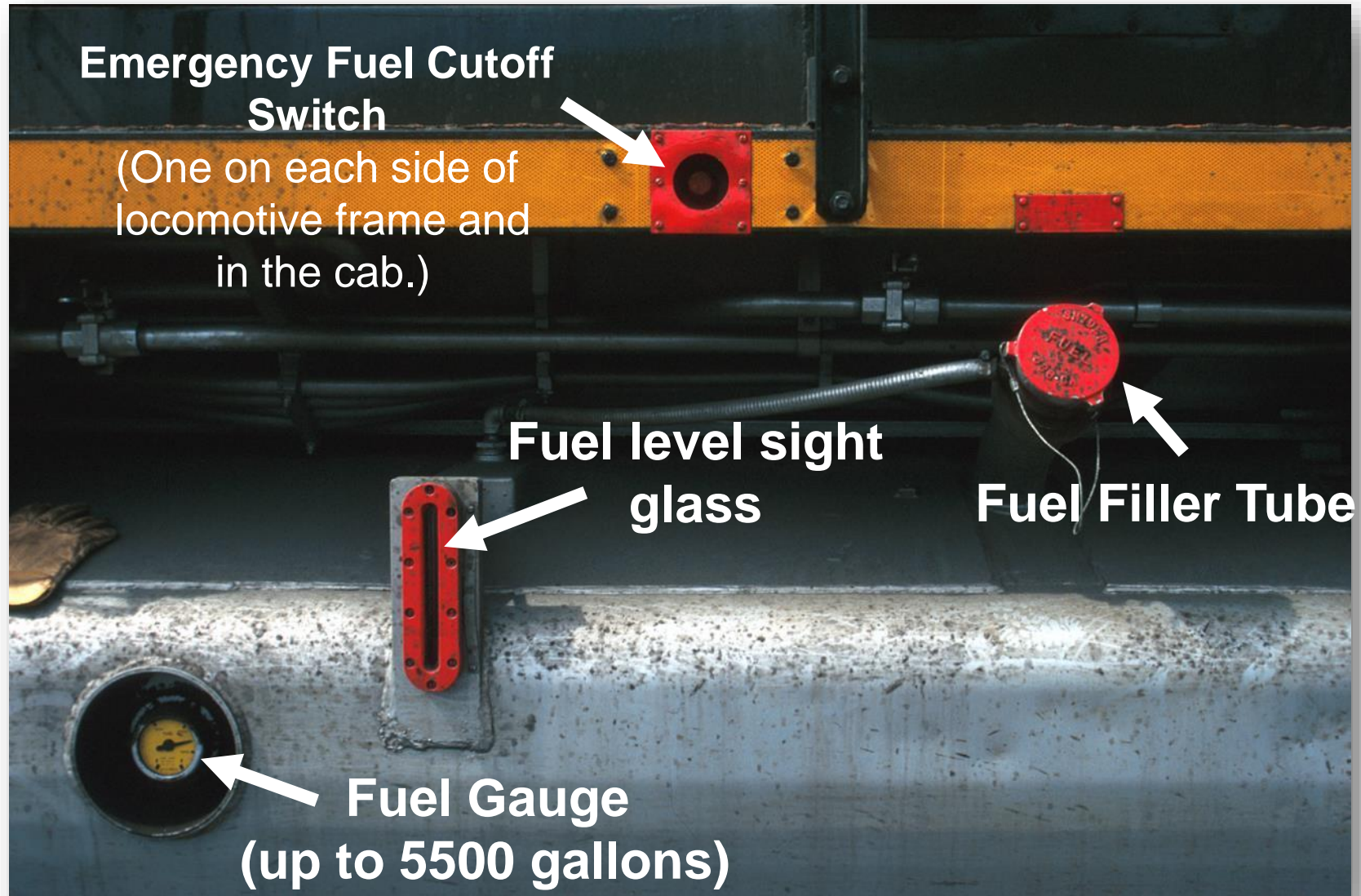


# Locomotive Compartments

*Traction Motors & Fuel Tank*



# Locomotive Fuel Tank





# Locomotive Traction Motors and Fuel/Air tanks



- *Tank runs under the locomotive*
- *Fuel tank has baffles but is open it does not have compartments*
- *Fuel tank is made out of ½ to 1 inch steel*
- *Fuel lines run up to the Engine Room*

# Locomotive Traction Motors and Fuel/Air tanks



- 2 200 Gallon
- Operate at 140 PSI
- Line run to the Compressor and to the front and rear of the Locomotive
- System has H<sub>2</sub>O Dryers and 150 Pressure relief device that periodically vent and release air.



# Locomotive Traction Motors and Fuel/Air tanks



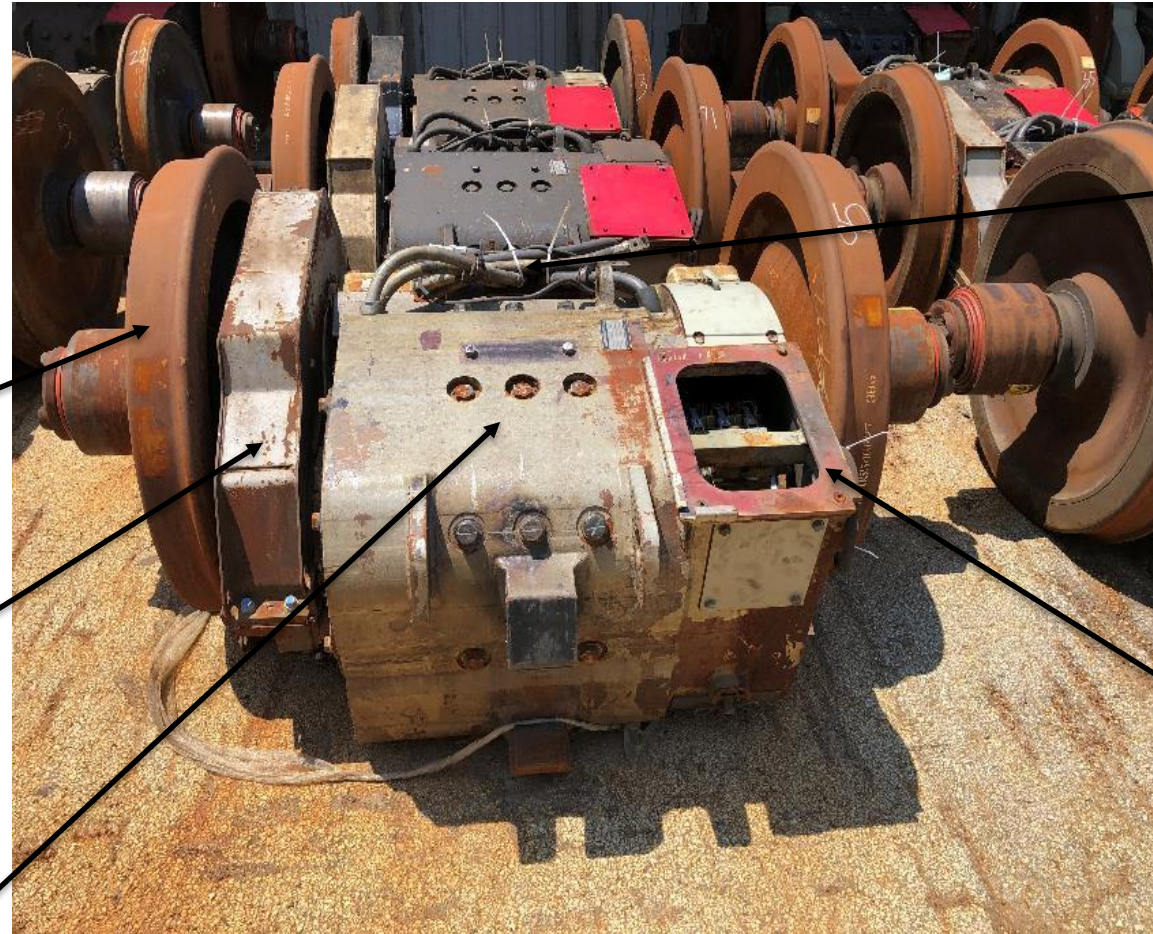
- ***Trucks Contain 2-3 Traction motors, brakes, suspensions spring, and sand nozzles.***
- ***Each traction motor weighs 6000 pounds (12,000 with the wheels) and draws 1200 amps.***
  - ***Contain 8 gallons of gear oil in each traction motor.***
  - ***Overheated bearing can cause fires to oil and high voltage cabling.***

# Locomotive Traction Motor

**Wheel Set**

**Gear Box**  
**8 Gallons of gear oil**

**Electric Motor**



**High Voltage Wiring**

**Air Colling Vent**



# Locomotive Traction Motor



**Motor**



**Wheel set**



## Front and Rear



**Multiple Unit  
(MU) Cables**  
**Connects  
Locomotives  
electrically**



**Multiple Units (MU) Air Lines**  
**Connects Locomotive Air Breaks**

**Brake Pipe (Train Line)**  
**Connect the whole trains Air  
Brakes (0-90 PSI)**





**Sand Fill Door**

**Sand Storage Box**

**Sand Dispensing Nozzles**

- ***Sand is used for traction to start and stop the train.***
- ***Sand nozzles and tanks are located at all four corners of the Locomotive.***



## ***Dynamic Braking***

- ***Converts kinetic energy into heat to slow down train speed.***
- ***Braking grids expels air at temps of 1200 degrees plus.***



## Recommended Practices for Responding to and Fighting Locomotive Fires:

- Be aware that locomotives have limited space in the cab, on the walkways, and to inside access panels.
- Responders wearing PPE, SCBA, or bunker gear can have difficulty gaining access to many areas.
- **NEVER** climb on the roof of a locomotive.
- Take response actions from the ground or walkway.
- Use dry chemical or CO<sub>2</sub> fire extinguisher.
- AFFF foam applications for ground fires or pooled fuel fires surrounding locomotives **ONLY**.
- Protect immediate exposures near the locomotive, i.e. dried grass, bridges, structures, etc.

# Locomotive Fires



- ***Engine/Exhaust/Turbo***
- ***Dynamic Break Grids***



- ***Cab***
- ***Traction Motor***



# Locomotive on Fire



# High-Voltage Capacitors



**High Electrical Energy Storage!**

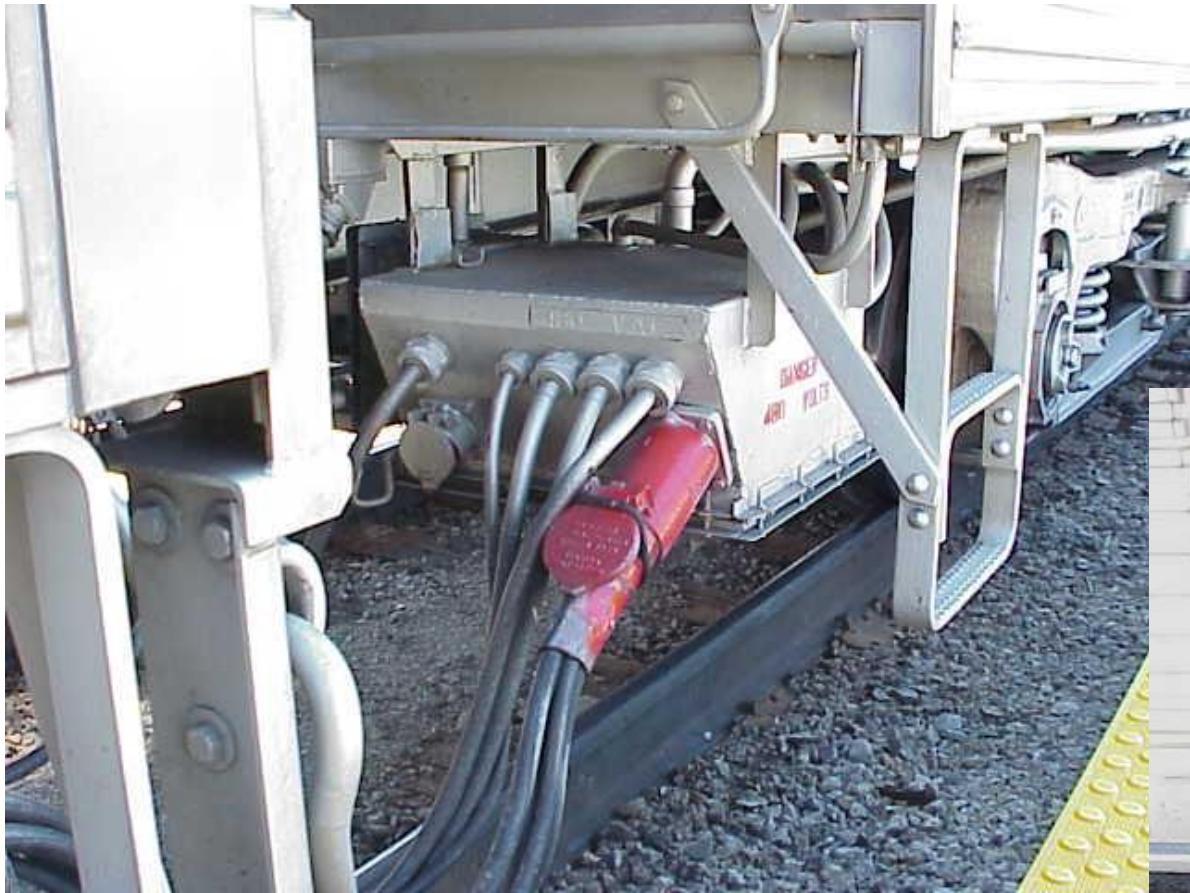


# What About Passenger Trains?



**Same hazards as freight locomotives  
PLUS: Head End Power (HEP)  
Electrical power for the coaches = 480 volts!!**

*Passenger Equipment 480 Volt Connections*





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# QUESTIONS?

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## BNSF HAZMAT

Railroad Emergency Response & Hazardous Materials Awareness