

Proper Car Placement in Trains

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Introduction

Some of you may wonder why it is important to know that cars can be placed in the wrong order in a train. And, why does this even matter on a model railroad?

On a real railroad improper car placement can cause embarrassing situations such as this.....

(Picture a train wreck.)

Proper car placement also insures the general safety of....

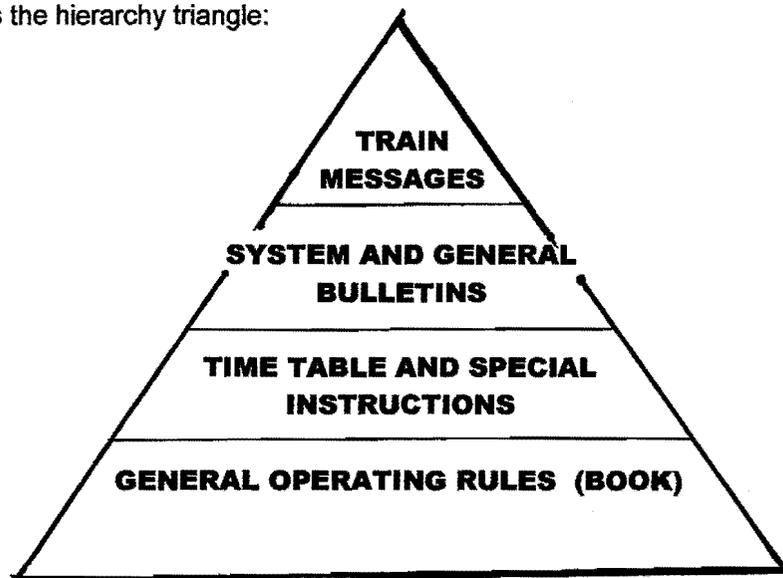
The merchandise being transported
The safety of the train crews handling the cars and the train
The safety of the community thru which these cars may move.

Some of these rules can be utilized to make the operation of your models more prototypical. The last reason I can think of for knowing this valuable information is that you can use it to heckle another modeler about his operation. ("Do you know that that tank car is in the wrong place in that train?")

How do you know how to properly place cars in a train?

There are a whole bunch of rulebooks, charts and other documents that trainmen must be familiar with when switching and operating trains. Every railroad has a "Book of Rules" which is the basis of this information. Superceding the "Book of Rules" is the Time Table and Special Instructions which is specific to a certain portion of the railroad. This is superceded by the System and General Bulletins. The most specific information is found in the Train Messages which are issued with every work order.

Here is the hierarchy triangle:



Lets start with a few general rules to set the stage:

Rule A. Employees whose duties are governed by these rule must provide themselves with a copy of these rules.... Employees must know and obey rules and special instructions that relate to their duties.

Rule B. When rules and special instructions conflict the following will govern:

1. Special Instructions in the timetable supercede any operating rule with which such special instructions may conflict.

2. System bulletins, general bulletins and information in the CSX Procedures Instructional Manual supersede special instructions in the timetable and any rule with which they may conflict.

3. Train messages supersede any rule and special instructions with which they may conflict.

Rule G. We all know this one thanks to Rick Gates.

All the nasty stuff on the railroad falls into two major categories which are:

Hazardous Materials, and

Restricted Equipment

What is Hazardous Material ?

Here are some definitions from the Book of Rules:

HAZARDOUS MATERIALS

These rules govern the switching and handling of cars containing hazardous materials, hazardous substances and hazardous wastes.

GENERAL REQUIREMENTS

No person may offer, accept or transport a hazardous material, substance or waste unless that material is properly classed, described, packaged, marked, labeled and is in condition for shipment as required or authorized by the U.S. Department of Transportation.

DEFINITIONS APPLYING TO THESE RULES

HAZARDOUS MATERIAL: A substance or material which is capable of posing an unreasonable risk to health, safety, and the environment when in transportation. Hazardous materials are categorized into 9 hazard classes based on the primary chemical hazard exhibited by the material. The hazard classes are:

*Class 1	Explosives
*Class 2	Gases
*Class 3	Flammable liquids and Combustible liquids
*Class 4	Flammable solids
*Class 5	Oxidizers/peroxides
*Class 6	Poisons
*Class 7	Radioactive materials
*Class 8	Corrosive materials
*Class 9	Miscellaneous hazardous materials

Classes 1,2,4,5 and 6 are further divided into subclasses called divisions.

Here are rules HM 5 thru 9 which may have some value to model railroaders:

SWITCHING AND TRAIN PLACEMENT

5. Train and engine service employees must familiarize themselves with switching and proper train placement of hazardous materials cars. (See Train Placement/Switching Restrictions Chart). Do not move a car containing a hazardous material if it is not properly placed in a train.

An occupied shoving platform is the same as an occupied caboose for the placement of hazardous materials car in a train.

6. Placarded rail cars must not move in a passenger train.

TRACK PLACEMENT OF EXPLOSIVES

7. When leaving a rail car placarded EXPLOSIVES 1.1 or 1.2 on any track, place it so it will be safe from all probable danger of fire. Do not leave these cars under a bridge or overhead highway crossing, nor in or alongside a passenger shed or station, except for loading or unloading purposes.

KEY TRAINS

8. A "Key Train" is any train with:

(a) 5 or more tank car loads of a poison inhalation hazard (PIH) or;

(b) 20 or more car loads or intermodal portable tank loads of hazardous materials **EXCLUDING** mixed loads with 49501 – as the first five digits of the STCC Number.

A CSXT computerized consist, if issued, will identify a "Key Train" which meets the qualifying criteria.

For trains not receiving a consist, the conductor will determine from the shipping description whether or not they are "Key Trains."

NOTE: The words "Poison Inhalation Hazard," or "Inhalation Hazard," will appear in the shipping description of PIH's.

Refer to Operating Rule 573 (2nd paragraph).

9. Restrictions Applying to "Key Trains"

(a) Will not exceed 50 MPH.

(b) In addition to the requirements of Operating Rule 58-F, if there is no defect at the location reported, the train will not exceed 30 MPH until it has passed the next defect detector.

(c) Friction bearing cars may not move in a Key Train.

Rule 5 refers to a chart called "Train Placement/Switching Restrictions Chart" which should be included here. Because it is in color, it is a separate handout.

Note: The words "Poison" and "Toxic" have the same meaning and may therefore be used interchangeably on shipping papers and placards and when determining train placement/switching restrictions; emergency response instructions; etc.

HAZARDOUS SUBSTANCE: A hazardous material that the U.S. Environmental Protection Agency (EPA) has designated as posing an unusual threat to the environment when spilled in quantities greater than a certain amount established by the EPA. This amount is called the material's Reportable Quantity or RQ.

HAZARDOUS WASTE: A hazardous material which has been used for its intended purpose and must be disposed of. It may be transported for storage, treatment or disposal.

PLACARDED CAR: A car (or container) displaying placards which indicate that the car contains a hazardous material(s). (Orange panels will also indicate that the car contains a hazardous material). Placards or orange panels will not indicate whether the car is a load or a residue.

RESIDUE: The hazardous materials remaining in a packaging, including a tank car and a covered hopper, after its contents are unloaded but before being cleaned and purged.

SHIPPING PAPER: A consist, waybill, shipping order, bill of lading, or other document serving a similar purpose containing information required by Hazardous Materials Rule 4.

SWITCHING MOVEMENT: An operation, whether inside or outside of a yard, where rail cars are switched, classified and assembled. The movement of the car(s) must not exceed one (1) mile. (See Exception)

TRAIN MOVEMENT: *The movement of a hazardous materials car, whether inside or outside a yard which (1) exceeds one mile or (2) is being moved to or from an interchange track. (See Exception)*

Exception: The movement of a hazardous materials car more than one (1) mile within the same yard is a switching movement, if no public road crossings are crossed.

What is Restricted Equipment?

Here are some definitions from the Book of Rules:

These definitions are in addition to those found in the Operating Rules.

Articulated Car - a car whose adjacent platforms (car bodies) are connected by sharing a common truck.

Clearance-Implicated Shipment - any shipment loaded on a flatcar, gondola, or moving on its own wheels, which also exceeds published clearance limitations for the specified route of movement and/or otherwise restricted shipment requiring specific operating handling procedures for safe movement.

Circus/Carnival Train - a train consisting entirely of cars (passenger and freight) belonging to a circus or carnival.

COFC Container on Flat Car.

Double Stack Car (DS) - a car designed to carry a trailer or container. When carrying containers, a double stack car is capable of carrying containers stacked one on top of another. When a double stack car has multiple platforms, see the definition for Multi-Platform car.

Flanger - a piece of equipment used to clear flangeways of snow.

Grain Train - a train consisting entirely of cars loaded with grain.

Hump - a method of switching cars by pushing them over a hill and letting gravity push them into classification tracks.

Intermodal Train - A train consisting entirely of equipment designed to carry trailers, containers, motor vehicles and/or automotive frames.

Long Car - a car at least 80 feet long over coupler pulling faces. A long car-short car combination consists of an 80 foot or longer car coupled to a 40-foot or shorter car except a caboose at the rear of a train.

Mail Train - an intermodal or trail van train carrying mail.

Mineral Train - a solid loaded freight train of coal, ore, phosphate, limerock, sand, salt or aggregates.

Multi-level Train (ML) - A train consisting entirely of multilevel autorack cars.

Multi-Platform Car - A double-stack or spine car with three or more platforms. (See Appendix 1)

Loaded - each end platform is occupied and no two adjoining platforms are unoccupied.

Empty - either end or any adjoining platforms unoccupied.

Non-Dimensional Shipment - Open load shipment on a flat car or gondola within car sides or end sills and not exceeding Plate "C" dimensions.

Rail Surveillance Service (RSS) - the observation and/or inspection of a car(s), trailer(s) (TOFC), or container(s) (COFC) containing sensitive commodities which are the property of the Department of Defense.

Restricted Shipment - shipment requiring specific operating handling procedures for safe movement.

RoadRailer® Train (RR) - a train consisting entirely of RoadRailer® equipment.

Scale Test Car - Composite - a short 2-axle scale test car with a wheelbase of seven (7) feet or less and consisting of a mold-casted body.

Scale Test Car - Non-Composite - a 2 or 4 axle scale test car with an outside to outside wheelbase of not less than seventeen (17) feet and consisting of a fabricated body.

Schnabel Car - a specially constructed car having two separable interlocking units that form a car body. Units may be separated and load interposed between and locked in place to form a complete unit.

Short Car - a single car that is 40 feet or shorter over the pulling faces of the couplers.

Span Bolster - a beam-like structure with each end resting on a conventional truck bolster and arranged to support a car body through a center plate at or near its mid-point. Span bolsters can also be used with two six-wheel trucks to provide 24-wheel (12 axle) support under extremely heavy cars.

Spine Car - A car with only a center sill structure designed to carry containers or trailers. When a spine car has multiple platforms, see definition for Multi-Platform car. (VTTX 30XXXX series cars are not considered spine cars).

Tank Surveillance Service (TSS) - the ground level observation and/or inspection of an M-1 Army tractor tank(s) on a flatcar.

TOFC - Trailer on flat Car.

Trail Van (TV) Train - Same as Intermodal Train.

Train Documentation - Information provided to the train and engine crew that identifies cars requiring special handling due to placement, dimensions, tonnage, speed or hazardous commodity.

Through Truss Bridge - a bridge span in which the steel framework extends above and over the top of rail.

TTSI - abbreviation for Timetable Special Instructions.

Unit Train - a train of similar car types loaded or empty with the same commodity. A mixed train having thirty (30) or more cars of unit train loads (coal, grain, potash, etc.) should be treated as a unit train.

Water Level Route - former Conrail Selkirk Branch, Chicago Line between CP169 and Chicago, the Shortline and Indianapolis line between CP13 and CP54 and the B&O line between Greenwich and Chicago..

Work Train - a train handling maintenance of way work equipment and working on the roadway.

Wreck Crane - a locomotive derrick used primarily in clearing train accidents.

Here are some rules for restricted equipment that might be beneficial to the model railroader:

RE 4, RE 6, RE 7, RE 8, RE 22, RE 32, RE 44, RE 46, RE 49, RE 56, RE 58, RE 61, RE 63, RE 64, RE 71, RE 83, RE 86, RE 97, RE 116-117-118, RE 119.

RE-4.0 Trains handling machinery with booms attached:

4.1 Must have the boom in trailing position except:

4.1.1 When moving in work or wreck trains over short distances to and from the work location.

4.1.2 Tie Handlers (material handler cars) may move in regular train service with boom trailing or forward if the Engineering Department employee in charge has confirmed that the equipment is properly secured.

RE-6.0 Cars identified by train or yard documents as "Do Not Hump" are governed by the following handling instructions:

6.1 Do not hump or switch detached from locomotive or switch with this car or kick other cars into this car.

6.2 Car may not be cut off in motion.

6.3 Car may not be struck by any car moving under its own momentum.

6.4 Car may not be coupled into with more force than necessary to complete the coupling.

RE-7.0 Plate "F" box cars, high side gondolas, open top hoppers, or covered hoppers loaded with 95 tons or more and having a cubic capacity of 4000 cubic feet or greater when identified by train documentation:

7.1 Crews must observe these cars for excessive rocking motion.

7.2 If excessive rocking motion is observed, immediate action must be taken to reduce speed to control the rocking motion.

7.3 Trains handling the above equipment, at locations designated in special instructions, will avoid operation in the speed range of 14 to 21 mph. If speed cannot be maintained at or above 22 mph, the speed of the train must be reduced to below 14 mph.

RE-8.0. Heavy Bad Order Cars:

8.1 May move in trains without additional equipment, speed, or train placement restrictions, unless otherwise specified by the Mechanical Department.

RE-22.0 Dead locomotives moving on waybill authority on own wheels, must not be moved without authority from Clearance Bureau.

RE-32.0 Circus/Carnival Train Movements:

32.1 CSXT-Business Car Operations must authorize and issue written or verbal instructions prior to movement.

32.2 NS and CR Amtrak Operations must authorize and issue written or verbal instructions prior to movement.

RE-44.0 Loaded auto-rack cars:

44.1 Must not be placed in a train directly behind open-top cars loaded with sand, gravel, coal or similar commodity.

RE-46.0 Single axle (single platform TTOX & four platform TTFX) cars:

46.1 Maximum tons behind these cars when empty must not exceed 3000.

Exception: When moving from the Water Level Route maximum tons must not exceed 5000.

46.2 Maximum tons behind these cars when loaded must not exceed 6000 provided that dynamic braking is limited to 18 effective axles.

46.3 Loaded or empty car must not be rear car of train and must be at least 5 cars or platforms ahead of any helper locomotive(s).

46.4 When helper locomotive is placed on rear of train that contains loaded or empty TTOX or TTFX single axle car(s), helper may have up to 6000 working horsepower and 12 effective working axles of power and is limited to a maximum tractive effort as follows:

46.4.1 Helper less than 4000 total working HP – 1000 amps or 110 K lbs.

46.4.2 Helper 4000 to 5000 total working HP – 900 amps or 110 K lbs.

46.4.3 Helper over 5000 working HP – 800 amps or 110 K lbs.

46.5 On Norfolk Southern, TTSI concerning the maximum safe trailing tonnage behind restricted equipment will apply.

RE-49.0 Block of 30 or more loaded cars of coal, coke, grain, ore, phosphate, limerock, sand, salt, minerals or aggregates:

49.1 Must be handled on head of train next behind engines except addition of cars of similar weight may be placed ahead of this block.

RE-56.0 Wood Rack Cars & Bulk Head Flats:

56.1 Loaded must not exceed 50 MPH.

56.2 Empty wood rack cars & empty modified wood racks (AAR car type F151&F251) – must not exceed 50 MPH.

56.3 Partly loaded wood rack cars will be handled only in work trains or as authorized by the Superintendent:

56.3.1 **Exception** – when necessary to switch partial loads, handle carefully during switching to prevent damage and minimize movement of partial load.

RE-58.0 Flat cars and other open-top cars loaded with pipe, lumber, logs, poles or other lading that has a tendency to shift:

58.1 Must not be handled in a train next to a loaded auto-rack car, a locomotive, or a caboose.

58.2 Restriction applies only:

58.2.1 when any of the lading protrudes beyond the car ends.

58.2.2 when any of the lading extending above the car ends is liable to shift so as to protrude beyond the car ends.

RE-61.0 Heavy Duty Flats, Schnabel and Span-Bolstered Cars

61.1 **Loaded** eight (8) or more axle Heavy Duty Flats, Schnabel or Span-Bolstered cars must be placed at or near the head end of train.

61.1.1 The following restrictions only apply to the cars listed below

61.1.2 Loaded Heavy Duty Flats, Schnabel or Span-Bolstered cars **cannot** be moved without Clearance Bureau authority.

61.1.3 Prior to forwarding this equipment in a train, authority for movement **must** be obtained from the Chief Dispatcher.

61.2. **Empty** eight (8) or more axle Heavy Duty Flats, Schnabel or Span-Bolstered cars over plate "C" must not exceed 40 MPH and be handled on the rear of train as last car in trains not exceeding 100 cars in length.

61.3 On Norfolk Southern, Timetable Special Instructions concerning the movement of Schnabel and high capacity flat cars will apply.

Car Identity	Axles	Car Identity	A
APWX 1004	12	GEX 80000	11
BBCX 1000	20	GEX 80002	11
CAPX 1001	20	GEX 80003	21
CEBX 100	12	GPIX 100	11
CEBX 101	12	HEPX 200	21
CEBX 800	36	KWUX 10	21
CPOX 820	20	PTDX 200	11
CR 766002	4	PTDX 201	11
CR 766003	4	PTDX 202	21
CR 766004	4	PTDX 203	11
CR 766078	8	PTDX 204	11

CWEX 1016	12	TETX 20002	12
DODX 38870-85	8	WECX 101	20
DODX 39898-99	8	WECX 102	22
EL 7600	8	WECX 301	22
EL 7601	8		
GEGX 21154-55	16		
GEX 40010	20		
GEX 40013	12		
GEX 40017-18	12		

RE-63.0 Caboose Cars:

63.1 Must be placed at the rear of the train unless otherwise authorized by the Superintendent.

63.2 Must not be subjected to pusher or helper service.

RE-64.0 Passenger equipment, including railroad owned office type cars, railroad research/test cars, foreign/private owned office type cars, commuter cars, and rapid transit cars will be restricted as follows:

64.1 Must not be subjected to helper service (when on rear of train). Must not be humped or flat switched with the locomotive detached.

64.2 Must not be coupled to cars with shelf type couplers.

64.3 Must be handled separately when being switched and spotted in yards.

64.4 Conrail, CSXT, and NS passenger cars should be positioned at the head end of train and may be run at intermodal speeds if operated in intermodal trains.

64.5 Trailing tonnage must not exceed 7000 tons for CSXT and Conrail passenger cars.

64.6 Trailing tonnage for NS passenger cars will be specified by car number.

64.7 Cars may be positioned on rear of a train after the train makeup and territory to be traversed is considered, and movement wire (notification) includes the requesting/approving officer's name.

64.8 Privately owned passenger cars will be placed on rear of freight train only after approval of CSXT Passenger Services (or NS Amtrak Operations, if applicable).

64.9 Commuter cars:

64.9.1 Will be placed on rear of freight train only after approval of CSXT Passenger Services (or Norfolk Southern Amtrak Operations if applicable).

64.9.2 Must be equipped with appropriate couplers and/or heavy duty knuckle adapters.

64.10 Rapid transit cars traveling on their own wheels may be moved only in special train service, dimensional train service, or local freight train service. When moved in local train service, the length of the train must not exceed 1,200 feet.

CLEARANCE-IMPLICATED SHIPMENT RULES

RE-71.0 Clearance-implicated shipments include:

71.1 Any load on a flat car, or in a gondola car which extends beyond car sides or end sills in height, width, or length, including all overhanging and bolstered load shipments.

71.2 Dead locomotives moving on waybill authority on own wheels.

71.3 Any maintenance of way work equipment moving on its own wheels, e.g., wreck cranes, bridge department cranes, pile drivers, snow plows, undercutters, and ditcher spreaders.

71.4 Any shipment requiring movement restriction, i.e., radioactive material, damaged equipment.

71.5 Any intermodal shipment, including loaded double stack container cars.

71.6 Any 20' 2" ATR (above top of rail) multi-level auto rack shipment.

71.7 Any shipment of restricted span bolstered heavy-duty cars covered by AAR Circular #0t-2-B.

71.8 Any free movement for nonprofit agencies.

71.9 Any open load exceeding \$1 million dollars in value.

RE-83.0 Welded Rail Equipment.

83.1 Trains handling loaded welded rail or continuously jointed rail:

83.1.1 Must not exceed 10 MPH when moving through turnouts, crossovers, tunnels, and through-truss bridges.

83.1.2 Loaded welded rail equipment not exceeding 12 cars (including buffer cars at each end of the cars loaded with rail) may be handled in regular freight service next to the locomotive consist.

83.1.3 Must not exceed 40 MPH when not exceeding 12 cars and handled in regular freight service.

83.1.4 When not equipped with designated buffer cars, must have a loaded hopper car placed at each end of cars loaded with rail.

83.1.5 No other equipment will be handled in this type of train except for cars relating to the welded rail (such as unloading and buffer cars), except as provided in rule 83.1.3.

83.1.6 Two loaded rail trains, or one loaded and one empty rail train, may be handled as one movement. When loaded and empty rail trains are handled together, the empty train must be on the rear.

83.1.7 Empty welded rail equipment must be handled on the rear of the train unless otherwise authorized by the Mechanical Department.

RE-86.0 All Camp Cars (including Univan Camp Cars) must not exceed 40 MPH

86.1 Must be placed at the rear of the train unless otherwise authorized by the Superintendent.

86.2 Must be placed immediately ahead of the caboose when a caboose is located at the rear of the train.

RE-97. Trains handling machinery with booms attached must have the boom in trailing position, except when moving in work or wreck trains, over short distances to and from work location.

EXCEPTION: Tanks with gun barrels attached can have barrels facing forward.

RE-116. The following composite scale test cars must be handled at the rear of the train ahead of five (5) cars with operative air brakes:

BO 914220-914227
CO 914200
CO 914201
CO 914203
CSXT 914228
CSXT 914229
CSXT 914240

NOTE:

When composite scale test cars are to be handled in trains requiring helper engines at the rear, the helper engines must be placed ahead of the scale test cars.

RE-118. The following non-composite cars must be handled on the head or on the rear of the train:

SBD 979751
LN 41496
CSXT 914207
LN 41497
CSXT 914208
SBD 991816-991818
CSXT 991815

RE-119. Passenger equipment movements must be authorized by Passenger Services. The following passenger equipment will be restricted as follows:

- All deadhead moves must be positioned at the head of a train with trailing tonnage not to exceed 7,000 tons.

- Inspection trip moves may be positioned at the rear of a train after:

1. train makeup and territory to be traversed is considered, and
2. movement wire (notification) must include the requesting/approving officer's name.

- Must not be humped or flat switched with motive power detached.

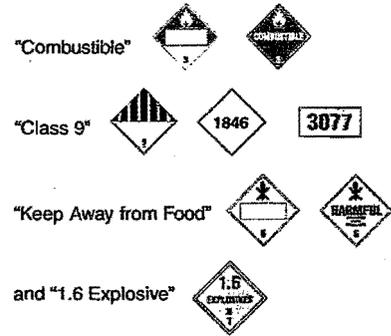
- Must not be coupled to cars with shelf type couplers (tank cars).

TRAIN PLACEMENT/SWITCHING RESTRICTIONS - PLACARDED CARS

GROUP 1	GROUP 2				GROUP 3	GROUP 4	GROUP 5
LOADED CARS							
 	       	      	      	   		<p>Any Placarded Tank Car (other than those covered by Note 2), the paperwork for which indicates "RESIDUE"</p>	
Any Type Car	Tank Cars	Other Than Tank Cars	Any Type Car	Any Type Car	Any Type Car	Tank Cars	

NOTE 1: Cars with the same placarding may be placed next to each other and may also be placed next to other cars within the same placarding group.

NOTE 2 — CARS WITH NO RESTRICTIONS: There are no train or switching movement restrictions for loaded or residue cars placarded, labeled or identified as:



There are no train or switching movement restrictions for RESIDUE cars other than tank cars.

NOTE 3: Placards cannot be used to determine whether a car is loaded or is a residue.

The symbol ✖ indicates the restriction shown to the right applies.

For the purpose of car spacing, each unit of an articulated intermodal rail cars shall be considered as one car.

TRAIN MOVEMENTS						RESTRICTIONS	
✖	✖		✖			When train length permits, must not be nearer than the 6th car from an engine, occupied caboose or passenger car. If train length does not permit, must be near the middle of the train.	
✖	✖		✖	✖	✖	M U S T N O T B E N E X T T O	Engine, occupied caboose or passenger car.
✖	✖	✖	✖	✖			Any placarded car in another placarding group, EXCEPT; may be placed next to a "Residue" (Group 5) or cars covered by NOTE 2.
✖	✖		✖				Any bulkheaded flat or open-top car when any of the lading protrudes beyond the ends or if shifted would protrude beyond the car ends.
✖	✖		✖				Loaded flat car except closed TOFC/COFC equipment, auto carriers, and other specially-equipped cars with tie-down devices for handling vehicles.
✖	✖		✖				Railroad wheels loaded on wheel car flats, in gondolas with no ends, or loaded with the axles above the top of gondola cars.
✖	✖		✖				Any rail cars, transport vehicles, or freight containers with temperature control equipment or internal combustion engine in operation.
				✖			A carload of undeveloped film.

SWITCHING MOVEMENTS						RESTRICTIONS	
✖	Applies to DOT-113 Tank Cars	Applies to TOFC/COFC	✖		Applies to Group 3 and to DOT-113 Tank Cars	Must not be: (1) Cut off in motion; (2) Struck by any car moving under its own momentum; or (3) Coupled into with more force than is necessary to complete the coupling.	
✖						Must be separated from engine by at least one non-placarded car.	
	✖					Where use of hand brakes is necessary, must not be cut off in motion until preceding car is clear of lead; also, restricted car must be clear of lead before another car is allowed to follow.	
	✖					Must not be cut off in motion for coupling in more than 2-car cuts, and cars cut off in motion to be coupled directly to a loaded placarded tank car must also be handled in not more than 2-car cuts.	