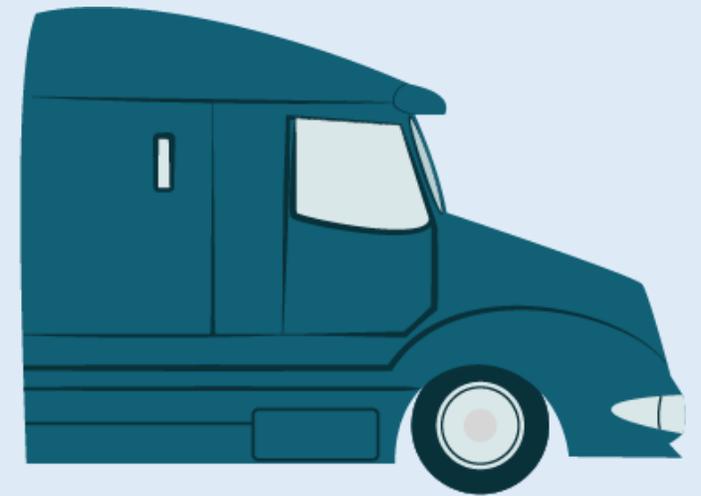


Flexible Sleeper Berth Pilot Program



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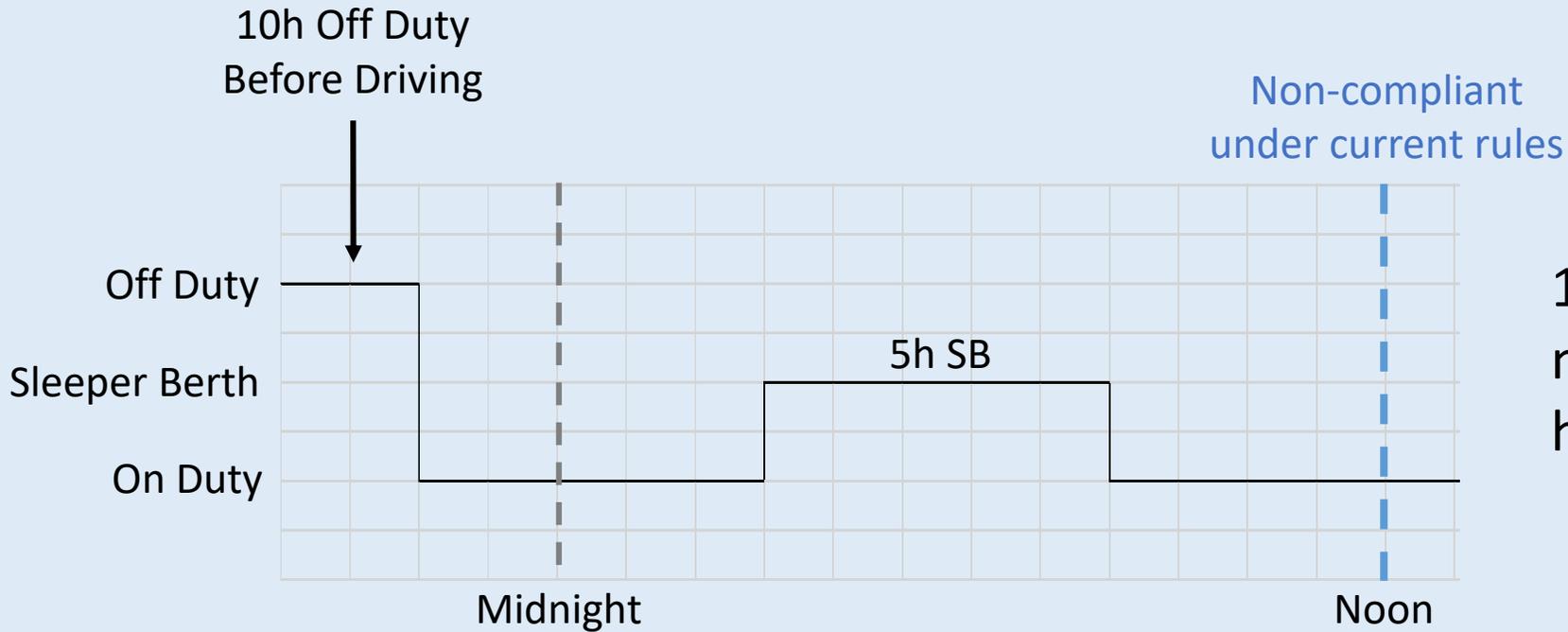
Field Study Purpose

- During FMCSA listening sessions for the HOS rulemaking, drivers reported that they would like some regulatory flexibility to be able to sleep when they get tired or as a countermeasure to traffic congestion.
- Under the current HOS regulations, stopping for a nap can reduce available work hours. This can make drivers reluctant to nap during a duty period.
- **11-Hour Driving Limit**
 - May drive a maximum of 11 hours after 10 consecutive hours off duty
- **14-Hour Limit**
 - May not drive beyond the 14th consecutive hour after coming on duty, following 10 consecutive hours off duty; Off-duty time does not extend the 14-hour period

The purpose of this research is to conduct a pilot study to demonstrate how HOS regulatory flexibility could be used to improve driver rest and alertness.



Example Duty Log



14-hour duty clock runs out by noon, although 5 of those hours were in the sleeper berth

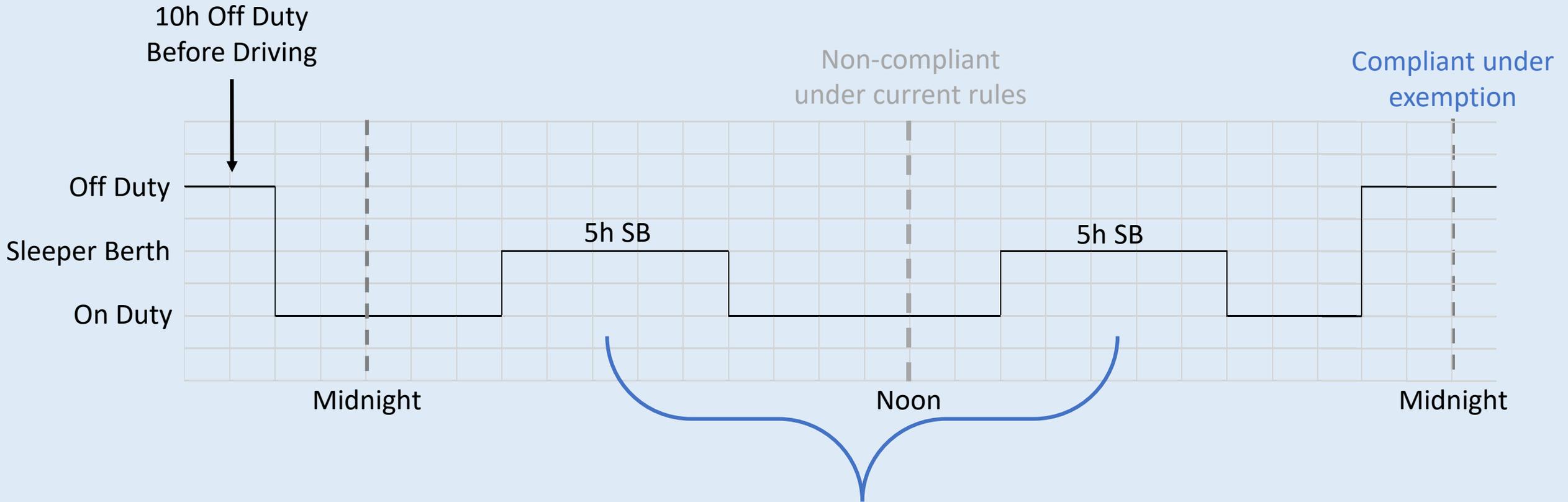


FMCSA Study-Granted Exemption

- Only for drivers participating in the study, only during their period of participation
- Study-related exemption issued to participating drivers:
 - A driver may split their 10 hours of required SB time into two periods (≥ 3 h)
 - Any SB period that is part of a pairing is excluded from calculation of the 14-hour duty period
 - When the second SB period of a split occurs, the recalculation of the 14-hour duty period starts at the end of the first SB period
 - During each duty period, drivers may choose to operate under either the current regulations or the study-related exemption. No mixing of exemption and non-exemption is allowed in the same duty period



Example Use of Exemption



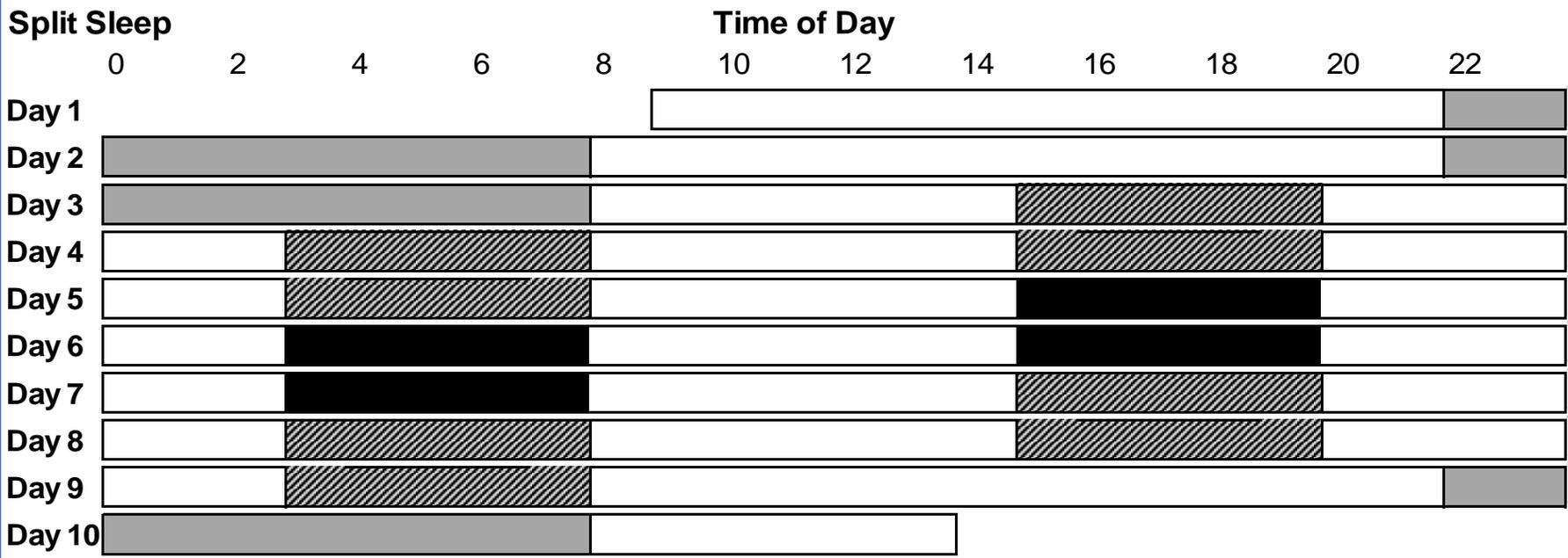
10h total in SB: both periods excluded from 14-h clock

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Split Sleep Laboratory Study

- Laboratory study for FMCSA on split sleep that is the basis of the current study (Belenky et al., 2012; Jackson et al., 2014)
- Split sleep periods had longer sleep durations than consolidated daytime sleep periods (with equal sleep opportunity).



Outcome Measures

- **Sleep**
 - Wrist Actigraphy (sleep/wake activity)
 - Sleep Log
- **Fatigue**
 - 3-min Psychomotor Vigilance Test (PVT)
 - Karolinska Sleepiness Scale (KSS)
- **Safety**
 - Onboard Monitoring System (OBMS)
 - Roadside Violations (from Commercial Driver's License Information System - CDLIS)
- **Exemption Use by Shift Type**
 - Custom Electronic Logging Device (ELD)



Safety Critical Events Captured via Onboard Monitoring Systems



- Primary safety outcome is Safety Critical Events (SCEs) that are captured by the OBMS
 - Crashes
 - Near-crashes
 - Other safety events
- OBMS used for this study will be the SmartRecorder™ developed by SmartDrive
 - Two camera views (road and face)
 - Audio channel
 - GPS



Data Collection Design

- Continuous data collection:
 - Actigraphy
 - ELD engine diagnostic data
 - OBMS
- Daily (as needed) data collection:
 - Sleep logs
 - ELD duty status
- Fatigue testing 3–4 times each day (approx. 5 min each):
 - Fatigue testing prior to duty, during mid-duty break, after duty
 - Additional test when using exemption (prior to returning to duty after nap)
 - Fatigue testing continues through restart breaks (3x daily)



Driver Sampling and Recruitment

- Recruit carriers for initial approval
- At least 200 drivers, per FMCSA request:
 - 50 from large carriers/50 from medium carriers/50 from small carriers
 - 25 owner operators
 - 25 team drivers
- Regularly use their sleeper berth (SB)
- Typically operate the same tractor each day
- Operate a vehicle with a gross vehicle weight rating (GVWR) > 10,000 lbs
- Permission from carrier to participate (when applicable)



Driver Participation

- Drivers will apply for the study online
- Enrolled during an in-person briefing session
- Daily data quality checks (with calls as needed)
- Weekly telephone briefings
- Drivers may participate for up to 90 days
- Drivers may operate under the study-issued exemption during any duty periods of their choosing during their period of participation
- End of study debriefing



Data Analysis

- Individual duty periods will be categorized as:
 - **Nighttime sleep** – the main sleep period at least partially occurs between the nighttime period from 01:00 until 05:00
 - **Daytime sleep** – the main sleep period occurs entirely outside the nighttime period from 01:00 until 05:00
 - **Split sleep** – driver uses their study-granted SB exemption and takes two SB periods, each ≥ 3 h and for a total duration ≥ 10 h.
- Each driver may contribute data to one, two, or all three of these categories. Data will be pooled across the 24-hour day.
- Comparisons between duty period categories:
 - Sleep
 - Fatigue
 - Safety
 - Duty Status



Project Order of Events

- Currently developing study website, study equipment, custom ELD, procedures, IRB/OMB applications
- 5-driver, 2-week pre-test of procedures
- Field study data collection to commence once OMB approval granted
 - 50–60 drivers per cycle; 90 day cycles (rolling enrollment)
 - 4 cycles of data collection (200–240 drivers total)
- Data reduction and analyses
- Public use data set
- Peer review of draft final report
- Submission of the final report



Point of Contact

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