RESPONSE TO FMCSA QUESTIONS

Dear Mr. Cestero:

Thank you for this opportunity to allow us to clarify your questions. This document has been prepared in response to your emailed questions which are included herein.

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Include the list of malfunctions found in table 4 of the ELD Rule 5

FMCSA Questions emailed on 19 Mar 2019

A member of the ELD Team reviewed your application and request that the following be updated:

1. Provide a valid picture showing the ELD device in operation and any other hardware that interfaces with the ELD device,
2. Include a description of the supported and certified data transfer mechanisms and step-by-step instructions for a driver to produce and transfer the ELD records to an "authorized safety official" utilizing one of the two following options:
   Option 1—Telematics using both: Wireless Web services and Email
   Option 2—Local using both: USB2 and Bluetooth,
3. Include the list of malfunctions found in table 4 of the ELD Rule.

Description of the supported and certified data transfer mechanisms

The Orion eLog ELD system offers a highly secure and flexible driver and vehicle management and compliance solution. Orion eLog validates the driver, eLog hardware, vehicle, and mobile device before the driver's initial use. The communications protocol and processes are based on US patents 8,849,908 and 9,633,039 which are under license by Praxis Technologies, Inc. The underlying software and hardware have been successfully deployed in secure battlefield environments with the Department of Homeland Security, United States Coast Guard, and various industrial complexes. The Orion eLog ELD system is comprised of proprietary Orion eLog hardware, commercially available display and cellular devices, and the proprietary Orion eLog portal. The following components comprise the Orion eLog hardware which is responsible for data connectivity between the vehicle and the display device and is illustrated in Figure 1 below:

- Cable with one end connected to the vehicle's ECU (CANBUS) port;

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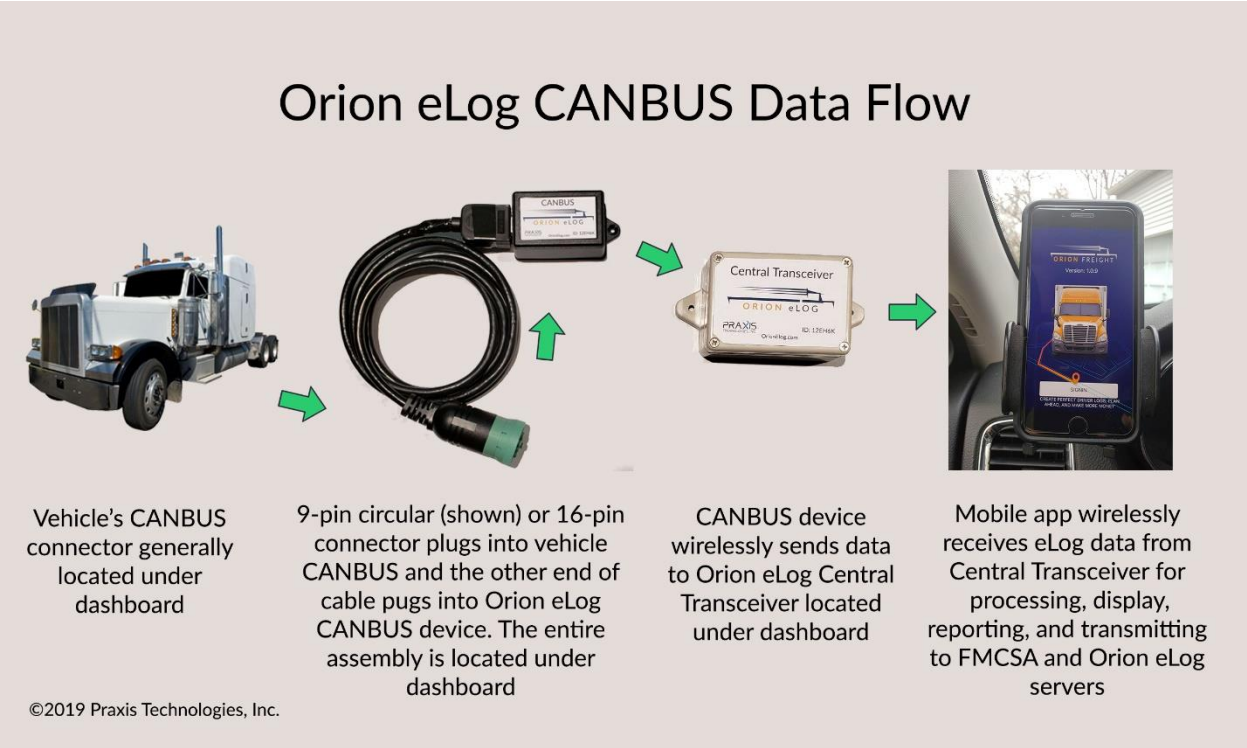
- The other end of the cable connects to the Orion eLog CANBUS device (OEC);
- OEC encrypts the PGN/SPN data and wirelessly sends it to the Orion Central Transceiver (OCT);
- OCT checks data validity and then distributes the data to one or more display devices such as a mobile smartphone or tablet.



Referring to Figure 1, Orion eLog CANBUS device (OEC) is a full spectrum reader that receives and processes all PGN and SPN combinations, including "on-request" codes. This feature provides flexibility in detecting vehicle parameters applicable for monitoring driver and vehicle operating conditions. OEC provides the following features:

1) OEC processes the incoming CANBUS data stream and based on remotely programmable rule sets automatically identifies and selects PGN/SPN combinations required for eLog compliance and then wirelessly sends the encoded CANBUS data to Orion Central Transceiver (OCT).
2) Many vehicle manufacturers limit specific PGNs that can be read through the vehicle's CANBUS, resulting in non-traditional PGN codes across different vehicle manufacturers, as well as within the same manufacturer with different models. Since OEC can be programmed to read any PGN/SPN combination, the OEC can be remotely re-programmed in real-time to read alternative PGN/SPN values that meet eLog compliance requirements. Programming OEC PGN, SPN, and associated sampling rates are controlled by authorized users using the Orion eLog mobile application or from the Orion eLog cloud-based portal.
3) OEC encrypts and stores up to 90 days of data and authenticates that the data was properly sent to the OCT. In the event there is an error event, OEC timestamps and transmits the occurrence to OCT.

The Orion Central Transceiver (OCT) identified in Figure 1 provides an innovative eLog communications and data processing solution that offers several advantages over traditional, single CANBUS transmitters. OCT provides secure communications between the OEC and one or more display device. Salient OCT features include:

1) Multiple simultaneous connections to share vehicle CANBUS data such as driver teams within the same vehicle as well as cloud connections from driver compliance officers, law enforcement, and vehicle maintenance managers.
2) Redundantly stores and authenticates data communications between OEC and multiple driver display devices.
3) Prevents an unauthorized exchange with or use by an OEC in any other vehicle and also provides optional inputs to detect engine operation and vehicle movement in the event of a vehicle ECU or OEC failure or removal.
4) Securely transmits and authenticates OEC data transfer to the driver display device such as smartphone, tablet, or laptop computer that offers Internet connectivity.

Installing the Orion eLog ELD system and Authenticating the Vehicle and Driver

1) Before OEC and OCT are installed in a vehicle, they are registered as a coupled hardware pair in the Orion eLog Portal.
2) The paired hardware is then assigned to a specific vehicle VIN. The result is the eLog system will only operate in the vehicle in which they are installed.
3) Each driver is registered as an authorized user for the Orion eLog ELD system
4) Each driver is assigned a specific mobile device IMEI (e.g., smartphone, tablet)
5) The driver, hardware pair (OCE and OCT), vehicle, and mobile device are all coupled within the Orion eLog Portal. The Orion eLog ELD system will not operate if there are any substitutions not authorized through the eLog portal.
6) OCT provides a hardware-based layer of security that prevents the CANBUS sensor from being used in any other vehicle and traps if the vehicle's ECU has been tampered.

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Step-by-step instructions for a driver to produce and transfer the ELD records to an "authorized safety official" utilizing Option 1—Telematics using both: Wireless Web services and Email

1) **Driver authentication**
    a. Driver logs in to the Orion eLog mobile application installed on an authorized mobile device using a biometric and two-factor authentication.
    b. The driver must be pre-registered in the Orion eLog portal for the device they using. Unregistered or unauthorized vehicle, device, and driver pairing prevents access to the Orion eLog ELD system.
2) **Vehicle authentication**
    a. After driver authentication, the driver scans an encrypted QR code that that is placard inside the vehicle. The QR code compares the scanned data with the authorized pre-registered vehicle and associated Orion eLog ELD system configuration.
    b. A perfect match is required between the driver, mobile display device and application, vehicle ID, and Orion eLog hardware configuration before the Orion eLog ELD system can be activated.
3) **Orion eLog ELD data transmittal**
    a. Upon driver login and ELD connectivity, data are automatically streamed from the vehicle to the display device and the Orion eLog cloud.
4) **Produce & Transfer ELD file for "Official Inspection"**
    a. Inside the Orion eLog mobile application, the Driver accesses the Log Inspection screen and taps the INSPECT LOGS button
    b. The driver is presented with instructions on the inspection process and hands the mobile device to the Official
    c. The Official is presented with two options:
        i. INSPECT LOGS ON-SCREEN – WEB SERVICES button
        ii. EMAIL LOGS button
    d. INSPECT LOGS ON-SCREEN – WEB SERVICES
        i. This brings up an additional instruction screen with two options for the Official:
            1. SUMMARY ELOG DATA
            2. DETAILED ELOG DATA
        ii. This method connects the Orion eLog ELD to the FMCSA server via a web service and passes the certificate, ELD data file, and output file comment.
    e. EMAIL LOGS button

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i. This feature incorporates an S/MIME standard protocol, AES-256 encryption algorithm, and FMCSA ELD public key. The message is signed using our private key.

ii. The email is sent to the FMCSA ELD email address and includes the ELD output file (which is the same file as with the web services method)

iii. The email is transmitted to FMCSA, decrypted, signature validated using our public key, and the ELD file is validated.

5) **Response to the ELD output file:**

a. Once the ELD file is posted, the driver receives a confirmation of the posting with an Error Count number. A value of zero indicates the file has been successfully uploaded. An Error Count equal to one or higher indicates that the requirements in the ELD file are not fulfilled according to ELD requirements.

Include the list of malfunctions found in table 4 of the ELD Rule

The Orion eLog ELD system is compliant with Section 4.6 ELD's Self-Monitoring of Required Functions Table 4 and provides Malfunction Diagnostic codes and events and the Requirements Traceability Matrix ELD-FUNC-4.3.1 found in the Electronic Logging Device (ELD) Test Plan and Procedures document. The Orion eLog ELD system achieves compliance through data fusion analyses incorporating connectivity with vehicle interface, vehicle operational monitoring, and ELD CANBUS inputs.

The following description addresses how the Orion eLog ELD system addresses Malfunction/Diagnostic Code Malfunction (and Data Diagnostics). The Malfunction and Data Diagnostic code descriptions are paired where appropriate for brevity. Codes 3 and 5 are separately addressed.

1. P(1) "Power compliance" malfunction is monitored at 3 distinctive locations:
    a. Orion eLog CANBUS device (OEC) power input from vehicle
    b. Orion Central Transceiver (OCT) power input from vehicle
    c. Wireless authentication from the mobile app which interrogates the input power to the OCT
2. E(2) "Engine synchronization compliance" malfunction
    a. Synchronization is not possible without power connection (See Code P above)
    b. With power connection, the OEC continually scans for errant PGNs indicating it can no longer acquire updated values for ELD parameters. Orion eLog ELD can be configured to specify PGN/SPNs desired as primary and as many alternate options as available. Any non-specified PGN/SPNs would be considered errant.
3. T "Timing compliance" malfunction
    a. Time check validation is coordinated between any two device sources which include OEC, OCT, the Orion eLog cloud server, and the Orion eLog mobile application
    b. In the event time/date are available from the CANBUS (e.g., PGN 65254), the value is still checked against the Orion eLOG server time in UTC to account for vehicle's time zone location.

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4. L “Positioning compliance” malfunction location validation consists of cross-checking various sources to include:
    a. If available, CANBUS PGN 65267
    b. Geospatial information obtained from the Orion eLog mobile application
    c. Calculated inertial navigation using time-distance mapping from PC Miler by ALK Technologies (recently purchased by Trimble MAPS)
    d. PGN 65267 is compared against available multiple sources for accuracy validation
5. R “Data recording compliance” malfunction compliance is achieved through multiple redundancies to include storing data in the following locations:
    a. In the OEC
    b. In the OCT
    c. In the Orion eLog mobile device
    d. In the Orion eLog ELD cloud server
    e. All data transfers are authenticated by CRC check to ensure data integrity before being encrypted
6. S(4) “Data transfer compliance” malfunction
    a. Data transfer compliance is presented in the description above for telematics transfer methods wireless web services and email (entitled above as Description of the supported and certified data transfer mechanisms)
    b. Also see Malfunction Code R above
7. O(6) “Other” ELD detected malfunction
    a. The Orion eLog ELD system is highly robust and provides a range of monitoring that includes all CANBUS PGNs and SPNs, vehicle operating conditions directly from the vehicle’s electrical and mechanical systems, data derived from the mobile device, and deterministic data calculation using information from the mobile application and the Orion eLog ELD server.
    b. As mentioned in Section 2b above, Orion eLog ELD can be configured to specify PGN/SPNs desired as primary and as many alternate options as available. Any non-specified PGN/SPNs would be considered errant.
8. Diagnostic codes
    a. 3 “Missing required data elements data diagnostic” event
        i. Orion eLog ELD system offers intelligent monitoring of ELD parameters expected to be passed through the CANBUS. In the event any expected PGN is not detected, the system seeks an alternative PGN if available. If a required PGN is unavailable, the system issues an alert and triggers an event code 3.
        ii. Since Orion eLog ELD provides cascading alternate configuration options, in the event one PGN for a specific eLog parameter doesn’t report, but an alternate does that provides the same results, it is noted, but no diagnostic event is generated.
    b. 5 “Unidentified driving records data diagnostic” event
        i. Orion eLog ELD records and stores vehicle operations on the OEC and the OCT and can only pair the data with an identified driver if the Orion eLog mobile application was synchronized during the period of data capture. In the event the vehicle was operated without using the Orion eLog mobile application, the data

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are earmarked as operations with an unidentified driver. When the OCT is paired at some later time with the mobile app, it displays the unidentified data to the driver who can accept or reject it as vehicle operational data generated by themselves. If the driver accepts the data as their own self-generated data, then the data are included in their log file. If rejected, then the data are stored in the system as marked as undefined driver assignment and included in the acquiring eLog hardware data file. These data can be reviewed by drivers or portal elog administrators at any time.

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Orion eLog Addendum

Photographs, Mobile Application, and Cloud Portal Screen captures

Praxis Technologies, Inc.
Sewell, New Jersey
Kaydon Stanzione (kstanzione@PraxisTechInc.com)
856.232.9679

NOTICE

Data displayed on any screen captures throughout this presentation are considered test data and are to be viewed as data derived from an operating registered vehicle.

ORION eLOG

PHOTOGRAPH SAMPLES FROM INSIDE A TRUCK

The following photographs are taken from inside a Freightliner or the Orion eLog mobile app running on an iPhone.

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Orion eLog plugs into either Deutsche 9-pin round connector (such as for Freightliner or IH) or DB connector for Volvo

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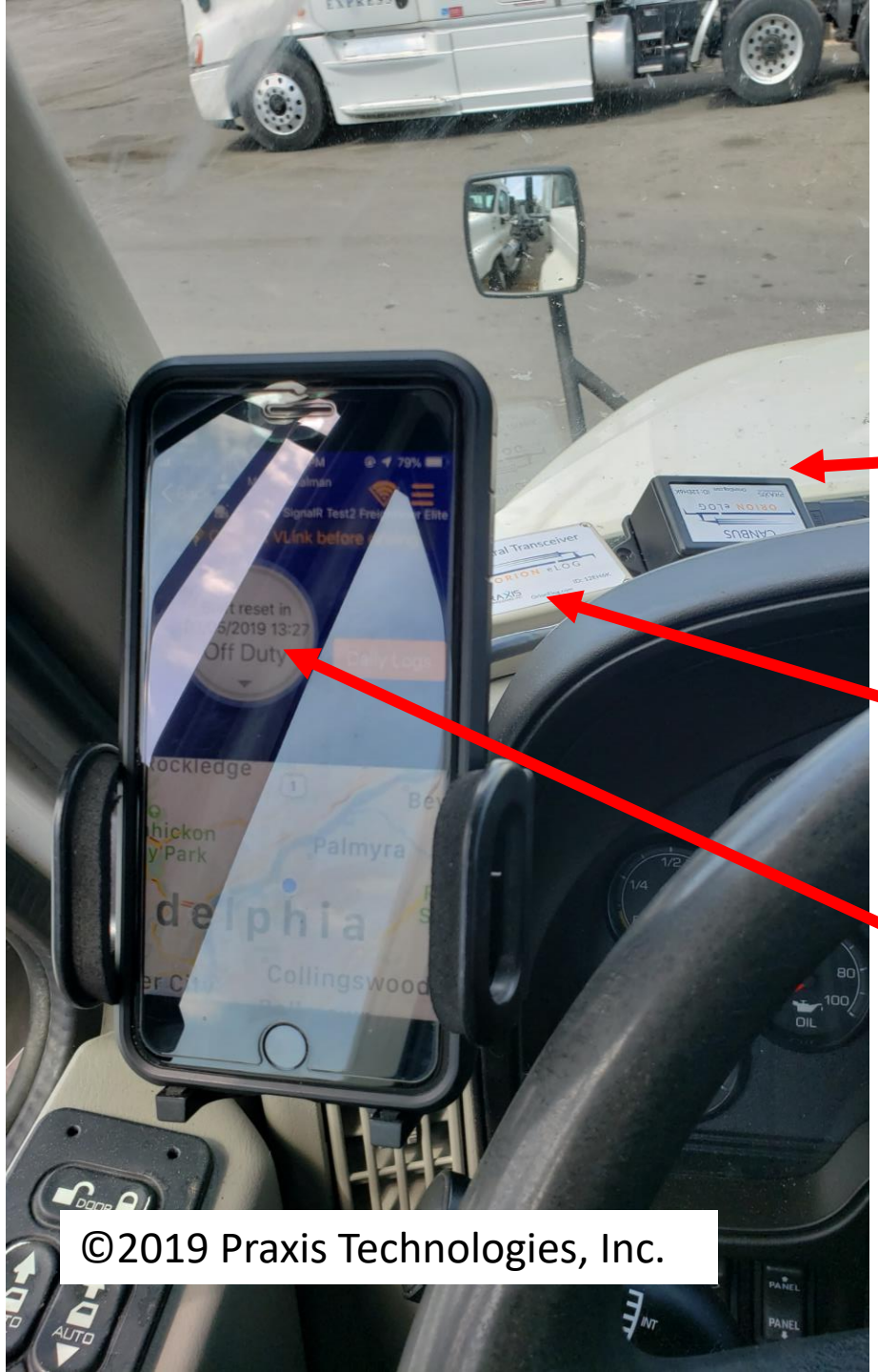

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ORION eLOG

Black enclosure houses the CANBUS, microprocessor, and wireless radio. It has the ability to receive the inflow of CANBUS data from the vehicle ECU as well as to send an “On Request” command to pull various PGNs and associated SPNs.

The CANBUS sends data to the Central Transceiver (white enclosure) which also communicates with the display device (iphone in this picture).

The current screen is the main driver dashboard screen.

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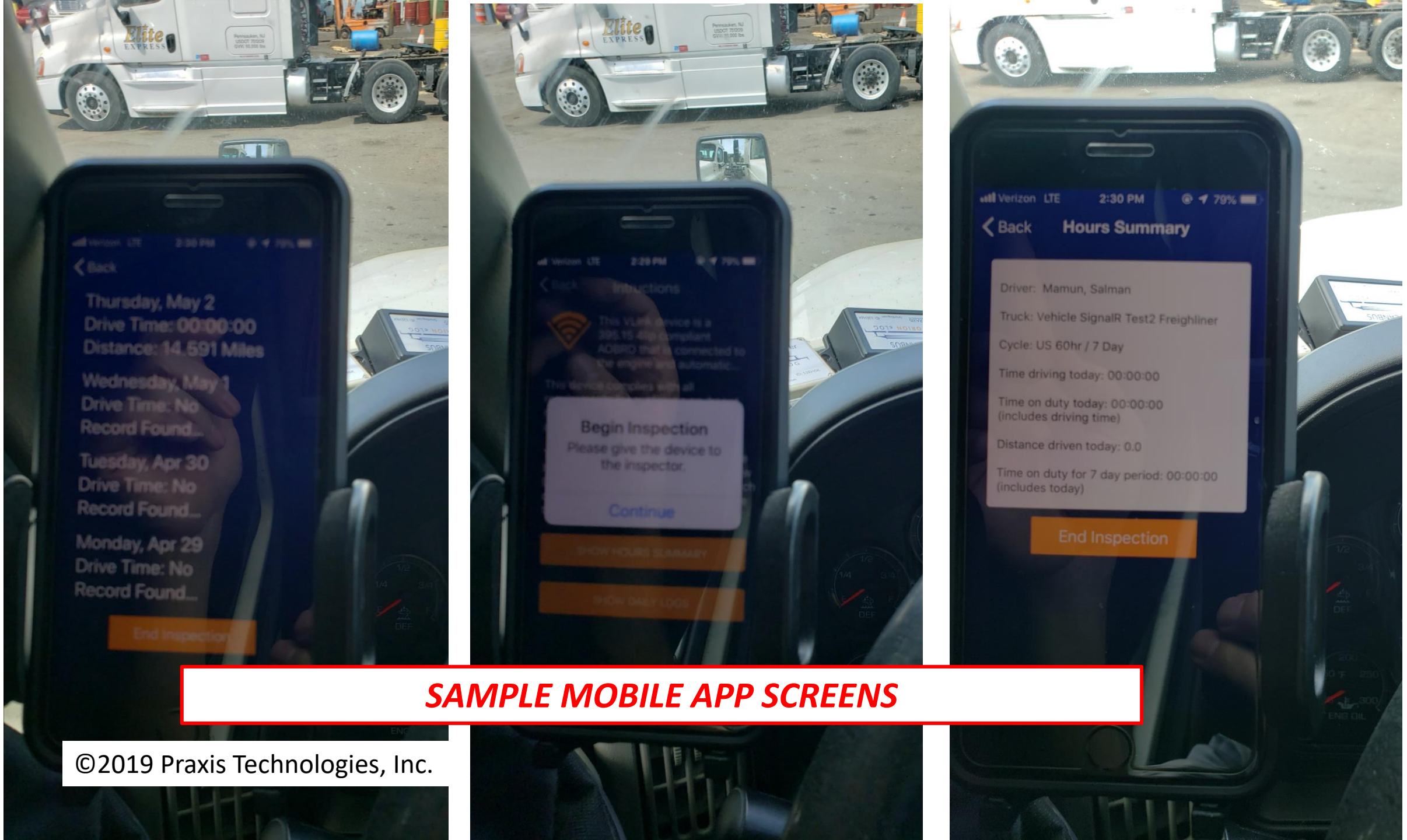

SAMPLE MOBILE APP SCREENS

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SAMPLE SCREEN CAPTURES MOBILE APP

The following screens are captured directly from the mobile app versus taking the picture of the screen inside the truck. This gives better clarity of the workflow.

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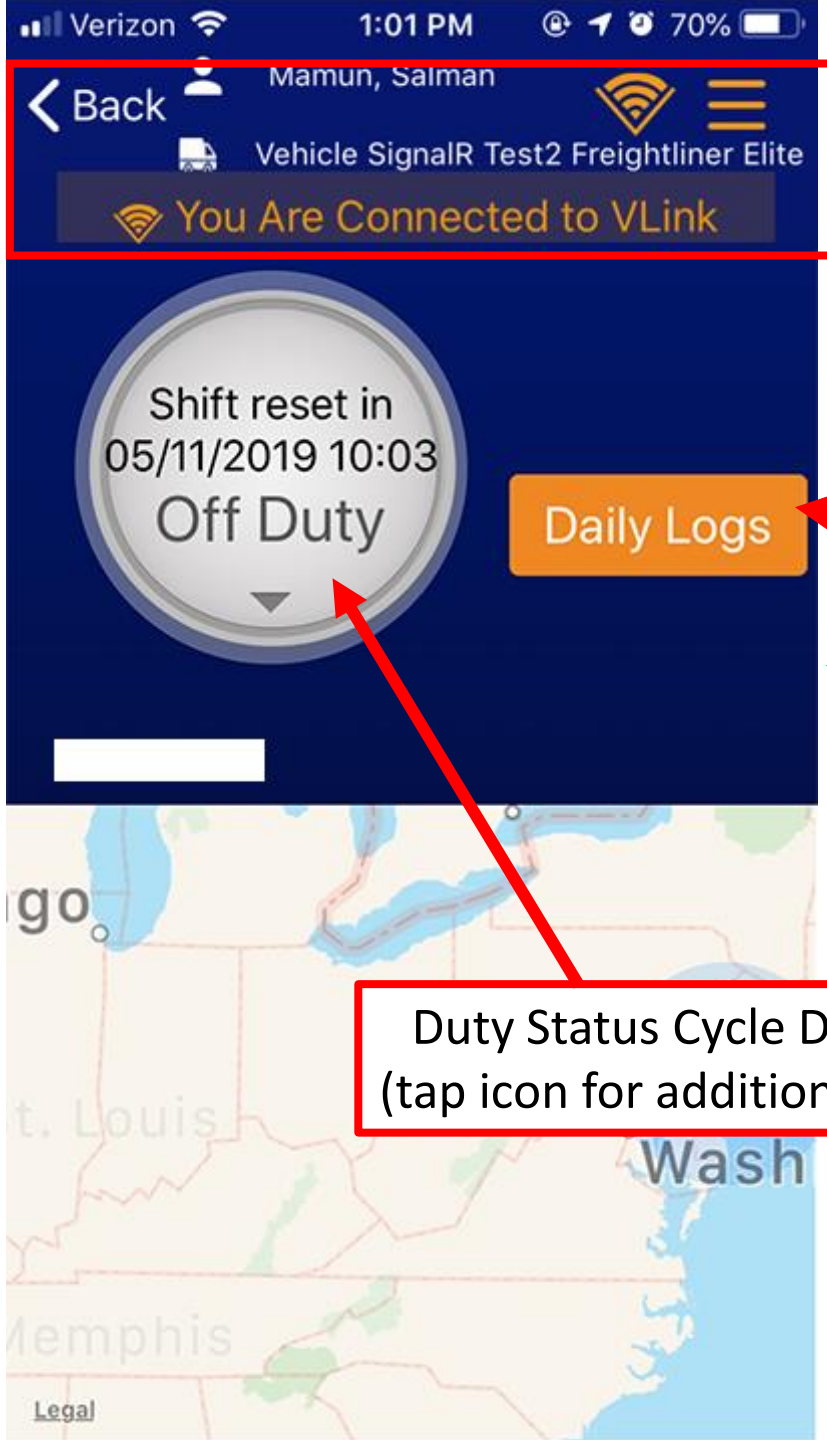

DRIVER DASHBOARD SCREEN

ORION eLOG

Information about driver and connectivity. This validates that the display device is connected to the CANBUS.

NOTE: Drivers only see Daily Logs menu item

Authorized eLog Administrators and Maintenance staff would have access to additional menu items which display here under Daily Logs

Duty Status Cycle Display
(tap icon for additional info)

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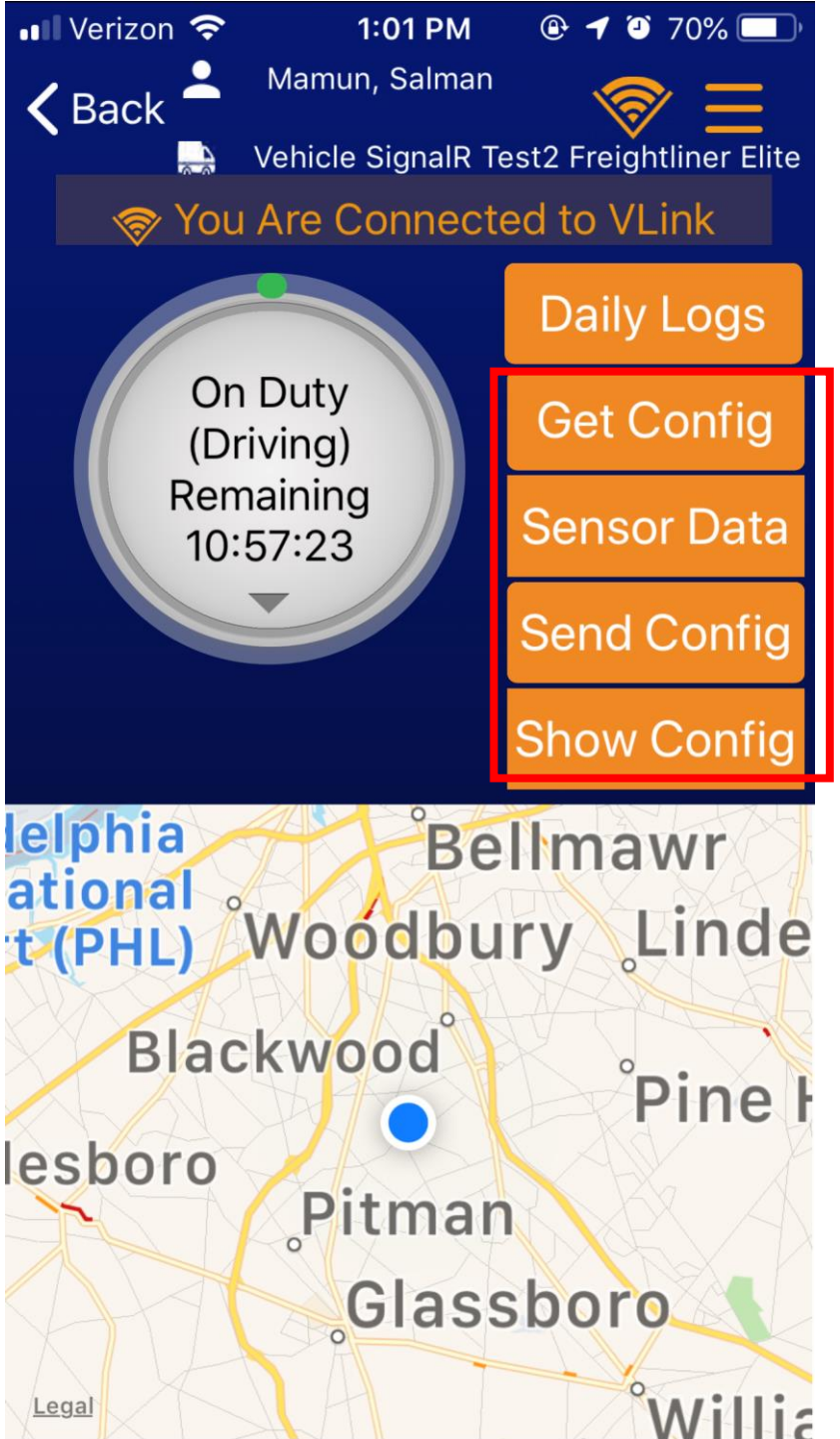

ORION eLOG

ELOG ADMINISTRATOR DASHBOARD SCREEN

These menu items are only visible to authorized eLog Administrators and Maintenance staff

1. *Get Config: retrieves the CANBUS PGN and SPN values and sample rates from the ECU*
2. *Sensor Data: provides the actual de-crypted hexadecimal value strings from the ECU*
3. *Send Config: sends a profile of CANBUS PGN/SPN and associated sample rates that reprograms how the CANBUS processes incoming ECU data (includes On Request PGN data)*
4. *Show Config: displays the CANBUS profile that is queued for re-configuration*

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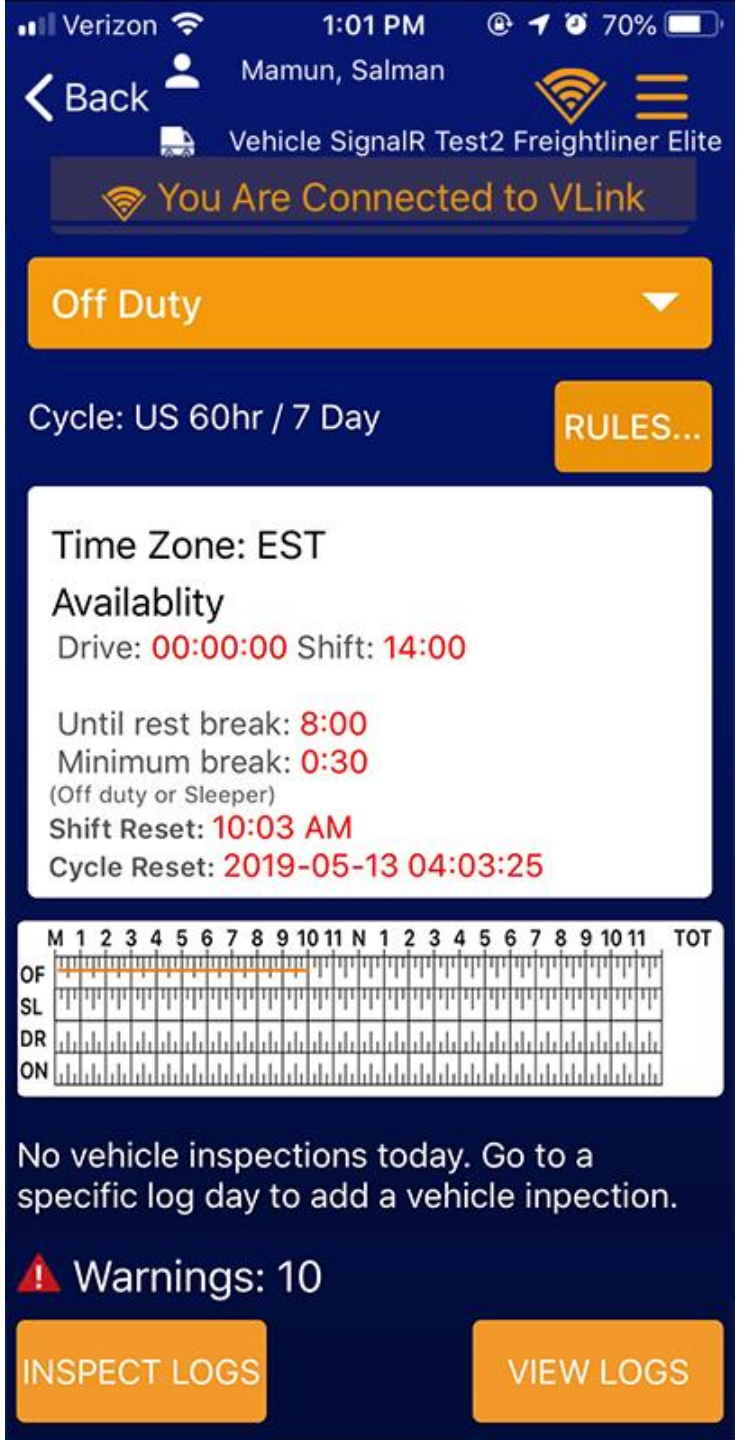
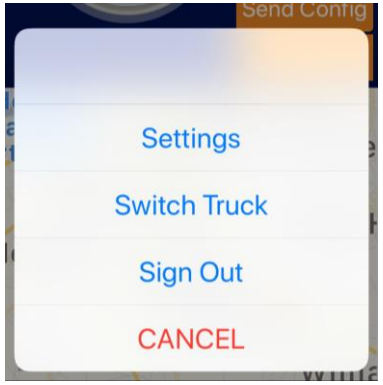


Tap this icon to display menu



ORION eLOG

The Driver taps the Duty Status Cycle Display which displays this screen

INSPECT LOGS is used for compliance deliver to Inspector / Official.

VIEW LOGS enables on-screen log viewing

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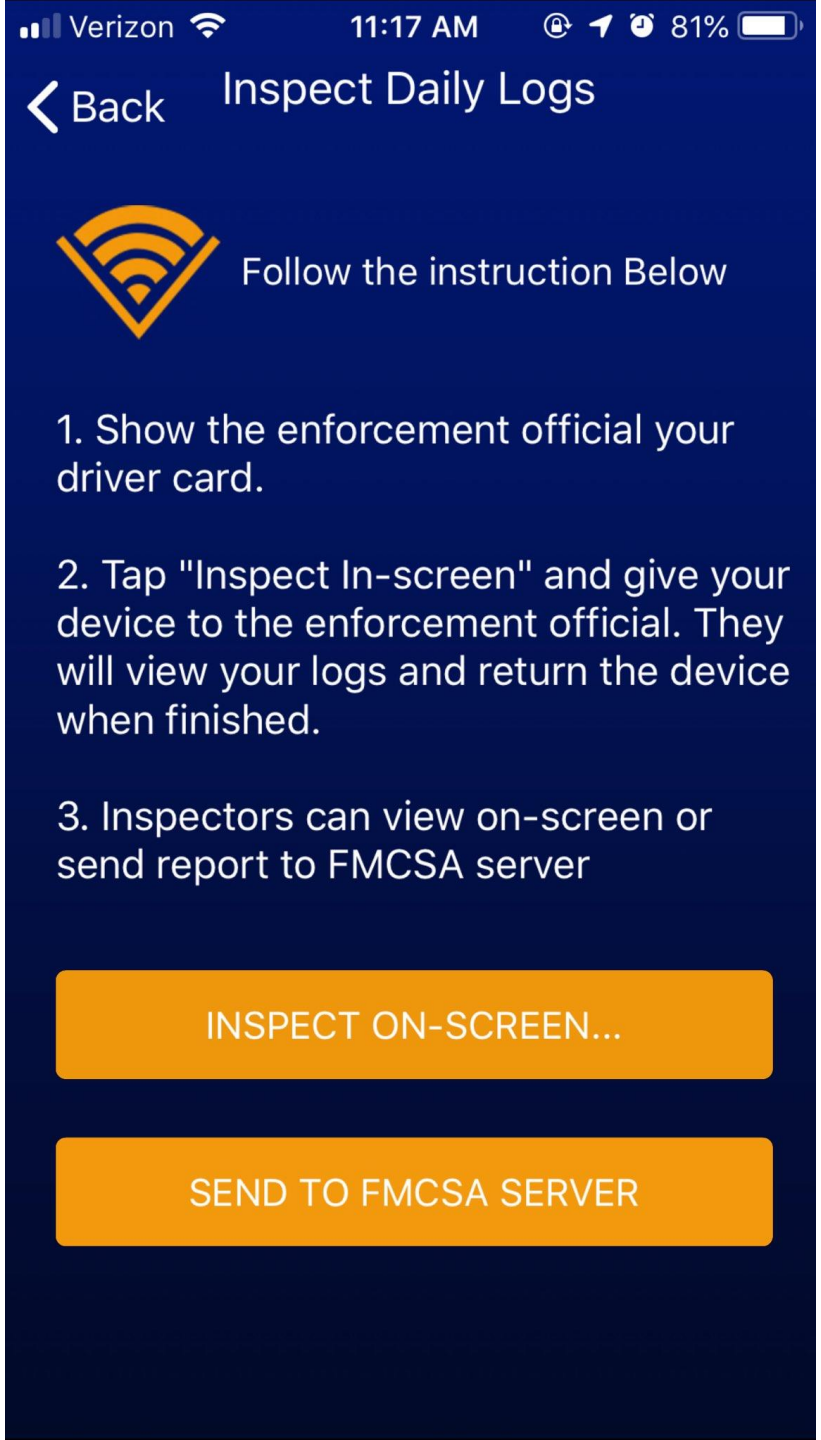

ORION eLOG

Enter this screen from the INSPECT LOGS icon on the previous screen

Prepares the Inspect Log to be viewed directly on screen by the Inspection Official

Option to send the Inspection log to the server via encrypted email

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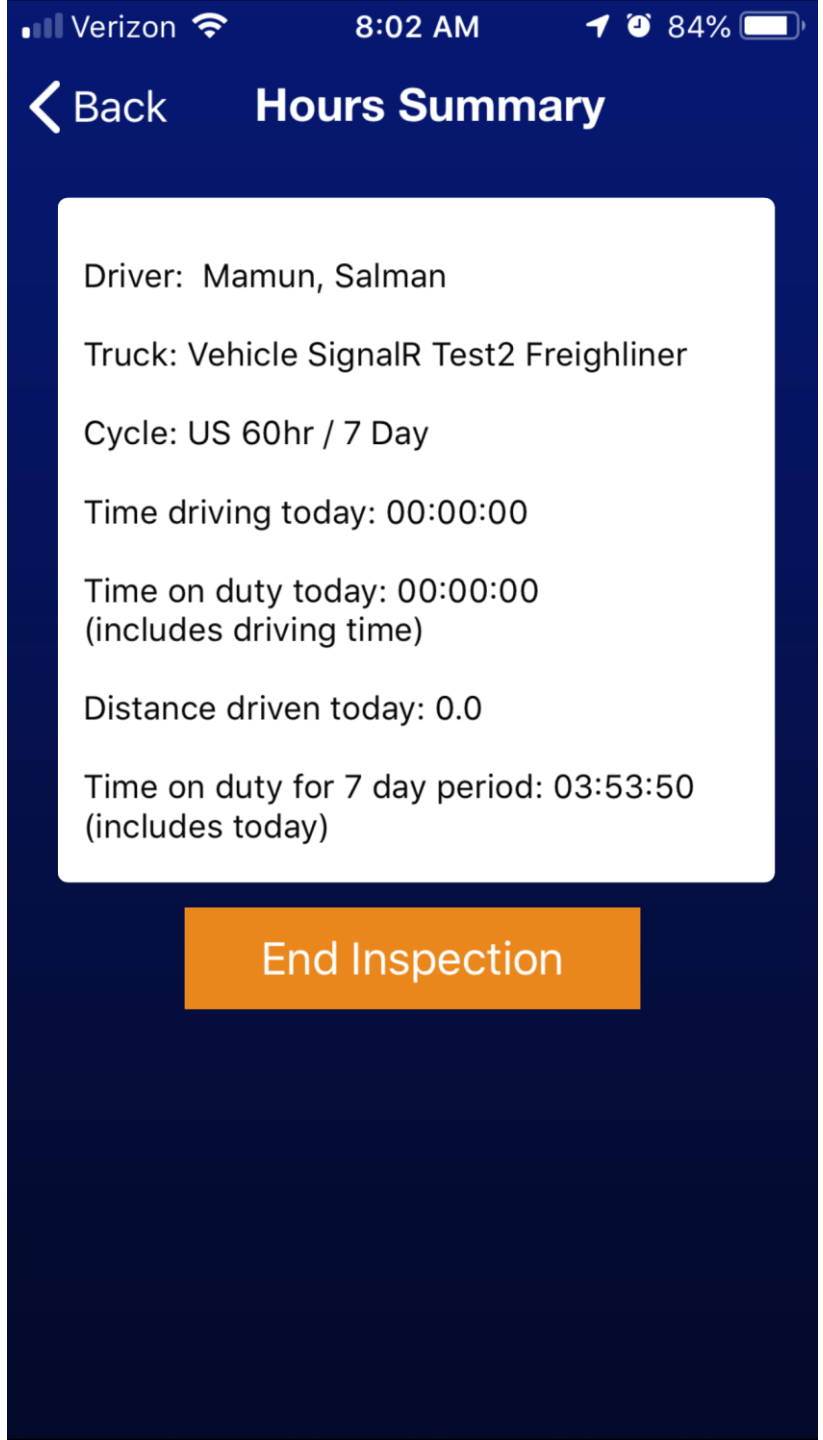

ORION eLOG

Provides an on-line viewing for the Inspection Official

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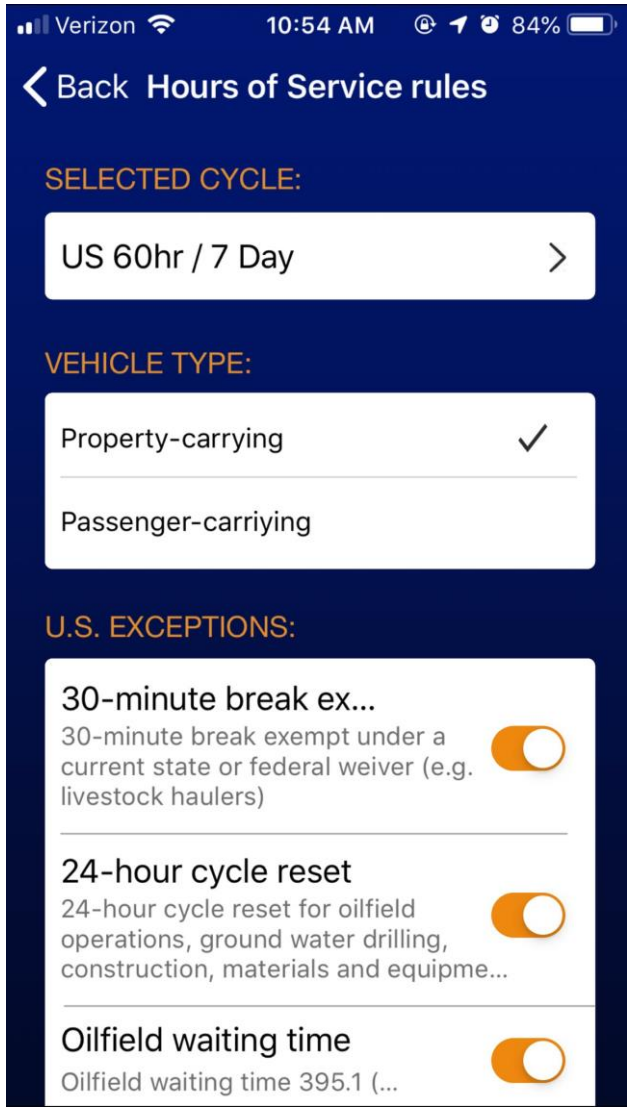
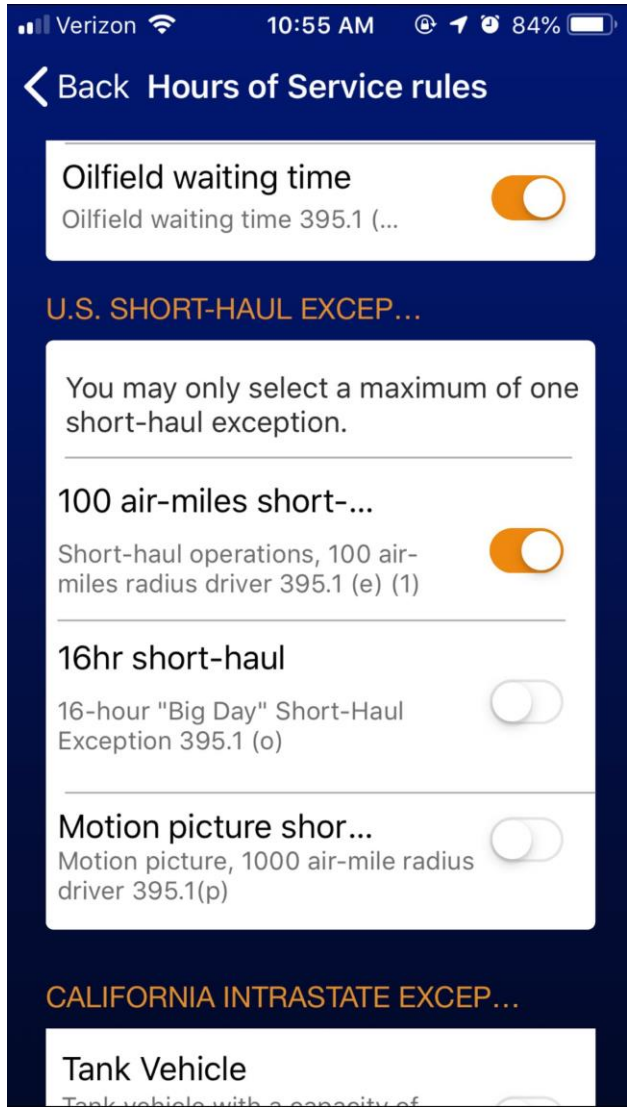
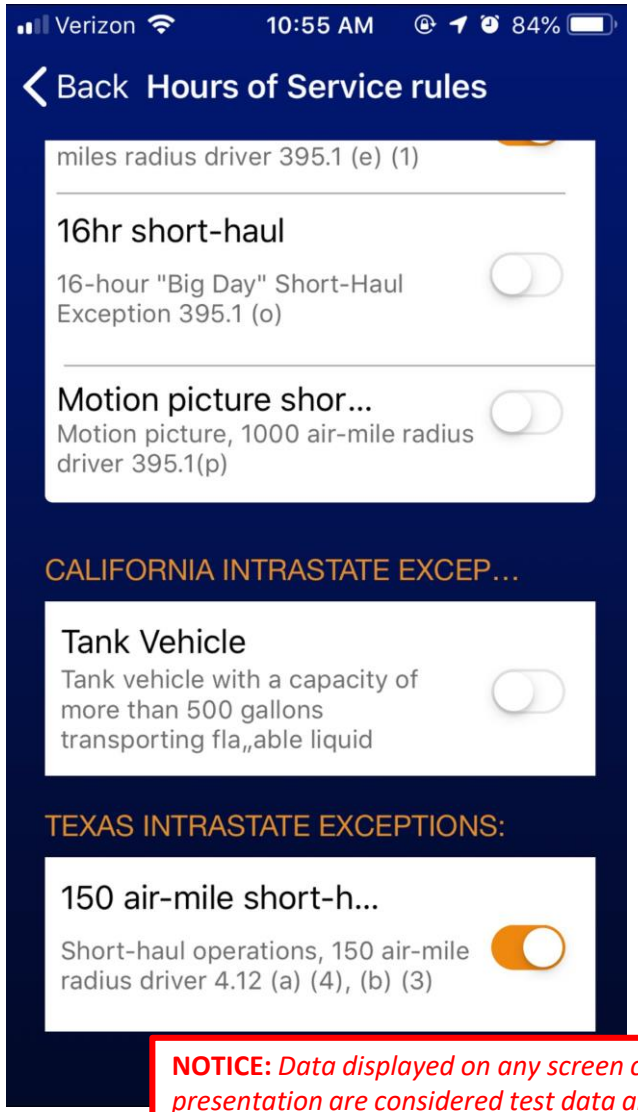
Top of screen >>>>> scrolling downwards







Enter here by tapping the RULES icon on the previous screen

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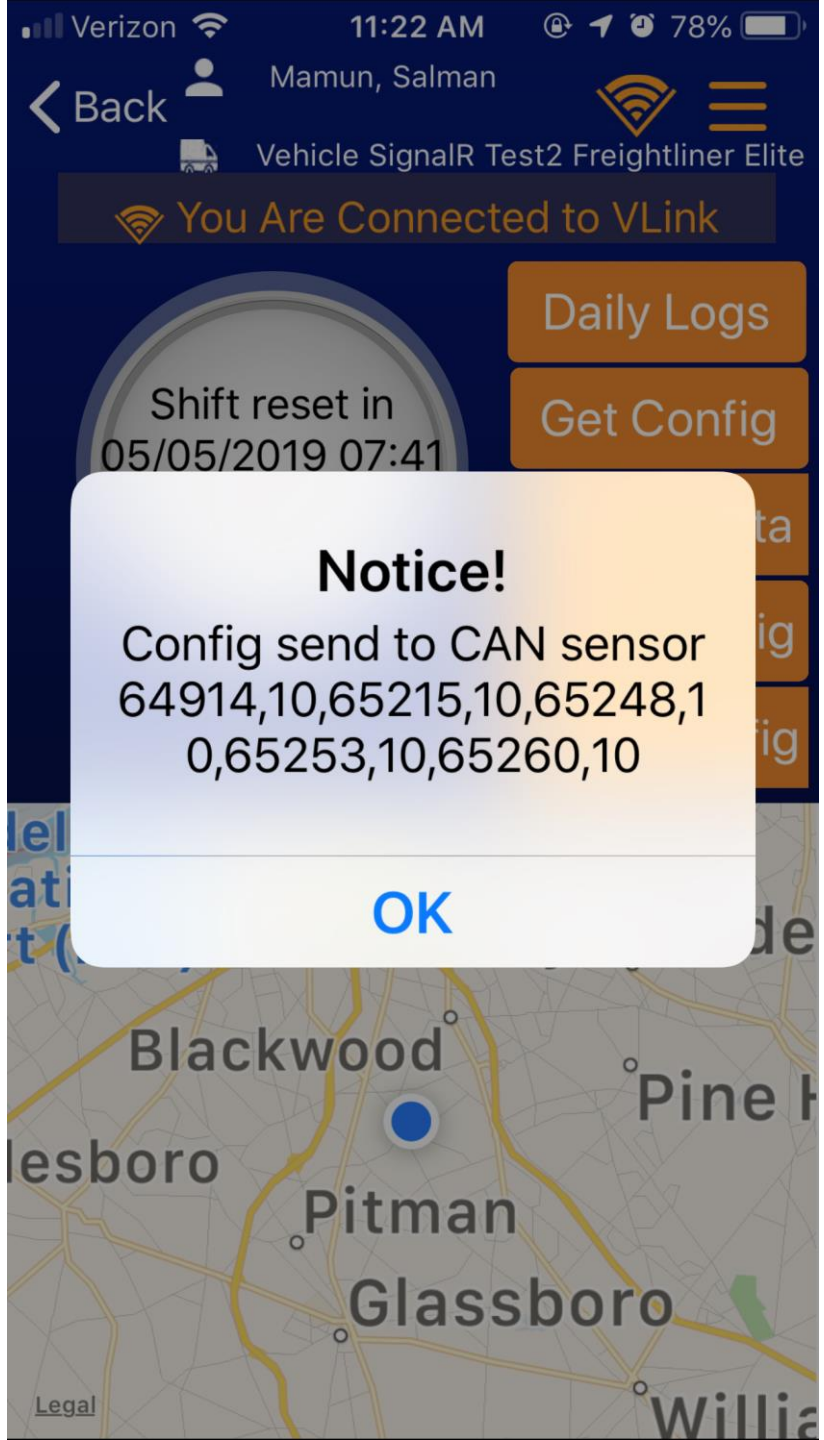

ORION eLOG

Select SEND CONFIG menu

This option is only for eLog Administrators and authorized maintenance users.

This is a sample of how to reconfigure the CANBUS firware with PGNs and associated interval reporting.

ORION eLOG

SAMPLE SCREEN CAPTURES CLOUD PORTAL

The following screens are captured directly from the cloud-based portal that enables eLog administrators to manage the entire eLog workflow.

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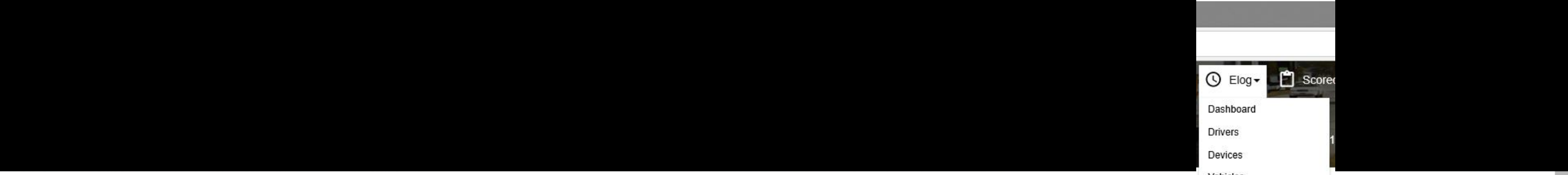
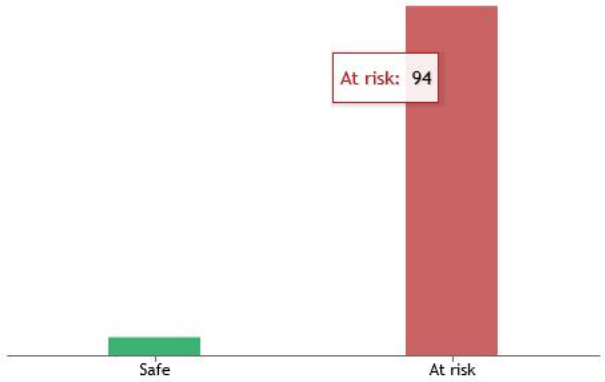
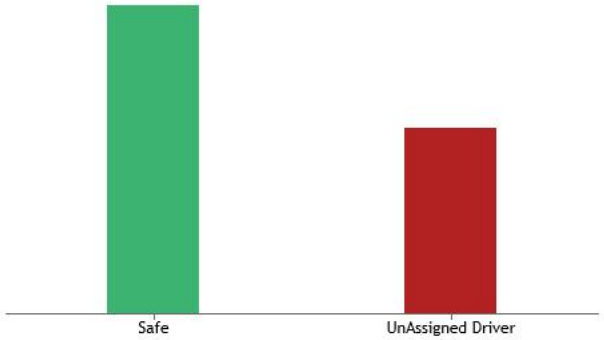


Home / Dashboard

Driver



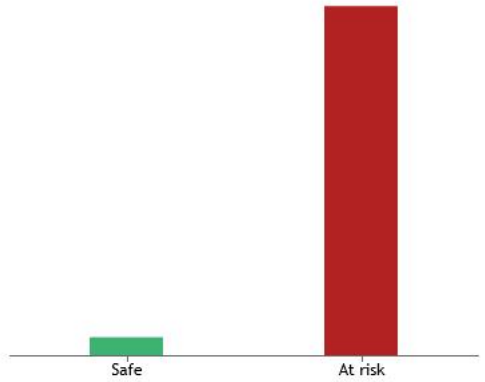
Truck



Driver With Violations

View

Daily Log



Driver Name	Duty Status	Daily Logs At Risk	Daily Logs With Violations		
			Driving Without Available Drive Time	Form & Manner	Missing Signature

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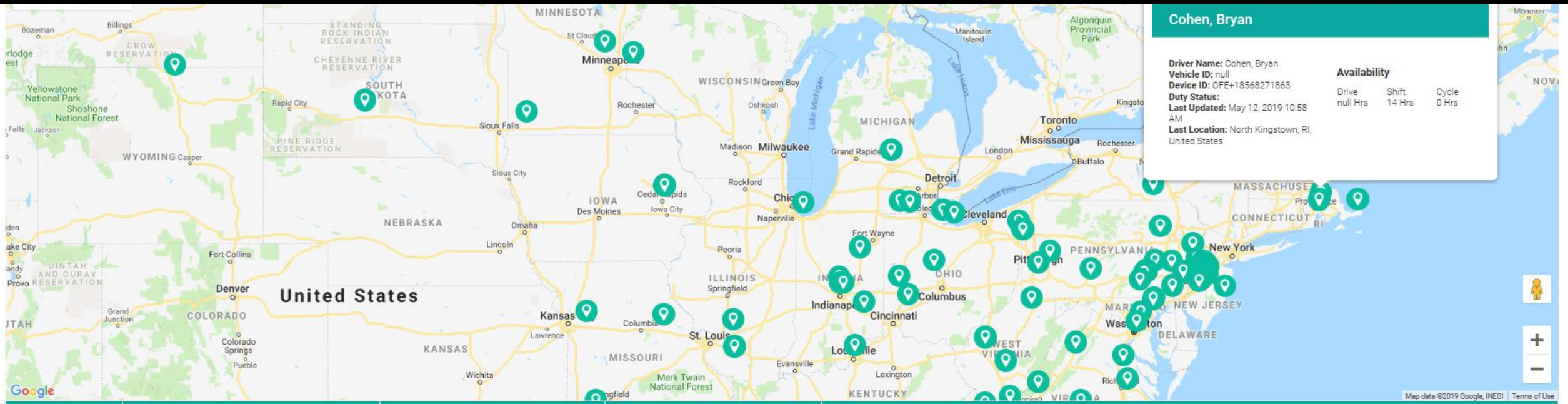
ORION eLOG



Info	Driver Name	Duty Status	Daily Logs At Risk	Daily Logs With Violations		
				Driving Without Available Drive Time	Form & Manner	Missing Signature

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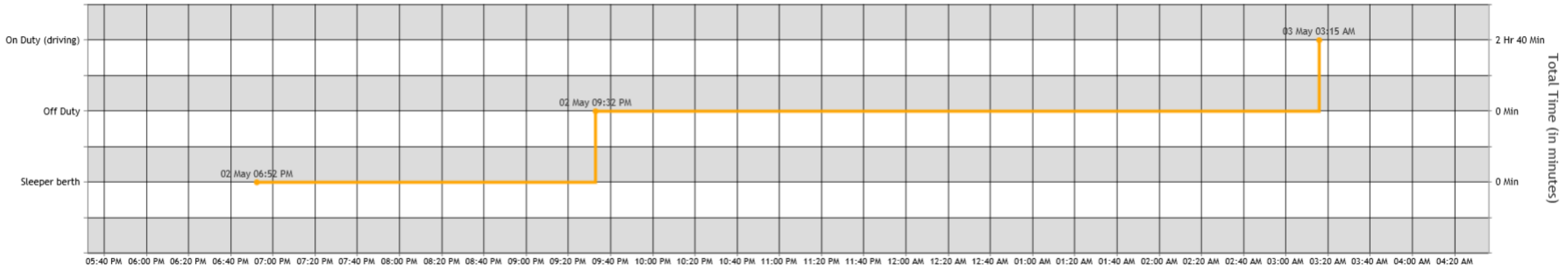
ORION eLOG

Round Trip: Agrawal, Mitesh

From May 1, 2019 2:23 AM To May 4, 2019 2:23 PM

Remarks: Signature:

On Duty Recap:	12.25 Jan 2 (rest)	12.25 Jan 2 (rest)	12.25 Jan 2 (rest)	12.25 Jan 2 (rest)	12.25 Jan 2 (rest)	12.25 Jan 2 (rest)	4:49 Since Last Reset	N/A Avaliable Tommorow



PERSONAL CONVEYANCE 0:07

Start	Duration	Duty Status	Location	ODmeter	Eng. Hrs	Origin
May 3, 2019 3:15:50 AM						
May 2, 2019 9:32:48 PM						
May 2, 2019 6:52:26 PM						
Apr 26, 2019 2:11:06 AM						
Apr 26, 2019 2:09:11 AM						

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ORION eLOG

Talmadge Garwood 0 0 0 0

Lee, James 0 0 0 0

Safe browsing

[redacted]

Home / Reports

Vehicle Mileage Report

Vehicle mileage reports use GPS location data and odometer readings from your daily logs to calculate vehicle mileage by state and province. Read the Vehicle Mileage FAQ for more details.

CREATE VEHICLE MILEAGE REPORT

Driver Hours & Mileage Report

Driver hours & mileage report use the record of duty status and truck mileage information from daily logs to calculate hours worked and miles driven.

CREATE DRIVER HOURS & MILEAGE REPORT

Saved Reports

Created	Type	Title	Created By	Status

DATA REMOVED FOR PRIVACY

ORION eLOG

ORION eLOG

THANK YOU FOR REVIEWING THE MERITS OF THE ORION ELOG SYSTEM

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