

Electric Vehicle Preparedness Task 2: Identification of Joint Base Lewis McChord Vehicles for Installation of Data Loggers

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McChord Vehicles for Installation of Data
Loggers

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Prepared for:

Joint Base Lewis McChord

Prepared by:

Idaho National Laboratory and
ECOtality North America

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Electric Vehicle Preparedness

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1. INTRODUCTION

The U.S. Department of Energy and the U.S. Department of Defense signed a memorandum of understanding on July 22, 2010, for the purpose of strengthening the coordination of efforts to enhance national energy security and to demonstrate federal government leadership in transitioning America to a low-carbon economy. The memorandum of understanding included efforts in the areas of energy efficiency, fossil fuels, alternative fuels, efficient transportation technologies and fueling infrastructure, grid security, smart grid, and storage.

In support of the memorandum of understanding, the Idaho National Laboratory, with funding provided by the U.S. Department of Energy's Vehicle Technologies Office and Federal Energy Management Program, directed ECotality North America to conduct several U.S. Department of Defense base studies to identify potential U.S. Department of Defense transportation systems that are strong candidates for introduction or expansion of electric drive vehicles. ECotality previously has conducted similar fleet, city, state, and country-wide studies using their micro-climate assessment process, which consists of the following four main tasks:

- Task 1: Conduct a fleet and infrastructure assessment
- Task 2: Develop target electrification vehicles
- Task 3: Perform detailed assessment of target electrification vehicles and charging infrastructure
- Task 4: Perform economic analysis of target electrification.

Assessment of the potential for replacing Joint Base Lewis McChord (Tacoma, Washington) fleet vehicles with plug-in electric vehicles (PEVs) starts with assessment of the fleet vehicles' missions and vehicle characteristics. This assessment was conducted through a written survey instrument and field interviews. The Task 1 report provided a summary and assessment of General Services Administration data and survey results.

PEVs generally are classified into two vehicle types: battery electric vehicles and plug-in hybrid electric vehicles. A battery electric vehicle is used to indicate that all motive power is provided by an onboard battery. Plug-in hybrid electric vehicles provide some motive power by an onboard battery that is supplemented by another power source (such as a gasoline engine or generator). Collectively, battery electric vehicles and plug-in hybrid electric vehicles are known as PEVs.

The Task 1 effort led to identification of fleet vehicles that appear to be good candidates for replacement by PEVs. To validate the survey results, a select number of vehicles within the candidate groups were selected for further monitoring and analysis through addition of vehicle data loggers. The Task 2 results are presented in this document.

2. DATA LOGGERS

Data are collected using non-intrusive data loggers (Figure 1) that are placed into the vehicle's onboard diagnostic port. Installation takes less than 15 minutes and typically is completed by fleet managers or a designee. ECotality maintains these data loggers and verifies the signal check-in weekly. The data loggers transmit vehicle information by cellular means to a data center, from which ECotality retrieves this information. Data are transmitted every 5 seconds.

Data collected consist of the following data points: key-on events, key-off events, and position updates logged every minute the vehicle is turned on. These data points are converted into records of trip events, stop events, and idle events.

From these data points, the following information is available:

- Trip distance
- Total distance between based locations
- Idle time
- Time between base location returns during the day, swing, and graveyard shifts
- Repeated intermediate stop location.

The data loggers are retained on a vehicle for approximately 6 to 8 weeks to accurately characterize movement of the vehicle.



Figure 1. Typical data logger.

3. FLEET VEHICLE SECTION

Data loggers have been installed on 60 vehicles at Joint Base Lewis McChord (Figure 2 shows the distribution of vehicle types). As can be seen in Figure 2, the majority of the vehicles are light trucks. There are a fair number of sedans and medium trucks as well. This distribution is approximately representative of the fleet and comprises a large number of smaller vehicles, which are the most likely candidates for replacement by PEVs in the near future. For comparison, vehicle type distribution for all vehicles is shown in Figure 3, which is taken from Task 1.

Figures 4 through 7 present distributions for model year, gross vehicle weight rating, cumulative distance driven, and monthly distance driven. The figures show that the selected vehicles are representative of a wide range of vehicle and mission types.

Figures 8 through 10 present survey results for the selected vehicles. Respondents have completed surveys for 23 of the selected vehicles. As can be seen in the figures, the vehicles cover a variety of different responses, and are fairly representative of the fleet in general.

Additionally, the vehicles are used for a variety of purposes by several different divisions on base. These include Public Works, Directorate of Family Morale, Welfare and Recreation, Madigan Army Medical Center, Criminal Investigation Division, Directorate of Logistics, and the Department of Emergency Services.

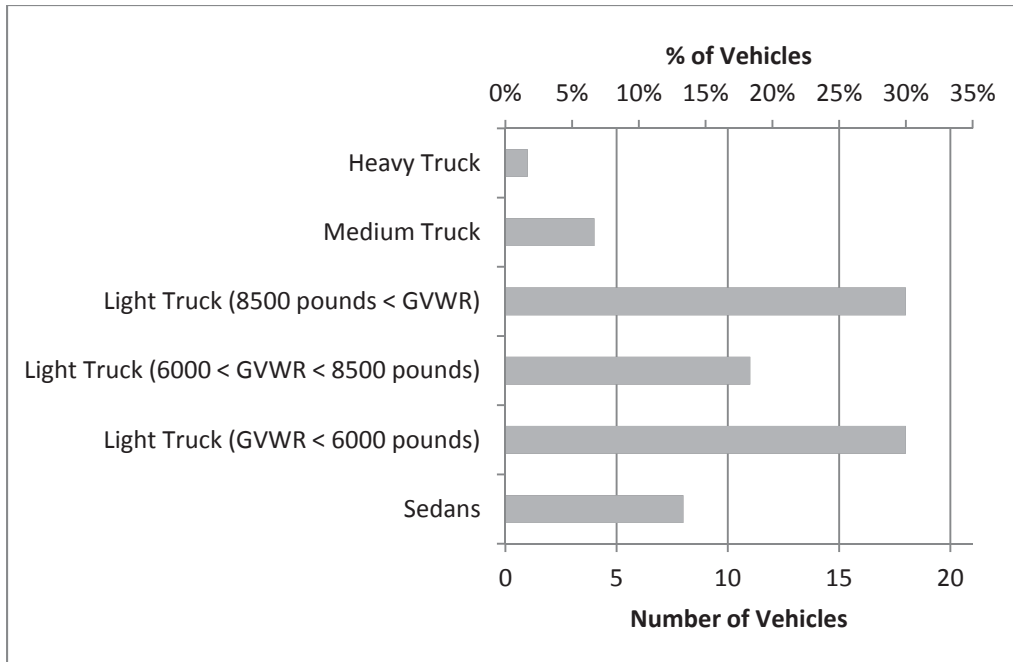


Figure 2. Vehicle type distribution for vehicles with data loggers.

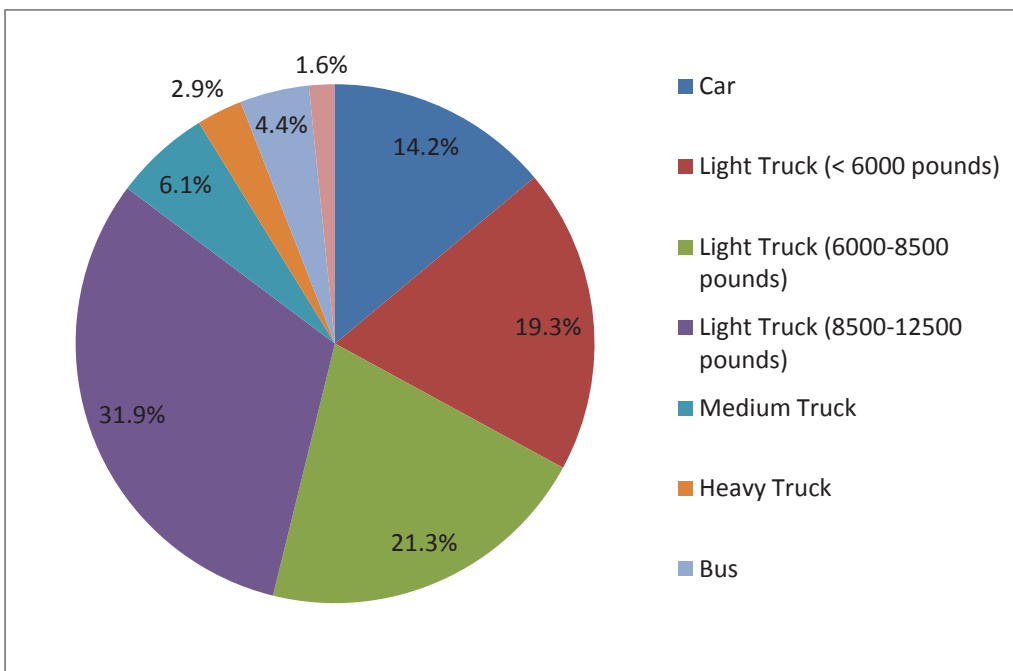


Figure 3. Vehicle type distribution for all vehicles.

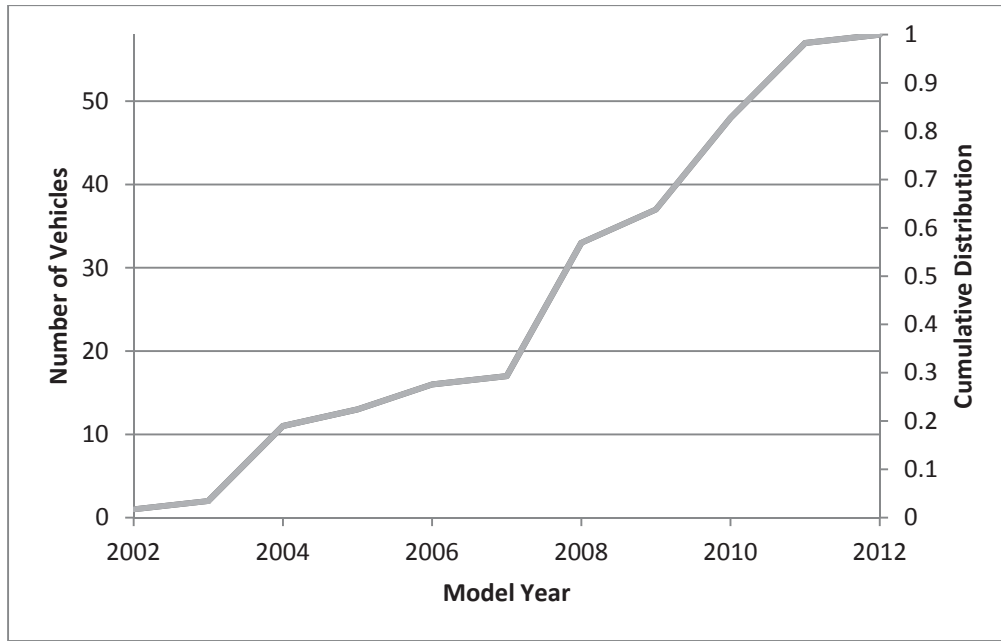


Figure 4. Model year distribution for vehicles with data loggers.

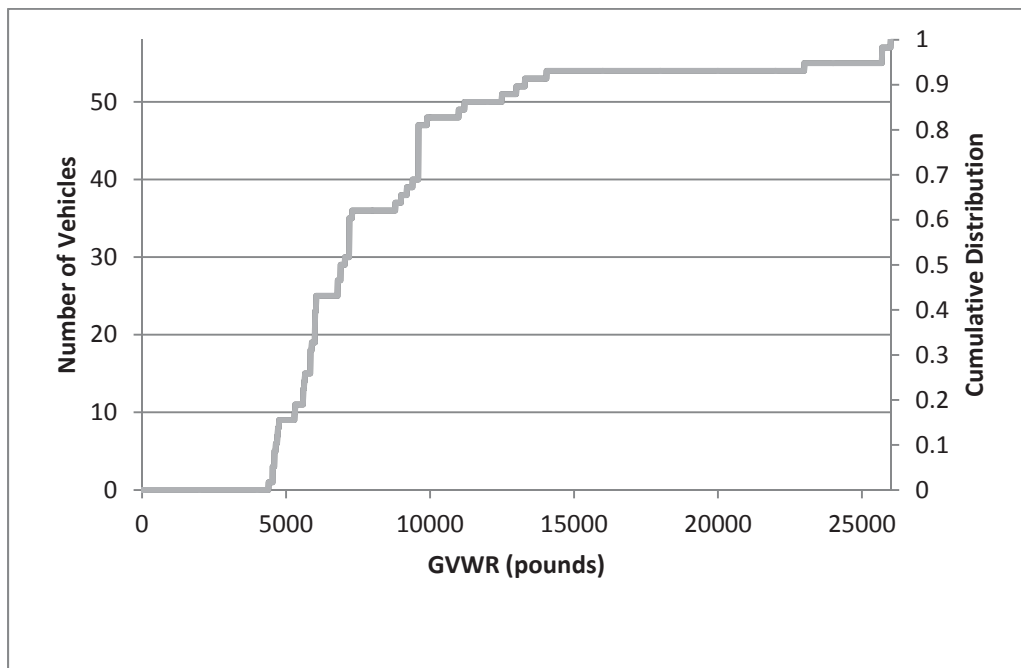


Figure 5. Gross vehicle weight rating distribution for vehicles with data loggers.

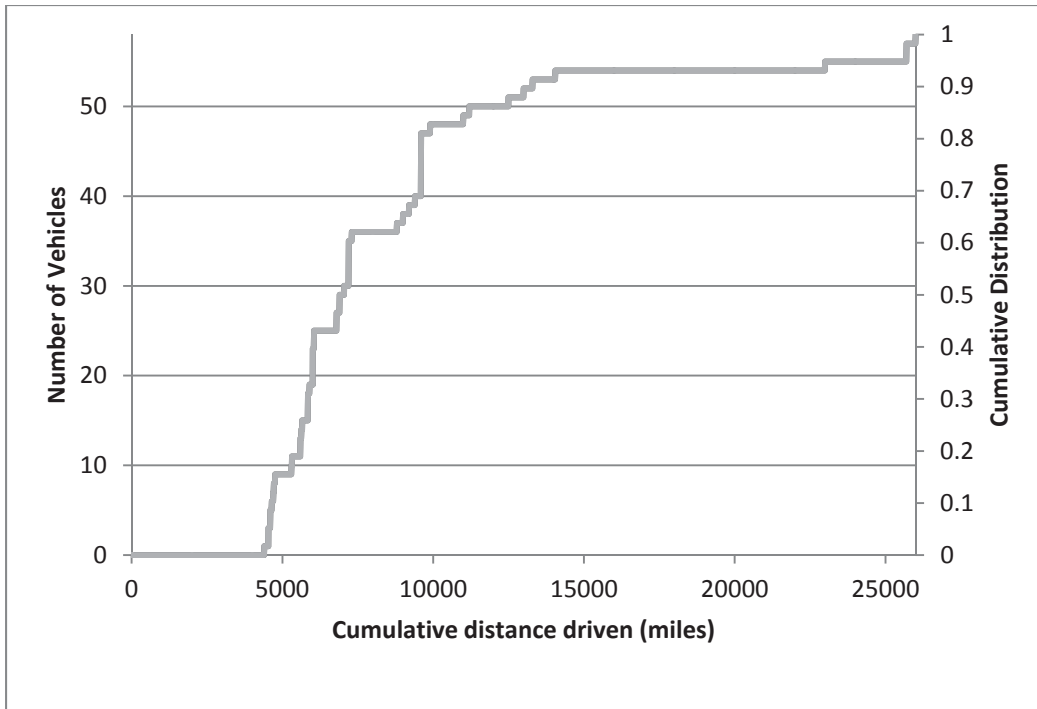


Figure 6. Distribution of cumulative distance driven for vehicles with data loggers.

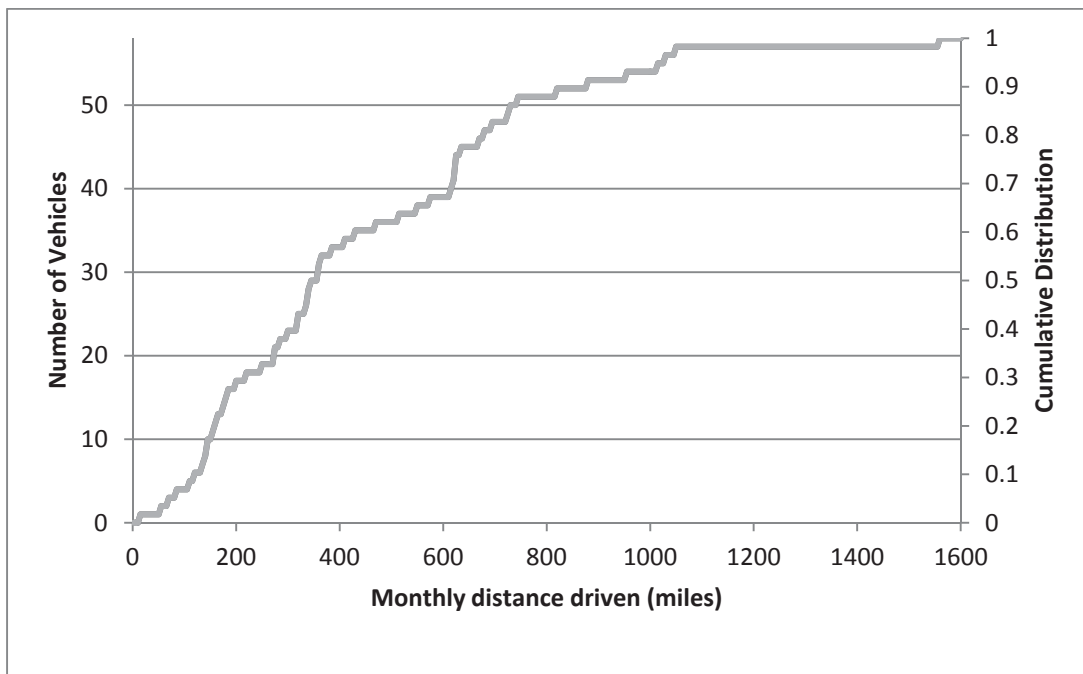


Figure 7. Distribution of monthly distance driven for vehicles with data loggers.

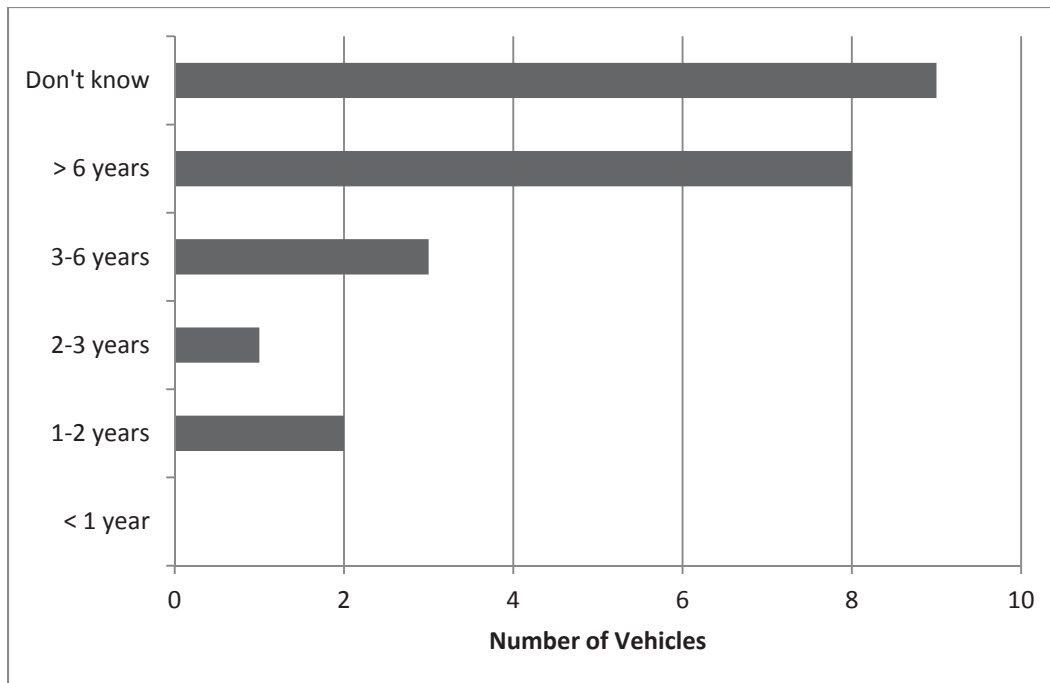


Figure 8. Survey results for vehicles with data loggers: How much longer do you expect to keep the vehicle in your fleet?

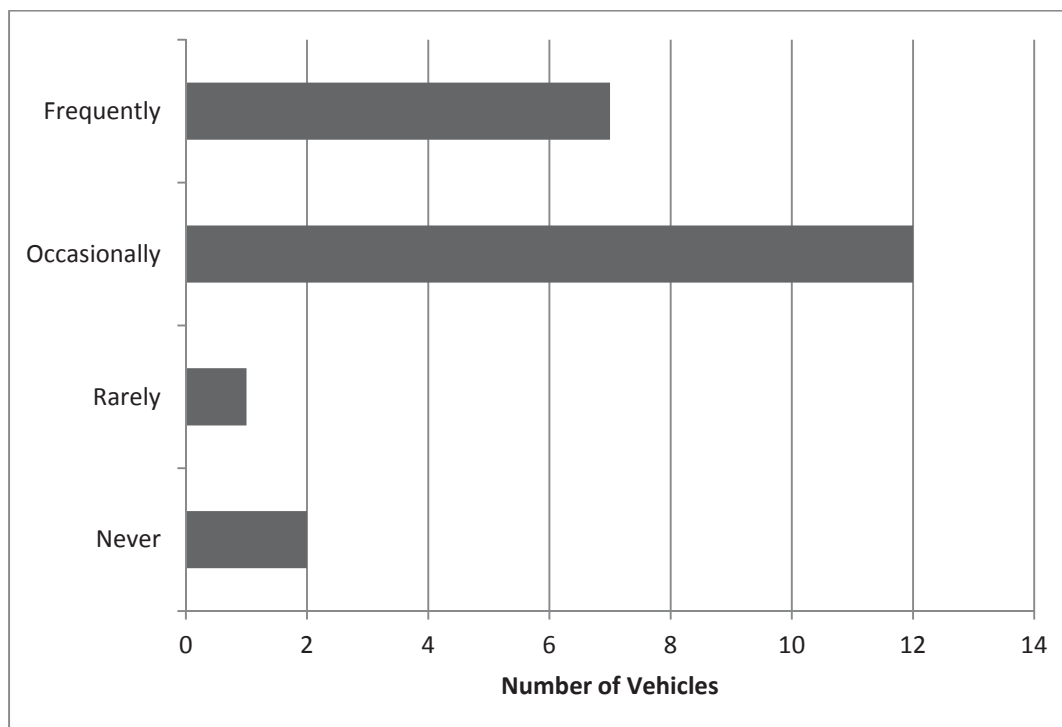


Figure 9. Survey results for vehicles with data loggers: Is this vehicle used off-base?

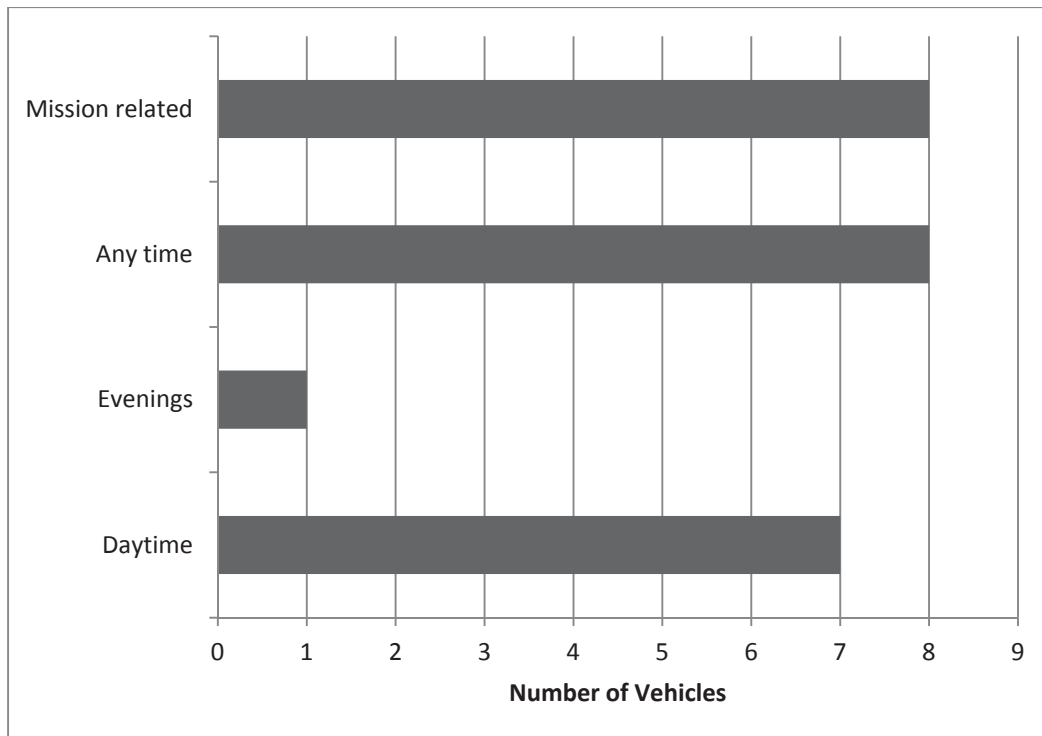


Figure 10. Survey results for vehicles with data loggers: Are the vehicles used during specific hours or at any time during the day?



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