Vehicle Maintenance Facility Preparedness for Next Generation Delivery Vehicles

AUDIT REPORT

Report Number 22-045-R23 | October 17, 2022

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Highlights

Background

The U.S. Postal Service plans to replace and expand its current delivery fleet with a mix of internal combustion engine and battery electric powertrain, purpose-built Next Generation Delivery Vehicles (NGDV), and commercial off-the-shelf vehicles. As a result, the Postal Service has initiated several efforts to prepare its Vehicle Maintenance Facilities (VMF) — where the current fleet is serviced and repaired — to maintain NGDVs upon initial deployment in late 2023.

What We Did

Our objective was to assess the Postal Service's VMF preparedness plans to maintain the future fleet of NGDVs. For this audit, we engaged a contractor to help us identify VMF preparedness and fleet transition best practices from five domestic and foreign delivery fleets and compared Postal Service practices against them. In addition, we conducted site visits at judgmentally selected VMFs in the Los Angeles, CA; Detroit, MI; Atlanta, GA; Pittsburgh, PA; and Baltimore, MD areas to understand their experiences with prior fleet transitions.

What We Found

Generally, we found the Postal Service's initial plans to prepare VMFs to maintain the future fleet of NGDVs were consistent with the best practices of other delivery fleets transitioning an older fleet to newer vehicles. We also noted opportunities for the Postal Service to further enhance its plans as it continues updating and refining the plans prior to NGDV deployment. Specifically, we found that several industry best practices were not fully outlined in the Postal Service's initial plans, such as defining essential technician skills and certifications, making upgrades needed to building systems, and developing a battery electric vehicle waste management strategy.

The Postal Service stated that it considered incorporating these fleet transition best practices but it was too early in the planning process to commit to additional efforts, as acquisition and distribution plans were not finalized. Headquarters management indicated they intend to implement any remaining and applicable best practices in the future. By evaluating the adoption of additional peer delivery fleet transition best practices, the Postal Service could be better prepared to maintain new NGDVs prior to deployment in October 2023.

Recommendations

We recommended management further evaluate industry fleet transition best practices and outline additional efforts to enhance existing VMF preparedness plans as they finalize NGDV acquisition and deployment.

Transmittal Letter

OFFICE OF INSPECTOR GENERAL
UNITED STATES POSTAL SERVICE

October 17, 2022

MEMORANDUM FOR: ANGELA H. CURTIS
VICE PRESIDENT, DELIVERY OPERATIONS

LINDA M. MALONE
VICE PRESIDENT, ENGINEERING SYSTEMS

FROM: Amanda Stafford
Deputy Assistant Inspector General
for Retail, Marketing & Supply Management

SUBJECT: Audit Report – Vehicle Maintenance Facility Preparedness for Next Generation Delivery Vehicles (Report Number 22-045-R23)

This report presents the results of our audit of the U.S. Postal Service's Vehicle Maintenance Facility Preparedness for Next Generation Delivery Vehicles.

We appreciate the cooperation and courtesies provided by your staff. If you have any questions or need additional information, please contact Steven Hutchins, Acting Director, Retail Operations, or me at 703-248-2100.

Attachment

cc: Postmaster General
Corporate Audit Response Management
Chief Retail and Delivery Officer & Executive Vice President

Results

Introduction/Objective

This report presents the results of our self-initiated audit of Vehicle Maintenance Facility Preparedness for Next Generation Delivery Vehicles (Project Number 22-045). Our objective was to assess the Postal Service's Vehicle Maintenance Facility (VMF) preparedness plans to maintain the future fleet of Next Generation Delivery Vehicles (NGDV). See Appendix A for additional information about this audit.

Background

The U.S. Postal Service operates one of the largest civilian fleets in the U.S. At the end of fiscal year (FY) 2021, the Postal Service owned approximately 217,000 delivery vehicles,[1] including both purpose-built and commercial-off-the-shelf (COTS) vehicles. The Postal Service maintains this fleet using 308 VMFs[2] throughout the country. Vehicle maintenance includes selecting and training mechanics; providing garages, tools, and equipment; and monitoring and maintaining preventive maintenance standards[3] to ensure that VMFs support the Postal Service's mission to deliver to 161 million addresses.

To manage its aging fleet,[4] the Postal Service approved approximately $3.9 billion to design, assemble, and deploy 50,000 vehicles during FYs 2024 through 2027. This fleet replacement strategy is included in the Postal Service's 10-year plan, *Delivering for America: Our Vision and Ten-Year Plan to Achieve Financial Sustainability and Service Excellence*, developed to transform the Postal Service's financial performance and customer service through significant investments in people, technology, and infrastructure.

To launch the multi-billion dollar modernization, in February 2021, the Postal Service awarded a contract to Oshkosh Defense to manufacture the NGDV to replace and expand the current delivery fleet with a much larger vehicle for mail and package delivery. In March 2022, the Postal Service placed its initial NGDV delivery order for 50,000 vehicles, including 10,019 battery electric vehicles (BEV). Then in June 2022, the Postal Service announced plans to explore increasing the number of BEVs and possibly replacing a portion of the new fleet with COTS vehicles. The Postal Service estimates the first NGDVs are to appear on carrier routes in October 2023.

> "The Postal Service estimates the first NGDVs are to appear on carrier routes in October 2023."

While the Postal Service has experience preparing VMFs for prior fleet transitions — it has added more than 27,200 ProMasters and 25,200 Metris vans to the fleet since FY 2016 — unique challenges may still exist. The Postal Service has not facilitated a fleet transition of this magnitude since 1987 and has no experience maintaining large numbers of electric vehicles. Furthermore, the NGDV will be equipped with many new features representing significant technical advancements when compared to the LLV – air conditioning, 360-degree cameras, advanced braking and traction control, air bags, and collision avoidance systems (see Figure 1).

Fortunately, fleet transitions are not a challenge unique to the Postal Service. Recently, many domestic and foreign companies have been acquiring new vehicles, including BEVs, to modernize their delivery fleets. While these fleets are different from Postal Service delivery vehicles in significant ways, their experiences can help inform the Postal Service's plans and strategies for preparing VMFs to maintain NGDVs.

For this audit, the U.S. Postal Service Office of Inspector General (OIG) engaged a contractor to help identify VMF preparedness and fleet transition best practices from five domestic and foreign delivery fleets and compared Postal Service's practices against them. In addition, the contractor and OIG team conducted

1 The current delivery vehicle fleet consists of the Long Life Vehicle (LLV), Flex Fuel Vehicle, Metris, ProMaster, minivan, and Step Vehicle (commonly called 2-Ton).
2 Headquarters Fleet Management provides administrative support and guidance for operations and maintenance to VMF Regional Management, which encompasses four areas: Westpac, Central, Southern, and Atlantic. Each Regional Manager oversees eight VMF Territories (or a total of 32 Territories) that are responsible for local VMFs.
3 Handbook PO-701, *Fleet Management*, Section 132, updated October 2008.
4 As of the end of FY 2021, the Postal Service has approximately 138,000 right-hand-drive LLVs, with an average age of 30 years. All LLVs have exceeded their projected 24-year life span and account for over 63 percent of the delivery fleet.

Figure 1. NGDV Feature Highlights

Source: *Delivering for America: Our Vision and Ten-Year Plan to Achieve Financial Sustainability and Service Excellence*, published March 23, 2021.

supplemental interviews with a vocational fleet,[5] a national commercial vehicle dealership,[6] a foreign postal operator, and a U.S. federal agency to further inform the Postal Service's VMFs preparedness efforts.

Findings Summary

We found the Postal Service's initial plans to prepare VMFs to maintain the future fleet of NGDVs were consistent with the best practices of other delivery fleets transitioning an older fleet to newer vehicles. We also noted opportunities for the Postal Service to further enhance its plans as it continues updating and refining the plans prior to NGDV deployment. It is also important to note that potential changes to its vehicle acquisition strategy, including the purchase of COTS vehicles, may require the Postal Service to re-evaluate its VMF preparedness plans and may result in changes to its current strategies.

Finding #1: USPS's Initial Plans Employ Best Practices for VMF Preparedness

We reviewed the Postal Service's plans and strategies related to preparing VMFs for the NGDVs. Generally, we found the Postal Service's initial plans to prepare VMFs to maintain the future fleet of NGDVs were consistent with the best practices of other delivery fleets when transitioning an older fleet to newer vehicles. See Appendix B for a description of best practices associated with fleet transitions.

Specifically, we determined the Postal Service followed best practices related to preparing VMFs for NGDVs including:

5 Fleet operates over 20,000 vehicles that are equipped for a specific industry, trade, or occupation, in daily service on urban, suburban, and rural routes across the U.S. This fleet has decades of experience operating Internal Combustion Engine (ICE), natural gas, and battery electric powertrains, and is recognized for its leadership in alternative fuel and vehicle adoption.

6 This fleet company is based in Southern CA and collaborates with manufacturers and large fleet customers on the procurement, adoption, service, and maintenance of numerous alternative fuels and technologies.

- Maintenance Manuals
- Site Configuration
- Shop Tools Inventory
- Parts and Supplies Inventory
- Supplier-Provided Training
- External Communications with Emergency Responders

Maintenance Manuals: We found that the Postal Service has closely engaged with the supplier and other internal and external stakeholders[7] to develop detailed, comprehensive, and actionable maintenance manuals prior to staff trainings and vehicle deployment. VMF staff rely on clear documentation that describes vehicle features, requirements, safety protocols, and supporting equipment operated on-site. The introduction of new content, whether it is the components of a familiar vehicle type or an entirely new powertrain, requires additional documentation. The Postal Service estimates its ongoing plans to develop NGDV maintenance manuals and ensure that they provide sufficient instruction for technicians will be completed in August 2023.

Site Configuration: We found that the Postal Service is currently in the information gathering stage of its site configuration plans but has taken some initial steps to transition its VMFs' infrastructure to accommodate the NGDVs. Space constraints are a common challenge among commercial fleets preparing their facilities to accommodate multiple fuel types and technologies. To promote safety, VMFs typically delineate pedestrian and vehicle rights-of-way, establish sufficient boundaries around fueling and electrical equipment, and separate staff and fleet parking. Management often adjusts these layouts and protocols when introducing vehicles featuring new navigational equipment, dimensions, and fueling requirements. To address these issues, the Postal Service is developing a nationwide AutoCAD On-site Layout[8] to help identify VMF space constraints. In addition, the Postal Service is using the current light-duty vehicle service bay sizing standards of 20' wide and 32' length[9] to establish safe boundary dimensions for the NGDVs so that technicians may perform maintenance on the vehicles in a safe and effective manner. Lastly, management plans to conduct physical site assessments for electric charging infrastructure to observe and analyze movement of vehicles and technicians to ensure safety and minimal interruptions to VMF operations. Management estimates they will complete these efforts by October 2022, which should allow sufficient time to make any necessary VMF site adjustments prior to NGDV deployment.

Shop Tools Inventory: We found that the Postal Service maintained appropriate lines of communication and collaboration with the NGDV supplier regarding standard and specialized tools that will be required to maintain the NGDVs and has a sufficient process in place to inventory and procure tools. In September 2021, the Postal Service completed a survey of current tools (hand tools, equipment, diagnostic tools) in VMFs to determine whether there was a gap for future required tools. To effectively and efficiently service and maintain the NGDVs, which have new features such as air conditioning, onboard camera systems, and BEV-specific components, the VMFs need to have the appropriate shop tools inventory and personal protective equipment before deployment. The Postal Service plans to procure the additional tools (estimated completion October 2022), diagnostic tools (estimated completion January 2023), and personal protective equipment (estimated completion April 2023) that are required for NGDV maintenance.

Parts and Supplies Inventory: We found that the Postal Service consulted with the NGDV supplier to determine appropriate NGDV parts provisions, replacement schedules, and parts lead times for new components. Implementing strategies to ensure effective management of NGDV parts and supplier inventory can improve VMF service capabilities and efficiencies. As part of this process, the Postal Service and NGDV supplier are conducting a level of repair analysis[10] to define the estimated replacement schedules. Consultations on parts ordering protocol and parts lead times will be included in future conversations. The Postal Service stated that these efforts are an ongoing, iterative

7 Stakeholders consulted in developing the manuals included the NGDV supplier; Headquarters, Fleet Management; Headquarters, Safety; Vehicle Center of Excellence; NGDV Program Management Office; American Postal Workers Union; National Association of Letter Carriers; and National Rural Letter Carriers' Association.
8 Commercial computer-aided design that allows a user to conceptualize facility configurations.
9 Handbook AS-503, *Standard Design Criteria*, Module 4D – Vehicle Maintenance Facilities, Section 2-5 Vehicle Service Bays, updated October 1, 2021; and Postal Service Form 4551, *Projected Fleet Requirements*, Section 9 Space Requirements – Postal Vehicle Maintenance Facility, updated September 2016.
10 A level of repair analysis is an analytical methodology used to determine when an item will be replaced, repaired, or discarded based on cost considerations and operational readiness requirements.

process as it finalizes parts and supplies inventory strategies to accommodate the NGDVs.

Supplier-Provided Training: We found that the Postal Service is working closely with the NGDV supplier to develop detailed, comprehensive, and effective trainings that utilize train-the-trainer models[11] and reflect the Postal Service's unique requirements. In addition, the Postal Service plans to begin initial supplier-provided NGDV maintenance training in August 2023 at a $9.8 million technician training facility[12] to be housed at the Postal Service's National Center for Employee Development facility in Norman, OK. The training facility should afford both new and current Postal Service technicians a strong starting point for NGDV adoption. Construction of the training facility is estimated to start August 2022 and be completed in June 2023, prior to NGDV deployment.

This centralized training will facilitate knowledge transfer among VMF staff and will allow staff to achieve a deeper level of engagement with the technology compared to online trainings or trainings at VMFs that have not yet completed the necessary site upgrades to fully operate all equipment. Furthermore, in September 2023, the Postal Service plans to launch monthly in-person trainings for VMF staff at all levels, where groups of technicians will undergo a two-week class to learn how to maintain and repair NGDVs. Training for VMF supervisors and managers will also be included in the training plans. The technicians selected for priority training will be based on the Postal Service's NGDV deployment sequence, which it has not finalized.

External Communications with Emergency Responders: We found that the Postal Service has outlined external communication strategies related to emergency responders in its plans. To ensure the safe handling of new vehicle technologies and powertrains (both ICE and BEV) in the event of traffic incidents, all relevant parties should be prepared to recognize and handle the unique features on these vehicles to avoid damaging them and to protect emergency responders from harm.[13] Outreach to local emergency responders can include efforts such as developing and distributing pamphlets describing new components, handling dos and don'ts to local partners, or inviting local partners to on-site, walk-around and trainings to observe new technologies. In addition, the exterior of BEVs should be clearly marked with language and logos advertising their zero-emission status to make it clear to any first responders what fuel types are onboard. To facilitate these efforts, the Postal Service plans to start developing materials for outreach to local emergency first responders in June 2023. They also plan to roll out local and regional response plans by October 2023. The specific content and timing of the outreach will depend on the location-specific deployment schedule and quantities of NGDVs.

As the Postal Service implements and revises its plans to prepare VMFs for NGDVs, it will be important to assess their initiatives, monitor progress toward implementation, ensure organizational coordination, and evaluate results. Furthermore, if the Postal Service were to make additional adjustments to its vehicle acquisition strategy to include the purchase of COTS vehicles, it may need to re-evaluate VMF preparedness plans to ensure it can accommodate the new vehicles. The OIG will continue evaluating associated risks and preparedness plan progress through future audits related to NGDVs.

Finding #2: Opportunities to Enhance VMF Preparedness Plans

While the Postal Service has incorporated many of the industry best practices in their plans to prepare VMFs for NGDVs, we noted opportunities to further enhance its plans. Specifically, we found that several of the industry best practices were not fully outlined in the Postal Service's initial plans, such as defining essential technician skills and certifications; making upgrades

> "...we found that several of the industry best practices were not fully outlined in the Postal Service's initial plans..."

11 Initial instruction is provided by the vehicle supplier to train managers and lead technicians so they can deliver equivalent trainings to their peers and supporting staff at their home sites, or at multiple facilities in a regional network.
12 The Postal Service plans to fully equip the National Center for Employee Development with ICE and BEV NGDVs, charging equipment, appropriate safety equipment, as well as establish protocols related to employee safety.
13 Fires in electric vehicles powered by lithium-ion batteries pose two main dangers to emergency responders. First is the risk of electric shock from exposure to high-voltage connections in a damaged battery. Second is the risk that damaged cells in the battery can lead to venting and combustion of toxic gases, cell rupture and release of projectiles, and battery reignition or fire.

Table 1. Summary of Current VMF Staff Trainings

Training	Audience	Scope
VMF Clerk Fundamentals	• General Clerks • Tools and Parts Clerks • Storekeepers	Provide personnel with skills to perform facility operations, including work orders, purchase orders, warranty claims and defects, and Solution for Enterprise Asset Management[14] entries.
VMF Manager and Supervisor Essentials	• New Supervisors • New Managers	Develop management skills to lead facility operations including inventory reports analysis and budgeting.
VMF Automotive Electrical	• New Technicians	Provide technicians with basic electrical theory and knowledge with LLV schematics, troubleshooting strategies, and use of electrical diagnostic tools and procedures.
VMF LLV Maintenance 2.2L and 2.5L	• New Technicians	Provide technicians with engine maintenance, diagnostics, troubleshooting for LLV systems and sub-systems, use of technical reference materials, special tools, and troubleshooting charts.

Source: Training documentation provided by Headquarters Fleet Management.

needed to building systems; and developing a BEV waste management strategy.

Essential Skills and Certifications

We found that the Postal Service's plans do not yet outline specific strategies to update essential staff skills and certifications to align with the new NGDV (both ICE and BEV) technologies, fuels, and systems. Operating and maintaining new technology and powertrain types can impact technician competencies. Thus, management may recommend that staff members obtain new skills and certification levels through education and certification programs to prepare for and maintain new components of the NGDVs.

The Postal Service currently offers four trainings on LLV maintenance to its VMF staff according to their position (see Table 1). However, introducing NGDVs will require expansion of training options to ensure that any new skills, certifications, and roles are supported. For example, during our site visit to selected VMFs, a VMF territory manager expressed interest in obtaining appropriate state certifications for technicians to conduct air conditioning maintenance in-house, as they are currently outsourcing this repair work at some of the territory VMFs.

Headquarters officials stated that they have not fully researched or developed strategies to update VMF staff skills and certifications to maintain NGDVs.

Headquarters management stated that they intend to develop plans related to essential skills and certifications needed to maintain NGDVs. However, they noted it was too early in the planning process to commit to additional efforts, as training efforts are still in development. Once the development of maintenance training is completed in collaboration with the supplier, the Postal Service will assess if any further skills or certifications are required.

Since the NGDVs are custom-built vehicles with technology new to the Postal Service, it may be beneficial for VMF employees to obtain essential skills and certifications regarding the new vehicles. Creating a comprehensive strategy for certifying that their employees are appropriately trained and ensuring there is sufficient time to administer training will help VMFs have the capability to maintain the new vehicles safely and efficiently. In addition, supporting industry standard certifications can help the Postal Service attract and maintain a highly qualified workforce.

Building Systems

We found that the Postal Service has taken initial steps to assess potential building and system upgrades for VMFs; however, outlining a more comprehensive strategy may improve current plans. Lighting, heating and ventilation, electrical systems, vehicle lifts, and bay doors are key building systems of a VMF. In addition, building upgrades should be a core part of future fleet transition strategy. Changes and upgrades to any one of these systems often trigger adjustments elsewhere to comply with local building codes. Engaging early and often with power utilities, regulatory agencies,

14 A web-based application designed to improve fleet inventory tracking and visibility and to standardize asset tracking and maintenance repair functions.

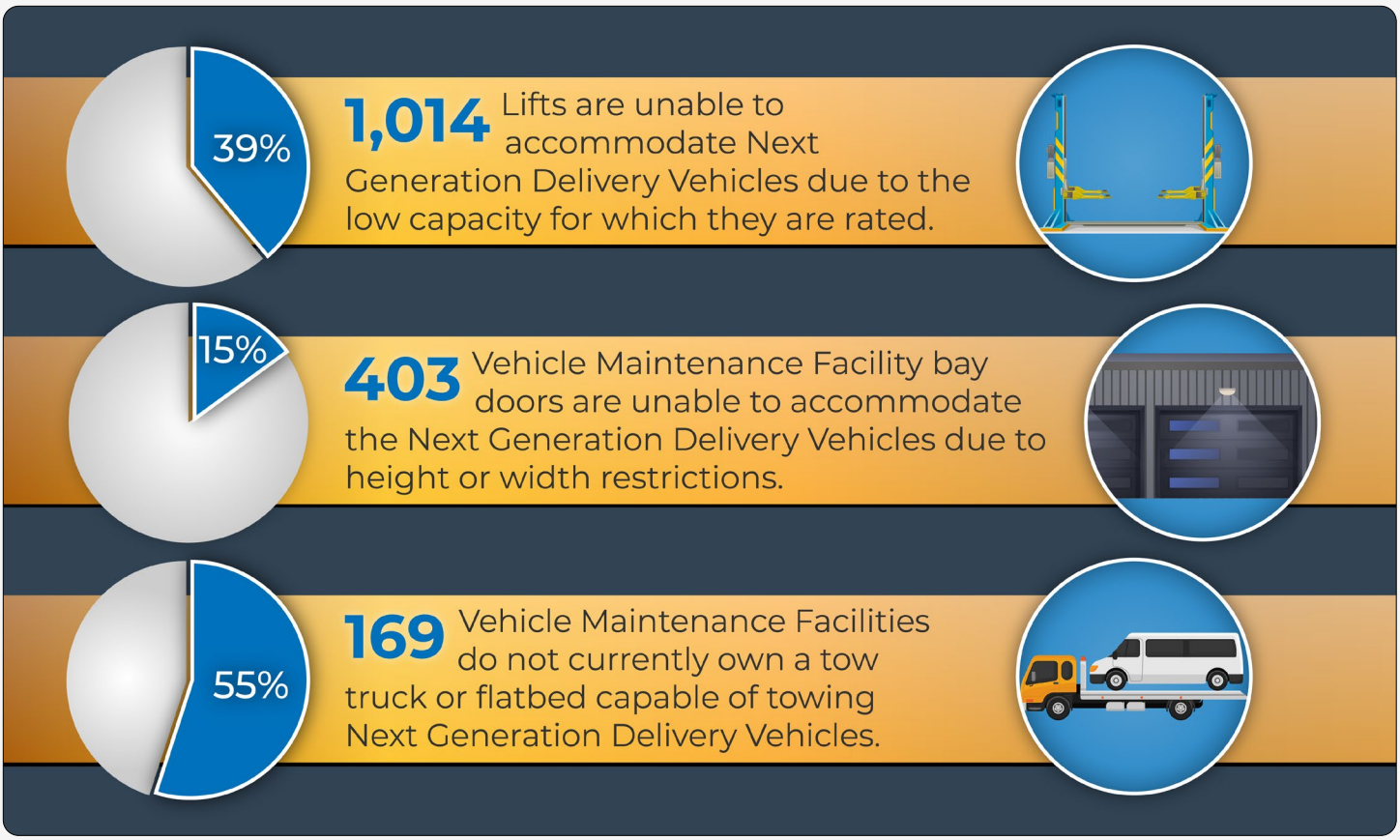
and state and local governments can help identify barriers to facility modifications and reduce lead times to complete the upgrades – both of which are key to the near-term success of the first site upgrades and the long-term success of a total fleet transition. In addition, leveraging grants and local incentives may help support the electrical upgrades needed in a facility to accommodate charging infrastructure in a cost-effective manner.

The Postal Service conducted a VMF facility capability survey[15] in April 2022 to assess the current state of VMF infrastructure including bay door size, lift capacity, lift height, tow truck capacity, electrical supply, and flood risk. OIG analysis of the survey indicated several key constraints that may impact the preparation of VMFs for NGDVs including:

- 1,014 (39 percent) lifts are unable to accommodate NGDVs due to the low capacity for which they are rated.
- 403 (15 percent) VMF bay doors are unable to accommodate the NGDVs due to height or width restrictions.
- 169 (55 percent) VMFs do not currently own a tow truck or flatbed capable of towing NGDVs.

Other challenges identified in the survey and confirmed by the OIG during our physical site observations include parking, power sufficiency, facility size, and facility leasing concerns. For example, during our site visits at VMFs in the Los Angeles, CA and Detroit, MI areas, we observed several potential facility constraints. Specifically, at the Torrance, CA VMF, we observed the ceiling likely needs to be modified so that the lifts can clear the light with taller vehicles (see Figure 2).[16]

At the Pasadena, CA VMF, we observed that extending their lifts to accommodate taller vehicles, like the NGDV, may be an issue due to the sprinkler system installed overhead. Depending on local or state ordinances, there must be some vertical clearance between the sprinklers and objects below to not cause interference (see Figure 3).



15 The Postal Service had not verified the survey data for accuracy or completeness at the time of OIG review, due to it recently being completed. Headquarters officials stated they are planning to verify the survey data with the Manager, Fleet Operations; Motor Vehicle Operator; and VMF Managers, in addition to on-site validation, as appropriate.

16 Headquarters management stated that while having the ability to lift vehicles high enough for technicians to work from underneath is ideal, it is not a requirement to service the vehicles.

Lastly, on May 5, 2022, we observed that the Dearborn, MI VMF was operating on generator power. This was due to a flood that occurred in June 2021 that damaged the electrical system, requiring them to refuel the generators to continue to provide maintenance operations at the facility.

As a result of the constraints identified in its survey, the Postal Service has been procuring and installing larger capacity lifts, planning to procure new tow trucks, and upgrading current facilities to accommodate the NGDVs. In addition, the Postal Service is conducting on-site verification of its survey with an estimated completion of September 2022. However, the Postal Service has not completed a more comprehensive nationwide survey to fully inform any necessary VMF building and systems upgrades and identify the key relationships (utilities and authorities) as well as site owners (landlords) to help accurately estimate timelines for completing any facility modifications. Pursuing these various partnerships can further help minimize construction delays by fostering successful working relationships. Headquarters officials stated that they had not completed this comprehensive site survey yet or developed various partnerships, as it was too early in the planning process to commit to additional efforts, as deployment plans have not been finalized.

To accommodate the current and future fleet, building upgrades may be necessary and can often result in adjustments elsewhere. Some of these building modifications may also take a considerable amount of effort to complete; therefore, the Postal Service should identify and plan for any construction timelines or delays, prior to the deployment of NGDVs. Such a strategy will ensure that VMFs obtain the required building upgrades to improve VMF capabilities, efficiencies, operating standards, as well as employee safety and morale.

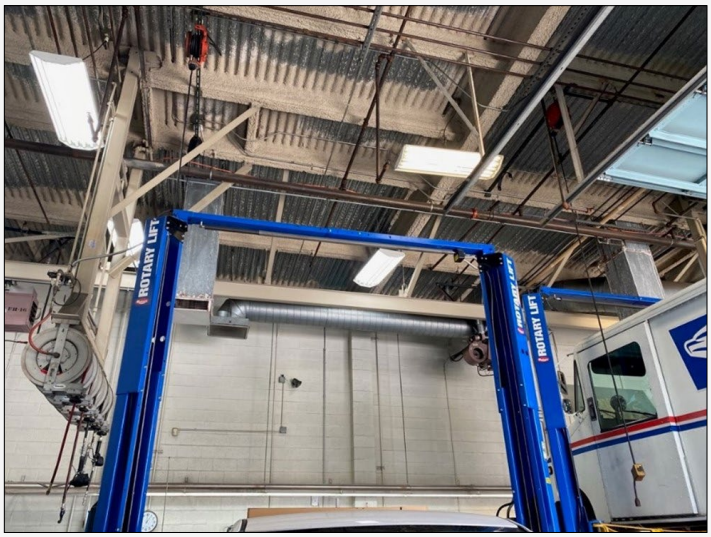
BEV Waste Management

We found that the Postal Service has not yet outlined BEV waste management strategies in its plans. To support environmental sustainability, fleets need to consult with relevant parties to develop a comprehensive waste management strategy. For BEVs, vehicle manufacturers remain the primary points of contact for battery disposal while the technology is in its early commercial stage. In addition, purchase agreements may require the manufacturer to take ownership of the battery after it has completed its useful life. Furthermore, BEV battery recycling for materials and components or

Figure 2. Potentially Inadequate Spacing Between Ceiling and Lift Height

Source: OIG photograph taken at the Torrance, CA VMF April 26, 2022.

Figure 3. Potentially Inadequate Spacing Between the Sprinkler System and Lift Height



Source: OIG photograph taken at the Pasadena, CA VMF April 28, 2022.

leveraging second-life markets[17] may be a positive opportunity with long-term growth potential. As this is still an emerging market, it is crucial for managers of fleets with BEVs to conduct a close review of battery and battery material retirement and disposal options.[18] For conventional ICE vehicles, auctioning, selling to scrap agents, or removing components that still have useful life and using them for repairs of other vehicles remain options.

Headquarters officials stated they plan to develop a BEV waste management strategy over the coming months;[19] however, it was too early to finalize plans since vehicles were not expected to be deployed until the end of 2023. Furthermore, as the NGDV batteries are designed for a 10-year life, the need for an established second-life or battery recycling program is many years in the future. However, in the rare instance that batteries are faulty or may be damaged due to accidents, the Postal Service may need to define a waste management strategy earlier. In January 2022, the Postal Service received the Technological Prove-out Vehicle[20] Bill of Materials from the NGDV supplier, which defines the full set of vehicle components for these NGDVs. Once the Bill of Materials for the pre-production model of NGDVs is completed (estimated March 2023) and the vehicle components and specifications have been finalized for the initial order, the Postal Service should begin developing plans for support and eventual disposal of NGDV components.

With the upcoming incorporation of the BEV NGDVs into the Postal Service's delivery fleet, it is essential that it have a well-developed waste management strategy. Such a strategy would ensure that the Postal Service can continue its commitment to environmental sustainability as it invests in new vehicles and technology. In addition, leveraging second-life markets may create unique opportunities for the Postal Service to reuse batteries for other resources once their useful life in an NGDV has ended.

Conclusion

The best practices identified in this report originated from the fleet industry's experience in adopting new technologies and battery electric powertrains over the past decade. While the OIG recognizes that it may be difficult to compare the Postal Service against other organizations — due to differences in delivery operations, the mix of mail and packages, and road infrastructure — the best practices highlighted offer supplementary information that the Postal Service can use as it finalizes its strategy for VMF preparedness to ensure an efficient, cost effective, and sustainable delivery fleet.

Furthermore, on July 20, 2022, the Postal Service announced that it anticipates adjusting its composition of its future delivery fleet to include COTS vehicles. While the results of this evaluation focused on NGDVs, the best practices identified are relevant to both purpose-built and COTS vehicles. Thus, any potential changes to their vehicle acquisition strategy, including the purchase of COTS, may require the Postal Service to re-evaluate its VMF preparedness plans and may necessitate changes to accommodate the new vehicles. In this event, vehicle suppliers and VMFs should remain primary stakeholders and resources for guiding and refining the transition strategy to meet the fleet's needs and goals.

By evaluating some of the best practices from the transition plans used by peer delivery fleets, the Postal Service could be better prepared to maintain the NGDVs and any additional vehicles when introducing them into its fleet. It may also reduce the likelihood of extended timelines, cost overruns, missed organization targets, heightened safety risk to the workplace and to staff, diminished staff morale, non-cooperative local partners, and unsupportive communities. Since initial vehicle deployments do not begin until the end of 2023, sufficient time exists for the Postal Service to fully develop its comprehensive plan to support VMFs and prepare them for NGDVs.

Recommendation #1

We recommend the **Vice President, Delivery Operations**, and **Vice President, Engineering Systems**, further evaluate industry fleet transition best practices and outline additional efforts to enhance existing vehicle maintenance facility preparedness plans, as the next generation delivery vehicles acquisition and deployment is finalized.

17 Second-life markets identify uses for batteries that have exceeded their warranted useful life and can no longer meet performance requirements of their first application. In a second-life application, a vehicle fleet may use that battery as a stationary energy storage asset to support its charging equipment.
18 Similar observations regarding battery replacement and recycling were also raised in the prior OIG whitepaper, *Electric Delivery Vehicles and the Postal Service* (Report Number RISC-WP-22-003, March 17, 2022).
19 We noted the Postal Service's current scrappage program for retired LLVs aligns with peer fleet's approaches of recycling components with remaining useful life.
20 Vehicle used by manufacturers to validate and test the specific designs of new models against Environmental Protection Agency and Federal Motor Vehicle Safety Standards requirements.

Management's Comments

Management agreed with finding 1 and disagreed with finding 2 and recommendation 1. Additionally, they had concerns with the content reflected in the background of the report. Specifically, management stated VMFs are currently maintaining Promasters, Metris, and administrative vehicles that have the same up-to-date technologies as NGDVs, and that they have had experience deploying more than 52,000 vehicles during the last six years. Management also stated that there is no requirement that BEVs indicate the vehicle fuel type to any first responders.

Regarding finding 2, management disagreed and maintained that many of the best practices to prepare VMFs are planned and slated for completion in the months ahead, and have not yet been conducted or completed due to the timing of vehicle deployments or other contractual timelines. Additionally, management stated that the Postal Service and its supplier are collaborating to define any skills and/or certifications that may be required and will be training employees on these competencies at the new training facility.

Management also noted that the best practices did not point to specific timelines for completion to compare against the Postal Service's plans, and that the OIG had not shared the best practice research, which would have aided them in preparing a cogent management response to the draft audit report. Management also raised issues with the finding discussions around building upgrades, incentives associated with charging infrastructure, and BEV waste management strategy.

Regarding recommendation 1, management concurred with the need to continue to monitor and apply best practices to ensure adequate preparation of the VMFs for deployment of NGDVs; however, they disagreed with the recommendation. Management stated that they have provided ample evidence of their processes and will continue to incorporate learnings from industry into its plans.

See Appendix C for management's comments in their entirety.

Evaluation of Management's Comments

Although management had concerns about some specific issues presented in the report, we believe the issues were presented in the context of best practices to be considered as management moves forward with NGDV implementation. As such, continued flexibility and an environment of constant evaluation and application of appropriate best practices is prudent. These best practices are presented for consideration regarding VMF preparedness for both COTS and NGDV vehicles. In that context, we see most of the concerns raised by management in its response as not being relevant to the higher-level consideration and application of appropriate best practices. During the project, we provided summary and detailed information on the best practices we obtained from the contractor, and have since provided the contractor's report to management.

Management disagreed with the recommendation to further evaluate industry fleet transition best practices and outline additional efforts to enhance existing VMF preparedness plans as they finalize NGDV acquisition and deployment. However, management concurred on its need to continue to monitor and apply best practices as it prepares VMFs for NGDVs. Additionally, in the audit exit conference, management detailed its evaluation of the best practices that we had provided to them, and outlined additional efforts to enhance VMF preparedness. Thus, we recognize the Postal Service's commitment to continue to monitor and apply industry best practices as it finalizes its VMF preparedness plans. These actions meet the intent of our recommendation and we consider them responsive to recommendation 1. As a result, recommendation 1 is closed with the issuance of this report, but we will continue to evaluate the risks associated with maintaining an upgraded delivery fleet through future audits related to NGDVs.

Appendices

Appendix A: Additional Information

Scope and Methodology

Our objective was to assess the Postal Service's VMF preparedness plans to maintain the future fleet of NGDVs. To accomplish our objective, we engaged a contractor to help identify VMF preparedness and fleet transition best practices from five domestic and foreign delivery fleets and compared Postal Service practices against them. Specifically, we sought to understand other delivery fleets':

- Preparation of VMFs for fleet transitions.
- Plans and strategy for upgrades/expansion of the VMF infrastructure to support fleet transitions.
- Plans and strategy to acquire appropriate diagnostic equipment, specialized tools, and software to support fleet transitions.
- Plans and strategy related to VMF personnel training and staff complement to properly support fleet transitions.

We provided guidance to the contractor and reviewed their work to accomplish our review objective. The best practice study encompassed five domestic and foreign companies that we judgmentally selected based on their comparable business scope and scale, stated use of alternative fuel-vehicle technologies, and information accessibility. The five companies selected for review were FedEx, UPS, Royal Mail, Deutsche Post, and DHL (see Table 2).

Table 2. Comparison of Domestic and Foreign Companies Selected for Review

	FedEx	UPS	Royal Mail	Deutsche Post	DHL
Criteria for Selection					
Experience with all-electric vehicles	X	X	X	X	X
Experience with EV charging equipment at own facility	X	X	X	X	X
Comparable vehicle types (Class 4-6,[21] box truck, non-refrigerated)	X	X	X	X	X
Comparable cargo (dry mail, no extreme weight)	X	X	X	X	X
Comparable duty cycle (high idle, low speed, heavy start/stop)	X	X	X	X	X
Public ownership			X		
In-house maintenance	X		X	X	X
Temperate climate for operations	X	X	X	X	X
Moderate topography for operations	X	X	X	X	X
Mix of urban, suburban, and/or rural routes	X	X	X	X	X
Fleet size (estimated)	210,000 (Global – motorized vehicles)	120,000 (Global – car, van, tractor, motorcycle)	50,800 (United Kingdom – car, van, bike, trolley)	112,000 (Germany – van, truck, car)	10,000 (USA - Ground)

Source: Contractor's analysis.

21 Medium-duty truck with a gross vehicle weight rating range of 14,001 – 26,000 pounds.

In addition, the contractor and OIG team conducted supplemental interviews with a vocational fleet, a national commercial vehicle dealership, Deutsche Post, and General Services Administration to further inform the Postal Service's VMFs preparedness efforts.

We also interviewed Postal Service Headquarters officials about their current and future strategies related to preparing VMFs for NGDVs and reviewed preparedness plans. In addition, we conducted site visits at judgmentally selected VMFs in the Los Angeles, CA; Detroit, MI; Atlanta, GA; Pittsburgh, PA; and Baltimore, MD areas to understand their experiences with prior fleet transitions.

Lastly, we evaluated the information gathered from the peer delivery fleets and compared their strategies with those of the Postal Service.

We conducted this performance audit from January through October 2022 in accordance with generally accepted government auditing standards and included such tests of internal controls as we considered necessary under the circumstances. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective. We discussed our observations and conclusions with management on September 7, 2022, and included their comments where appropriate.

We assessed the reliability of Solution for Enterprise Asset Management data by conducting logical tests on the data. We determined that the data was sufficiently reliable for the purposes of this report.

Prior Audit Coverage

The OIG did not identify any prior audits or reviews related to the objective of this audit within the last five years.

Appendix B: Fleet Transition Best Practices

After reviewing delivery fleet practices at organizations with a wide spectrum of fleet management expertise, our contractors identified 29 fleet transition best practices related to preparing VMFs for NGDVs.

Maintenance Manuals

- Close engagement with the supplier is necessary for developing detailed, comprehensive, and actionable manuals.
- Review supplier manuals prior to staff trainings and vehicle delivery to identify and resolve gaps with the supplier, ensuring that the product meets a fleet's standard.

Site Configuration

- Validate safe boundary dimensions for new vehicles according to onboard equipment and powertrain types with the supplier and determine fit with existing site for service bays and hazardous vehicle isolation zones.
- Identify a hazardous vehicle isolation zone apart from physical structure, personal property, and utility lines.
- Review site configuration for pedestrian and vehicle pathways when selecting vehicle charging infrastructure.
- Engage utilities early and often to identify near- or long-term electrical upgrades and new equipment construction and footprint requirements, such as transformers.

Shop Tools Inventory

- Maintain current tool procurement and inventory process.
- Communicate regularly with supplier(s) about future changes to their scope of vehicle service and consult on necessary shop tools inventory adjustments to accommodate any changes.
- Consult with new vehicle and equipment suppliers on type and quantity of appropriate personal protective equipment to have on hand.

Parts and Supplies Inventory

- Maintain current parts and supplies procurement standards based on manufacturer guidance.
- Consult with manufacturer on replacement schedule and parts lead times for new components such as air conditioning, emissions controls, and automatic brakes.
- Consult with manufacturer on replacement schedule, protocol, and parts lead times for BEV powertrain components, including battery removal and replacement.
- Consult with electric vehicle charging provider(s) on modular features, component stocking options, and warranty requirements.

Supplier-Provided Training

- Supplier-provided trainings and close engagement with the supplier are both necessary for ensuring detailed, comprehensive, and effective trainings that reflect a fleet's unique requirements.
- Train-the-trainer models achieve efficiencies and create knowledge redundancies, strengthening a VMF's team and a fleet's knowledge base at multiple levels of hierarchy.
- Safety is paramount and must be a core component of all trainings.

External Communications with Emergency Responders

- Reach out to local emergency response partners and authorities early and often to ensure their safe handling of new vehicle technologies and powertrains on both ICE and BEVs.
- Provide pamphlets, answers to frequently asked questions, manuals, and/or regular email updates to local partners.
- Host on-site vehicle walk-around and/or trainings for local partners.
- Clearly mark vehicles to communicate to external parties and first responders what and where their unique features and powertrain are located.

Skills and Certifications

- Update staff skill and certification requirements to align with new technologies, fuels, and systems.

Building Systems

- Consider full building upgrades to establish a strong foundation for system adjustments and improve staff morale during transition period.
- Identify and engage with local utilities and authorities having jurisdiction early and often to understand near- and long-term needs and barriers to site modifications.
- Explore grants and local incentives to support necessary electrical upgrades for vehicle charging infrastructure.
- Scope system upgrades to support the facility's expected level of service over the long term, accounting for future changes in vehicle technologies and powertrains including the share of BEVs requiring service.
- Incorporate any construction timelines into project schedules and identify backup solution in the event of delays.

Waste Management

- Review local guidance and regulations, and consult vehicle and/or battery supplier, on electronic waste[22] (e-waste) disposal including vehicle battery storage and disposal.
- Evaluate second-life, recycling, and scrappage options for retired or failed vehicle batteries in consultation with vehicle and/or battery supplier.
- Develop a review schedule for e-waste and battery disposal protocols over the first BEV NGDV's useful battery life (10 years) and update for market alignment.

22 The Environmental Protection Agency defines electronic waste as electronics that are nearing the end of their useful life, and are discarded, donated, or given to a recycler.

Appendix C: Management's Comments

UNITED STATES POSTAL SERVICE

Date: September 29, 2022

JOHN CIHOTA
DIRECTOR, AUDIT SERVICES

SUBJECT: Management Response: Vehicle Maintenance Facility Preparedness for Next Generation Delivery Vehicles (#22-045-DRAFT)

Thank you for providing the Postal Service with an opportunity to review and comment on the findings and recommendation contained in the draft audit report, *Vehicle Maintenance Facility Preparedness for Next Generation Delivery Vehicles.* Please see the following document sections for specific feedback.

Background: The Postal Service provided a series of briefings, documents and responses to questions and requests posed by the Office of Inspector General (OIG) throughout the audit process. Not all of this content has been considered or reflected in preparing the audit report. For example, on page 7, OIG states: *"Furthermore, the NGDV will be equipped with many new features representing significant technical advancements when compared to the LLV – air conditioning, 360-degree cameras, advanced braking and traction control, air bags, and collision avoidance systems (see Figure 1)."* While these new features represent advancements from the current LLV/FFV fleet, the report should acknowledge that ProMaster, Metris, and certain administrative vehicles also have many of the same up-to-date technologies that the VMFs are currently charged with maintaining. The audit report suggests that these advancements will be challenging for the VMFs to support, when in fact this support has already been in place for some time.

Finding 1: USPS's Initial Plans Employ Best Practices for VMF Preparedness
Management agrees with this finding. However, management disagrees with the OIG's presentiment that the Postal Service's own experience in deploying more than 52,000 vehicles within the last six years has not allowed the organization to prepare for the transition of its fleet. Currently, only 50,000 NGDVs have been ordered from the supplier, which are scheduled to deploy from FY24 into FY27. Thus, the OIG's assertion that the Postal Service has not experienced a fleet transition of this magnitude is incorrect, as OIG's report acknowledges that the Postal Service has deployed more than 52,000 vehicles since 2016 with many different characteristics.

In addition, management disagrees with OIG's finding that the exterior of the BEVs should be clearly marked with language and logos advertising their zero-emission

status to make it clear to any first responders what fuel types are on board. There is no requirement, at either the federal or state level, that BEVs must indicate the vehicle fuel type to any first responders. Current vehicles being sold on the open market today do not have such markings that distinctively identify them as BEVs.

Furthermore, the OIG states, *"if the Postal Service were to make additional adjustments to its vehicle acquisition strategy to include the purchase of COTS vehicles, it may need to re-evaluate VMF preparedness plans to ensure it can accommodate the new vehicles."* This statement is out of scope; the audit was to "assess the Postal Service's VMF preparedness plans to maintain the future fleet of NGDVs," not COTS vehicles and their impact.

Finding 2: Opportunities to Enhance VMF Preparedness Plans
Management disagrees with this finding. In its original discussions with OIG regarding the audit, management made clear to the OIG that many items to prepare VMFs are planned and slated for completion in the months ahead, and had not yet been conducted or completed due to the timing of vehicle deployments, or other contractual timelines. The Postal Service is still well over one year away from deploying the first NGDV. Furthermore, NGDVs are not going to be widely deployed to all VMFs simultaneously. The Postal Service will ensure VMFs are fully prepared in accordance with deployment plans.

In addition, the OIG is evaluating VMF readiness based on its own best practice research, which has not yet been shared with Postal management despite multiple requests. While the audit report speaks negatively about the "opportunities" associated with tasks that have not yet been completed, it does not point to specific content within the research which indicates this work is not on schedule or should be slated for completion on timelines which are different than what the Postal Service has established in its forward plans. The Postal Service should not be held to a standard of "best practice research" that cannot even be shared with Postal leadership, to at least aid with preparing a cogent management response to the draft audit report, or to flag "opportunities to enhance preparedness" when they are already incorporated in the plans that the Postal Service shared with the OIG.

The OIG also states, "*the Postal Service's plans do not yet outline specific strategies to update essential staff skills and certifications to align with the new NGDV (both ICE and BEV) technologies, fuels, and systems.*" Management disagrees with this statement. Management has provided the OIG with the training plan that is being developed with the supplier on specific, contractually-required timetables in the months ahead and OIG acknowledged this action under Finding 1. Furthermore, the OIG ignores the fact that Commercial Off-the-Shelf (COTS) vehicles deployed by the Postal Service contain many of the updated features that the OIG notes will be included in the NGDV, and technicians have experience dealing with many of these features. Additionally, as the OIG was informed by management, the Postal Service and its supplier are collaborating to define any further skills and/or certifications that may be required and will be training on these competencies at the new training facility.

Management also disagrees with the finding's section relating to Building Systems. The OIG acknowledges that the Postal Service has begun to identify needed building upgrades and modifications at VMFs, but states, *"outlining a more comprehensive strategy may improve current plans."* The OIG then goes on to state, *"building upgrades should be a core part of future fleet transition strategy"* and discusses bringing buildings up to code where codes may have changed over the years. In its statement, it appears the OIG is focused on overall VMF modernization as opposed to preparedness for NGDV. While management agrees that some VMFs will require updated lifts and potential bay door expansions as noted in the materials shared with the OIG, management disagrees that fleet transition requires full remodels of its VMFs, as similar sized vehicles with updated technology have been deployed into these same VMFs since 2016.

Further, the OIG discusses the use of grants and local incentives to accommodate electric vehicle charging infrastructure. This finding and comment are out of this audit's scope which is the preparedness of the VMFs within USPS. As shared with the OIG, each VMF that services BEV NGDVs will have only two on-site chargers, which should fit within the VMFs' current electrical infrastructure. Incentives are typically associated with the locations where the vehicle is operated and charged for daily use, not where it is maintained.

While management does agree that it has not yet fully defined its policy for BEV waste management, as the OIG was informed, BEV vehicles are still more than a year from being deployed, and this is identified as a task for completion during the coming year. As also stated to the OIG, BEV traction batteries are expected to operate for a 10-year period. The Postal Service is developing its policy related to BEV waste management, and has existing contractual mechanisms in place that can be leveraged if needed, should any early incidents occur that require waste management activity. Management reaffirms that it is too early to audit the BEV waste management policy for the Postal Service and disagrees with the inclusion of this finding in the audit report.

The OIG additionally states, *"introducing NGDVs will require expansion of training options to ensure that any new skills, certifications, and roles are supported"* (pg.12) and *"the NGDVs are custom-built vehicles with technology new to the Postal Service"* (pg.13). However, there is no mention of the other vehicles in the fleet that the VMFs are currently charged with maintaining, some of which are 2022 model year hosting modern technology systems that the VMFs actively work on daily. In addition to this, and as shared with the OIG, requirements for any new skills or certifications will be developed through the process already underway with the vehicle supplier for training and handbook development – which is contractually due for completion well into 2023. This is another example of a future task and decision point that is understood and incorporated into program plans and will be addressed once the technical specifics have been finalized.

Finally, for Finding #2, the OIG states, *"we observed that the Dearborn, MI VMF was operating on generator power."* This was due to a flood that occurred in June

2021 which damaged the electrical system. As a result, it required employees to refuel the generators to continue to provide maintenance operations at the facility (pg. 15). This is a contingency operating plan in cases of specific issues. It is not clear how this statement relates to the VMF's preparedness for NGDVs.

Recommendation [1]:
We recommend the **Vice President, Delivery Operations**, and **Vice President, Engineering Systems**, further evaluate industry fleet transition best practices and outline additional efforts to enhance existing vehicle maintenance facility preparedness plans, as the next generation delivery vehicles acquisition and deployment is finalized.

Management Response/Action Plan:
Although Postal leadership concurs with the need to continue to monitor and apply best practices where appropriate, the Postal Service has provided ample evidence of the process already in place to ensure adequate preparation of the VMFs for deployment of the NGDVs. Management **disagrees** with the need for this recommendation. Even in the written recommendation, the OIG states "further evaluate…" in acknowledgement that the Postal Service is actively pursuing and applying best practices (either actively in process or in the project plan in the coming months). The Postal Service will continue to follow its processes and incorporate learnings from industry into its plans.

Target Implementation Date: N/A - Ongoing

Responsible Official: N/A

Signature of Officials

E-SIGNED by ANGELA.H CURTIS
on 2022-09-29 12:30:52 CDT

Vice President, Delivery Operations

E-SIGNED by Linda.M Malone
on 2022-09-29 10:52:35 CDT

Vice President, Engineering Systems

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