

Final
Advisory
Memorandum

Preventive Maintenance and
Compressed Natural Gas
Inspections of Ride-On Buses

Report # OIG-15-003

November 20, 2014

Montgomery County Maryland
Office of the Inspector General



Report in Brief

Preventive Maintenance and Compressed Natural Gas Inspections of Ride-On Buses

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Background

Montgomery County's Division of Fleet Management Services (FMS) maintains a Ride-On Bus fleet of over 300 buses, 94 of which as of our test date were fueled by compressed natural gas (CNG). CNG and other buses must undergo CNG and preventive maintenance inspections at various mileage intervals specified by the Federal and Maryland Transit Administrations. FMS' maintenance objective is to have greater than 80% of preventive maintenance inspections completed on time for the previous year at any given time.

Why We Did This Inspection

Our office received several complaints related to non-compliance with County, State, and/or Federal requirements for Montgomery County Ride-On Buses in the areas of preventive maintenance and CNG inspections. The complaints were that, in both types of inspections, FMS was not performing the inspections in compliance with mileage requirements.

Noncompliance with preventive maintenance and CNG inspection requirements could present immediate potential safety concerns, and ultimately funding concerns.

What We Found

In a test of 60 preventive maintenance inspections performed by all three maintenance shops from September 2013 through March 2014, we found 65% compliant with mileage requirements, compared to the 80% compliance requirement. In testing CNG bus inspections, we found 39% to be compliant. FMS asserted that, in a test of 60 randomly-selected inspections from March through August 2014, they obtained an 81% rate of compliance.

What We Recommend

We recommend the Department of General Services test FMS' assertion as to inspection compliance. We recommend that DGS take actions to ensure immediate and ongoing compliance with inspection regulations.

Preventive Maintenance and Compressed Natural Gas Inspections of Ride-On Buses

Introduction

This report addresses complaints the Office of the Inspector General (OIG) received related to non-compliance with County, State, and/or Federal requirements for Montgomery County Ride-On Buses in the areas of preventive maintenance and compressed natural gas (CNG) inspections. Both of these issues present potential safety and continued funding concerns.

Objectives, Scope, and Methodology

The objectives of this review were to determine if the Department of General Services' (DGS) Division of Fleet Management Services (FMS) is performing preventive maintenance and compressed natural gas inspections on Montgomery County Ride-On buses within the stated Federal Transit Administration (FTA) mileage intervals.

The complainants provided us details of 21 recent preventive maintenance inspections at the Nicholson Court Small Transit Shop that were likely non-compliant from a mileage standpoint. We reviewed those inspections, specifically looking at mileage intervals. We tested an additional random sample of 60 bus inspections performed by all three maintenance shops from September 2013 through March 2014.

As to CNG-equipped buses, we tested the applicable inspection records of all CNG-equipped Ride-On Buses in service as of April 2014.¹

¹ We did not review the inspections of 19 CNG-equipped buses that were new models and had not yet met inspection criteria. We also did not test compliance with requirements for post-accident inspections.

The complainants brought several other matters, including personnel issues, to our attention. We expressed our related concerns in discussions of each of these with DGS and FMS management.

We conducted our inquiry from March 2014 through June 2014 in accordance with *Quality Standards For Inspection and Evaluation*, issued by the Council of the Inspectors General on Integrity and Efficiency (January 2012). Our inquiry procedures included examining County records; reviewing County, State, and Federal laws and regulations; and interviewing and corresponding with County staff.

Background

Montgomery County's Division of Fleet Maintenance Services (FMS) operates around the clock to ensure continued service to the County. It manages a fleet of over 2,400 light vehicles, 450 pieces of heavy equipment, and 330 ride-on buses. The County had 94 buses fueled by Compressed Natural Gas in service on our test date. FMS employs more than 200 people at 4 main locations, as well as several satellite depots.

Preventive Maintenance

FMS' maintenance plan for Ride-On buses is based on preventive (scheduled) maintenance rather than reactive (unscheduled) maintenance. "Preventive maintenance" encompasses all of the activities, supplies, materials, labor, services, and associated costs required to preserve or extend the functionality and serviceability of the asset in a cost effective manner, up to and including the current state of the art for maintaining such an asset. This maintenance includes, but is not limited to, adjustments, cleaning, lubrication, repairs, and replacements, all intended to preserve or extend equipment life. Non-scheduled repairs would include flat tires, dead batteries, and other unforeseen mechanical breakdowns.

Preventive maintenance inspections of the Ride-On fleet are mileage based. Such inspections are based on relative mileage rather than absolute mileage². According to FMS policy, the acceptable variance for mileage based inspections is up to 10%. Considering the 10% mileage variation, FMS considers the 6,000 mile interval requirement as being "on-time" if it has been

² The next due PM inspections are based on the mileage at which the previous PM was completed (relative mileage)— not at multiples of 6,000 miles (absolute mileage).

between 6,000 and 6,600 miles since the last preventive maintenance inspection. FMS appears to have a strong system of monitoring and self-reporting preventive maintenance exceptions. However, we did not test the system, since that was outside the scope of this review.

According to FMS policy, there are four types of preventive maintenance inspections. They are characterized as: 1. PMA, 2. PMB, 3. PMC, and 4. PMD. Each of the four inspections has certain requirements that must be conducted and passed for the continued operation of the Ride-On bus. Each inspection is documented by completion of a Work Order Report.

The classifications of inspections and mileage intervals are listed in the following table:

PM Inspection	Interval
PMA	6,000 miles
PMB	12,000 Includes all procedures in PMA
PMC	24,000 Includes all procedures in PMB
PMD	48,000 Includes all procedures in PMC

Source: FMS Transit Maintenance Plan dated February 26, 2014.

Each vehicle type has its own inspection sheet for the respective service intervals. Electronic copies of the sheets are maintained and printed for each inspection. The following table illustrates an overview of the tasks associated with each preventive maintenance inspection:

Inspection	Preventive Maintenance Tasks
PMA	Steam clean and road test, driver’s compartment, followed by the passenger compartment, exterior inspection, engine, transmission, and chassis inspection. Inspection and lubrication of the wheelchair lift is performed as part of the PMA.
PMB	The PMB task list includes everything listed on the PMA as well as servicing the hydraulic system, HVAC system, wheelchair ramp, and replacing the fuel filters.
PMC	The PMC task list includes everything listed on the PMB as well as checking the crankcase breather, and changing the fuel and coolant filters.
PMD	The PMD task list includes everything listed on the PMC as well as servicing the transmission, hydraulic system, front wheel bearings, rear axle service, as well as checking the crankcase breather, and changing the fuel and coolant filters. Compressed natural gas and gasoline buses may receive a new set of spark plugs at this time.

Source: FMS Transit Maintenance Plan dated February 26, 2014.

Because the FTA provides funding for these services, it requires compliance with its preventive maintenance schedule for each Ride-On bus for the continued funding of the program.

According to the FTA, a grantee (e.g., Montgomery County) must maintain project property in good operating order and in compliance with any applicable Federal regulations or directives that may be issued, except to the extent that FTA determines otherwise in writing. The grantee agrees to keep satisfactory records pertaining to the use of project property, and to submit to FTA upon request such information as may be required to assure compliance with Federal requirements. The grantee is required to have a written vehicle maintenance plan and facility/equipment maintenance plan. These plans should describe a system of periodic inspections and preventive maintenance to be performed at certain defined intervals.³

Compressed Natural Gas Inspections

CNG is natural gas under pressure which remains clear, odorless, and non-corrosive. Natural gas is a more abundant, cleaner-burning, and less expensive fuel than either gasoline or diesel.

CNG tanks must initially be US Department of Transportation (DOT) approved. As the structural integrity of CNG tanks degrades over time, all tanks are required to have an expiration label. A failure or rupture of any CNG fuel system component can cause an explosion of great force.

CNG tanks must be visually inspected after a motor vehicle accident or fire and at least every 36 months or 36,000 miles, whichever comes first, for damage and deterioration per DOT regulations. FMS stated that it intends to conduct CNG inspections on each bus annually.

Finding 1: Preventive Maintenance Inspections

FMS did not conduct preventive maintenance inspections of the Ride-On Bus fleet at the mileage intervals required.

We initially reviewed 21 work orders which the complainant identified as likely instances of non-compliance, specifically looking at the mileage intervals for preventive maintenance inspections. The 21 inspections were all performed by the Nicholson Court Small Transit Shop from August 2013 through February 2014. Twenty of the 21 inspections were conducted after

³ FTA C 5010.1D

the required period of 6,000 miles (or 6,000 to 6,600 miles with the 10% variance).⁴ One inspection was performed after 5,217 miles.

We then selected an additional random sample of 60 bus inspections performed by all three shops from September 2013 through March 2014. Our examination of this sample generated a 35% non-compliance rate, which is not inconsistent with the County's self-determined and internally reported non-compliance rate of 30% during the month of January 2014 alone. FMS' maintenance objective is to have greater than 80% of PMs completed on time for the previous year at any given time.

Non-compliance with preventive maintenance requirements can potentially result in termination of federal funding as well as impairment of the safety of the bus fleet.

In an interview with OIG staff, the Fleet Management Services Division Chief provided many reasons for these results. He noted that our test period was during the move to the Equipment Maintenance & Transit Operations Center, and that during this period he had lost several skilled technicians. He stated that, in order to meet preventive maintenance requirements, he has established a dedicated training and quality assurance unit. This unit has developed a standardized preventive maintenance program for all shops to follow. It also will ensure new mechanics undergo a week-long onboarding process. Finally, he stated that he now receives and monitors preventive maintenance reports three times every 24 hours. We did not request and review those records that would be necessary to verify these latter assertions.

Finding 2: CNG Inspections

FMS did not conduct CNG inspections of the Ride-On Bus fleet at the mileage intervals required.

The Ride-On Bus system had 94 CNG tank-equipped buses in service on our test date.

We scanned a list of all preventive maintenance inspections performed from January 1, 2013 through April 11, 2014, specifically looking for CNG tank inspections. We identified 47 Ride-On Bus CNG tank inspections during this period. Of those 47, five buses were no longer in service at our test date. We excluded those and considered the results of the CNG tank inspections for 42 buses.

⁴ In one of the inspections, the odometer reading fell from 196,940 to 6,702 miles in one month, indicating a re-set odometer. For test purposes, we considered the 6,702 miles to be the distance traveled.

Of the inspections reviewed, 24 did not meet CNG tank inspection regulations in that the mileage or time limits for inspections had elapsed.

At the time of our inspection, an additional 33 buses were required to undergo but had not undergone CNG tank inspections during our test period. Since our test period covered longer than one year, these are considered exceptions. Finally, 19 buses were not reviewed as they were new models and had not yet met inspection criteria. Thus, these are not considered exceptions.

Our tests of the inspections of CNG systems in the CNG Ride-On Buses in service thus revealed a non-compliance rate of 61%⁵.

In the interview with OIG staff, the Fleet Management Services Division Chief stated that he plans to use his trained employees in future CNG tank inspections, but he will supplement them by contracting out the routine CNG inspections. He will retain the post-accident CNG inspections in-house due to sensitivity.

Conclusion

When we interviewed the Fleet Management Services Division Chief, who is a new manager with prior experience, he claimed to be well aware of performance problems at the FMS shops. He stated they are due primarily to staffing shortages, and that our findings were not news to him. We heard concerns about the large span of control for management, low staffing levels of mechanics and technicians, high workloads at all levels, and slow performance of tasks.

The County's procedures for preventive maintenance and CNG tank inspections are clear. It is not completely clear why FMS has not been carrying out these procedures. The risks from continuing non-compliance with preventive maintenance and CNG tank inspection requirements are the potential termination of federal funding and the development of an unsafe bus fleet.

Subsequent to the initial interview, the Fleet Management Services Division Chief asserted that his staff conducted a test of 60 randomly-selected inspections from March through August 2014, and obtained an 81% rate of compliance. He also asserted that that he was made aware of the CNG non-compliance issues in late December and that he created new policy and procedures based on federal compliance standards that were signed in April, 2014. He stated

⁵ Calculated as $(24 + 33)/94 = 61\%$

that he awarded a contract for the certified inspection and repair of the CNG buses in August and as of late October, 2014 had completed 73 inspections. We did not request and review those records that would be necessary to verify these latter assertions.

Recommendation

DGS management should verify the FMS assertions regarding their most recent compliance and take actions to ensure both immediate and ongoing FMS compliance with preventive maintenance and CNG tank inspection regulations.

Summary of the Chief Administrative Officer's Response

The response from the Montgomery County Chief Administrative Officer (CAO) to the final draft report is included in its entirety in Appendix A.

The CAO agreed with our preventive maintenance finding, but believes our samples covered only a few months that the CAO acknowledges were challenging. The CAO states that DGS did meet the required standard of 80% for the entire period of January 2013 through March 2014. We did not verify this assertion.

The CAO agreed with our CNG finding.

The CAO did not disagree with our recommendation, citing several corrective measures that have been taken to meet inspection requirements going forward. We did not test the implementation or effectiveness of these measures.

The CAO's response did not cause us to alter our findings or recommendations.

Appendix A: Chief Administrative Officer's Response



OFFICES OF THE COUNTY EXECUTIVE

Isiah Leggett
County Executive

Timothy L. Firestine
Chief Administrative Officer

MEMORANDUM

November 12, 2014

TO: Edward L. Blansitt, Inspector General

FROM: Timothy L. Firestine, Chief Administrative Officer *Timothy L. Firestine*

SUBJECT: Final Draft: Report on Preventive Maintenance and Compressed Natural Gas Inspections of Ride-On Buses

I am in receipt of your final draft report on Preventive Maintenance and Compressed Natural Gas Inspections of Ride-On Buses. I appreciate the work of the Office of the Inspector General (OIG) in issuing this report.

As was discussed at the exit conference, the Department of General Services (DGS) Division of Fleet Management Services (FMS) remains steadfastly committed to maintaining a safe fleet of Ride-On buses traveling County roads. Preventive maintenance and timely repairs are the hallmark of ensuring that when vehicles pull out of the depots, they are in the best condition possible. Specific comments concerning the review's findings and recommendations are found below.

OIG Finding 1: FMS did not conduct preventive maintenance inspections on the Ride-On Bus Fleet at the mileage intervals required.

CAO Response: We agree with the OIG's finding. To meet preventive maintenance requirements, the Division Chief established a dedicated training and quality assurance unit and developed a standardized preventive maintenance program for all shops to follow. We believe the twenty one Preventive Maintenance (PM) work orders provided by the complainants did not accurately represent the overall compliance or quality of the preventive maintenance program during the sample period. The hand selected work orders by the complainants only represented 7% of the 273 PMs completed between August 2013 and February 2014. The total PM compliance for the transit bus fleet at the Nicholson Court maintenance shop during that time frame was 85%, which is 5% higher than the Federal Transit Administration (FTA) compliance standard.

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Appendix A: Chief Administrative Officer's Response

Edward L. Blansitt, Inspector General
November 12, 2014
Page 2

Moreover, the 60 samples randomly selected by the OIG all occurred in a 5-month period (August 2013 through February 2014), which does not accurately represent the compliance or the quality of the PMs that occurred during the OIG's specified sample period of January 2013 through March 2014. During the 5-month period in which the random sampling occurred, DGS was experiencing a number of significant program challenges and factors that directly contributed to the lower compliance rate. During the random sampling period, DGS relocated its main transit maintenance shop, while at the same time lost four critical, supervisory transit maintenance staff. These vacancies were backfilled on a temporary basis with less experienced staff, during a time in which the shop experienced the highest vacancy rate in over three years and a workman's compensation rate that doubled from 500 to over 1000 lost days.

We acknowledge that there were PM inspections that did not meet the required interval; however, DGS did meet the FTA required standard of 80% for the entire sample period (January 2013 through March 2014). In fact, DGS completed 3,061 PM intervals during this time period, and the random samples pulled by the OIG only represented 2% of the total PMs completed. Moreover, during the same time period (January 2013 through March 2014) bus reliability increased 53%, from 5,428 to 8,359 miles between failures. This performance metric is considered to be an industry measure of the quality of an organization's preventive maintenance program.

OIG Finding 2: FMS did not conduct CNG inspections on the Ride-On bus fleet at the mileage intervals required.

CAO Response: We agree with the OIG's finding. DGS acknowledges that it was not fully compliant with compressed natural gas (CNG) tank inspections prior to January 2014. Once DGS became aware of the non-compliance in late December 2013, the Chief of the Division of Fleet Management Services immediately investigated, identified, and corrected the deficiencies. In January 2014, DGS created a standard operating procedure for CNG tank inspections, based on all applicable Federal and National Fire Prevention Association guidelines. This policy was completed in March 2014 and was sent to the Maryland Transit Administration (MTA) for review and approval. DGS finalized, signed and issued this policy in April 2014. A copy of this policy was provided to the OIG.

In February 2014, DGS created a separate CNG tank inspection cycle in the FMS fleet management information system. This new process and inspection interval allows for separate scheduling and reporting of the CNG tank inspections. At the same time, DGS scheduled two CNG system inspector classes, enabling 40 of the 88 transit maintenance staff to complete this training. Although not a legal mandate, DGS is in the process of training select FMS technicians to become "certified" CNG system inspectors. Additionally, DGS drafted requirements for an independent, third party CNG tank inspection and repair contract by certified CNG tank inspectors. This contract was awarded in August 2014 and CNG tank inspections began in

Appendix A: Chief Administrative Officer's Response

Edward L. Blansitt, Inspector General
November 12, 2014
Page 3

September. Since awarding the contract, 73 of the 90 active transit buses have been inspected and certified.

OIG Recommendation: DGS management should verify the FMS assertions regarding their most recent compliance and take actions to ensure both immediate and ongoing FMS compliance with preventive maintenance and CNG tank inspection regulations.

CAO Response: DGS acknowledges a decline in the transit bus Preventive Maintenance (PM) program during the months of August 2013 through December 2014; however, this period does not accurately represent the compliance or quality of the PM program as a whole. The combined PM compliance rate across all three transit maintenance shops during the OIG review for the sample period was 80%, and bus reliability increased by 53% from the previous year.

Leveraging technology, FMS has automated PM reporting, and PM schedules are emailed to all supervisory maintenance staff and leadership three times a day to ensure consistent communication of maintenance requirements. This automated report is one example of an escalation tool used to ensure compliance, establish accountability, and improve performance. Moreover, the Training and Quality Assurance Section works with each maintenance shop to conduct random quality inspections. This is followed up with weekly maintenance production meetings to review compliance, identify obstacles, and determine areas for improvement. These performance measures are also tied to FMS staff performance plans.

If you have any questions, please feel free to contact me or Assistant Chief Administrative Officer Bonnie Kirkland, who can be reached at (240) 777-2593 or Bonnie.Kirkland@montgomerycountymd.gov.

TLF:ag

cc: John Hummel, Deputy Inspector General
David Dise, Director, DGS
Fariba Kassiri, Assistant Chief Administrative Officer
Bonnie Kirkland, Assistant Chief Administrative Officer
Beryl L. Feinberg, Chief Operating Officer, DGS
Bill Griffiths, Chief, Division of Fleet Management Services, DGS