

# *City of Milwaukee*



*Review Report of the Department of Public Works, Fleet Operations  
Compliance with CNG Vehicle Inspection Requirements*

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*City of Milwaukee, Wisconsin*

February 2020

*Office of the City Clerk*

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January 7, 2020

Honorable Ashanti Hamilton  
President  
City of Milwaukee  
Milwaukee, WI 53202

Honorable Robert Bauman  
Alderman – District 4  
City of Milwaukee  
Milwaukee, WI 53202

Honorable Robert G. Donovan  
Alderman – District 8  
City of Milwaukee  
Milwaukee, WI 53202

**Subject:** Findings of the Department of Public Works, Fleet Operations Compliance with CNG Vehicle Inspection Requirements

Dear President Hamilton, Alderman Bauman, and Alderman Donovan:

This responds to your December 18, 2019, request, regarding the Department of Public Works (DPW), Fleet Operations inspection process for Compressed Natural Gas (CNG) and compliance with CNG vehicle inspection requirements as defined by code NFPA 52 and Wis. Stat. SPS 340.71.

At your request, I have specifically addressed:

1. Whether the DPW is in compliance with CNG vehicle inspection requirements as defined by code National Fire Protection Association (NFPA) 52 and Wis. Stat. SPS 340.71.
2. Whether a completed CNG inspection form and accompanying photos were retained for detailed inspections.

The review concluded that DPW, Fleet Operations, is currently not in compliance with NFPA 52 and Wis. Stat. SPS 340.71 inspection requirements. However, it is noted that management proactively initiated mitigating actions to address past-due inspections during the review.

Sincerely,

Ronda M. Kohlheim, MBA  
Inspector General

Cc: Honorable Tom Barrett, Mayor

## Review Scope and Objectives

The Department of Public Works (DPW), Fleet Operations, is comprised of Sanitation, Forestry and Fleet Operations. Fleet Operations is responsible for repairing, maintaining and operating the department's centralized fleet of more than 4,000 motor vehicles and related equipment, which includes 68 compressed natural gas (CNG) vehicles. Currently, there are 60 refuse packers, five vans, three cars and another seven CNG refuse packers on order.



To cover the cost of purchasing CNG packers, the division has used Congestion Mitigation and Air Quality (CMAQ) grant funding. Under Wis. Stat. SPS 340.71, CNG systems must be operated and maintained as defined by code National Fire Protection (NFPA) 52, which requires that CNG cylinders must be inspected every three years or 36,000 miles, whichever comes first, or after any accident or fire. The scope of the review included all DPW CNG vehicles and equipment.

The preliminary focus of the review was:

1. Determine whether the DPW was in compliance with CNG vehicle inspection requirements as defined by code NFPA 52 and Wis. Stat. SPS 340.71.
2. Evaluate whether a completed CNG inspection form and accompanying photos were retained, for detailed inspections.

## Review Conclusions and Recommendations

The review concluded that Fleet Operations is not in compliance with CNG vehicle inspections as defined by code NFPA 52. Specifically, in January 2019, management noted that 39 vehicles were due for inspection, of which five were already past the inspection due date. At that time, an action plan was implemented to perform two inspections per week, with a two-month completion time frame. Yet, by the end of the year, management ascertained that only nine inspections had been performed. CNG inspections must be conducted by a qualified or certified CNG Fuel System Inspector. A qualified inspector must have at least one of the following qualifications: (a) two years' experience conducting container inspections on the type of cylinder being inspected; (b) supervision by a person with two years' experience relevant to the type of cylinder being inspected; (c) approval from the manufacturer of the container being inspected; (d) certification as an inspector from one of the organizations with specific original equipment manufacturer (OEM)-approved training centers with fuel gas cylinder standards' recommended inspection guidelines; (e) certification as an inspector by a state or nationally recognized organization that tests for specific knowledge of applicable fuel gas cylinder standards' recommended inspection guidelines; or certification as an inspector by the authority having jurisdiction.<sup>1</sup> The DPW, Fleet Operations, employs 59 Vehicle Service Technicians (VST), two are CNG certified and there are eight current vacancies. However, two new VSTs are expected to start on January 27<sup>th</sup>.

The City offers to pay for VSTs to take a two-day CNG Tank and Fuel System Inspector class, offered at the Milwaukee Area Technical College (MATC). Additionally, it also covers the cost of the state exam. There is a three-percent worker footnote pay, for CNG inspector, which is applicable only while performing an inspection. This year, Fleet Operations has 46 CNG vehicles due for inspection, of which 41 are already past the required inspection due date. To date, VSTs are working on a special project, with oversight by a CNG inspector and indirect supervision by the Fleet Repair Supervisor(s) to perform inspections on CNG vehicles with an overdue inspection date. These inspections are being piloted during first shift work hours and on Saturdays; the project

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<sup>1</sup> Agility Fuel Solutions, CNG Fuel Cylinder Inspection Manual, ENP-558 Rev. C: February 2018, <https://agilityfuelsolutions.com/wp-content/uploads/2018/04/ENP-558-CNG-Cylinder-Inspection-Manual.pdf>

is expected to continue until the backlogged inspections have been completed. As of January 6<sup>th</sup>, six inspections have been completed and one is in progress, but was waiting on parts. Of the 41 remaining overdue inspections, eight were more than 120-days past the due date.

This report identifies five recommendations to address these issues.

1. Adopt and use industry-recommended inspection intervals in official policy.
2. Require an appropriate level of CNG training for all employees.
3. Establish safety guidelines that must be followed when operating and servicing CNG equipment.
4. Require certification for all CNG vehicle inspectors.
5. Collaborate with the Milwaukee Fire Department and other First Responders
6. Develop and implement comprehensive policies and procedures over the CNG inspection processes and controls.

### **A. Process Efficiency**

CNG inspections are safety-driven procedures, which must be conducted frequently enough to detect potential safety issues. While inspection of all CNG cylinders is required every three years or 36,000 miles whichever comes first, the Natural Gas Vehicle (NGV) industry best practices were amended in 2008 to include inspection of the entire high-pressure portion of the fuel system; and in 2018 the NGV CNG Fuel System Inspection Group published a guidance document regarding CNG inspections. In accordance with best practice, Management should adopt and use industry recommended inspection intervals over CNG inspections to support the achievement of objectives and respond to risks.

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#### **Recommendation 1: Adopt and use industry-recommended inspection intervals in official policy.**

In order to identify any unsafe conditions before they become a serious problem, Management should implement the industry-recommended inspection intervals as part of the inspection process.

Specifically,

- **Pre-in-service inspection** - a detailed visual inspection of all the high-pressure fuel system components, which is conducted prior to placing a new vehicle into service. The inspection should be used as a reference point for future inspections, while determining any potential damage or disrepair to the CNG system that might have occurred during the installation process.
- **Operator Pre-and Post-Trip Inspection** – as required by standard, vehicle drivers should be required to conduct an inspection of any easily-accessible and visible CNG components, which includes looking for any signs of wear, damage, or fuel leakage.
- **General Visual Inspection** – require Vehicle Service Technicians (VSTs) to conduct a basic inspection of all visible elements of the CNG fuel system. This inspection should be performed during routine maintenance. Technicians should be required to look for any signs of obvious or gross external damage to or leakage from the fuel system components. Evidence of any dents, damage to shields, or a leak should automatically prompt a detailed visual inspection by a trained, qualified, or certified CNG inspector.
- **Detailed Visual Inspection** – require a trained, qualified, or certified CNG inspector to conduct a thorough inspection, which covers the entire high-pressured fuel system, including cylinders.

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**Recommendation 2: Require an appropriate level of CNG training for all employees.**

Thorough safety training is one of the frequently overlooked elements by several CNG fleets. Comprehensive safety training is essential to ensure technicians have the skills and knowledge necessary to perform their jobs safely and accurately. To prevent incidents and demonstrate that the City has proactively implemented safety practices and procedures that protect employees, citizens and visitors, management should require all employees, including management who works on or around CNG vehicles to be trained at a level that corresponds to their job responsibilities.

Specifically,

- CNG equipment operators should receive at least level one safety training to become familiar with the properties of natural gas and know how to use the safety features of the vehicle.
  - All VSTs, any other technician, Fleet Repairs Manager, and any other employee working on or around CNG vehicles, should receive at least level one training. Level one safety training will enable them to become familiar with the unique properties of the fuel, as well as, the principles of working around compressed gas.
  - CNG-certified VSTs should not only be required to maintain their certification, but be required to take training that enables them to be familiar with fuel system installation code requirements and standards, and be trained to identify and assess damaged components, include various damage levels to CNG cylinders.
  - Technicians performing diagnostics and repairs to the CNG fuel system or engine should be required to have at least a level three training. These technicians need training that teaches them about the unique components of heavy-duty natural gas fuel systems and engines; how to distinguish between a fuel problem, a fuel system problem and an engine problem; and how to diagnose problems that do not set codes in the controls.
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Comprehensive safety guidelines should be established to ensure drivers, VSTs, and trained, qualified and certified CNG inspectors have the fundamental knowledge and skills essential to safely and properly perform their job task require.

**Recommendation 3: Establish safety guidelines that must be followed when operating and servicing CNG equipment.**

Management should utilize strict compliance standards, safety guidelines, and a formal process that requires:

- CNG equipment be inspected and maintained exclusively by trained DPW personnel.
- Personal protective equipment (PPE) and proper attire be worn while servicing and performing maintenance on any CNG equipment.

- A natural gas fire extinguisher be accessible and visible throughout all servicing areas and facilities. In addition, a portable fire extinguisher be installed in all CNG vehicles and is easily accessible.
  - CNG safety signage be visible at all applicable locations as stipulated by federal, state and municipal regulations.
  - CNG equipment be serviced in a designated area that complies with all federal, state and municipal laws and regulations.
  - Vehicles equipped with a natural gas fuel system be labeled with a blue reflective decal on the rear of the vehicle identifying CNG.
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While there is no national requirement for a CNG inspector be certified, certification is a recommended practice in the national gas vehicle industry as it provides a conspicuous level of risk mitigation. This credential demonstrates technician knowledge and skills required to perform CNG fuel system inspections according to all codes, standards and industry best practices.

These important skills include the ability to:

- Understand the purpose of each CNG fuel system component and their inspection requirements, and to identify damage or disrepair.
- Accurately differentiate between the four types of CNG cylinders, assess their damage types and levels and determine whether this damage is repairable or if the cylinder must be condemned.
- Recognize the manufacturing, installation and inspection standards for CNG fuel systems, which may vary from model year to model year, depending on the codes in force at the time.
- Properly apply CNG installation and inspection standards to perform CNG fuel system inspections.
- Conclude the final disposition of a CNG cylinder after an inspection.
- Properly defuel and dispose of a condemned CNG cylinder

**Recommendation 4: Require certification for all CNG fuel system inspectors.**

To prevent incidents and demonstrate that the City has proactively implemented safety practices and procedures that protect employees, citizens and visitors, Management should require all CNG inspectors to be certified.

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CNG vehicles are different than conventional vehicles and it is critical that the Milwaukee Fire Department (MFD) and other first responders be familiar with and properly trained to deal with accidents involving these vehicles. The scene of an accident involving a vehicle is most often chaotic, and first responders must work within the constraints of a critical time frame to ensure their safety and the safety of accident vehicle occupants as well as the general public. When an accident involves a CNG vehicle first responders must achieve balance between speed and caution because many potential hazards are present. It is the utmost importance that first responders including fire department, paramedic, and police personnel have the information they need to respond to an incident involving a CNG vehicle or equipment.

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**Recommendation 5: Collaboration with the Milwaukee Fire Department and other First Responders.**

In the event that there would be an urgent safety concern, issue, or incident involving the appropriate action a first responder should take, Management should collaborate with the MFD and other first responders to:

- Develop an emergency response process and procedure between DPW personnel and first responders in the event of an emergency.
  - Ensure first responders have a sound understanding and regarding the City's current CNG vehicles and equipment.
  - Enhance the responder's current skill set and ability to assist in dealing emergency situations.
  - Identify MFD or other first responder safety concerns and recommendations.
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## B. Internal Controls

In accordance with best practice requirements, including the *2013 COSO Framework–Principle 12*: Management should implement control activities through policies that establish what is expected and in procedures that put policies into action.

Written policies and procedures should be: developed and enforced for all operations; made accessible and communicated to all personnel; and, reviewed and updated as needed. Well-defined policies, procedures and processes outline current requirements, operations, interdependencies, risks and controls, and they can help identify improvement opportunities. Per best practice:

- Policies contain high-level principles or requirements that a department or functional area of the organization must follow, as formally agreed upon by management.
- Procedures are affiliated with particular policies and define lower-level processes, such as daily, weekly, or quarterly functions and job activities.
- Processes are contained within procedures, defining in detail how regular business functions are performed whether on a repeating or as needed basis, and show interrelationships and dependencies with other processes, organizational areas or technologies.

Documented policies and procedures promote consistency, define expectations, serve as a training tool, provide continuity to operations and provide a pivotal source of information and direction pertaining to the conduct of standard operations and their related activities regarding a specific process, processes or controls.

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**Recommendation 6: Develop and implement comprehensive policies and procedures over the CNG inspection processes and controls.**

Management should develop, document, and communicate comprehensive policies and procedures to enhance governance over the critical processes and requirements for CNG vehicle inspection processes as follows:

- Ensure that CNG inspections, repairs and maintenance are performed exclusively by trained personnel.
- Pre- and Post-trip inspection forms should be completed daily with each use of any CNG equipment and should be turned in daily and retained according to the City's Global Retention Schedule.
- Safety guidelines for use of safety equipment and general safety requirements when working on or around CNG vehicles (i.e. CNG safety signage, natural gas rated fire extinguishers, use of appropriate tools, appropriate attire and personal protective equipment, emergency responses to gas leaks, vehicle fire procedures, emergency shut down procedures, procedures when the vehicle is involved in an accident, the cylinder has been damaged, transferred or alter, etc.)
- Tracking the inspection due date for CNG equipment.
- Tracking the expiration dates for CNG inspectors.
- Document and retain a copy of CNG inspector certificates.
- Document and retain evidentiary support of inspections, results, and follow-up efforts (i.e. pre-in-service, pre- and post-trip, general visual, and detailed visual inspections, CNG Cylinder Inspection Form and photos).
- Maintain a list of tools used and the specifications required to perform inspections.
- Process for removing a cylinder shield.
- Steps for defueling and isolating a cylinder when level 2 or 3-cylinder damage is discovered.
- Actions to be used when cylinder damage is assessed.

The policies and procedures should be stored in a centralized location that is easily accessible and regularly updated. Updates should occur on an as-needed basis, ideally no less than an annual basis.

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Department of Public Works  
Operations Division-Fleet Services Section

Jeffrey S. Polenske  
Commissioner of Public Works

Laura Daniels  
Director of Operations

Jeffrey A. Tews  
Fleet Services Manager

February 13, 2020

Ronda Kohlheim, Inspector General

Subject: Findings of the Department of Public Works, Fleet Services Compliance with CNG Vehicle Inspection Requirements

Dear Ms. Kohlheim:

The City of Milwaukee DPW Operations Division Fleet Services Section appreciates the opportunity to work with the Inspector General's Office regarding the report on Compliance with CNG Vehicle Inspections Requirements. We offer the following responses to the report's recommendations:

**Recommendation 1. Adopt and use industry-recommended inspection intervals in official policy.**

Fleet Services shares the reports concerns regarding four key aspects of compressed natural gas (CNG) system inspections. As new equipment is received, a comprehensive **pre in-service inspection** process is conducted on each new vehicle to ensure there are no defects or leaks within the entire CNG system including storage tanks, piping, valves and lines. This process allows Fleet to obtain the baseline information including obtaining the all-important identification information found on each CNG tank, denoting the tank type (1, 2, 3, or 4), the operating pressures, and the life expectancy of each tank, which is typically 20 years from the date of manufacture. All information is entered into the fleet maintenance information system (FleetFocus), which allows this baseline information to be utilized over the entire life of the vehicle. Fleet also requires Operations Driver Workers (ODW's) to perform **pre and post trip inspections** on their assigned trucks before each shift and at the end of the shift. When routine maintenance and repairs are done, Fleet Vehicle Service Technicians (VST's) are trained to do **general visual inspections** to look for problems with the entire vehicle, including CNG system deficiencies. Fleet also follows Federal Motor Vehicle Safety Standard FMVSS 304 regarding mandated **detailed visual inspection** of the CNG tanks and system. The report correctly states that Fleet is not in compliance with these inspections, specifically the requirement that inspections are conducted every 36 months, or 36,000 miles, whichever comes first. Fleet was following a scheduled inspection plan, automatically generated by the FleetFocus system. Due to various factors, this action plan was not fully completed on schedule, and 39 vehicles had not been inspected on time. Fleet has taken a multi-step approach to correct this problem at a highly accelerated rate. These inspections are being conducted by a team of VST's led by one of Fleet's state certified CNG tank inspectors. As of the writing of this response, 21 inspections have been completed and two more are underway.

Completion Date: Fleet expects to be completely up to date on CNG tank inspections by March 31, 2020

(Continued)



**Recommendation 2. Require an appropriate level of CNG training for all employees.**

ODW's are trained by both the Fleet Operations section in fueling procedures for CNG vehicles during orientation training, and by the Sanitation Services Section in all aspects of operating refuse trucks, including CNG fueling practice. Detailed pre and post trip methods are part of testing necessary for drivers to successfully pass their commercial driver's license (CDL) road test. In addition to the daily pre and post trip inspections on their assigned trucks, ODW's are expected to document any observed defects on both the Operators Daily Report, and the B.F.D. 2000 Equipment Condition Report when repairs are needed. On the repairs side, Fleet provides VST's with 40 hours of college level 400 training at MATC in all facets of CNG engine theory, diagnosis, and repair of the entire CNG system. This training is conducted during winter and summer months. The training is provided at Fleet's expense to all VST's.

Completion Date: This is an ongoing initiative provided to all new employees, and offered as remedial training to employees as needed.

**Recommendation 3. Establish safety guidelines that must be followed when operating and servicing CNG equipment.**

All staff currently receives ongoing training in proper safety techniques and PPE use from the DPW-Administration Safety Section, including mandatory safety updates. Repair staff wear safety shoes and eye protection and gloves, and have work rated coveralls provided by Fleet. However, since this training is general in nature, Fleet will work with the Safety Section to formalize a CNG safety checklist to be used during this training. All CNG vehicles have the required CNG signage and identification tags on the rear of the vehicle and at the fuel fill points. All required signage and decals are provided and installed at the Fleet CNG fueling stations. Fleet agrees with the report's recommendation to place fire extinguishers into the cabs of all CNG trucks, and has already begun this effort. Maintenance and replacement of these fire extinguishers will become a regular part of the CNG tank inspection process.

Completion Date: June 2020

**Recommendation 4. Require certification for all CNG vehicle inspectors.**

Currently Fleet has two VST's that are state certified CNG tank inspectors, authorized to conduct the mandated CNG tank inspections, and affix inspection stickers to each tank inspected. These VST's were trained at MATC for 16 hours in preparation for the state exam. All expenses were paid by Fleet, and each inspector receives a footnote to their wages when performing inspection duties. Due to the increasing number of CNG vehicles, particularly refuse trucks, Fleet plans to add more certified inspectors to the ranks of service staff, by examining and/or adjusting incentives offered to VST's and other staff who become state certified CNG tank inspectors.

Completion Date: July 2020

(Continued)

**Recommendation 5. Collaborate with the Milwaukee Fire Department and other First Responders**

Fleet agrees that additional training, collaboration and cooperation with the Milwaukee Fire Department and the Milwaukee Police Department would significantly increase the safety of employees, emergency personnel, and the general public. Fleet will provide information about the CNG fleet and the CNG refueling stations with MFD and MPD, in any manner they deem appropriate.

Completion Date: April 2020

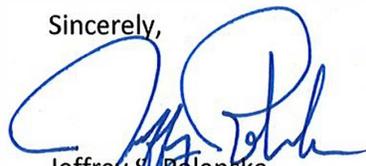
**Recommendation 6. Develop and implement comprehensive policies and procedures over the CNG inspection processes and controls.**

The CNG tank inspection process requires strict adherence to a detailed checklist that provides a Pass/Fail record of all conditions of every CNG tank on board any vehicle. Pictures are taken and stored to provide current history for the next scheduled or unscheduled inspection. However, Fleet fully recognizes this as an opportunity to expand and improve other areas regarding CNG training. Among other initiatives, Fleet Services has begun the process of creating and formalizing many of the policies and procedures that apply to the operation and maintenance of vehicles and equipment, including CNG equipment, in the form of standard operating procedures (SOP's). In November, 2019, the new position of Fleet Repairs Manager was created to manage the Repairs work unit and the FleetFocus system. This position will be responsible for the development of SOP's and provide additional oversight and accountability for the inspection program. This manager is now responsible for the inspection program by monitoring upcoming inspection schedules, ensuring timely completion of CNG inspections, follow through with any necessary repairs or replacements, and the timely reporting of results. In addition, he is revising the previously mentioned pre-trip and post-trip forms and options for electronic retention are currently under way. Comprehensive safety guidelines will be finalized and incorporated into standardized work rules and vehicle operations manuals, where applicable. Formalized policies and procedures for vehicle fueling and defueling, PPE, required tools, and emergency response will all be developed. CNG tank inspection due dates are currently tracked within the FleetFocus system, and CNG tank inspection documentation, including forms and required photos are currently uploaded into the FleetFocus system for electronic storage, permanently linked to the associated vehicle and work order. The FleetFocus system has control features that can restrict or deny fuel authorization to vehicles with past due inspections or expired tanks. In addition, customized reports can be created and distributed to notify personnel of expiring CNG tank inspector certifications.

Completion Date: July 2020

Fleet Services will continue to work to complete the initiatives outlined above to ensure that all safety standards, regulations, and requirements are fully met and continually adhered to by staff.

Sincerely,



Jeffrey S. Polenske  
Commissioner of Public Works