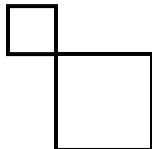


BUILDINGS AND FLEET

FLEET MAINTENANCE MANUAL

May 2007



Fleet services procures, maintains, fuels, dispatches and manages the vehicles and equipment fleet of City of Milwaukee, including police. The fleet is comprised of over 4000 units ranging from automobile and trucks to off-road construction equipment.



Message from Superintendent:

For most government agencies, fleet/equipment services impact the delivery and cost of nearly every service provided to the public, impact the productivity of nearly every employee, support emergency services making the difference between life and death, and support the maintenance of infrastructure which helps support local economy, and quality of life.

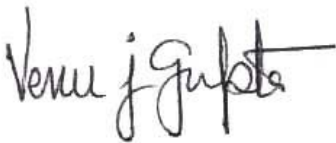
The main goal of the department is to maintain City's fleet so that it is always available for the work performed by various departments and in keeping downtime to a minimum. By keeping a good preventative maintenance program we can accomplish our mission while preserving City of Milwaukee's major capital investment in fleet.

The purpose of this PM manual is to annually document our program and reflect any changes and upgrades to the program.

Preventative Maintenance (PM) program consists of scheduling periodic lubrication, inspection and tune ups based on time, mileage, engine hours, or gallons of fuel used. If PM services are not performed on a scheduled basis, safety, useful life of a vehicle or productivity could be compromised.

Vehicle technologies have advanced considerably, such as the use of electronic control modules (ECM) to control engine timing or fuel injection systems, anti-lock brakes, and airflow – sensors, evaporative emissions controllers, etc. Vehicles are no longer just mechanical machines but incorporate a variety of Electronic equipment. Today's mechanic must be skilled and knowledgeable in the use of electronic measurement and diagnostic equipment to perform a variety of tests and adjustments during the periodic preventative maintenance to keep the equipment operating safely and efficiently while reducing downtime, optimizing fuel use and help employees work efficiently.

As Superintendent, I take great pride in our highly skilled vehicle technicians and other talented individuals operating behind the scenes, providing proficient fleet repairs and maintenance services for the City of Milwaukee.



Venu J. Gupta
Superintendent, Buildings and Fleet
May, 2007

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INTRODUCTION

For most government agencies, fleet/equipment services impact the delivery and cost of nearly every service provided to the public, impact the productivity of nearly every employee, support emergency services making the difference between life and death, and support maintenance of infrastructure which helps support local economy and quality of life.

Preventive maintenance is an extremely critical part of fleet operations. We have created a Preventive Maintenance Team to decrease the incidents of equipment arriving late for the PM's they are due for. This team has been charged with overhauling the complete PM program from the intervals to the locations the PM's are completed.



Brad Morin performing preventive maintenance

FLEET SERVICES

Fleet Services purchases, maintains and fuels a fleet of over 4000 light and heavy vehicles and components such as plows, leaf attachments and salt hoppers for the City of Milwaukee. This number also includes police vehicles. Fleet Services does not perform PM's on Police vehicles but does perform all repairs. The types of equipment range from small soil compactors to Police Vehicles, through heavy duty trucks, off-road construction equipment and certain specialty equipment. Other than supporting DPW operations, the department provides equipment to other city agencies.

More than 54 skilled technicians along with welders, body men, tire men, and parts personnel along with their supervisors work at various city garages to keep the fleet properly maintained. The department also dispenses gasoline and diesel fuel at nine locations throughout the City and propane at selected sites. Facilities include the Central Repair Garage as headquarters and three field garages. A centralized dispatch and operator training program are also run from the Central Repair Garage through the Dispatch section of Fleet Services.

Fleet Services operates Fleet Focus, a computerized fleet maintenance information system, to track all of the units, repairs and maintenance costs, and to schedule vehicles for periodic maintenance work. The system also records fuel dispensed to each vehicle. The City Of Milwaukee is in the process of installing the Fuel Focus system which is a module of Fleet Focus. This system will give us real time entry of fuel transactions into the fleet management system. We will also utilize some new technology on all newer equipment. The operator will no longer enter the vehicle mileage when fueling. There will be a ring around the fuel tank neck that will take the mileage from the vehicle and enter it into the vehicle information on Fleet Focus. This will give provide greater accuracy, allowing the Preventive Maintenance program better information in scheduling the PM's.

MAINTENANCE FACILITIES

More than 93 skilled employees and their supervisors work at various city garages to keep the fleet properly maintained. Facilities include the Central Repair Garage as headquarters, Ruby Garage, Lincoln and the newest location is at the DPW Field Headquarters.

The Central Garage is also the location of the Dispatch Office. The Dispatch Office schedules the daily assignments of 400 Operation Driver Workers and directs the DPW equipment operator training program which provides driver training to more than 700 employees.



Central Repair Garage

2142 W. Canal St
Sq. Ft.: 149,995
Unit Parking: 250
Built in: 1979
Repair Employees: 80
Dispatch Section
Employees: 11

At Central Repair Garage a major undertaking has happened in the past year. All the HVAC units have been replaced and other facility equipment has been upgraded in order to meet current state building codes.



Northwest Garage

3025 W. Ruby St
Sq. Ft.: 71,456
Unit Parking: 200
Built In.: 1948
Repair Employees: 9

The Northwest Garage performs a variety of repair and preventive maintenance activities for heavy equipment. It also services refuse packers that park at the Sanitation Industrial Road site, about four miles away. The facility is the original city heavy equipment repair facility and is in need of a major upgrade or replacement.



Lincoln Garage

3921 W. Lincoln Ave.
Sq. Ft.: 85,124
Unit Parking: 280
Built In: 1957
Repair Employees: 10

Lincoln Garage performs a variety of repair and preventive maintenance activities for heavy equipment parking on the south side of the city. While having had some upgrades to its facilities, there are still facility elements that warrant consideration in 2007.



Tire Shop

123 N. 25th St.

Sq. Ft.: 18,240

Unit Parking: 40

Tire Shop Employees: 6

Remodeled In: 2004

The Tire Shop is a state of the art tire maintenance facility developed during 2004. It was designed from the ground up as a tire service facility and has demonstrated it's superiority over a "make-do" alternative. It is centrally located and is in close proximity to Central Garage.



DPW Field

Headquarters

3525 N. 35th St.

Sq. Ft.: 228,250

Unit Parking: 500

Built In: 2005

Repair Section

Employees: 3

The DPW Field Headquarters serves as the centralized location for many DPW activities. Included at the site is a Fleet Services preventive maintenance and minor repair facility that services approximately 500 vehicles which park at this location.

PREVENTIVE MAINTENANCE

In a perfect situation all repairs to every vehicle would be completed in a planned preventive maintenance (PM) program. From the time a vehicle was purchased until it was sold, all repairs would be predicted and prevented. One hundred percent of all shop labor and parts would be attributed to preventive maintenance (PM). Shop scheduling would be much easier. Breakdowns, road calls, and downtime would be virtually nonexistent. Equipment would be safe and dependable. Operating costs would be minimal. In the real world, however, this does not happen.

A scheduled preventive maintenance program is a systematic method of planned, proactive vehicle inspection along with servicing and repairs performed at specific intervals. Effective equipment management requires that repairs be made before failure. This involves a preventive maintenance approach to provide for systematic, periodic servicing of equipment to facilitate operations minimum downtime.

Planning and scheduling PM activities requires providing the right maintenance at the right time at the lowest overall cost. Combining these factors requires fleet managers to understand operating and maintenance characteristics to customize an effective preventive maintenance program.



Ron Caracter
lubricating a
suspension during
preventive
maintenance

SCHEDULED PREVENTIVE MAINTENANCE PROGRAM

Scheduled Preventive Maintenance (PM) is the heart and soul of all efficient fleet management operations. An effective PM program will reduce peaks and valleys in repair volume. Sound PM programs enhance risk management. A well-maintained vehicle is usually a safer vehicle. In addition to safety, the documentation included in a proactive PM program can be invaluable in the courtroom.

PLANNING A PREVENTIVE MAINTENANCE PROGRAM

Perhaps the most essential concept of a PM program is flexibility. Each organization must establish PM service parameters specific to its own budgetary and quality constraints.

OPERATOR RESPONSIBILITIES

An operator has a responsibility for his/her particular piece of equipment and is expected to inspect this equipment daily, checking tire pressure, checking for fluid leaks, lubricant levels, belt conditions, battery connection and cleanliness, lights, signals and horn, windshield wipers, and wiper fluids and reporting any problems. For equipment which requires a Commercial Driver's License, federal law dictates a specific driver checklist. Vehicle Service Technicians need to know the details of daily operations and defects.

SCHEDULING PREVENTIVE MAINTENANCE

Scheduling intervals allow for a determination of when and how often a PM activity will be performed. Local usage and environmental conditions, as well as manufacturer's recommendations, should be taken into account when establishing PM schedules.

Typically, agencies indicate that their PM program schedule is determined by:

1. Manufacturers' recommendations for routine maintenance inspections;
2. Incremental indicators such as mileage, elapsed time, engine hours, or fuel consumption;
3. Service levels to determine what will be inspected and what maintenance tasks will be carried out at various service intervals (done in addition to general, routine tasks; also can be sophisticated enough for the scheduling of non-normal PM, e.g. brake pad replacements, etc); and

4. Technician availability, shop designation, and user convenience.
5. Adjustments to schedule – increased or shortened intervals – based on a particular fleet’s experience due to particular use and availability of equipment, etc.

SERVICE INTERVALS

PM intervals and service levels are initially based on manufacturer recommendations for vehicle maintenance. In addition to guidance from manufacturers and other outside sources, fleet managers use a variety of other resources to customize their PM programs, notably the past performance of similar equipment in the fleet from vehicle histories, others’ experience with similar vehicles, and demands made on vehicles, such as continuous service, dirty operating conditions, and extreme temperature ranges. The following are the most common measures of service intervals other than manufacturers’ recommendations.

Time - Time is frequently used as a PM service interval. In systems based on time intervals, vehicles and equipment are serviced annually, semi-annually, quarterly, monthly, and daily or by hours of service. For example, setting a PM schedule up to service a unit every x-number of miles or x-number of days will ensure that even if the odometer data is corrupted, the unit will be rotated into the schedule for service and will not be overlooked.

Mileage – Is a common method of determining service intervals. Vehicles using mileage as a service interval are scheduled to be serviced after traveling a predetermined distance. This is a time proven method that is most effective on units that have high mileage applications or trip patterns.

Hours – Trip characteristics of some vehicles in public fleets require significant engine operating time although the vehicles display a low mileage rate. Engine hours are often a better indicator of wear and, therefore, are a better indicator of PM requirements. Construction, stationary and heavy equipment often have hour meters as opposed to mileage odometers. This equipment mandates hours as a service interval.

Total fuel usage – There are several reasons that agencies have begun to use fuel consumption as the criteria for PM interval scheduling. Combined with recorded travel distance, or hours of operating time, fuel consumption realistically reflects what is happening to an engine. An automated fuel transaction system can facilitate updates of PM schedules when interfaced with the automated PM system.

Either/or – Most current automated information systems provide the opportunity to schedule PM's on the basis of so many miles/hours, so much time expired, or so much fuel consumed. This provides the greatest control over what is happening with the equipment.

Environmental conditions – Managers also consider demands made on vehicles by use, seasons, and terrain.

SERVICE CHECKLISTS

Servicing of equipment can be thought of as having progressive stages or levels. There are three levels commonly identified, but it is possible to add more levels to accommodate various circumstances and types of equipment.

“A” Level Service or Level One Service – Systematic inspection of the unit (including the outside, under the hood, underneath the vehicle, and inside the cab) is often a part of the “A” servicing level.

“B” Level Service or Level Two Service – Service typically includes all the elements of the A service plus inspection of components having a high rate of wear or deterioration or a proven need for frequent adjustment. It includes such things as oil and filter changes, addition of transmission oil and hydraulic fluids, clutch adjustments, brake lining inspection and brake adjustments, engine running condition check, and adjustments to meet manufacturers' specifications.

“C” Level Service or Level Three Service – Service typically includes all the elements of the A and B inspection plus a thorough check and inspection of all remaining components and assemblies. “C” activities may include additional services such as front end alignments, transmission service, diesel fuel filters, hydraulic filters, engine tune-up, and drive train adjustment.



James Kehoss working on the computerized vehicle alignment machine

Brad Morin using the PDF scanner to check the vehicles computer diagnostic system



PREVENTIVE MAINTENANCE

The Equipment Maintenance administrative staff processes the preventive maintenance schedules for vehicles/equipment. The clerical staff run a report for preventive maintenance based on odometer readings from fuel uploads and computer system reports or based on time between inspections. Departments are then notified by phone, fax or email of all scheduled equipment due for inspection.

The department/division is responsible for delivering the equipment to the assigned repair/PM location. The person delivering the vehicle/equipment for preventive maintenance is responsible for notifying the supervisor of their arrival. If there is any additional work they want to have done on the vehicle during the inspection, they fill out Form BFD 2000 (Equipment Condition Report). They are to include the unit number & mileage, specify work needed done, and designate who to contact when work is completed or if there is a question (sample "1" attached).

The City Department/Division can contact the shop supervisor to make arrangements if a special need arises to deviate from the preventative maintenance schedule. If vehicles/equipment is scheduled for maintenance and an emergency arises, it is the responsibility of the operator or supervisor to contact the Fleet Repair Shop to reschedule. These types of emergencies happen on a fairly regular basis. The repair division is very flexible when it comes to scheduling the PM's needed.

In conjunction with the manufacturer recommended intervals, the Equipment Maintenance Section has developed preventive maintenance intervals. These interval schedules may change due to equipment availability and repair trends on units. The Fleet Supervisors are responsible for ensuring the city vehicles and equipment have regular preventive maintenance completed.

CITY OF MILWAUKEE B.F.D. 2000 EQUIPMENT CONDITION REPORT

EQUIP# _____

DATE _____

MILEAGE _____

REPORT# _____

R.O.# _____

TECHNICIAN _____

CHECK ALL PERTAINING ITEMS.
SPECIFY EXACT PROBLEM IN THE REMARKS AREA.

BRAKES		SUSPENSION		HYDRAULICS	
STARTER		HORN		P.T.O.	
CHARGING SYSTEM		LIGHTS		BATTERY	
W/S WIPERS		EXHAUST		COOLING SYS	
GAUGES		PACKER CONTROL		DRIVE TRAIN	
MIRRORS		SENSOR		FLOW	
SEAT BELTS		AIR SYSTEM		STEERING	
TACHOGRAPH		TIRES		WINDOWS	

LEAVE KEYS IN PROPER LOCATION.

REMOVE ALL PERSONAL PROPERTY AND SECURE TOOLS AND EQUIPMENT.

REMARKS: _____

OPERATOR SIGNATURE: _____

TECHNICIAN

COMMENTS: _____

PREVENTIVE MAINTENANCE FORMS

Safety inspections and preventive maintenance of vehicles is the key to a good equipment maintenance operation. Each (PM) is completed as per guidelines set and listed on the checklist for that scheduled PM. Safety is a key and an important part of our organization. Therefore, safety sensitive items and equipment are inspected and/or repaired on each and every PM checklist. The basic PM is an A-PM which checks the vehicle from front to rear and interior to exterior, all lights and all fluid levels.

The B-PM includes all the items listed on the A-PM checklist. It also includes changing oil, oil filters and brake adjustments.

The C-PM includes all the items listed on the A-PM and the B-PM checklist. It includes changing air, power steering and transmissions filters. It also includes differential, hydraulic oil and transmission fluid change, coolant filter change, air dryer cartridge replacement and battery post and cable clean.

Due to the variety of equipment, there may be additional items included on either an A, B, or C PM. Each PM sheet is exclusive to the type of equipment being serviced.

Inspections and preventive maintenance invariably leads to repairs and/or replacement. The work associated with these repairs are accounted for and tracked separately from the inspections and PM's.

The inspection and preventive maintenance forms are included for light equipment and the various types of heavy equipment.

REPAIR ORDERS AND PRE-TRIP INSPECTIONS

All maintenance and repair work, including quick fixes, are issued a Repair Order. Computer generated repair orders are issued one of two ways; when an operator brings equipment into a repair location or when a repair is noted during a PM.

The repair order shows a work order number which is used to reference all activity involved with each repair such as parts ordered, labor charged and a description of the work that is done. It also shows commercial charges for outside services to the vehicle.

The Repair Supervisors review the completed repair orders on a daily basis to ensure all information is correct.

Another way to identify equipment repairs needed is through the Pre-Trip Inspection Form (sample "2" attached). Operators fill out this form each time they use a piece of equipment. Any damage or items requiring attention are noted at the time of the inspection. That information is placed on the BFD2000 form at the end of the shift and turned into the repairs section to be repaired.



David Lowry completing the installation of the rear brake drums after performing a 4 wheel brake job.

DAILY PRE-TRIP INSPECTION

- ✓ **Check box to show that you have checked item and that it is OK**
- Tires** for inflation/wear/damage
 - Lights** for proper operation
 - Fluid** levels including engine oil, transmission, fuel, radiator, hydraulic & batteries.
Be sure to check your fuel level before leaving the yard!
 - Windows/wipers** for damage and wiper blade proper functioning
 - Leaks** showing prior to moving equipment from parking spot
 - Air Cleaner** for air restrictions/replacement needed
 - Gauges** for proper operation
 - Controls** for proper operation
 - Brakes** visual inspection for proper adjustment
 - Hoses/Belts** for leaks or damage/and tension on belts
 - Body Damage** for visible damages/new paint scrapes
 - Other Items Required** while performing a CDL Pre-Trip Inspection
 - Completed a Repair Form BFD 2000 listing all items requiring attention / repair**

PM Information on Equipment Record

FleetFocus - [Fleet Equipment]
 File Edit Action Data Queries/Reports System Mgmt View Preferences Window Help

Row 1 Equipment ID 22130 Model year 2001 Manufacturer ID GMC Model ID TS10653 License number 59466 Operator ID GKAD0W Department ID SANITATION Latest meter 1 reading 57481 Latest meter 2 reading 0 Equip 2001-

Ownership/Depreciation Warranty Replacement/Disposition Notes Files Add Data Relationships
 Basic Info Meter Info Classes Locations Assignments Accounts Status Motor Pool Authorization
 Comments Class PM Codes Recurring Costs Acquisition Registration Multijurisdictional

Equipment ID 22130 [2001 GMC TS10653 PICKUP - EXTENDED C] [New equipment unit]

Next PM service number [] PM SERVICE D
 PM service 11/22/2007
 Next PM due date 05/22/2007 Service [] Work order ID [EGT] 2007 3317
 Last performed [] UNIT IN [] PM SERVICE B

Date source []

PM overrides
 Meter 1 0
 Meter 2 0
 Fuel qty 0
 Life meter at last PM 57481
 Next PM due at meter reading 60481
 Quantity fuel used since last PM 0.0

Ready Rec: 1 of 1 NUM 1:32 PM
 Start Mail :: INBOX - Windows ... FleetFocus - [Fleet Eq... Edit Vacation

Notification of PM Due or Overdue on Work Order

The screenshot displays the FleetFocus software interface. At the top, there is a menu bar with options: File, Edit, Action, Data, Queries/Reports, System Mgmt, View, Preferences, Window, Help. Below the menu is a toolbar with various icons for file operations and navigation.

The main window is divided into several sections. On the left, there is a table with the following columns: Row, Work order ID, Job status, Equipment ID, Job type, Priority ID, Repair reason ID, Date and time in, and Date and time finished. The table contains four rows of data:

Row	Work order ID	Job status	Equipment ID	Job type	Priority ID	Repair reason ID	Date and time in	Date and time finished
1	LGT-2007-3374	OPEN	23269	REPAIR	E	W	05/23/2007 12:54	05/23/2007 12:54
2	LGT-2007-3358	OPEN	23269	PM	E	I	05/23/2007 08:58	05/23/2007 08:58
3	LGT-2007-2814	CLOSED	23269	REPAIR	E	W	04/25/2007 14:03	04/27/2007 22:16
4	LGT-2007-2161	CLOSED	23269	REPAIR	E	W	03/27/2007 13:09	03/27/2007 13:39

Below the table, there are several tabs: Output Control, Labor, Parts, Commercial, Delay, Tools, Current Labor Assignments, Files, Summary Cost Info, 3C Summary, Basic Info, More Info, Messages, Comments, Tech Notes, Standard Jobs, Tasks, Service Requests/Defects, Estimating. The 'Basic Info' tab is currently selected.

In the 'Basic Info' section, there are input fields for 'Work order ID' (LGT-2007-3374) and 'Equipment ID' (23269). Below these fields, there is a section titled 'Information about the work order or equipment unit' containing a text area with the following text:

```

OTHER OPEN WORK ORDERS
WORK ORDER NUMBER EST TYPE STATUS
LGT -2007-3358 PM OPEN
UNIT IS OVERDUE 142 LIFE HILES ON METER 1 FOR SERVICE C
    
```

The text 'UNIT IS OVERDUE 142 LIFE HILES ON METER 1 FOR SERVICE C' is circled in red. Below the text area, there is a 'Job status' dropdown menu set to 'OPEN' and a 'Current work delay' input field.

At the bottom of the window, there is a status bar showing 'Successful insert', 'Ready', and system tray icons including 'Start', 'Mail :: INBOX - Window...', 'Edit Vacation', 'FleetFocus - [Work ...]', 'I:\jbaal\Fred', 'Fleet Maintenance Man...', 'Rec: 1 of 42', and 'NUM'. The system clock shows '1:00 PM'.

**PM Compliance
By Location
2006**

Counts

Location	Total	Early	Late	Within Target
HVY	131	13	76	42
HV2	508	60	340	108
LGT	1242	329	343	570
LNC	1115	46	161	908
NW	850	21	163	666
TOWER	659	77	209	373
Grand Totals	4505	546	1292	2667

Percentages

Location	Total	Early	Late	Within Target
HVY	100%	10%	58%	32%
HV2	100%	12%	67%	21%
LGT	100%	26%	28%	46%
LNC	100%	4%	14%	81%
NW	100%	2%	19%	78%
TOWER	100%	12%	32%	57%
Grand Totals	100%	12%	29%	59%

Percent of Work Orders

PM vs. Repair
2006

PM Work Order Count

Light	1,254
Heavy	3,298
Police	2,066
Total	6,618

Repair Work Orders	22,120
PM Work Orders	6,618
Total - All Work Orders	28,738

PM Work Load (% of all Work Orders)	23.0%
-------------------------------------	-------

Fleet Services uses two types of Work Order designations, "Repair" and "PM." The above chart shows the numbers and overall percentage of Work Orders that were opened using these labels. The procedures for the operation of our shop dictate that only minor repairs discovered in the course of a PM inspection are done on PM Work Orders. Other repairs found, while not a breakdown and technically could be considered "preventive," are performed on REPAIR Work Orders. Items found that are not disabling and are repaired at a later date are likewise performed on REPAIR Work Orders.

PREVENTIVE MAINTENANCE

The new PM Committee who will oversee the PM's performed by Fleet Services. They have been charged with reducing the number of PM's that are performed either late or early. They will meet on a monthly basis to work out the problems that have been inherent in performing PM's on time. Letters from the committee to the Departments will go out for any vehicle more than 60 days late.



From left to right Jim Strehlow Heavy Repairs, Brad Morin Light Repairs, Chris Frahm Light Repairs, Richard Rutten Ruby Garage, Al Bartell Second shift all locations, Team Leader Pat Brushafer Light Repairs

CALL IN PROCEDURE

Light Repairs


The PM report is generated by the Supervisor or clerical staff (see Sample 4). The office assistant will call the using departments to request the vehicles be brought into Central Garage for the needed PM. The using department is not told which day the vehicle is needed; they are requested to bring the vehicle during a specific week. If the vehicle does not show, the supervisor will make the call asking that the vehicle be brought in. If that does not work, as a last resort, we will make one more call and tell them the fuel card will be shut off if the vehicle does not show up for the required PM.

Equipment Due or Late for PM by Equipment Number

Equip	Year-Make-Model	Dept	Latest Meter	Due at Meter	Meter Past	Due Next PM Date	Days Late	PM Location
22381	2000 GMC TK30903	SANITATION	55334	53529	1805	3/28/2007	56	LGT
22871	2000 GMC TK31003	SANITATION	84062	82011	2051	4/11/2007	42	LGT
22873	2002 FORD F350	SANITATION	56621	56080	541	4/16/2007	37	LGT
23181	1986 GMC TG21305	WATER	62362	63708	0	4/16/2007	37	LGT
25081	1996 CHEV CC31003	FORESTRY	85616	83747	1869	4/16/2007	37	LGT
25011	1999 GMC TC31403	B+F POOL	32576	31478	1098	4/20/2007	33	LGT
22366	1996 GMC TC20903	FORESTRY	51331	53285	0	5/3/2007	20	LGT
23270	2003 GMC TG33405	B+F ELECT	13711	15013	0	5/8/2007	15	LGT
22155	2004 FORD R14C	INF TE+ES	13095	13959	0	5/9/2007	14	LGT
22231	2003 GMC TC25903	FORESTRY	26952	27061	0	5/10/2007	13	LGT
22874	2002 FORD F350	SANITATION	28116	29628	0	5/13/2007	10	LGT
24344	2001 JEEP WRANGLER	PARKING	78341	79973	0	5/14/2007	9	LGT
22100	1994 GMC TS10603	HEALTH	99645	100787	0	5/20/2007	3	LGT
22113	1995 GMC TS10603	WATER	59616	61246	0	5/20/2007	3	LGT
22390	2002 FORD F350	WATER	16612	18013	0	5/20/2007	3	LGT
23308	1995 GMC TG21306	INFRA	66003	67520	0	5/21/2007	2	LGT
23252	2001 CHEV G31405	INF BRIDGE	28479	28409	70	5/28/2007	0	LGT
20146	2000 FORD FOCUS	SANITATION	40186	40438	0	6/7/2007	0	LGT
23259	2001 CHEV G31405	B+F POOL	42406	42922	0	6/7/2007	0	LGT
22313	1990 CHEV CK20903	HEALTH	151962	152032	0	6/11/2007	0	LGT
22370	2000 GMC TC20903	FORESTRY	66959	66778	181	6/12/2007	0	LGT
22126	2000 GMC TS10653	SANITATION	82440	82299	141	6/19/2007	0	LGT
22120	2000 GMC TS10653	SANITATION	85327	83360	1967	7/4/2007	0	LGT
24128	1995 GMC TT10516	WATER	58983	58936	47	7/5/2007	0	LGT
20091	1992 PLYM SUNDANCE 4DR	NEIGHBOR	38716	37585	1131	7/8/2007	0	LGT
22154	2004 FORD R14C	NEIGHBOR	27089	27097	0	7/10/2007	0	LGT
22148	2003 CHEV CS10653	SANITATION	34860	35669	191	7/12/2007	0	LGT
25072	1995 GMC TC31003	B+F POOL	88611	88578	33	7/19/2007	0	LGT
22234	2004 FORD F201	SANITATION	19614	19478	136	7/23/2007	0	LGT
24373	2004 JEEP WRANGLER	PARKING	60154	57147	3007	7/29/2007	0	LGT
22145	2003 CHEV CS10653	SANITATION	34261	33332	929	7/31/2007	0	LGT
23026	1993 GMC TG21305	INF TE+ES	122377	121817	560	8/8/2007	0	LGT
24156	2004 CHEV CT10506 4DR	INF TE+ES	34888	34387	501	8/9/2007	0	LGT
24359	2003 JEEP WRANGLER	PARKING	57937	57948	0	8/9/2007	0	LGT
22394	2002 GMC TC25903	SANITATION	69904	69488	416	8/15/2007	0	LGT
22361	1996 GMC TC20903	SANITATION	145240	145060	180	8/19/2007	0	LGT
22372	2000 GMC TC20903	INF TE+ES	165949	163280	2669	8/22/2007	0	LGT
22385	2000 GMC TK30903	SANITATION	43155	42874	281	8/22/2007	0	LGT
22138	2001 GMC TS10653	SANITATION	76675	76774	0	8/23/2007	0	LGT
22396	2003 GMC TC25903	SANITATION	49286	50429	0	8/23/2007	0	LGT
24377	2006 JEEP WRANGLER	PARKING	21454	20099	1355	8/27/2007	0	LGT
20168	2003 FORD FOCUS	NEIGHBOR	27509	27510	0	8/28/2007	0	LGT
22150	2004 FORD R14C	SANITATION	37860	37806	54	9/5/2007	0	LGT
22151	2004 FORD R14C	SANITATION	38297	38214	83	9/5/2007	0	LGT
22374	2000 GMC TC20903	SANITATION	103496	103118	378	9/6/2007	0	LGT
24371	2004 JEEP WRANGLER	PARKING	48525	47165	1360	9/7/2007	0	LGT
22376	2000 GMC TC20903	B+F OPER	103863	104246	0	9/15/2007	0	LGT
24383	2006 JEEP WRANGLER	PARKING	22793	22618	175	9/20/2007	0	LGT
21056	1994 GMC TC10906	INF TE+ES	228786	228602	184	9/21/2007	0	LGT
22379	2000 GMC TC20903	B+F FLEET	84278	83912	366	9/26/2007	0	LGT

PM Scheduling Information
 Light Equipment
 PM Scheduling Information
 Light Equipment

Class Code	Description	Time Interval	Miles or Hours	Slot No	Task	Schedule Updated Based On
PM-LGT	LIGHT EQUIPMENT PM	6 Months	3000	1	B	UNIT IN
				2	B	UNIT IN
				3	B	UNIT IN
				4	C	UNIT IN
PM-LGT-S	LIGHT SPECIAL EQUIPMENT PM	12 Months		1	C	UNIT IN
PM-LGT-T	LIGHT TRACTOR PM	4 Months		1	B	UNIT IN
				2	B	UNIT IN
				3	C	UNIT IN
PM-LGT-X	LIGHT EQUIPMENT EXTREME DUTY	3 Months	3000	1	B	UNIT IN
				2	B	UNIT IN
				3	B	UNIT IN
				4	C	UNIT IN

Equipment					Mileage/Hour Reading
Date					Tech
Work Order					
	N/A	OK	Needs Work - Minor	Needs Work - OOS	
Outside - Walk-Around					
Body Damage					
Sits Level					
Severe Rust Holes					
Broken or Cracked Glass					
Lights or Lenses Damaged					
Mirrors					
Door Hinges, Latches, Handles					
Open Vehicle - Start					
Seat Upholstery					
Seat Adjuster					
Cranking					
Starting					
Gauges and Warning Lights					
Cold Running					
Horn					
Turn signals					
Headlights					
Tail Lights					
Marker Lamps					
Stop Lamps					
Wipers					
Heater/Blower					
Pedals					
Transmission Shift					
On Hoist					
Drain Oil					
Change Oil Filter					
Inspect and Lubricate Steering Linkages					
Inspect and Lubricate Drive Shaft					
Inspect and Lubricate Suspension					
Shocks or Struts					
Differential Gear Lube					
Manual Transmission Gear Lube					
Exhaust System					
Parking Brake Cables					
Brake Lines and Hoses					
Fuel Lines and Hoses					
Fuel Tank					
Floorboards					
Leaks, Loose Parts					
Tires - Wear					
Tires - Pressure					

	N/A	OK	Needs Work - Minor	Needs Work - OOS	Comments
Vehicle Down From Hoist					
Fill Crankcase					
Windshield Washer Fluid					
Battery					
Radiator/Overflow Tank					
Anti-Freeze Strength					
Hoses					
Belts					
Water Pump					
Brake Fluid					
Air Filter					
Power Steering Fluid					
Leaks					
Engine Running					
Automatic Transmission Fluid					
Oil Filter Leaks					
Warm Running					
Final Check					
Recheck Oil Level					
Lubricate Door Hinges, Latches, Locks					
Lubricate and Test Tailgate					
Lubricate and Test Dump Hoist					
Install Reminder Sticker					
"C" Level Inspection					
Remove Wheels - Inspect Brake Lining					
Change Transmission Fluid					
Flush Cooling System					
Engine Tune-Up					
Replace Fuel Filter					

PREVENTIVE MAINTENANCE CALL IN PROCEDURE

Heavy Repairs

The PM report is generated by the Supervisor or clerical staff (see Sample 5). There are several ways vehicles are called in for their scheduled preventive maintenances; they are,

1. Vehicles due for PM's are put onto the "Call in Sheet". This call in sheet is the communication method to relay information from repairs second shift to Dispatch first shift. This sheet is used by the Dispatch office to call the using departments requesting vehicles to be brought in to a specific location for PM's. The requesting location gets the information to the Dispatch Office with a two day notice. This way the using department does not need to hunt the vehicle down during the course of the day to get it in for the PM, it can give the driver the message at the end of their shift. The vehicle will need to go in to the garage for a PM the following day.
2. PM Call in sheets are faxed to the using department requesting vehicles be brought in the garage for PM. Usually this schedule is for the complete month.
3. The vehicle is brought in to the repair facility for some needed repairs and the fleet management system flags the staff opening the work order of the needed PM.

If a vehicle does not arrive for its PM, the call in sheet is marked as a "PM No Show" in the "Notes to Dispatch" section of the call in sheet. If a second request is made, that will be noted to the right of the equipment number. As a last resort a call is made informing the using department that the fuel card will be shut off if the vehicle is not brought in for the PM.

Equipment Due or Late for PM by Equipment Number

Equip	Year-Make-Model	Dept	Latest Meter	Due at Meter	Meter Past	Due Next PM Date	Days Late	PM Location
27617	1984 CHEV CC31003	B+F POOL	79015	0	0	2/13/2007	99	HV2
27618	1983 SULL 185DUQ	B+F POOL	2944	0	0	3/8/2007	76	HV2
32161	1993 CCC LET40A	SANITATION	66053	0	0	4/12/2007	41	HV2
32163	1993 CCC LET40A	SANITATION	61770	0	0	4/13/2007	40	HV2
32209	1996 OSHKO NL1840	SANITATION	99845	0	0	4/13/2007	40	HV2
32173	1994 CCC LET40A	SANITATION	52160	0	0	4/15/2007	38	HV2
56555	1998 RAYCO RG1672DXH	FORESTRY	2246	0	0	4/16/2007	37	HV2
56557	2000 RAYCO 1672 DXH	FORESTRY	841	0	0	4/16/2007	37	HV2
26274	1997 CHEV CP31442	INF TE+ES	92280	0	0	4/18/2007	35	HV2
32222	2004 CCC LET2-46	SANITATION	8419	0	0	4/19/2007	34	HV2
27612	1983 SULL 185DUQ	B+F POOL	2385	0	0	4/20/2007	33	HV2
31127	1989 INTL S1954	INF TE+ES	81308	0	0	4/20/2007	33	HV2
57426	1977 SRECO HS38XC	B+F COMM	1317	0	0	4/20/2007	33	HV2
32187	1994 CCC LET40A	SANITATION	90514	0	0	4/22/2007	31	HV2
32217	2003 CCC LET2-46	SANITATION	18898	0	0	4/28/2007	25	HV2
32175	1994 CCC LET40A	SANITATION	85139	0	0	4/29/2007	24	HV2
50105	1997 TERRA T5C	INF UNDER	268	0	0	5/2/2007	21	HV2
32149	1993 CCC LET40A	SANITATION	60707	0	0	5/11/2007	12	HV2
32165	1993 CCC LET40A	SANITATION	56380	0	0	5/12/2007	11	HV2
32183	1994 CCC LET40A	SANITATION	71675	0	0	5/12/2007	11	HV2
26501	1990 HYSTR E30CR	B+F FLEET	1554	0	0	5/16/2007	7	HV2
26503	1986 MITS FG10	INF TE+ES	5518	0	0	5/16/2007	7	HV2
26518	2004 DAEWOO G25E-3	WATER	424	0	0	5/16/2007	7	HV2
26525	1974 YALE GLPO20	B+F FLEET	2597	0	0	5/16/2007	7	HV2
26559	1968 DROTT 85RM2	B+F FLEET	2984	0	0	5/16/2007	7	HV2
26565	1979 AL-CH ACP60L	B+F POOL	4958	0	0	5/16/2007	7	HV2
32159	1993 CCC LET40A	SANITATION	12370	0	0	5/16/2007	7	HV2
32227	2005 CCC LET2-46	SANITATION	8553	0	0	5/16/2007	7	HV2
23538	2003 WORK WP31042	WATER	21568	0	0	5/17/2007	6	HV2
32153	1993 CCC LET40A	SANITATION	84723	0	0	5/17/2007	6	HV2
32155	1993 CCC LET40A	SANITATION	44621	0	0	5/17/2007	6	HV2
32971	1988 AUTOCL ACL64	SANITATION	55920	0	0	5/17/2007	6	HV2
23712	2003 GMC TG33803	INF SIGN	27768	0	0	5/18/2007	5	HV2
32203	1995 CCC LET40A	SANITATION	68725	0	0	5/18/2007	5	HV2
23526	1990 GMC TP31042	INF TE+ES	111485	0	0	5/19/2007	4	HV2
23539	2003 WORK WP31042	WATER	16207	0	0	5/23/2007	0	HV2
25142	1995 FORD F800	INF TE+ES	17937	0	0	5/23/2007	0	HV2
32167	1993 CCC LET40A	SANITATION	96031	0	0	5/23/2007	0	HV2
32179	1994 CCC LET40A	SANITATION	72177	0	0	5/23/2007	0	HV2
32185	1994 CCC LET40A	SANITATION	64972	0	0	5/23/2007	0	HV2
41002	1996 ELGIN PELICAN	SANITATION	10731	10754	0	6/4/2007	0	HV2

PM Scheduling Information Heavy Equipment

Class Code	Description	Time Interval	Miles or Hours	Slot No	Task	Schedule Updated Based On
PM-H-ABC	HEAVY EQUIPMENT PM W/A INSP	1 Month		1	A	UNIT IN
				2	A	UNIT IN
				3	A	UNIT IN
				4	B	UNIT IN
				5	A	UNIT IN
				6	A	UNIT IN
				7	A	UNIT IN
				8	B	UNIT IN
				9	A	UNIT IN
				10	A	UNIT IN
				11	A	UNIT IN
				12	C	UNIT IN
PM-H-BC	HEAVY EQUIPMENT PM W0/A INSP	4 Months		1	B	UNIT IN
				2	B	UNIT IN
				3	C	UNIT IN
PM-H-SKD	SKID LOADER PM INSP	4 Months	100	1	B	WORK FINISHED
PM-H-SPC	PM - SPECIAL EQUIPMENT HEAVY	12 Months		1	C	SCHEDULED
PM-SWEEP	SWEEPER PM	2 Months	100	1	B	UNIT IN
				2	B	UNIT IN
				3	B	UNIT IN
				4	B	UNIT IN
				5	B	UNIT IN
				6	B	UNIT IN
				7	B	UNIT IN
				8	B	UNIT IN
				9	B	UNIT IN
				10	B	UNIT IN
				11	B	UNIT IN
				12	B	UNIT IN
				13	B	UNIT IN
				14	B	UNIT IN
				15	C	UNIT IN
PM-HVY-T	HEAVY TRACTOR PM	6 Months	250	1	B	WORK FINISHED
				2	B	WORK FINISHED
				3	B	WORK FINISHED
				4	C	WORK FINISHED

Tire Shop

The tire shop services all of DPW along with the Police Department. The tire shop routinely repairs and changes over 6900 tires per year. There were over 3400 tire mountings and 3500 tire service calls in 2006. The tire shop is open from 5:30 am to 11:00 pm. This work is performed by only 5 employees. The tire shop is always looking for new ways to enhance the operation of the fleet tires. The following two programs will attest to that effort.



Nitrogen Program

The City of Milwaukee Fleet Services Section had undertaken a pilot program to evaluate the benefits of nitrogen-filled tires. It is a well known fact that under-inflated tires consume more fuel and increases tire wear. Proponents claim that nitrogen filled tires maintain optimum pressure longer and more consistently.

Maintaining proper air pressure is a constant battle for most Fleet operations. Air permeation, temperature fluctuations between seasons, and driver/operator indifference are all contributing factors of less-than-optimum tire maintenance.

Going into the pilot program we understood that nitrogen offered many advantages over compressed air, including the elimination of wheel rust and oxidation (due to the

moisture found in compressed air), extended tire life, cooler running tires, and improved retread ability. Tires inflated with nitrogen tend to stay inflated much longer than those with compressed air.

The Fleet Tire Shop nitrogen pilot program began by monitoring twelve identical Jeep Wranglers from our Parking Checker fleet. Six of the jeeps tires were filled with compressed air and six were filled with nitrogen. To start the program, the tire pressures on all the test vehicles were set identically to manufacturer's requirements. All of the test vehicles had the same size and brand tires.



Tread depth and tire positions were also recorded. During the test we collected data on tread wear, pressure fluctuations, and mileage and fuel consumption.

After a comparison of the six Jeeps using compressed air and the six Jeeps using Nitrogen, we selected two Jeeps that were the most consistent in regards to mileage, time run, and equal time run without any flats. The Jeep filled with regular air had a mileage of 4102 miles; the Jeep with nitrogen had 3875 miles.

The miles per gallon were compared on all twelve Jeeps. It was concluded that the nitrogen filled vehicles had an improvement in fuel mileage of 0.28 miles per gallon, or a 0.38% gain. Mileage fluctuations on a Fleet of twelve would be expected due to the different driving characteristics of each driver, job assignments, idle time, driving routes, etc.



The loss of tire pressure in the twelve Jeeps was compared next. This portion of the comparison was as equal as could be expected. The time frame was the same for all vehicles. Air temperature was the same, and the miles driven were very close. Looking at this data, there was a positive gain in using Nitrogen, by at least seven percent.

The time frame of the test program was fairly short; there were not any seasonal changes or unusual weather events. Nitrogen being more stable does not change as the ambient temperature changes. Regular air expands with heat and contracts with cold which in turn changes tire pressures as the outside temperatures change.

Nitrogen also migrates through a tire three to four times slower than regular air because of its larger molecular size. A longer test would have shown benefits in keeping tire pressures more consistent from both migration and ambient temperature changes.

The current drawback to the expansion of Nitrogen throughout the Fleet is the ability to have Nitrogen available at all air sites and vehicle mounted compressors within the City. Tires filled with Nitrogen must also be topped off with Nitrogen, adding regular compressed air slowly negates the benefits of Nitrogen. As the tire and fleet industry accepts and expands on the use of Nitrogen we expect that many of the supply issues will be addressed.

In summary, as expected, this study showed positive findings in the use of Nitrogen.

Due to our findings we now make it a common practice to purge and fill all the new trailer tires with Nitrogen. In many cases trailer tires can sit idle for long periods of time between assignments and have very infrequent tire pressure checks.

Street Sweeper Tires

In a side program, we did a trial test on a single street sweeper. Street Sweepers pick up a lot of tire debris due to the nature of their duty. We installed two new Goodyear tires with DURASEAL technology (the same size and ply rating, as original equipment). The DURASEAL technology is a coating on the inner-liner of the tire that seals any protruding object that enters the casing, even after the object is pulled out. The tires were filled with Nitrogen.

The sweeper works a double shift daily, all objects that were found in the tire were merely pulled out, and the tire was checked for pressure, per manufacturer's instructions. Even though the cost of the tire itself was close to double that of a standard tire, there was no real labor charged to the unit for tire repairs in the six month period.

That sweeper went an amazing 6,386 miles without a tire failure during that period. For a Street Sweeper that is impressive.

From what we have learned in the two test programs, we will be looking into expanding the use of nitrogen to other tire groups within the City's Fleet. It is also our intention to expand our ability to produce nitrogen. Our current nitrogen production is limited to auto and light truck tires. Although we are able to inflate larger truck and end loader tires, it is at a very slow and time consuming rate with our current equipment.

We firmly believe that a good tire maintenance program along with nitrogen inflation will ensure that our fleet vehicles are as fuel efficient as possible, with the added benefits of longer tire life and enhanced safety.

The use of nitrogen does not eliminate the need to inspect tires and check pressures on a regular basis, but it will help maintain a more consistent reading between checks which in turn will insure maximum fuel mileage and tire life.