

AMERICAN WATER WORKS SYSTEM  
MIDWESTERN DIVISION

TECHNOLOGY TRANSFER CONFERENCE

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HUESTON WOODS

FIRE HYDRANT INSPECTION  
OPERATION AND MAINTENANCE

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TECHNOLOGY TRANSFER CONFERENCE

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OPERATION AND MAINTENANCE

I. GENERAL COMMENTS

When I learned that I was going to have the opportunity to give a presentation on hydrant inspection I gave a great deal of thought as to what my presentation should include. It seemed that every idea I thought of was too basic and were things that every one would already know. But when you stop to think of hydrant inspections a lot of it is basic and maybe that is why the condition of fire hydrants is often taken for granted. I suppose that there are those who think of hydrant inspection as simply going around to each hydrant location to; see if the hydrant is still there, see if the caps are still on and to see if the hydrant can be turned on and maybe let a little water run out of it. There is a little more to it than that. Hydrant inspections and flow testing, if properly done, are a very scientific and involved process and a process that distribution department personnel are involved in daily. My presentation here today is designed to define for you:

1. When hydrants should be inspected.
2. Why hydrants should be inspected.
3. How hydrants should be inspected.

In addition I have chosen to broaden this topic to include operation and maintenance because I believe these three (3) functions are inseparable. The job that should be done would be incomplete if one (1) phase was omitted. Also we will touch a little bit on flow testing for pitot pressures.

II. THE DIFFERENT PHASES OR TIMES FIRE HYDRANTS SHOULD BE INSPECTED:

There are really five (5) separate hydrant inspection programs recommended. My remarks today will address each of these inspection programs. These inspections are:

1. Inspection prior to installation
2. Inspection during installation
3. Hydrant maintenance inspections
4. Inspection after each use
5. Inspection during prolonged periods of freezing weather

I will comment on each one and try to explain the reason for each.

1. Inspection prior to installation

Why would we want to inspect hydrants prior to installation? Fire hydrants should be inspected at the time of delivery in order to verify compliance with the specifications requested and to check for possible damage during shipment. The procedures recommended to be followed are outlined in AWWA Manual No. M 17. This inspection should include:

- a. Direction of opening
- b. Size and shape of the operating nut
- c. Depth of bury
- d. Size and type of inlet connection
- e. Main valve size
- f. Outlet nozzles sizes and configuration of threads
- g. Thread dimensions
- h. The hydrant should be cycled to "FULL OPEN" and "FULL CLOSED" positions to insure that no internal damage has occurred during shipment.
- i. Hydrants should be stored with the inlet connection and nozzles facing down.

2. Inspection during installation

Why inspect hydrants during installation? Because proper installation procedures will enhance the appearance of the hydrant, make the hydrant more functional, more accessible to fire crews and help to reduce future maintenance costs. The recommended procedures for this inspection are outlined in the AWWA Manual No. M 17, AWWA Standard C600-82 and AWWA Manual No. M 8. Most of the items that will be mentioned under this inspection program are very simple at the time of installation but become pretty expensive to correct later. At the time of installation:

- a. Hydrants should be installed plumb.
- b. The pumper nozzle should face the street so that it be easily accessible to connect fire apparatus.
- c. A set back of at least two (2) feet from the face of the curb is recommended. This set back will help to protect them from the overhang of vehicles. (Much better appearance if all hydrants are set back the same distance).

At certain locations it may be necessary to provide protection for hydrants. This can be done by installing "guard posts". We use damaged or broken pieces of pipe to set in the ground and fill them with concrete. At locations where hydrants are highly vulnerable to traffic it sometimes is necessary to install a thrust collar to provide the support for them to break off properly. The procedures for installing thrust collars can be found in AWWA Manual No. M 17.

- d. Hydrants should be set to the established grade, with the centerline of the lowest nozzle 18" above the ground. (AWWA says 12"). The correct bury line is marked on all hydrants. This item is very important. Hydrants set to the proper grade will be more apt to break off as designed.
- e. Hydrants should be set away from obstructions.
- f. Hydrants should be located so that they are visible to the fire crew as they drive down the street. The Insurance Services Office prefers a hydrant on each corner. One (1) comment made in the report on Kentucky-American's 1974 inspection was that more hydrants were needed at intersections, particularly in residential areas.
- g. Hydrants should be located so that they are not a nuisance to property owners. Install away from driveways, not in line with the front door, don't block parking space, etc... One way to prevent these problems is to install them on property lines. If installing hydrants in developed or "built up" areas, talk to the property owner. It just might save you the trouble of going back and removing it.
- h. In setting a hydrant use a firm footing such as a concrete slab or solid concrete block set on firm ground to prevent settling and placing strain on the hydrant lateral.
- i. Insure that the hydrant is properly anchored. There are several ways this can be done:
  - (1) Restraining type joints
  - (2) Strapping or rodding
  - (3) Concrete thrust blocks

If concrete thrust blocks are used special care should be taken to insure that the drain holes are not plugged. However, if dry barrel hydrants are set in areas where the water table is such that water would stand in the hydrant, the drain holes are to be plugged, according to AWWA C-600-82. Accurate records must be kept of these hydrants because they are subject to freezing. When drain holes are left open a drainage pit 2' x 2' x 2' should be constructed around the hydrant

base. This pit should be constructed of coarse gravel and extend above the drain holes. The gravel should be covered with a layer of 8 Mil polyethylene.

- j. Extreme care should be taken to keep foreign materials (particularly gravel) out of the mains during installation. This type of material is subject to be drawn into the hydrant laterals and lodge in the hydrant main valve assembly. The main valve is made of rubber and is easily damaged.
- k. After being installed and placed in service each hydrant should be flow tested and this information recorded. On page 23 of your handout material you will find a copy of the card used at Kentucky-American to record information pertinent to a new hydrant. A card is completed for each hydrant installed. This information is also a very good reference for future use and provides the necessary information for preparing an inspection sheet for the route books and also for entering hydrants in the master hydrant register. It also serves as the basis for preparing the letter initiating billing.
- l. Hydrants should be backfilled to prevent excess settlement.

### 3. Hydrant maintenance inspections

Why should hydrants be inspected over and over after installation? The fire hydrant differs from the rest of the distribution system in that it is above ground and is readily accessible for maintenance. This distinction also makes it subject to damage from traffic, unauthorized use and vandalism. Because the hydrant is vulnerable and the fact that fire hydrants are needed only in fire emergencies, it is necessary to provide periodic inspections, so that when a fire department pumper pulls up to a hydrant the crew can be reasonably sure that it will be able to:

- (1) Readily remove the outlet caps
- (2) Attach the suction hose
- (3) Open the hydrant valve
- (4) Obtain a supply of water.

It is important to remember that a hydrant is usually not found to be inoperative until after a hose has been layed and the pumper has been connected to one of its outlets. If a hydrant is found to be inoperative or dry, about all a fire crew can do is to move to the next nearest hydrant. Although this may appear to be an easy procedure to follow, it involves a great deal more time than most utility personnel realize.

Because of the emergency nature of their use, the period of time between usage may be as much as several years or even longer. It is quite obvious therefore, that fire hydrants must be periodically inspected to provide reasonable assurance that they will operate satisfactorily under fire conditions.

I think we can all agree that regularly scheduled inspections of hydrants after installation are necessary to ensure satisfactory operating conditions. There may, however, be a difference of opinion as to what should be done during these inspections and the frequency which inspections should be conducted. There are several publications which address the recommended inspection and maintenance procedures and the frequency for which these inspections should be conducted. The following four (4) publications will be discussed in further detail: (1) AWWA Manual No. M17 & M8, (2) Insurance Services Office Fire Suppression Rating Schedule, (3) Municipal Fire Administration Handbook and (4) Distribution Policy Memo 5.

1. AWWA Manual No. M 17 and M 8

The most often referred to publication is the AWWA Manual No. M 17, "Installation, field testing and maintenance of fire hydrants." This manual states, and I quote, "all hydrants should be inspected annually". In freezing climates, hydrants may require two (2) inspections, one (1) in the fall and one (1) in the spring. During freezing weather, dry barrel hydrants should be inspected after each use.

2. Insurance Services Office Fire Suppression Rating Schedule

The latest fire suppression rating schedule published by the Insurance Services Office requires that hydrants be inspected and maintained in accordance with the AWWA Manual No. M17. As you know the I. S. O. determines through their inspections the insurance grading class of a city. Prior to 1981 this rating schedule was based on a negative point system. The new schedule published in 1981 is based on a positive point system. The I. S. O. considers two (2) factors in their rating of fire hydrants: (a) size, type and installation and (b) inspection and condition of hydrants.

A. Size, type and installation (Maximum points under this item are 100)

1. Hydrants having a 6" or larger branch with a pumper outlet and with or without 2½" outlets will receive the full 100 points.
2. Hydrants with a 6" or larger branch, no pumper outlet but 2 or more 2½" outlets will receive 75 points.
3. Hydrants with only one (1) 2½" outlet will receive 25 points.

- 4. Hydrants with less than a 6" branch will also receive 25 points.

The actual number of points allowed will be determined by prorating each sub-item according to the number of each type found compared to the total number of hydrants. In addition deduct 2 points for each 10% of the hydrants that do not open in the direction of the majority. Deduct another 10 points if more than one (1) thread configuration is used on outlet nozzles.

B. Inspection and condition of hydrants (Maximum points under this item are 100)

- (1) According to the Kentucky I. S. O. Office the present I. S. O. requirement is that all hydrants be inspected and flow tested twice each year.

- a. The frequency of inspection is the average time interval between the three most recent inspections.

<u>Frequency of Inspections</u>	<u>Points</u>
½ Year	100
1 Year	80
2 Years	65
3 Years	55
4 Years	45
5 or more Years	40

- b. The points for inspection frequency shall be reduced by 10 points if the inspections are incomplete.
- c. An additional reduction of 10 points shall be made if hydrants are not subjected to full system pressure during inspections.
- d. If there are no records of claimed inspections, deduct an additional 20 points.

(2) Condition: There are three (3) conditions considered,

- a. Standard (no leaks, opens easily, conspicuous, well located for use by pumper.
- b. Useable
- c. Not usable

Again the number of points allowed are determined by prorating the number of deficiencies found to the total number of hydrants checked.

3. Municipal Fire Administration Handbook. (Book used by Lexington Fire Chief).

While this book is written primarily as a guide for municipalities, the inspection procedures recommended for fire hydrants are generally the same as the AWWA publications. This manual goes a little farther and recommends hydrants be color coded as to the volume of water available. This color scheme would be as follows:

<u>Flow</u>	<u>Color</u>
(1) Greater than 1000 GPM	Green
(2) 500 - 1000 GPM	Orange
(3) Less than 500 GPM	Red

The AWWA manuals mention this color scheme as optional.

At Kentucky-American the bonnet and caps of those hydrants with flows of less than 500 GPM are painted red. These hydrants are primarily in rural areas and have been requested by letter specifically for the purpose of refilling tank trucks while fighting fires in rural areas. While the volume of water available from these hydrants may not be all that great, the fire department maintains that valuable time is saved in not having to drive long distances to refill their tanks. Whether or not a color code is used hydrants should be painted with colors that are easily visible both day and night.

4. Distribution Policy Memo - 5 - Dated November 4, 1976.

This memo was written by Mr. Barr and states that each fire hydrant owned and/or operated by the water company shall be inspected once a year during the fall or early winter so as to complete the program before any continuous or frequent weather which would lend to hydrant freeze up. Basic distribution department responsibilities #2 and #6 of this same memo pertain to the operation, inspection and maintenance of fire hydrants.

At Kentucky-American our hydrant inspection program is intended to comply with distribution policy Memo 5, the procedures set forth by the AWWA publications, the I.S.O. requirements and some of our own ideas. While the various publications are thorough in what to inspect and when the inspections are to be done they deal primarily with the "mechanical" aspects. For our use a complete hydrant inspection program should be expanded and designed to report any conditions such as broken sidewalks, sunken holes, valve



boxes that are too high or any other conditions that could create a potential liability to the company.

At Kentucky-American, although we inspect all of our hydrants each year, we really have had two (2) different programs. The inspection portion of each program is the same. However, the two programs differ in that one year we inspect and flow test all the hydrants for pitot pressures. The next year in lieu of flow testing for pitot pressures, each hydrant is fully opened with the outlet caps still on. This procedure accomplishes three objectives: (1) ensures that water is on the hydrant; (2) enables us to check for leaks and (3) complies with the I.S.O. requirement of subjecting each hydrant to full system pressure. In addition to fully opening each hydrant, we operate each lateral valve to ensure that it is fully opened.

In addition to the annual inspections conducted by Kentucky-American personnel the Lexington Fire Department usually makes an annual inspection of each hydrant. This inspection is made by each fire crew inspecting the hydrants in their assigned area and is important to the fire department for several reasons:

- (1) Familiarizes fire crew with assigned area.
- (2) Familiarizes fire crew with hydrants in assigned area.
- (3) Insures fire department all hydrants are operated annually.
- (4) Shows fire department personnel how the water company is maintaining hydrants.

I think these inspections are important to the water company for three reasons:

- (1) They provide a second inspection.
- (2) They give us a better feel for what the fire department expects.
- (3) They inform us of maintenance to be done that may not be known until later.

The fire department submits a written report on each hydrant to the water company. Any deficiency noted is checked out, repaired if necessary and then we reply back to the fire department in writing concerning each deficiency noted. Please refer to page 29 of your handouts for a sample of the correspondence used.

Prior to the publication of the latest fire suppression rating schedule, all of these programs conformed to the I.S.O. requirements, but may not now.

I feel that these programs are adequate and do keep the hydrants in our system in excellent operating condition. I can only remember in recent years one (1) instance when a hydrant was not operational at the time of a fire and in my judgement another inspection would not have prevented this. While we probably have some obligation concerning adequate fire protection and to help our community to enjoy low insurance rates, there are some questions in my mind if the benefit gained from two (2) inspections and flow tests each year would be worth the additional expense.

Last year at Kentucky-American we spent \$16,123 dollars on programmed hydrant inspections alone. We inspected 4230 hydrants which required a total of 1545 hours. For 1983 we anticipate inspecting 4300 hydrants which would require 1600 hours. To inspect and flow test every hydrant twice each year would require an additional 1600 hours or one (1) additional employee and vehicle. And then you still don't have a guarantee that a hydrant won't fail. It seems to me that a more practical solution would be to:

- (1) Be very thorough in your one (1) inspection
- (2) Use strict maintenance practices
- (3) Conduct inspections after use, and
- (4) Conduct inspections during periods of prolonged freezing weather.

#### Organizing An Inspection Program

So far we have talked about the recommendations and requirements of the various publications regarding how and when maintenance inspections should be conducted. Assuming we have agreed that these inspections are necessary and how often we should do them, how do we see that the job gets done in the field.

In organizing an inspection program there are six (6) important areas to consider:

- (1) Numerically number all hydrants  

This would be done to account for all hydrants and to know how many there are to be inspected.
- (2) Prepare a register listing each hydrant in numerical order. Some information this register should contain is:
  - a. Hydrants listed numerically
  - b. Location of hydrants
  - c. Make of hydrant

- d. Size lateral
- e. Lateral valve No.
- f. Distribution route No.
- g. Map coordinate
- h. Work order No.
- i. Date installed
- j. Date billed

(3) Inspection sheets should be prepared for each hydrant. These inspection sheets should be placed in route form (similar to the way meters are routed for reading). This procedure will organize the inspection process, make it more thorough and help to reduce lost time due to back-tracking, missing hydrants, etc.... At Kentucky-American we use the old meter books for our hydrant and valve route books. Each book contains approximately 150 inspection sheets. On page 24 of the handout material is a sample copy of an inspection sheet.

(4) Establish record keeping procedures

There are basically two things that will satisfy this requirement.

- a. Use the inspection sheet to record data during each inspection.
- b. Create a file folder or envelope for each hydrant.

Each time maintenance is performed on a hydrant, put the hydrant number on the order. The order then will be more likely to find its way to the proper file.

(5) The program should be outlined in writing with a copy given to each employee involved. Prior to beginning work, have a meeting with everyone who will be involved to discuss the instructions and outline what the objective of the program is. This meeting should include supervisor, crews and clerical help. On pages 15 through 20 of your handout material you will find a copy of the instructions given to our personnel. A copy of these instructions are placed in vinyl protective covers and given to each crew to use as a reference in case they forget.

Records compiled during the inspection of hydrants can be used as the basis for programmed maintenance work orders. This could include such items as:

- a. Hydrant extensions if the number required is substantial
- b. Straightening of hydrants if the number is substantial

Flow test records are also very important. The results from hydrant flows should be reviewed to:

- a. Check for closed main line valves
  - b. Check for low or inadequate flows in a particular area. (Basis for main replacement, extensions or tie-ins).
  - c. Indicate bad hydrants
  - d. Tell you a lot about the condition of your mains and the direction of flow in a main.
6. Prepare a programmed maintenance work order

I believe programmed maintenance work orders have several advantages:

- a. Will tend to keep the program organized
- b. Will keep the goals of the program and budgeted projections in front of you
- c. Simplifies record keeping
- d. Simplifies cost accounting.

### Maintenance

Maintenance procedures should be outlined in writing so that everyone has the same understanding of what is to be done and when. Distribution policy memo 7 does that. This memo requires that a fire hydrant must be returned to an operable condition, either by repair or replacement, within 48 hours of the company's first notification of its being inoperable. Some standard operating instructions that a hydrant maintenance program should include are:

- (1) Minor maintenance items should be done at the time of inspection.
- (2) Items that cannot be corrected at the time of inspection and will not render the hydrant inoperable should be recorded and scheduled for repair by the

maintenance crews.

- (3) Major maintenance items which would cause the hydrants to be inoperative should be repaired immediately.
- (4) Crews should be trained in the proper maintenance techniques to use and be familiarized with the construction of all makes of hydrants.
- (5) Anyone who uses fire hydrants, whether they are water company employees, fire department personnel or users by special permit, should be instructed about how to use them properly, including the correct wrench to use, no cheater bars, how to open and close them slowly and that if they aren't opened a certain number of turns they will leak continually through the drain holes. Strictly speaking there should be no special uses allowed. Hydrants should only be used for fighting fires, flushing and for testing mains. Even though it is not desirable, some special uses are allowed at Kentucky-American. This is simply because in some instances there just seems to be no other practical way.
- (6) Never put missing caps back on a hydrant without first checking to see if vandals may have placed trash in the hydrant barrel. If flushing is required, flush through the 4½" opening.
- (7) When taking hydrants out of service ALWAYS call the fire department. This call should state the hydrant location and time taken out, and for how long. A record should be made of the call. This record should include the name of the person talked to and time the call was made. When the hydrant is placed back in service this same procedure should be followed. On page 22 of your handouts is a copy of the form used at Kentucky-American to record these calls.
- (8) An adequate supply of repair parts must be kept on hand at all times. This seems like a simple enough thing to do, but I assure you it is not. In our system there are thirteen (13) different models of hydrants for which repair parts must be readily available if we are to comply with our maintenance instructions. In addition we are presently maintaining hydrants for four (4) separate fire departments.

Because parts are not readily available from suppliers a very thorough review (really guesses) of the number of each part to have on hand is essential. This may not be as much of a problem now that most suppliers are going to the "kit" concept. For example, you can no longer obtain most repair parts individually from Mueller. They have created six (6)

different repair kits and each one is designed for a particular section of the hydrant. These kits are advertised as providing:

- (1) The "most needed" parts
- (2) Elimination of surprises because of needing a part not anticipated
- (3) Convenience of ordering, etc....
- (4) Encouragement of proper repairs.

Although in the past we have not always used every part included in the kits when making repairs to a particular hydrant section, I don't think this change will increase the cost of parts for us substantially. Most of the items we are talking about are gaskets, O-rings, drain valve facings, bolts, screws, etc..., which aren't the expensive items. On page 25 of your handouts material you will find a copy of the brochure Mueller Company published which lists the contents of each repair kit.

One thing we have been able to accomplish this year is to work out an arrangement to purchase Mueller parts through a local distributor. Since early 1982 Mueller Company has charged us catalog price minus 2% for early payment. The C. I. Thornburg Company will deliver these parts to us and will allow us a 10% discount or a savings of 8%. For 1983 it is expected that we will save approximately \$1500. In addition they will (with some coaching) try to stock our anticipated requirements. Hopefully this arrangement will also cure the age old problem of never being able to control when money budgeted for hydrant repair parts will be spent.

#### 4. Inspection after each use

Each use in this case means after being used by the fire department or by special permit. The inspection procedure should be the same as for maintenance inspections. Except, that during freezing weather the hydrant should not be opened to fill the hydrant barrel with water. During periods of freezing weather the procedures outlined in inspection No. 5 should be used. Arrangements can be made through the fire department liaison officer for their reporting of those hydrants used. This should be no problem. I think that most fire departments keep a record of each hydrant used as well as the volume of water pumped by each pumper. This inspection isn't much trouble because there aren't many of them.

#### 5. Inspection during prolonged periods of freezing weather

This inspection would not be designed for every hydrant in the system, only those hydrants that are in areas where a major fire is most likely to occur. These areas could

include:

- a. Downtown areas
- b. Warehousing districts
- c. Major shopping centers
- d. Major apartment complexes
- e. Schools

The primary purpose of this inspection is to check to see if the hydrant is frozen or has water in the barrel. Some suggested methods for detecting freezing in hydrants include:

- a. Sounding by striking the hand over an open outlet. Water or ice shortens the length of the "organ tube" and raises the note.
- b. Trying to turn the stem. If frozen solidly the stem will not turn.
- c. Lowering a weight or plumb bob on a string into the hydrant. It may strike ice or come up wet indicating water in the barrel.

If the hydrant is only slightly frozen you may be able to break it loose by placing a hydrant wrench on the operating nut and tapping it smartly. But, probably the best method of thawing I can think of is by the use of steam. Absolutely do not use such chemicals as quicklime, calcium carbide, gasoline, alcohol or sulfuric acid to melt the ice in hydrants.

### III. SUMMARY

1. First we must insure that the hydrants supplied to us are in accordance with the specifications requested.
2. Second we must provide adequate inspections to insure that hydrants are installed properly.
3. Third we must provide periodic inspections after installation to minimize the risk of our fire hydrants being rendered inoperable due to use, from abuse or because of mechanical failures.
4. Fourth maintenance must be performed timely and the maintenance performed must be of high quality.

Although hydrant failures will probably never be eliminated completely it is my belief that these programs will keep failures to a minimum.

In closing I would like to say that it has been a pleasure to be a part of this conference. As this is a technology transfer conference some of you may have comments you would like to share with us or questions you would like to ask. At this time the program is open for comments or questions.

HYDRANT INSPECTION & FLOW TESTING PROGRAM

Materials Needed

- |                                    |                                 |
|------------------------------------|---------------------------------|
| 1. Lubricant for Nozzle threads    | 12. Channel lock pliers (large) |
| 2. Stop watch                      | 13. 3/8" Open end wrench        |
| 3. Flow slips                      | 14. 1/4" Allen wrench           |
| 4. Cap chains                      | 15. 3/4" Open end wrench (2)    |
| 5. Outlet caps (both sizes)        | 16. Hydrant wrench              |
| 6. Outlet adaptors from 4½" to 2½" | 17. Calibrated gauges           |
| 7. Weather rings                   | 18. Cones - Barricades          |
| 8. Valve keys                      | 19. Weed hook                   |
| 9. Oil - oil plugs                 | 20. Blank maintenance orders    |
| 10. Canvass or piece of plywood    | 21. Geophone                    |
| 11. Small paint brushes            |                                 |

PROCEDURE FOR FLUSHING HYDRANTS

1. Use geophones to sound hydrant for leaks.
2. Open hydrant slightly to flush out sediment and any rusty water that may have accumulated in the lateral.
3. Before flowing hydrants look around to see which way it can be flowed without causing damage.
4. Install gauge on hydrant with pitcock to gauge shut off and pitcock to bleed air off open.
5. Open hydrant and after all air has been released close air pitcock on the gauge assembly and open pitcock to gauge.
6. Record static pressure. (Hydrant need only be opened 4 or 5 turns).
7. Shut hydrant off and remove one (1) 2½" cap.
8. Flow hydrant fully opened for approximately 2 minutes and record pitot pressure.
9. Close hydrant down to where it is approximately half way open and let it flow until the water is clear using stop watch to record number of minutes flowed. Also record pressure at which it flows.
10. While hydrant is flowing fill out necessary forms.
11. Observe any items of maintenance which the hydrant or its setting may require, such as:
  - a. Condition of operating nut
  - b. If it opens LEFT or RIGHT
  - c. Straightening
  - d. Painting
  - e. Need additional dirt around hydrant.
  - f. Valve box needs adjustment
  - g. Sidewalk needs repair
  - h. Hydrant doesn't drain back
  - i. Hydrant leaks
  - j. Any obstacles obstructing access to hydrant



12. Check the operating stem to insure that it operates freely and also check the oil level in the bonnett. (If hydrant is dry add the required oil). Report it so that stem O-Ring can be checked.
13. Make ABSOLUTELY sure each hydrant has chains and caps on it and that they are properly installed with chains clamped together so that they cannot be removed.
14. Lubricate every hydrant butt including 4½" before the caps are placed back on.
15. Inspect hydrant butts to insure threads aren't damaged and that they are tight in hydrant barrell.
16. After flow testing check hydrant to see that it drains.
17. Report IMMEDIATELY any items of maintenance that would prevent the hydrant from being used or would create a hazardous condition.
18. After flow testing, sound each hydrant for leaks.
19. Cut any weeds that would prevent this hydrant from being readily visible.
20. Record keeping as required.
21. Report any street adress of any hydrant not on corner or intersecting street.
22. Report daily to pump station hydrant route book # working out of for that day.

HYDRANT INSPECTION PROGRAM

Materials Needed

- |                                      |                              |
|--------------------------------------|------------------------------|
| 1. Lubricant for nozzle threads      | 10. Cones - 2 Barricades     |
| 2. Channel lock pliers (large)       | 11. Oil - oil plugs          |
| 3. Cap chains                        | 12. Weather rings            |
| 4. Small paint brushes               | 13. 3/8" Open end wrench     |
| 5. Hydrant wrench                    | 14. 1/4" Allen wrench        |
| 6. Valve keys                        | 15. Geophone                 |
| 7. Outlet caps (both sizes)          | 16. Weed hook                |
| 8. 3/8" open end wrench              | 17. Blank maintenance orders |
| 9. Outlet adaptors from (4½" to 2½") | 18. 3/4" Open end wrench     |

PROCEDURE FOR INSPECTING HYDRANTS

1. Before the hydrant barrell is filled with water, use geophones to sound the hydrant for leaks.
2. Open the hydrant all the way with out removing the caps to make sure it has water available. Check for leaks at the break flange gasket or elsewhere.
3. Shut the hydrant off and remove the caps to see if the hydrant drains.
4. Lubricate each hydrant nozzle including the 4½" before the caps are placed back on.
5. Inspect each hydrant butt for damaged threads and that the nozzle is tight in the hydrant barrell.
6. Check each operating nut for damage and the operating stem to insure that it operates freely and also check the oil level in each bonnet. If the hydrant is dry, add the required oil. Should the oil reservoir fail to hold the oil, write a maintenance order to replace the upper stem O-rings.
7. Make ABSOLUTELY sure each hydrant designed for cap chains, has chains on them and that these chains are properly installed and clamped together so that they cannot be removed.
8. Remove all chains hanging from caps on old model hydrants (primarily Darling) where there is no way to fasten the chains to the hydrant barrell.
9. Check every hydrant lateral gate valve to make sure it is fully OPENED.

10. Observe any items of maintenance which the hydrant or its setting may require, such as:
  - a. If it opens LEFT or RIGHT
  - b. Straightening
  - c. Painting
  - d. Need additional dirt around hydrant
  - e. Valve box needs adjustment
  - f. Sidewalk needs repair
  - g. Hydrant doesn't drain back
  - h. Hydrant leaks
  - i. Any obstacles obstructing access to hydrant
11. Minor maintenance is to be performed before leaving the hydrant. This would include such items as:
  - a. Weather rings
  - b. Oil plugs
  - c. Replacement of chains
  - d. Loose bolts
  - e. Tightening - replacing chains
  - f. Valve box tops
  - g. Missing bolts
  - h. Adding oil
12. Before leaving the hydrant sound again with the geophones for leaks. (Hydrant should be finished draining before this check is made).
13. Report IMMEDIATELY any items of maintenance that would prevent the hydrant from being used or would create a hazardous condition.
14. Cut any weeds that would prevent this hydrant from being readily visible.
15. Record keeping as required.

HYDRANT PAINTING PROGRAM

Materials Needed

- |   |  |
|---|--|
| 1. International Orange Paint             | 13. Channel Lock Pliers (large)          |
| 2. Aluminum paint                         | 14. 3/8" Open end wrench                 |
| 3. 2" paint brushes                       | 15. 1/4" Allen wrench                    |
| 4. 1" Paint brushes                       | 16. Hydrant wrench                       |
| 5. Drop clothes (and/or sheet of plastic) | 17. 3/4" Open end wrench (2)             |
| 6. Wire cages                             | 18. Weed hook                            |
| 7. Barricades, cones                      | 19. Geophones                            |
| 8. Wet paint signs                        | 20. Blank maintenance orders             |
| 9. Lubricant for nozzle threads           | 21. Mineral spirits and/or paint thinner |
| 10. Cap chains                            | 22. Outlet caps (both sizes)             |
| 11. Weather rings                         | 23. Valve Key                            |
| 12. Oil-plugs & oil                       |  |

PROCEDURE FOR PAINTING FIRE HYDRANTS

1. Hydrants to be painted are to be selected by route book.
2. Hydrant body is to be painted international orange.
3. Hydrant bonnet, caps and chains are to be painted aluminum.
4. Hydrants with flows less than 500 gpm are to have the bonnet and outlet caps painted red. (Will be mostly in rural areas and will be designated on the order).
5. Hydrants are to be painted neatly and not to have orange splashed on aluminum or vice versa.
6. Paint is not to be spilled or dropped on sidewalk areas, etc. around fire hydrants.
7. Wet paint signs are to be put out when a hydrant is painted.
8. In congested areas where there is pedestrian traffic, a wire cage is to be placed over the fire hydrant. A wet paint sign is to be placed on each cage.
9. Cages are to be removed as soon as the paint is dry.

10. Visually inspect each fire hydrant for any maintenance needed. Any minor maintenance items observed while painting the hydrant is to be corrected. Items may include but not limited to, caps, chains, oil plugs, weather rings, butt luvricant, hydrant drains, loose bolts, etc....
11. Report IMMEDIATELY any items of maintenance that would prevent the hydrant from being used or would create a hazardous condition.
12. All weeds around the hydrant are to be cut prior to painting.
13. Oil residue or residue splashed on the hydrant by traffic is to be removed with mineral spirits prior to painting.
14. ABSOLUTELY no gasoline is to be used as thinner or cleaner.
15. Paint brushes and equipment are to be cleaned daily.
16. Paint brushes and equipment should not be cleaned in the distribution building. Solvents are not to be flushed down building drains.
17. Extreme care should be exercised to avoid spilling or splashing paint on company vehicle.
18. Record keeping as required.

KENTUCKY AMERICAN WATER COMPANY

HYDRANT DATA CARD

Hydrant No. \_\_\_\_\_ Make \_\_\_\_\_

Location \_\_\_\_\_  
\_\_\_\_\_

Route No. \_\_\_\_\_

Valve on Branch \_\_\_\_\_ Yes  No

4 1/4" Steamer Nozzle \_\_\_\_\_ Yes  No

Static \_\_\_\_\_ Pitot \_\_\_\_\_

Minutes Flowed \_\_\_\_\_ Flow G.P.M. \_\_\_\_\_

Needs Painting

Needs washing

Needs Straightening

Needs Chains

Leaks at Packing

Leaks at Break Flange

Leaks at Base

Doesn't Drain Back

Stem Broken

Needs Extension 6" 12" 18"

Condition of Valve Box \_\_\_\_\_  
\_\_\_\_\_

Other \_\_\_\_\_

Inspected By \_\_\_\_\_ Date \_\_\_\_\_

Painted By \_\_\_\_\_ Date \_\_\_\_\_

Repaired

Month/ Day/ Year	a.m. p.m.	Hydrant Location	Fire Dept. Personnel Notified	Water Co. Personnel Calling Hydt out of Service from field	Water Co. Personnel who called Fire Dept.

HYDRANTS CALLED OUT OF AND BACK INTO SERVICE

FIRE HYDRANT LOG

-22-

**HYDRANT DATA CARD**

<b>City</b>	<b>County</b>	<b>Work Order No.</b>
<b>Hydrant Location Principal St.</b>		
<b>Intersecting St.</b>		
<b>Branch Size</b>	<b>Make</b>	<b>Date of Letter to</b>
		<b>Kentucky Inspection Bureau</b>
		<b>Fire Department—City</b>
<b>Route #</b>		<b>Fire Department—County</b>
<b>Lateral Valve #</b>		<b>Billing Department</b>
<b>Size of Main</b>		
<b>Date Placed in Service</b>		
<b>Date of Test</b>	<b>Rate of Flow</b>	<b>G.P.M.</b>
		<b>Static</b>
	<b>See Other Side for Sketch</b>	<b>Pitot</b>
<b>Data By</b>		
<b>Map Cord.</b>		<b>Date Painted Last</b>



### HYDRANT INSPECTION REPORT

MUNICIPALITY \_\_\_\_\_ HYD. NO. \_\_\_\_\_

LOCATION \_\_\_\_\_

MAKE \_\_\_\_\_ SIZE \_\_\_\_\_

2½" NOZZLES \_\_\_\_\_ STEAMER NOZZLES \_\_\_\_\_

OPENS \_\_\_\_\_ SIZE MAIN \_\_\_\_\_ SIZE BRANCH \_\_\_\_\_ BRANCH VALVE NO. \_\_\_\_\_

CONDITION	INSPECTION DATES					
PAINT						
CAPS						
CHAINS						
STEM						
PACKING						
DRIP						
TOP NUT						
VALVE						
VALVE SEAT						
CONDITION OF WATER						
MINUTES FLUSHED						
STATIC PRESSURE						
RESIDUAL PRESSURE						
FLOW						
INSPECTED BY						

CONDITION	INSPECTION DATES					
PAINT						
CAPS						
CHAINS						
STEM						
PACKING						
DRIP						
TOP NUT						
VALVE						
VALVE SEAT						
CONDITION OF WATER						
MINUTES FLUSHED						
STATIC PRESSURE						
RESIDUAL PRESSURE						
FLOW						
INSPECTED BY						

# Mueller® Hydrant Repair Kits make your job easier

Now you can get the parts and materials you need most often to work on hydrants, all in convenient kit form. Having the "most needed" parts in kits when you work on a hydrant means you are less likely to be surprised by a part you need, but don't have. And kits can save you the time of looking up and ordering individual parts. Kits are available for six different hydrant

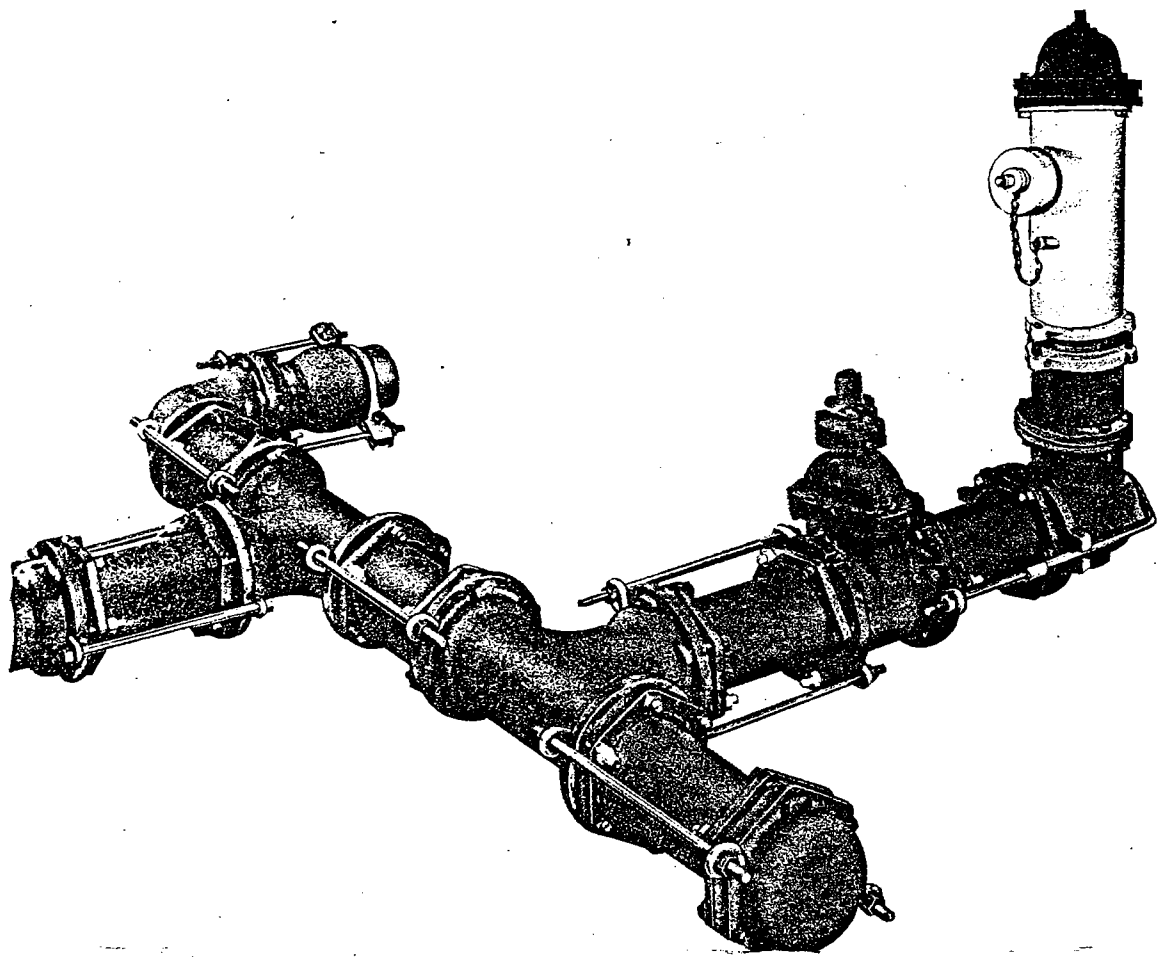
sections. Using all the parts provided in a kit helps you maintain your hydrants in top operating condition. Available for Mueller Centurion®, Mueller Improved and Mueller/107® Fire Hydrants, each kit comes with installation instructions.

## Typical Hydrant Repair Kit Contents\*: 1983 Price List

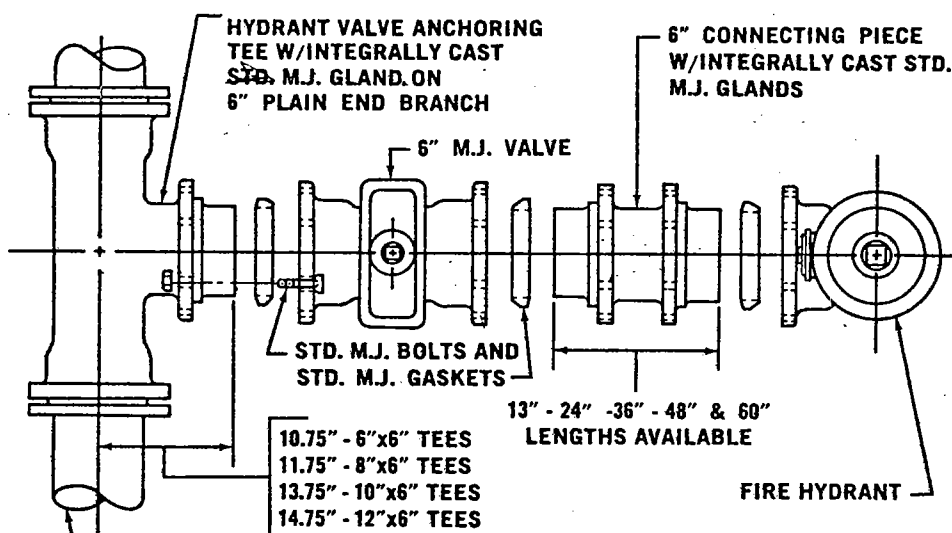
<b>BONNET REPAIR KIT</b>	19.18	<b>MAIN VALVE REPAIR KIT</b>	99.19
<ul style="list-style-type: none"> <li>• Hold down nut O-ring</li> <li>• Bonnet O-ring</li> <li>• Anti-friction washer</li> <li>• Bonnet gasket</li> <li>• Stem O-rings</li> <li>• Hydrant lubricating oil</li> </ul>		<ul style="list-style-type: none"> <li>• Seat ring</li> <li>• Top seat O-ring</li> <li>• Bottom seat O-ring</li> <li>• Main valve</li> </ul>	
<b>SAFETY FLANGE REPAIR KIT</b>	64.48	<b>EXTENSION KIT</b>	131.10
<ul style="list-style-type: none"> <li>• Stem coupling</li> <li>• Safety flange</li> <li>• Flange gasket</li> <li>• Replacement bolts &amp; nuts</li> <li>• Hydrant lubricating oil</li> </ul>		<ul style="list-style-type: none"> <li>• Extension barrel</li> <li>• Extension stem</li> <li>• Stem coupling and hardware</li> <li>• Flange</li> <li>• Flange gasket</li> <li>• 8 bolts and nuts</li> <li>• Hydrant lubricating oil</li> </ul>	
<b>SHOE REPAIR KIT</b>	66.44	<b>EXTENSION STEM KIT</b>	38.19
<ul style="list-style-type: none"> <li>• Drain valve facings</li> <li>• Drain valve facing screws</li> <li>• Drain ring housing gasket</li> <li>• Top seat O-ring</li> <li>• Bottom seat O-ring</li> <li>• Main valve</li> <li>• Cap nut seal</li> </ul>		<ul style="list-style-type: none"> <li>• Extension stem</li> <li>• Stem coupling and hardware</li> </ul>	

\*Kit contents vary by hydrant model

Take advantage of this new convenience in hydrant repair. Kits are available now from your local Mueller Distributor. Ask about them today.



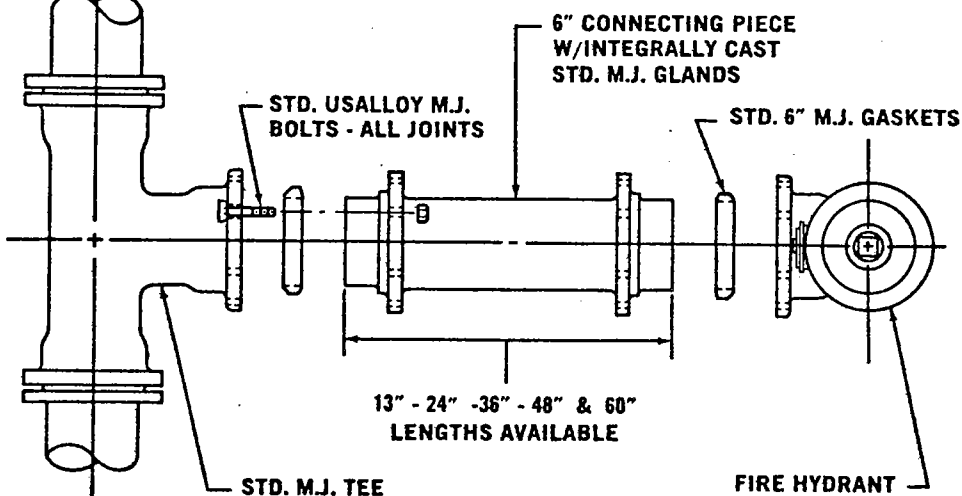
This fitting is a connecting piece provided with an integrally cast standard, mechanical joint gland on each end. It provides a positive lock against joint separation without the use of tie rods or blocking when used as shown in the sketches below. Standard mechanical joint bolts and standard mechanical joint gaskets are used with this fitting.



- 10.75" - 6"x6" TEES
- 11.75" - 8"x6" TEES
- 13.75" - 10"x6" TEES
- 14.75" - 12"x6" TEES

13" - 24" - 36" - 48" & 60"  
LENGTHS AVAILABLE

**METHOD NO. 1**



13" - 24" - 36" - 48" & 60"  
LENGTHS AVAILABLE

**METHOD NO. 2**

U-591

Size In.	Lgth. In.	Wt. Lb.
6	13	70
6	24	105
6	36	150
6	48	185
6	60	220



MIDWESTERN DIVISION COMPANY NAME Kentucky-American Water Company

1982 Reporting format for HYDRANT MAINTENANCE PROGRAM

For the (month quarter year-to-date)

M. W. O. # M493

	<u>1982</u>	<u>19 82</u>	
	Bud.	Act.	Diff.
<u>Number of Hydrants Maint.</u>	<u>4475</u>	<u>4230</u>	<u>245</u>
<u>Cost Per Hydrant</u>	<u>4.41</u>	<u>3.812</u>	<u>(.598)</u>
<u>Supervision:</u>			
Hours	<u>110</u>	<u>109</u>	<u>(1)</u>
Amount	<u>1452</u>	<u>1494</u>	<u>42</u>
<u>Labor:</u>			
Hours	<u>1760</u>	<u>1435.5</u>	<u>(324.5)</u>
Amount	<u>15220</u>	<u>12091</u>	<u>(3129)</u>
Mileage	<u>2192</u>	<u>1876</u>	<u>(316)</u>
Material	<u>739</u>	<u>662</u>	<u>(77)</u>
Other	<u>152</u>	<u>0</u>	<u>(152)</u>
Total Cost	<u>19755</u>	<u>16123</u>	<u>(3632)</u>
Total Cost/Hydt.	<u>4.41</u>	<u>3.812</u>	<u>(.598)</u>
Total Hrs./Hydt.	<u>.418</u>	<u>.365</u>	<u>(.053)</u>

Number of Hydts. repaired \_\_\_\_\_

Remarks:

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October 1981

MAP NUMBER # 18

HYDRANT INSPECTION  
LEXINGTON FIRE DEPARTMENT

*Capt R. C. Hall* Eng #1  
Inspecting Officer

*May R. W. Hall* (#1)  
District Chief

Hydrant Number	LOCATION NUMBER - STREET	Date	Remarks: Condition
1 88	20 <sup>th</sup> BLK THIRD ST. CEMETERY	10/5/81	CURB NEEDS PAINT
2 89	219 E THIRD ST - #1	"	" " "
2-25-82 90	100 BLK. E. THIRD	"	(DARLING) STEM NEEDS LUB - CURB NEEDS PAINT
4 91	3 <sup>rd</sup> E Limestone	"	CURB NEEDS PAINT
5 92	3 <sup>rd</sup> E N UPPER	"	" " "
2-25-82 106	341 N. LIME E SALEM	"	2 1/2" CAP CHIPPED
7 108	N. LIME E 4 <sup>th</sup>	"	CURB NEEDS PAINT - 2 1/2" CAP CHAIN NOT ATTN
2-25-82 114	442 N. LIMESTONE	"	(DARLING) - NO CHAINS - NO CURB NO PAINT CANNOT TURN STEERWAL NUT COMPLETELY AROUND WITH WHEEL
9 117	5 <sup>th</sup> E N LIMESTONE	"	NO CURB - YELLOW PAINT PRESENT
10 118	UPPER E 5 <sup>th</sup> ST	"	OK
11 121	535 N. LIME	"	NO CURB - YELLOW PAINT PRESENT
12 123	6 <sup>th</sup> E LIME	"	YELLOW PAINT NEEDED
13 124	637 N LIME	"	" " "
14 212	623 ELSMERE	"	CURB NEEDS PAINT
15 2-7	138 E. SIXTH ST	"	" " "
2-25-82 219	TOWER E SIXTH ST	"	HEDGE NEEDS TO BE CUT AWAY
17 <del>227</del>	<del>2<sup>nd</sup> X UPPER X</del>	X	<del>CURB NEEDS PAINT</del>
18 278	644 ELSMERE	10/15/81	CURB NEEDS PAINT
19 284	439 N. UPPER	"	OK
20 289	306 BLK N. UPPER	"	CURB NEEDS PAINT
21 324	N SIXTH E UPPER	"	" " "
22 360	144 ALABAMA AVE	"	" " "
23 361	ALABAMA AVE	"	" " "
24 376	637 N. UPPER	"	" " "
2-25-82 381	537 TOWER	"	NO CURB OR PAINT - NEEDS

Ed Blankenship  
Assistant Distribution Superintendent

## MEMORANDUM

**TO:** Darrell Whitt  
Jeff Ashby  
Randy Teegarden

**FROM:** Ed Blankenship

**DATE:** March 19, 1997

**SUBJECT:** EMPLOYEE RESPONSIBILITIES FOR FIRE HYDRANT INSPECTION  
AND FLOW TESTING

1. All Hours worked on this program are to be charged to 83601002-1130301 - M1025, which is listed on Line 12 of the daily time report.
2. All mileage to be charged to the maintenance account.
3. Vehicles will be cleaned last thing Friday afternoon and will be stocked first thing Monday morning with enough material to last for a week. Material such as degreaser, blue and white paint, hydrant oil, hydrant caps and chains, etc...
4. Since time reports and mileage reports will be simplified, you should be able to leave from the garage immediately after receiving your clipboard and you will not return to the garage before 3:45 p.m. each day unless special reasons such as tailgate or general safety meetings, hearing or fit test, etc...
5. You are to follow the procedure for flowing fire hydrants as close as possible. See attached.
6. The fire hydrants that do not drain back will be excavated and repaired as soon as utilities can be located. This will be done by hydrant inspection personnel, even if it requires working overtime.

EB:ld

### Procedure for Flow Testing Fire Hydrants

1. Check hydrant for leakage with Sonoscope
2. Verify the hydrant lateral valve is open by operating it 1 or 2 times.
3. Install gauge assembly on fire hydrant with pitcock to gauge shut off and the pitcock to bleed the air off OPEN.
4. Open the hydrant and after all air and discolored water has been expelled, close air pitcock and open pitcock to gauge slowly.
5. Open hydrant 5-6 turns and record static pressure.
6. Shut hydrant off. Release pressure slowly and then remove the remaining 2 1/2" nozzle cap.
7. Before flowing the hydrant look around to see which direction it can be safely flowed without causing damage to driveways, utility strips, parked vehicles or endanger pedestrian and/or vehicular traffic. Do not allow the water stream to flow towards or into traffic without using a diffuser.
8. Slowly, open the fire hydrant fully and allow the water to flow full force for two (2) minutes.
9. During this two (2) minutes read and record pitot pressure. If the pitot pressure is less than 20 psi, flow the hydrant again using a 2 1/2" X 2" adapter, continue this procedure until a pitot of more than 20 psi is obtained.
10. Slowly, close the hydrant to where it is approximately one-half open, observe the quality/turbidity of the water. If the water is clear, close the hydrant completely. If the water is not clear, allow the water to continue to flow at a rate that will not cause damage or flooding until the water clears.
11. While the fire hydrant is flowing to clear up the water it is necessary to record the pitot pressure and number of minutes flowed.
12. While the fire hydrant is flowing to let the water clear up, fill out the necessary paperwork.
13. Observe any items of maintenance which the hydrant or its setting may require, such as:
  - A. Needs straightening
  - B. Needs painting
  - C. Additional fill dirt.
  - D. Valve box adjustment.
  - E. Sidewalk repair.
  - F. Doesn't drain back.
  - G. Leaks.
  - H. Leaning/approximate angle.
  - I. Hard to operate.
  - J. Loose chains.
  - K. Missing weather caps.
  - L. Missing bonnet oil plugs.



### Procedure for Flow Testing Fire Hydrants

14. Make ABSOLUTELY sure every hydrant designed for cap chains, have cap chains on them, and the chains are properly installed with S hooks clamped together so the chains can not be removed easily.
15. Clean the old hardened grease from each hydrant outlet nozzle and install new lubricant.
16. Check the operating stem to ensure that it operates freely, is not damaged or rounded off so that a hydrant wrench will not turn it.
17. Use the dipstick provided to check the oil level in the bonnet. If oil appears on the dipstick, there is too much oil and the excess is to be removed with the battery filler. If additional oil is required, USE ONLY APPROVED HYDRANT OIL.
18. If the hydrant fails to hold the oil, prepare a maintenance order to replace the upper stem O-rings.
19. Hydrants that are discolored with oil running down the bonnet are to have the excess oil removed, bonnet cleaned with the degreaser provided and repainted. The proper oil level can be determined with the dipstick and the excess oil removed with the battery filler device.
20. Report IMMEDIATELY any needed maintenance that would prevent the hydrant from being used or would create a hazardous situation.
21. After flow testing, sound each hydrant for leaks.
22. Record all pitot pressures below 90 psi on the blank page in the front of each hydrant inspection route book.
23. Observe the hydrant to insure the water drains out of the upper barrel. If the water does not drain prepare a maintenance order and dig up sheet immediately.
24. Remove the gauge assembly from the hydrant and snug all nozzle caps wrench tight.
25. Make sure hydrant is clean.
26. Cut weeds from around fire hydrants.
27. Touch up paint as needed.

Signed:

Date:

\_\_\_\_\_

\_\_\_\_\_

19\_\_\_\_ Fire Hydrant Flow Test Program

Equipment and Materials Needed for Each  
Vehicle Involved in the Hydrant Inspection and  
Flow Test Program

1. Gauge assemblies with calibrated gauges.
2. Pair channel lock pliers 10" - 18".
3. Supply of cap chains.
4. Small paint brushes, nozzle lubricant.
5. Fire hydrant wrenches, Mueller & Universal.
6. Valve cut-off keys.
7. Tee head cut-off key.
8. Outlet nozzle caps 2 1/2".
9. Outlet nozzle caps 4 1/2" NST and KAWC thread.
10. Outlet reducer adapters, 4 1/2" to 2 1/2", 2 1/2" to 2", 2 1/2" to 1 1/2" and 2 1/2" to 1 1/4".
11. Cones, 2 barricades, 1 mesh person working sign.
12. Weather rings.
13. Oil reservoir plugs.
14. Approved hydrant oil (only).
15. Drive ratchet W/3/4" socket.
16. Inch Open end wrench.
17. Inch allen wrench.
18. - 3/4" Open end wrenches.
19. Weed hooks.
20. Crescent adjustable wrenches 10"-18"
21. Geophones - Sconoscope.
22. Dipstick to check the oil.
23. Degreaser.
24. Blue paint.
25. White paint.
26. Battery filler device.
27. Plywood or canvas for splash pad.
28. Valve box locator.
29. Blank maintenance orders.
30. Valve route book, and hydrant book.
31. Small map (1"=400' Scale).
32. Diffuser.
33. Weed eater.
34. Vehicle should be equipped with outside 2-way radio speakers. The volume on these speakers should be turned down so they are audible to only the employee.
35. Jobsite protection will be in accordance with the Safety Code, Jobsite Inspection Checklist and all applicable system, region and company safety rules.