



Robert Prosser & Associates

AUDIT REPORT

ON THE

HYDRANTS PROGRAM

The overall objective of the audit was to determine if adequate control systems are in place to minimize significant business risks related to hydrants, for the purpose of fire suppression.

With relatively few exceptions, we believe that adequate controls are in place. Recommendations have been provided to further enhance the hydrants program.

September 2006



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Report Highlights

The Corporate Audit Plan included provision to conduct an audit of significant business risks related to hydrants. The last comprehensive audit of the Hydrants Program was completed in 1995.

The overall objective of the audit was to determine if adequate control systems are in place to minimize significant business risks related to hydrants, for the purpose of fire suppression. The audit focused on the following key business risks as determined by audit through discussions with management and the City's Risk Manager:

- Hydrant Not Properly Located
- Hydrant Malfunction
- Inadequate Water Supply (Fire Flows – Pressure & Volume)
- Hydrant Inaccessibility
- Private Hydrants Malfunction and Inadequate Pressure/Volume

The potential impacts of the above risk events not being properly managed include:

- Firefighter injury/death
- Civilian injury/death
- Property damage

In conducting our audit we compared the City of Saskatoon's practices against documented industry standards from the following authoritative sources:

- National Fire Protection Agency (NFPA) 1999
- American Water Works Association (AWWA)
- Fire Underwriters Survey (FUS)

The audit also included an examination of current controls in place to relevant sections of the National Building Code and the National Fire Code.

With respect to public hydrants our overall conclusion is that, for the most part, and with the exception of hydrant inspection and flushing frequency, adequate systems, practices and controls are in place to minimize the risk of hydrants not being properly located, hydrant malfunction, inadequate water supply and hydrant inaccessibility. In some areas we note compensating controls that help mitigate risks (e.g. backup hydrants and an alternative water supply). We also offer recommendations for improvement in the following areas:

- Updating the City of Saskatoon Design Standards (2006) to reflect the latest edition of the "Water Supply for Public Fire Protection, A Guide to Recommended Practice".
- Having SFPS Department Dispatch rather than firefighters at incidents, assume responsibility for notifying Public Works (via email) of hydrants used for fire suppression, including an assessment of the hydrant's condition after its use.

- Updating the inspection service level standards to include performing a formal inspection after hydrant repair or replacement.
- Strengthening controls to ensure repair requirements are not overlooked.
- Establishing controls to facilitate timely identification of recurring repairs/problems associated with particular hydrants and/or make/model of hydrants.
- Monitoring the achievement of hydrant repair and replacement priorities and service levels and investigating significant variances.
- Inspecting all hydrants used by groups other than the SFPS, after temporary usage.
- Requiring all hydrants that have a meter box removed, to have a formal inspection at the time of the removal.

With regard to the inspection and flushing frequency of public hydrants, we note that the City is not following the National Fire Code standard. We are recommending:

- Requiring the City to follow the inspection and testing frequency standard set out in the National Fire Code or alternatively, having City Council approve a policy adopting current service level frequencies.

With regard to private hydrants we have concerns regarding hydrant inventory as well as the inspection and flushing frequencies. The City is responsible for ensuring hydrants are inspected and flushed according to the National Fire Code. We note that the City does not have a complete record of all the private hydrants in its inventory. We also note that existing controls do not ensure that private hydrants are inspected and flushed according to frequency standards set out in the National Fire Code. We are recommending:

- Putting controls in place to ensure the City has at all times a current record of all private hydrants in the City.
- Requiring private hydrants inspection & flushing results by independent 3rd parties to be examined at the hydrant inspection frequency standard set out in the National Fire Code, or having City Council approve a policy adopting an alternative service level frequency.

Chapter 1 - Introduction

The Corporate Audit Plan included provision to conduct an audit of significant business risks related to hydrants. The last comprehensive audit of the Hydrants Program was completed in 1995.

The key activities of the Hydrants Program include field inspection, maintenance, replacement and relocation of fire hydrants.

Hydrants provide the source of water required for fire suppression activities, thereby minimizing injuries, loss of life and property damage due to fire. Hydrants are also accessed for managing water quality and hydraulics (pressure and volume) in the water distribution system. The objective of the Hydrants Program is to ensure that a high percentage of hydrants are in operational readiness (reliability) and will perform satisfactorily (adequacy) upon demand at a fire incident.

Hydrants also serve as a temporary water source for construction sites and for such municipal operations as street sweeping and sewer flushing.

The following table highlights the activity of the hydrants program over the past few years.

Year	# of Hydrants	# of Summer Inspections	# of Winter Inspections	# of Repairs¹	# of Replacements - Operating Budget	# of Replacements – Capital Budget	Operating Budget (actual) (1,000s)
2002	5238	2479	2682	123	32	13	\$451.1
2003	5277	3083	2376	29	14	6	\$397.7
2004	5316	2554	3053	86	31	10	\$611.7
2005	5374	3222	2386	122 ²	25 ³	26	\$585.6

Audit Objective

The overall objective of the audit was to determine if adequate control systems are in place to minimize significant business risks related to hydrants, for the purpose of fire suppression. The audit focused on the following key business risks as determined by audit through discussions with management and the City's Risk Manager:

- Hydrant Not Properly Located
- Hydrant Malfunction
- Inadequate Water Supply (Fire Flows – Pressure & Volume)

¹ Per the Water and Sewer Section Manager, many of the repairs are preventative, and the hydrants would still be operational for fire protection.

² This figure includes 58 hydrants, which were hit and required the replacement of the breakaway flange.

³ This figure includes 1 hydrant, which was hit and required the replacement of the entire hydrant.

- Hydrant Inaccessibility
- Private Hydrants Malfunction and Inadequate Pressure/Volume

Audit Scope

The scope of the audit included the activities of the Hydrants Program. To the extent necessary, consideration was given to other programs within City departments that could have a significant impact on the objective of the program.

Acknowledgements

Robert Prosser & Associates Inc. wishes to extend special thanks to the Water & Sewer Section Manager, Water & Sewer Section Superintendent, Public Works Branch Manager, General Manager of Infrastructure Services, General Manager of Fire & Protective Services, Deputy Chief of Fire & Protective Services and the Fire Marshall for accommodating our request for interviews, information and documents and reviewing our audit findings.

Chapter 2 - Hydrant Not Properly Located

One of the objectives of the audit was to determine if adequate control systems are in place to minimize the risk of a Hydrant not properly located. Failure to have a hydrant properly located could result in a firefighter injury/death, civilian injury/death or property damage. Our overall conclusion is that, for the most part, adequate systems, practices and controls are in place to minimize the risk of a hydrant not properly located. For those weaknesses in controls that were noted we made recommendations for improvement.

The following matrix outlines the current controls in place, our findings and opportunities for improvement.

Ref	Current Systems, Practices & Controls	Commentary
A1	<p>City of Saskatoon Design Standards – The City of Saskatoon Design Standards (2006) address hydrant location and spacing in newly developed and rezoned areas of the City.</p> <ul style="list-style-type: none"> ○ Section C-4.1 states the distribution of hydrants shall be according to required fire flow as tabulated in “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1981”. <ul style="list-style-type: none"> ▪ <u>“Water Supply for Public Fire Protection - A Guide to Recommended Practice, (1999 edition)” published by the Fire Underwriters Survey</u> – The 1999 edition recommends maximum spacing of hydrants in commercial, industrial, institutional and multi-family residential areas of 90 meters; in single family residential areas 180 meters is recommended. ○ Section C-4.2 states the location of hydrants relative to principal entrances to buildings shall be as specified in subsection 3.2.5 of the National Building Code (NBC). <ul style="list-style-type: none"> ▪ <u>National Building Code (NBC)</u> – Subsection 3.2.5 (2b) of the National Building Code (NBC) requires access routes to be provided to a building so that, for a building not provided with a fire department connection, fire department pumper vehicles can be located so that the length of the access route from a hydrant to the vehicle plus the unobstructed path of travel for the 	<p>Upon examination of the City of Saskatoon Design Standards (2006), we note the following:</p> <ul style="list-style-type: none"> • Section C-4.3 requires hydrants to be spaced a maximum of 140 meters apart. However, the “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1999” recommends spacing in commercial, industrial, institutional and multi-family residential areas of 90 meters. • Hydrant spacing requirements for commercial, industrial and high density (more than three stories) residential areas were omitted (the 2001 version specified spacing of 100 meters). • Section C-4.1 states that the distribution of hydrants shall be according to required fire flow as tabulated in “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1981”. This is an old document and a newer version is available. The City of Saskatoon Design Standards (2001) stated that the latest edition of the “Water Supply for Public Fire Protection, A Guide to Recommended Practice” should be used. <p>Per the Water & Sewer Section Superintendent, in consultation with the Design Branch, there have been several versions regarding the standards for hydrant spacing as well as other design criteria. For this reason, Infrastructure Services and Community Services – Planning Branch have undertaken a joint venture to</p>

Ref	Current Systems, Practices & Controls	Commentary
	<p style="text-align: center;">fire fighter from the vehicle to the building is not more than 90 meters.</p> <ul style="list-style-type: none"> ○ Section C-4.3 states hydrants are to be spaced a maximum of 140m apart. 	<p>review and update all design criteria. Associated Engineering has been retained and is currently in the process of reviewing these documents, researching best practices and obtaining design standards from other Canadian municipalities. It is expected that this project will be completed by the fall of 2006 and new standards will be adopted.</p> <p>Although design standards state a maximum of 140 meters, we understand that the standards actually followed by designers and developers are within this maximum (i.e., industrial (100 metres), institutional (120 metres) and residential (140 metres). However, as noted above, they are not within the standards set out in the “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1999”.</p> <p>See Recommendation(s) Below: #1</p>
A2	<p><u>Technical Planning Committee & Zoning Regulations</u> – The Fire Marshall is a member of the Technical Planning Committee. This committee reviews neighborhood concept plans and site plans. Through this committee the Fire Marshall would be able to identify fire protection concerns in newly developed and rezoned areas of the City.</p> <p><u>This will ensure the following standard is met;</u></p> <ul style="list-style-type: none"> ● <u>NFPA Standard 1201</u> – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. <ul style="list-style-type: none"> ○ Section 14-7 Zoning Regulations states: <ul style="list-style-type: none"> ▪ Fire departments shall seek to establish good working relationships with the local zoning and planning authorities so that review of development and construction proposals can identify fire protection concerns. ○ Section 14-6 Enforcement Procedures states: <ul style="list-style-type: none"> ▪ 14-6.2 - The fire department shall provide prompt and complete staff advisory services in the technical areas concerning advance planning for buildings and subdivisions, technical subjects, and code interpretation. The code enforcement staff also shall assist 	

Ref	Current Systems, Practices & Controls	Commentary
	fire suppression forces in developing pre-fire plans.	
A3	<p><u>Subdivision Plan Review for Compliance with Standards</u> – The plans are stamped & signed by the Water & Sewer Planning & Design Engineer as evidence that they have been designed in accordance with the City Standards. These plans include the location of hydrants and the pipe size (fire flows).</p>	
A4	<p><u>Subdivision Plan Approvals</u> – The plans are approved by the Planning and Design Section Manager, Municipal Engineering Branch Manager and the Infrastructure Services Department Manager as evidence that they have been verified compliant with the City Standards. These plans include the location of hydrants and the pipe size (fire flows). These plans must also be approved by the Environmental Protection Branch of the Saskatchewan Environment. This “Guide to Waterworks Design - 2006”, applies to all waterworks controlled by “The Water Regulations 2002”.</p>	
A5	<p><u>Hydrants & Infrastructure Constructed According to Subdivision and Construction Plans and Specifications</u> – The plans for the hydrants & infrastructure go to tender and are awarded to either an external contractor or to the City. Procedures are in place to ensure hydrants and infrastructure are constructed according to the plans.</p> <ul style="list-style-type: none"> • <u>City Project Engineer Monitoring</u> – When a contract to install water mains & hydrants is awarded to the City then a project engineer will be assigned to the project. This individual will perform inspections to ensure the work is performed according to specifications. • <u>External Contractor Project Engineer Monitoring</u> – When a contract to install water mains & hydrants is awarded to an external construction company the Contractor will assign one of their own engineers or hire a project manager to oversee the project to ensure the work is performed according to specifications. • <u>City Inspection</u> – Throughout the course of construction a City Inspector will inspect the project to see that the work is performed according to specifications. 	
A6	<p><u>Independent 3rd Party Review</u> – On a periodic basis (10-15 years), insurance companies have an external</p>	Based on discussions with a representative of CGI (the company that conducts these reviews), failure to adopt

Ref	Current Systems, Practices & Controls	Commentary
	<p>party review (examine controls in place as well as perform tests on hydrants (i.e. flow test hydrants)) the municipality's fire suppression systems in place. This external party will assign a grade based on the requirements within the "Water Supply for Public Fire Protection - A Guide to Recommended Practice, (1999 edition)" published by the Fire Underwriters Survey. This will allow for deficiencies to be detected and corrected. The key components of a hydrant system looked at include: size, type, installation, inspection, condition, and distribution.</p>	<p>practices from the "Water Supply for Public Fire Protection, A Guide to Recommended Practice, (1999 edition)" can result in a poorer rating, thereby increasing insurance premiums for residents/business owners of Saskatoon.</p> <p>In the last review, Saskatoon had a Class 1 (best) rating for Dwellings and a Class 3 rating (based on a 10 point scale) for Commercial. The next review for Saskatoon is due in 2006.</p>
A7	<p><u>Notification from SFPS Regarding Hydrant Not Properly Located</u> – After responding to a fire, the Saskatoon Fire and Protective Services (SFPS) Department identifies situations where a hydrant was not properly located (i.e. too far away). The Fire Department, through discussions with Public Works, can then determine if an additional hydrant should be installed or if alternative measures should be taken.</p>	
A8	<p><u>Backup Hydrants</u> – The SFPS Department has apparatus that can be used to pump water from one apparatus to the next in the event that the distance between hydrants is too great. This allows them to utilize a hydrant from a greater distance.</p>	
A9	<p><u>Alternative Water Supply</u> – The SFPS Department apparatus carry 500 gallons of water on board. These apparatus can be relayed to one another to increase the volume by 500 gallons for each additional apparatus connected. Per the Assistant Fire Chief, this would provide sufficient time to connect to a farther hydrant or call for additional water resources (i.e. Water Tanker). The SFPS Department could also obtain water from storm water retention ponds. The delay would be minimal and would not adversely affect firefighting operations.</p>	

Recommendation:

1. That the City of Saskatoon Design Standards (2006) be revised to reflect the latest edition of the "Water Supply for Public Fire Protection, A Guide to Recommended Practice".

Management Response:

1. Agree

Chapter 3 - Hydrant Malfunction

We examined whether adequate systems, practices and controls are in place to minimize the risk of Hydrant malfunction. Hydrant failure could result in a firefighter injury/death, civilian injury/death or property damage.

We conclude that, for the most part, adequate systems, practices and controls are in place.

The following matrix outlines the current controls in place, our findings and opportunities for improvement.

Ref	Current Systems, Practices & Controls	Commentary
B1	<p>City of Saskatoon Design Standards – The City of Saskatoon Design Standards (2006) address installing valves on the line to hydrants.</p> <ul style="list-style-type: none"> ○ Section C-4 states that all hydrant leads connected to mains 300mm or larger, and all hydrants in commercial and industrial areas, shall be valved. <p>This will allow for the remaining hydrants on a main waterline to be in-service in the event that a hydrant needs to be shut down (i.e. repairs).</p>	<p>We note that this design standard does not meet the “Water Supply for Public Fire Protection - A Guide to Recommended Practice, (1999 edition)” published by the Fire Underwriters Survey. The 1999 edition requires that a valve should be provided on lateral connections between hydrants and street mains – i.e. it does not differentiate between large and small mains. However, we consider the City making this standard a requirement in high-risk areas (e.g. commercial and industrial areas; areas with large mains) as acceptable risk management. We also note that compensating controls are in place for areas where individual hydrants are not valved – e.g. alternative sources of water supply such as apparatus carrying water.</p> <p>Another issue raised by the Water & Sewer Section Manager is that if a valve fails and requires replacement, it would require the shutdown of the main, which would cover a larger area. However as noted above there are compensating controls in place – e.g. alternative sources of water supply such as apparatus carrying water.</p> <p>The Water & Sewer Superintendent also states that for smaller mains, an area will be valved so that the large areas of the City do not have water shut down in the event of a hydrant being repaired.</p>
A3	<p>Subdivision Plan Review for Compliance with Standards – See Chapter 2, Control A3.</p>	
A4	<p>Subdivision Plan Approvals – See Chapter 2, Control A4.</p>	

Ref	Current Systems, Practices & Controls	Commentary
A5	<p><u>Hydrants & Infrastructure Constructed According to Subdivision and Construction Plans and Specifications</u> – Procedures are in place to ensure hydrants and infrastructure is constructed according to the plans. – See Chapter 2, Control A5.</p> <ul style="list-style-type: none"> • <u>City Project Engineer Monitoring</u> • <u>External Contractor Project Engineer Monitoring</u> • <u>City Inspection</u> 	
A6	<p><u>Independent 3rd Party Review</u> – See Chapter 2, Control A6</p>	
B2	<p><u>SFPS Hydrant Usage Notification</u> – The SFPS Department, through email, contacts Public Works each time they use a hydrant (summer or winter). They report the location and if any problems were encountered or observed. Public Works will then perform an inspection and make any necessary repairs on the hydrant to ensure it is operating correctly. If, during the winter months, the hydrant does not drain properly, Public Works will steam and flush the hydrant, thus preventing freeze up.</p> <p><u>This will ensure the following standards are met:</u></p> <ul style="list-style-type: none"> • <u>NFPA Standards</u> – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. <ul style="list-style-type: none"> ○ Section 18-4 Hydrant Service states: <ul style="list-style-type: none"> ▪ 18-4.1 All hydrants shall be inspected and tested at least once per year, preferably twice per year, and after use at fires if problems related to hydrant performance have been experienced. If not inspected and tested by the water utility, the hydrants shall be inspected and tested by the fire department. Where problems or deficiencies are identified, the fire department shall file a report with the water utility requesting specific relocations, repairs, or other adjustments to correct the problem. • <u>National Fire Code</u> – The National Fire Code section 6.6.4 (1) states, hydrants shall be inspected ... after each use in conformance with article 6.6.4.4. 	<p>The Water & Sewer Section Manager indicates that, over the past few years, there have been relatively few hydrant problems reported by SFPS (i.e. 1 in 2003, 6 in 2004 and 1 in 2005).</p> <p>We note that Firefighters (who are currently responsible for notifying Public Works) have many responsibilities during and after an incident that increase the risk that Public Works is not notified as required. In our opinion, it would be appropriate for SFPS Department Dispatch to assume this responsibility.</p> <p>See Recommendation(s) Below: #2</p>
B3	<p><u>SFPS Pre-flushes Hydrants</u> – SFPS Department</p>	

Ref	Current Systems, Practices & Controls	Commentary
	procedure is to pre-flush hydrants before they are used to confirm their operability. This, along with utilizing screens on the pump inlets, also prevents damage to the apparatus pump due to debris in the hydrant.	
B4	Backup Hydrants – The SFPS Department has apparatus that can be used to pump water from one apparatus to the next in the event that the hydrant malfunctions. This allows them to utilize an operational hydrant from a distance.	
A9	Alternative Water Supply – See Chapter 2, Control A9.	
B5	Hydrants Installed are Designed for Cold Winter Climate – The City uses Dry barrel hydrants that allow water to drain out when the hydrant is turned off. This will prevent freeze up in winter.	
B6	<p>Inspection Service Level Standards – The City has an inspection program whereby all hydrants are inspected at the following frequency:</p> <ul style="list-style-type: none"> ○ Approximately 50% of the hydrants are inspected in the summer and the remaining 50% are inspected in the winter. In the following year the reverse is done for each individual hydrant. Inspections are done by quadrant within each zone (east of the river and west of the river). <ul style="list-style-type: none"> ▪ Summer inspections involve examining the hydrant and flushing the line. ▪ Winter inspections involve examining the hydrant. ○ All hydrants reported as having problems are inspected. ○ All hydrants used by SFPS are inspected. ○ Hydrants in the Downtown Business Core are inspected twice per year, once in the summer and once in the winter. <p><i>This will ensure the following standard is met:</i></p> <ul style="list-style-type: none"> • NFPA Standards – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. <ul style="list-style-type: none"> ○ Section 18-4 Hydrant Service states: <ul style="list-style-type: none"> ▪ 18-4.1 All hydrants shall be inspected and tested at least once per year, preferably twice per year, and after use at fires if 	<p>Industry standards suggest the following:</p> <ul style="list-style-type: none"> • The “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1999” recommends that: <ul style="list-style-type: none"> ○ Hydrants should be inspected at least semi-annually, and after use. ○ The inspection should include operation at least once a year. ○ Where freezing temperatures occur, the semi-annual inspections should be made in the spring and fall of each year. ○ Because of the possibility of freezing they should be checked frequently during extended periods of severe cold. • The AWWA Manual “M17-Inspection, Installation, Testing, and Placing the Hydrant in Service” recommends: <ul style="list-style-type: none"> ○ Hydrants should be inspected regularly, at least once a year, to ensure their satisfactory operation. ○ In freezing climates, dry-barrel hydrants may require two inspections per year (spring and fall). ○ In severe freezing conditions, periodic winter inspections may also be required.

Ref	Current Systems, Practices & Controls	Commentary
	<p>problems related to hydrant performance have been experienced. If not inspected and tested by the water utility, the hydrants shall be inspected and tested by the fire department. Where problems or deficiencies are identified, the fire department shall file a report with the water utility requesting specific relocations, repairs, or other adjustments to correct the problem.</p>	<ul style="list-style-type: none"> ○ It is advisable to inspect all types of hydrants after each use. ○ During freezing conditions, after-use inspections are especially important for dry-barrel hydrants. <p>In addition, the National Fire Code (NFC) 1995, subsection 6.6.4 requires:</p> <ul style="list-style-type: none"> ● Hydrants to be inspected at intervals not greater than 6 months and after each use. ● Hydrants to be flushed at intervals not greater than 12 months with the main valve and any outlet valves fully opened until the water runs clear. <p>In comparing the City's hydrant service levels to those above, we can see that:</p> <ul style="list-style-type: none"> ● After-use inspections are appropriate, and ● Inspections in response to reported problems are appropriate. <p>However, other than the Downtown Business Core, service level standards for preventive inspections are lower than that recommended in the industry and lower than that required by the NFC (i.e., hydrants are only inspected once per year, and are only flushed every two years). This increases the risk of hydrant malfunction.</p> <p>The Water & Sewer Section Manager indicates that, in his experience, not flushing the hydrants on an annual basis will result in a poorer quality of water but it will not cause a reduction in the flows or cause the hydrant not to operate properly.</p> <p>We also note that service level standards do not include the inspection of hydrants after they are repaired or replaced. We understand that after a hydrant is repaired or replaced, its functionality is tested, but a formal inspection is not recorded.</p>

Ref	Current Systems, Practices & Controls	Commentary
		<p>Although we understand there are no industry guidelines or standards that recommend a higher inspection frequency based on land use/risk (i.e. commercial, industrial, downtown, high-rise), the Water & Sewer Section Manager indicates they have taken a risk-based approach to inspect the Downtown Business Core more frequently given its denser population.</p> <p>See Recommendation(s) Below: #3&4</p>
B7	<p><u>Repair Service Level Standards</u> – The City’s preservation objective is to minimize the long-term cost of maintaining the hydrants in a functional condition.</p> <ul style="list-style-type: none"> ○ Minor repairs are performed as part of the annual inspection process. ○ Defects rendering the hydrant “out-of-service” are repaired immediately provided repair parts are readily available. As many hydrants models are no longer in production, repair parts can be limited. The City has a system of salvaging parts from hydrants that are being replaced. ○ Hydrants that require service but are still fully functional are scheduled in relation to other operational and repair activities within the Water Distribution Operations Area operations section. ○ Hydrants struck by vehicles are responded to within 24 hours (from the time of notification till the time the hydrant is physically inspected). <p><i><u>This will ensure the following standard is met;</u></i></p> <ul style="list-style-type: none"> ● <u>AWWA Standards</u> – The AWWA Manual “M17- Inspection, Installation, Testing, and Placing the Hydrant in Service” requires that major defects should be repaired as soon as possible after the defect is reported. 	
B8	<p><u>Replacement Service Level Standards</u> – Service levels for replacement vary based upon circumstances for the replacement.</p> <ul style="list-style-type: none"> ○ Hydrant failures that result in water outages are replaced within 24 hours. ○ Hydrants that require replacement but are still functional are prioritized for replacement when other Water & Sewer emergency work is 	

Ref	Current Systems, Practices & Controls	Commentary
	<p>complete. This includes trying to schedule these replacements as fill in work during the winter months as hydrant repairs are typically off the roadway thus eliminating the need to maintain cuts during winter months.</p> <ul style="list-style-type: none"> ○ All gate style hydrants and obsolete hydrants are replaced as part of the annual Water Main Replacement programs. 	
B9	<p><u>Documented Standard Operating Procedures for Inspections</u> – There are documented standard operating procedures for both the summer and winter inspection program. These documents outline the responsibilities of the supervisor and the operation assistant along with the procedures they are to follow.</p>	
B10	<p><u>Documented Training Manual for Inspections</u> – There are documented training manuals for both the summer and winter inspection program. These documents outline the methods and techniques to be followed when performing an inspection.</p>	
B11	<p><u>Assigning Inspections</u> – In order to ensure inspections are completed the supervisor will assign the inspector to a quadrant, which is recorded on the detailed tab of the Daily Work Plan spreadsheet. Each day the inspector will obtain a copy of the Daily Work Plan to determine quadrants that they are to inspect. As every hydrant within a quadrant is to be inspected, it is left to the inspector to determine the order in which the hydrant is inspected.</p>	
B12	<p><u>Recording Inspection Results</u> – Inspection results are recorded in the following manner:</p> <ul style="list-style-type: none"> ○ Spatial Data Engine (SDE) system <ul style="list-style-type: none"> ▪ In 2004 the inspection program migrated to utilizing IPAQ (PDAs) to conduct inspections. The information captured in this device is then uploaded into the Spatial Data Engine (SDE) system. ○ Water Service Disruption Report <ul style="list-style-type: none"> ▪ This report communicates the defects found throughout the course of the inspection to those who are responsible for making the repairs <p><i><u>This will ensure the following standard is met:</u></i></p>	<p>All inspection results are being entered into the Spatial Data Engine (SDE) system. In addition, deficiencies are also recorded on the Water Service Disruption Report. It is our understanding that future plans include programming the Spatial Data Engine (SDE) system to allow recording of in-depth details regarding hydrant deficiencies, thereby eliminating the recording of information manually on the Water Service Disruption Report.</p> <p>Per the Water & Sewer Section Manager, the AWWA manual is a good base of information containing practices on which to develop an inspection program. The City of Saskatoon’s procedures meets or exceeds many of these criteria and has been tailored to meet local needs.</p>

Ref	Current Systems, Practices & Controls	Commentary
	<ul style="list-style-type: none"> • AWWA Standards – The AWWA Manual “M17- Inspection, Installation, Testing, and Placing the Hydrant in Service” states that inspection results should be maintained and include the inspection date and condition of the hydrant along with repair work if necessary. 	<p>Per the Water & Sewer Section Manager, with regards to the forms used, the IPAQ (PDAs) electronic forms contain most of the categories listed on the AWWA forms as well as additional information not on the AWWA forms, which are felt as an enhancement to the inspection process.</p>
B13	<p>Monitoring Inspection Results – When performing a hydrant inspection, the inspector will record deficiencies on a Water Service Disruption Report. This report communicates the defects found throughout the course of the inspection to those who are responsible for making the repairs. The Water Service Disruption Report is submitted at the end of the shift to the supervisor IV in charge of hydrants who can then ensure the appropriate repairs have been recommended.</p>	
B14	<p>Monitoring Inspection Service Levels – On a daily basis the hydrant supervisor will review the Individual/Crew Daily Work Record to see the number of inspections performed. Upon receiving a completed Quadrant Map the supervisor will ensure that all hydrants are highlighted, highlight the quadrant on a wall map and record the month the inspections occurred. When all the quadrants are highlighted at the end of the season, the supervisor knows that all inspections were completed.</p> <ul style="list-style-type: none"> ○ Wall Map <ul style="list-style-type: none"> ▪ Within the Public Works building is a map of the City, overlaid with a quadrant map. Each quadrant is assigned a letter and number (i.e. L-2). ○ Quadrant Map <ul style="list-style-type: none"> ▪ For each quadrant there is a detailed quadrant map that details the infrastructure (i.e. hydrants, valves, waterlines). On a daily basis the inspector will highlight the hydrants inspected. Upon inspecting all the hydrants the quadrant map is forwarded to the hydrant supervisor. ○ Individual/Crew Daily Work Record <ul style="list-style-type: none"> ▪ This document is filled out the by the inspector and contains the number of hydrants that have been inspected along with the quadrant that they are in. 	<p>Upon review of the Spatial Data Engine (SDE) system and discussion with management, we note the following:</p> <ul style="list-style-type: none"> • The system is not being utilized to monitor achievement of preventive inspection service levels. The system captures the data that could be used to generate reports showing hydrants inspected by type, date and quadrant. Reports could also be generated showing those hydrants that required an inspection but were not inspected. • The system is not being utilized to monitor achievement of other inspection service levels (e.g., in response to hydrants reported as having problems, used by SFPS Department, semi-annual in the Downtown Business Core, etc.). <p>The Water & Sewer Section Manager indicates that the current system works sufficiently and in time they will move towards programming the Spatial Data Engine (SDE) system to generate this information.</p> <p>We were unable to analyze the extent to which service levels have been met due to the fact that the Water & Sewer Section Superintendent and the Spatial Data Engine (SDE) Systems Administrator had concerns over the integrity of the data captured</p>

Ref	Current Systems, Practices & Controls	Commentary
		<p>Per the Water & Sewer Section Manager, there were incomplete datasets in relation to the detailed hydrant inspection information that was being recorded on the IPAQ (PDAs). In speaking with the Spatial Data Engine (SDE) Systems Administrator, it is likely the source of the problem was due to an inconsistent pattern of downloads from the field. In the past, power losses to the IPAQ (PDAs) would result in the loss of any data being stored in RAM. However, the new IPAQ (PDAs) being introduced allow for the storage of data onto a flash card, which is not affected by power losses. Also, the recent software upgrade allows for automatic downloads of data each time the IPAQ (PDAs) is docked for recharging. It is felt that these two changes will better secure the data being collected in the field.</p> <p>Per the Water & Sewer Section Manager, this is a relatively new system and is in the process of revisions and updates which will assist in fixing the “bugs”.</p>
B15	<p>Assigning Repairs – After reviewing the Water Service Disruption Report, the supervisor will determine the repair required and decide which individual/group should perform the repair. When the work is ready to be assigned the supervisor will then enter the details of the request into the Work Request Registry (WRR) system. This system will then generate a Work Request. The supervisor will then enter the work request number into an MS Excel spreadsheet and assign the work to the individual(s), which is recorded on the detailed tab of the Daily Work Plan spreadsheet. The individual(s) responsible for performing the repairs will obtain a copy of the Daily Work Plan to determine the work they are to perform. Work not assigned in the system will show as to be assigned until it is assigned and will show as outstanding until it is recorded as being complete.</p>	<p>Delaying the entering of repairs required into the Work Request Registry (WRR) system increases the risk of repair requirements being overlooked.</p> <p>The Water & Sewer Section Manager indicates that, in cooperation with the City of Regina, they are working on establishing timeline targets and priorities for certain basic repair activities (i.e. replace a broken flange).</p> <p>See Recommendation(s) Below: #5&6</p>
B16	<p>Recording Repair & Replacement Results – Repair and replacement results are recorded in the following manner:</p> <ul style="list-style-type: none"> ○ Hydrant Repair Report <ul style="list-style-type: none"> ▪ The employee(s) responsible for performing the repairs will fill out this report, which details the work performed on the hydrant. ○ Hole Open Maintenance Emergency Repair (HOMER system) <ul style="list-style-type: none"> ▪ The supervisor will enter the in-depth details of the repairs from the Hydrant Repair Report into the HOMER system. 	<p>Per the Water & Sewer Section Manager, the AWWA manual is a good base of information containing practices on which to develop a repair program. The City of Saskatoon’s procedures meet or exceed many of these criteria and has been tailored to meet local needs.</p> <p>Per the Water & Sewer Section Manager, with regards to the forms used, the IPAQ (PDAs) electronic forms contain most of the categories listed on the AWWA forms as well as additional information not on the AWWA forms, which are considered an enhancement to the inspection process.</p>

Ref	Current Systems, Practices & Controls	Commentary
	<p>This system contains the complete history of the hydrant.</p> <ul style="list-style-type: none"> ○ Work Request Registry (WRR) system. <ul style="list-style-type: none"> ▪ The supervisor will enter the date the work was completed into the Work Request Registry (WRR) system. ○ Hydrant Card <ul style="list-style-type: none"> ▪ The details of the repair are recorded onto a physical hydrant card, which is then filed with the repairs for the year. <p><i>This will ensure the following standard is met;</i></p> <ul style="list-style-type: none"> ● <u>AWWA Standards</u> – The AWWA Manual “M17-Inspection, Installation, Testing, and Placing the Hydrant in Service” states that repair results should be maintained and include the date completed, nature of repairs and other relevant information. 	
B17	<p><u>Monitoring Repair & Replacement Results</u> – on a daily basis the hydrant supervisor will review the Hydrant Repair Report to ensure that repairs were performed appropriately.</p>	<p>The AWWA Manual “M17-Inspection, Installation, Testing, and Placing the Hydrant in Service” suggests monitoring repair results in order to determine if there are recurring problems associated with a particular hydrant or make/model of hydrant. This information could then be used as part of the replacement program to systematically remove these hydrants from the system.</p> <p>It is our understanding that, although such information is captured in the Spatial Data Engine (SDE) system, the system is currently not programmed to report this information for decision-making purposes</p> <p>See Recommendation(s) Below: #7</p>
B18	<p><u>Monitoring Repair & Replacement Service Levels</u> – the supervisor reviews the Work Request Registry (WRR) system online to determine the number of work requests that are outstanding.</p>	<p>It is our understanding that although the required information is entered into the Work Request Registry (WRR) system, there is no process for monitoring the achievement of repair and replacement service levels. Although the Water & Sewer Section Manager indicates that there may be factors that affect the timing of such work, without the appropriate reporting mechanisms, management can not know first, whether the service level is not being met, and second, what the reasons may be in order to take corrective action. For example, Our test of the service level, responding to</p>

Ref	Current Systems, Practices & Controls	Commentary
		<p>hydrants struck by vehicles within 24 hours revealed that there were two instances where management was unable to determine the time between notification and the initial inspection. However, the Work Request Registry (WRR) system captured the notification time and the repaired time, which was 2 days for one of the hydrants and 7 days for the other hydrant. Our testing included 10 other instances whereby the time between notification and repair was 2 days or greater. For each of these instances the onsite inspection was within 24 hours. Therefore, it is not unreasonable to assume that these 2 hydrants were also inspected within the 24 hours. Failure to have timely repairs to a hydrant could result in the hydrant not being available for use when required.</p> <p>In Chapter 3, Control B15, we recommended, “That once priorities and standard timelines have been established for hydrant repair activities, management implement controls to monitor and report on compliance.”</p>
B19	<p>Hydrant Service Program – In 2001 Public Works implemented a new hydrant service program in the Water Distribution Operations Group.</p> <ul style="list-style-type: none"> ○ A specialty service vehicle (large cube van) is now used to facilitate the timely repair of fire hydrants that had traditionally been addressed by full replacement. This van includes specialty equipment to dismantle and repair hydrants without excavation and carries a comprehensive inventory of repair parts. This has significantly reduced the need for replacement of hydrants. ○ A dedicated hydrant shop has been established where used parts are salvaged and inventoried, and repairs can be undertaken on some components. 	
B20	<p>Hydrant Replacement Program – Hydrant replacements and new hydrants that are installed as part of the watermain replacement programs are authorized under signature by a professional Engineer and subsequently documented in as built drawings and annual close out reports.</p>	
B21	<p>Hydrants Used By Groups Other Than SFPS – Hydrants have special connections and require special tools to turn them on. Individuals or companies who use hydrants to obtain water must request this service through Public Works.</p>	<p>Through our audit of Water Utility Line Loss in 2004, we noted that there are Civic programs (i.e. Parks & Urban Forestry, street sweeping, sewer cleaning programs, civic programs requiring the use of the City water truck, emergency access by the RM of Corman</p>

Ref	Current Systems, Practices & Controls	Commentary
	<ul style="list-style-type: none"> ○ By going through Public Works, they are provided the special tools to use the hydrants. In addition, an individual from Public Works will hook up the water meter to the hydrant and remove the water meter when the use is complete. By having the Public Works employee perform the connection and disconnection, the risk of damage to the hydrant is minimized. As well, the Public Works employee would visually see any damage to the hydrant when they are present. 	<p>Park) that utilize hydrants without informing Public Works. This increases the risk that the hydrant could be damaged without Public Works being made aware. Since these Civic programs are seasonal, there is also a risk the hydrant may not drain properly, resulting in the hydrant freezing during the winter. Such damage would not be detected until the following year when an inspection was completed or when the SFPS Department responded to an incident and needed to use the hydrant for fire suppression. Per the Water & Sewer Section Manager, additional controls put in place for 2006 include the designation of specific hydrants (51) in the system that the civic programs can access complete with rules around their use, tracking of access frequency and water consumption and special hydrant designation markers. These hydrants will then be inspected in the fall to ensure they are operational and ready for the winter season.</p> <p>Per the Water & Sewer Section Manager, water supply stations are included in the Business Plan. These water supply stations cost between approximately \$60,000 and \$180,000 depending on the setup etc.</p> <p>It is also our understanding that although a Public Works employee will disconnect the water meter box from the hydrant, they are not performing a full inspection. Hydrants, with seals, are not designed to be left open under pressure for extended periods of time as the seals can wear out and the hydrant will fail. Therefore, it would be beneficial to have a formal inspection performed on hydrants upon removal of the water meter box.</p> <p>See Recommendation(s) Below: #8,&9</p>

Recommendations:

2. That SFPS Department Dispatch assume responsibility for notifying Public Works (via email) of hydrants used for fire suppression, including an assessment of the hydrant's condition after its use.
3. That the inspection service level standards be updated to include performing a formal inspection after hydrant repair or replacement.
4. That the City follow the inspection and testing frequencies set out in the National Fire Code, or alternatively, that City Council approve a policy adopting the current service level frequencies.
5. That controls be strengthened to ensure repair requirements noted in Water Service Disruption Reports are not overlooked.
6. That once priorities and standard timelines have been established for hydrant repair activities, management implement controls to monitor and report on compliance.
7. That controls be put in place to facilitate timely identification of recurring repairs/problems associated with particular hydrants and/or make/model of hydrants.
8. That all hydrants used by groups other than the SFPS be inspected after temporary usage.
9. That all hydrants that have a meter box removed be required to have a formal inspection at the time of the removal.

Management Response:

2. SFPS - Agree
3. Agree
4. Agree
5. Agree
6. Agree
7. Agree
8. Agree
9. Agree

Chapter 4 - Inadequate Water Supply (Fire Flows – Pressure & Volume)

We examined whether adequate systems, practices and controls are in place to minimize the risk of an inadequate water supply (Fire Flows – Pressure & Volume). Failure to have an adequate water supply could result in a firefighter injury/death, civilian injury/death or property damage.

We conclude that, for the most part, adequate systems, practices and controls are in place.

The following matrix outlines the current controls in place, our findings and opportunities for improvement.

Ref	Current Systems, Practices & Controls	Commentary
C1	<p><u>City of Saskatoon Design Standards</u> – The City of Saskatoon Design Standards (2006) address hydrant fire flows.</p> <ul style="list-style-type: none"> ○ Section C-2.1 states that the flow units for residential areas shall not be less than 70m³/ha/day peak hourly and 40m³/ha/day maximum daily. ○ Section C-2.2 states the fire flow shall be based on the recommendations of the Insurance Bureau of Canada in their publication “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1981”. <ul style="list-style-type: none"> ▪ <u>“Water Supply for Public Fire Protection - A Guide to Recommended Practice, (1999 edition)” published by the Fire Underwriters Survey</u> – The 1999 edition recommends that the lateral street connection not be less than 150mm in diameter. In addition, hydrants should have at least two 65mm outlets. Where required flows exceed 5000 L/min or pressures are low there should also be a large pumper outlet. ○ Section 2.3 states the size of water main shall be based on supplying peak hourly demand or peak daily demand plus fire flow, which ever is greater but shall not be less than 150mm diameter. In commercial and industrial areas the minimum size shall be 200mm diameter. ○ Section 2.4 states all water mains shall be looped. 	<p>In Chapter 3, Control A1, we noted that the City of Saskatoon Design Standards (2006), Section C-4.1 states that the distribution of hydrants shall be according to required fire flow as tabulated in “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1981”. This is an old document and a newer version is available. The City of Saskatoon Design Standards (2001) stated that the latest edition of the “Water Supply for Public Fire Protection, A Guide to Recommended Practice” should be used.</p> <p>In Chapter 3, Control A1, we also noted Per the Water & Sewer Section Superintendent, in consultation with the Design Branch, there have been several versions regarding the standards for hydrant spacing as well as other design criteria. For this reason, Infrastructure Services and Community Services – Planning Branch have undertaken a joint venture to review and update all design criteria. Associated Engineering has been retained and is currently in the process of reviewing these documents, researching best practices and obtaining design standards from other Canadian municipalities. It is expected that this project will be completed by the fall of 2006 and new standards will be adopted.</p> <p><i>In Chapter 3, Control A1, we recommended, “That the City of Saskatoon Design Standards (2006) be revised to reflect the latest edition of the “Water Supply for Public Fire Protection, A Guide to Recommended Practice””.</i></p>

Inadequate Water Supply (Fire Flows – Pressure & Volume), cont'd

Ref	Current Systems, Practices & Controls	Commentary
	The minimum size of a dead end main to which a hydrant is connected shall be 200mm in diameter unless a hydraulic analysis indicates a smaller size is adequate. A hydrant is not required at the end of a cul-de-sac, which is 75m in length or less.	
A2	<u>Technical Planning Committee & Zoning Regulations</u> – See Chapter 2, Control A2.	
A3	<u>Subdivision Plan Review for Compliance with Standards</u> – See Chapter 2, Control A3.	
A4	<u>Subdivision Plan Approvals</u> – See Chapter 2, Control A4.	
A5	<u>Hydrants & Infrastructure Constructed According to Subdivision and Construction Plans and Specifications</u> – Procedures are in place to ensure hydrants and infrastructure is constructed according to the plans. – See Chapter 2, Control A5. <ul style="list-style-type: none"> •<u>City Project Engineer Monitoring</u> •<u>External Contractor Project Engineer Monitoring</u> •<u>City Inspection</u> 	
A6	<u>Independent 3rd Party Review</u> – See Chapter 2, Control A4.	
B2	<u>SFPS Hydrant Usage Notification</u> – See Chapter 3, Control B2.	
A9	<u>Alternative Water Supply</u> – See Chapter 2, Control A9.	
B6	<u>Inspection Service Level Standards</u> – See Chapter 3, Control B6.	
B7	<u>Repair Service Level Standards</u> – See Chapter 3, Control B7.	
B8	<u>Replacement Service Level Standards</u> – See Chapter 3, Control B8.	
B9	<u>Documented Standard Operating Procedures for Inspections</u> – See Chapter 3, Control B9.	
B10	<u>Documented Training Manual for Inspections</u> – See Chapter 3, Control B10.	
B11	<u>Assigning Inspections</u> – See Chapter 3, Control B11.	
B12	<u>Recording Inspection Results</u> – See Chapter 3, Control B12.	
B13	<u>Monitoring Inspection Results</u> – See Chapter 3, Control B13.	

Inadequate Water Supply (Fire Flows – Pressure & Volume), cont'd

Ref	Current Systems, Practices & Controls	Commentary
B14	<u>Monitoring Inspection Service Levels</u> – See Chapter 3, Control B14.	
B15	<u>Assigning Repairs</u> – See Chapter 3, Control B15.	
B16	<u>Recording Repair & Replacement Results</u> – See Chapter 3, Control B16.	
B17	<u>Monitoring Repair & Replacement Results</u> – See Chapter 3, Control B17.	
B18	<u>Monitoring Repair & Replacement Service Levels</u> – See Chapter 3, Control B18.	
B19	<u>Hydrant Service Program</u> – See Chapter 3, Control B19.	
B20	<u>Hydrant Replacement Program</u> – See Chapter 3, Control B20.	
C2	<u>Backup Hydrants</u> – The fire department has apparatus that can be used to pump water from one apparatus to the next in the event that the water flow from one water main is not adequate. This allows them to utilize an alternate hydrant on a separate water main.	
C3	<u>Valve Inspection Program</u> – Valve inspection is useful in locating valves in the system that have been left in the “off” position. Ensuring all valves are in the proper operating position helps to ensure proper flow and circulation of water through the distribution system.	
C4	<u>Water Distribution System Modeling</u> – Water Distribution System modeling assists designers in ensuring that systems are adequate to provide adequate water supply for industry and for fire suppression for the City as a whole. Such modelling allows management to make long term recommendations for the installation or upgrading of the primary water main network or reservoirs.	
C5	<p><u>System Pressure Regulation</u> – The Water Treatment Plant ensures that adequate pressure is being applied at the point of entry into the water distribution system and monitors and controls reservoir levels to ensure adequacy of supply.</p> <p>The fire flow field tests are managed through a systematic approach of field verification of pipe C-values (roughness which defines the flow and dynamic pressure in the system), fire flow testing and hydraulic modeling.</p>	<p>Per the Water & Sewer Section Manager, the area of greatest concern in metallic pipe which losses cross section over time due to tuberculation which affects local pressures and flows. As Saskatoon's water is mildly depositing - all older mains likely have significantly reduced hydraulics.</p> <p>Public Works has been working on verifying field performance as part of the summer hydrant inspection and the UDF program. This includes running some random fire flows in both an east and west side neighborhood where Public Works has identified concerns during the UDF program. This work will be</p>

Inadequate Water Supply (Fire Flows – Pressure & Volume), cont'd

Ref	Current Systems, Practices & Controls	Commentary
		proceeding in the fall of 2006.
C6	<u>System Pressure Regulation</u> – Project engineers ensure that water main replacement projects consider water main sizing for a variety of criteria, including fire flow requirements, proper location and spacing of hydrants within the scope of the project.	
C7	<u>SFPS Department CAD</u> – SFPS Department Central Dispatch utilizes a Computer Aided Dispatch (CAD) system for dispatching apparatus. This system also includes a GIS system, which has a map of all the streets in the city along with hydrant location, including size & flow of the water mains that are connected to the hydrants. The dispatchers will notify the firefighters of the hydrants that will produce the water supply that is required.	
C8	<u>Firefighters Monitor Inlet Gauges</u> – When utilizing hydrants for fire suppression, the firefighter manning the pumper will monitor gauges to ensure there is adequate water flow and to ensure they do not draw more water than the infrastructure can provide. If such monitoring is not done, the infrastructure could collapse. In addition, they use collapsible suction hoses, which are designed to collapse in the event that the water flow supply is less than the pumper is drawing.	
C9	<u>Hydrant Out of Service Ring</u> – Public Works places an “Out of Service” ring on the steam port of a hydrant if it is inoperable.	
C10	<p><u>Hydrant Under Service Notification</u> – Public Works will notify the SFPS Department Central Dispatch when hydrants are out of service, and again when they are back in service. SFPS Central Dispatch will record on the CAD system that the applicable hydrant is out of service. If a fire occurs in an area where the out of service hydrant is located, the SFPS dispatcher will notify the Engine Company that the applicable hydrant is out of service and will also provide an alternative hydrant to use.</p> <p><u><i>This will ensure the following standard is met:</i></u></p> <ul style="list-style-type: none"> • <u>NFPA Standards</u> – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. <ul style="list-style-type: none"> ○ Section 18-4 Hydrant Service states: <ul style="list-style-type: none"> ▪ 18-4.3 The fire department communications center shall be notified by the water utility 	

Inadequate Water Supply (Fire Flows – Pressure & Volume), cont’d

Ref	Current Systems, Practices & Controls	Commentary
	<p>whenever any fire hydrant is placed out of service or returned to service. The communications center shall then advise all stations for the purpose of posting this information for all members.</p>	
C11	<p><u>Water Main Under Repair</u> – Public Works will notify the SFPS Department Central Dispatch when a water main is out of service and when it will be back in service. SFPS Central Dispatch will record on the CAD system that the applicable water main is out of service and the corresponding hydrants attached to it. If a fire occurs in an area where the out of water main is located, the SFPS dispatcher will notify the Engine Company that the applicable hydrants are out of service and will provide an alternative hydrant to use.</p> <p><i>This will ensure the following standard is met;</i></p> <ul style="list-style-type: none"> • <u>NFPA Standards</u> – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. <ul style="list-style-type: none"> ○ Section 18-4 Hydrant Service states: <ul style="list-style-type: none"> ▪ 18-4.3 The fire department communications center shall be notified by the water utility whenever any fire hydrant is placed out of service or returned to service. The communications center shall then advise all stations for the purpose of posting this information for all members. 	
C12	<p><u>Dead End Hydrants</u> – Public Works will install a black ring with the initials “D.E.” to signify the hydrant is at the end of the waterline and therefore may not be suitable for fire suppression purposes.</p>	
C13	<p><u>Hydrant Hoods Painted</u> – As part of the hydrant-painting program, hydrant hoods are painted different colors to indicate the size of the water main feeding a particular hydrant. Firefighters rely on this information to determine the maximum volume of water that can be drawn from the hydrant without cavitating and possibly collapsing the water main. It also allows the firefighters to select the hydrant that is best suited for their needs. The water main size and hood coloring is as follows:</p> <ul style="list-style-type: none"> ○ 4” – White ○ 6” – Red ○ 8” – Yellow 	<p>Our review of the current color-coding adopted by the COS revealed that it is not consistent with the AWWA Manual M17 or with NFPA 291.</p> <ul style="list-style-type: none"> • <u>AWWA Manual</u> – The AWWA Manual “M17-Inspection, Installation, Testing, and Placing the Hydrant in Service” section 4.2 (21) indicates that the adoption of a color scheme to indicate flow capacity is optional. However, if such a scheme is to be used, the uniform color-coding system shown in table 4-1 is recommended. This color scheme is consistent with NFPA 291, Fire Flow Testing and Marking of Hydrants.

Inadequate Water Supply (Fire Flows – Pressure & Volume), cont'd

Ref	Current Systems, Practices & Controls	Commentary
	<ul style="list-style-type: none"> ○ 10” – Black ○ 12” – Blue ○ 14” – Orange ○ 16” – Green ○ 18” – Silver <p><u>This will ensure the following standard is met:</u></p> <ul style="list-style-type: none"> ● <u>NFPA Standards</u> – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. <ul style="list-style-type: none"> ○ Section 18-4 Hydrant Service states: <ul style="list-style-type: none"> ▪ 18-4.2 Fire hydrant locations shall be clearly marked and maintained so that each hydrant location is visible and accessible at all times. Each hydrant shall be marked to provide pumper operators with an indication of available flow. 	<ul style="list-style-type: none"> ● <u>NFPA Standards</u> – NFPA 291 <i>Recommended Practice for Fire Flow Testing and Marking of Hydrants (1995 Edition)</i> Chapter 3 Marking of Hydrants states: <ul style="list-style-type: none"> ○ 3-1 Hydrants should be classified in accordance with their rated capacities (at 20 psi [1.4 bar] residual pressure or other designated value) as follows: <ul style="list-style-type: none"> ▪ Class AA — Rated capacity of 1,500 gpm or greater (5,680 L/min) ▪ Class A — Rated capacity of 1000-1,499 gpm (3785-5,675 L/min) ▪ Class B — Rated capacity of 500-999 gpm (1,900- 3,780 L/min) ▪ Class C — Rated capacity of less than 500 gpm (1,900 L/min) ○ 3-2.1 (Public Hydrants) all barrels are to be chrome yellow except in cases where another color has already been adopted. The tops and nozzle caps should be painted with the following capacity-indicating color scheme to provide simplicity and consistency with colors used in signal work for safety, danger, and intermediate condition: <ul style="list-style-type: none"> ▪ Class AA — Light blue ▪ Class A — Green ▪ Class B — Orange ▪ Class C — Red ○ 3-2.1 also recommends the following: <ul style="list-style-type: none"> ▪ For rapid identification at night, it is recommended that the capacity colors be of a reflective-type paint. ▪ Hydrants rated at less than 20 psi (1.4 bar) should have the rated pressure stenciled in

Inadequate Water Supply (Fire Flows – Pressure & Volume), cont'd

Ref	Current Systems, Practices & Controls	Commentary
		<p>black on the hydrant top.</p> <ul style="list-style-type: none">▪ In addition to the painted top and nozzle caps, it may be advantageous to stencil the rated capacity of high volume hydrants on the top.▪ The classification and marking of hydrants provided for in this chapter anticipate determination based on individual flow test. Where a group of hydrants can be used at the time of a fire, some special marking designating group-flow capacity may be desirable. <p>However, we note that adopting this color coding is optional and therefore we are not advocating changing colors.</p>

Recommendation:

That the information be received.

Chapter 5 - Hydrant Accessibility

We examined whether adequate systems, practices and controls are in place to ensure hydrants are accessible by firefighters when responding to fires. Failure to connect to hydrants due to accessibility could result in a firefighter injury/death, civilian injury/death or property damage.

We conclude that, for the most part, adequate systems, practices and controls are in place.

The following matrix outlines the current controls in place, our findings and opportunities for improvement.

Ref	Current Systems, Practices & Controls	Commentary
A5	<p><u>Hydrants & Infrastructure Constructed According to Subdivision and Construction Plans and Specifications</u> – Procedures are in place to ensure hydrants and infrastructure is constructed according to the plans. – See Chapter 2, Control A5.</p> <ul style="list-style-type: none"> •<u>City Project Engineer Monitoring</u> •<u>External Contractor Project Engineer Monitoring</u> •<u>City Inspection</u> 	
A6	<u>Independent 3rd Party Review</u> – See Chapter 2, Control A6	
A9	<u>Alternative Water Supply</u> – See Chapter 2, Control A9.	
B2	<u>SFPS Hydrant Usage Notification</u> – See Chapter 3, Control B2.	
B9	<u>Documented Standard Operating Procedures for Inspections</u> – See Chapter 3, Control B9.	
B10	<u>Documented Training Manual for Inspections</u> – See Chapter 3, Control B10.	
B11	<u>Assigning Inspections</u> – See Chapter 3, Control B11.	
B12	<u>Recording Inspection Results</u> – See Chapter 3, Control B12.	
B13	<u>Monitoring Inspection Results</u> – See Chapter 3, Control B13.	
B14	<u>Monitoring Inspection Service Levels</u> – See Chapter 3, Control B14.	
D1	<u>Backup Hydrants</u> – The fire department has apparatus that can be used to pump water from one apparatus to the next in the event that the accessibility to the hydrant is impeded. This allows them to utilize an alternative	

Ref	Current Systems, Practices & Controls	Commentary
	hydrant from a distance.	
D2	<p><u>SFPS Hydrant Not Accessible Notification</u> – The SFPS Department, when responding to a fire, would identify situations whereby a hydrant could not be properly accessed (i.e. surrounded by shrubs). The firefighter would then notify the Fire Marshall who would then perform an inspection as noted below.</p>	
D3	<p><u>Hydrant Inspection by Public Works –Obstruction</u> – When performing a hydrant inspection the inspector will record onto the IPAQ (PDA) whether the hydrant is obstructed and if the SFPS Department or Roadways Branch is to be notified. Obstructed hydrants are handled in one of three ways.</p> <ul style="list-style-type: none"> ○ If the obstruction is small or easily removed (e.g. tall grass), or in a location where removing it is not damaging "private" landscaping, the inspector will remove the obstruction (e.g. industrial area). ○ If the obstruction is located in a residential area, the inspector will generally not attempt to clear or remove the obstruction as this can lead to disputes between an inspector and the homeowner. In this case, the inspector will note the condition on the IPAQ (PDA), and fill out a Notice of Hydrant Obstruction form, which is submitted to the supervisor. The supervisor will then inspect the obstructed hydrant, and if he agrees with the inspector's assessment, submits the Notice of Hydrant Obstruction form to the SFPS Department to perform another inspection. ○ If the hydrant is covered with snow the inspector will notify the supervisor at the end of their shift who will submit a request to the Roadways Branch to have it cleared. <p><u>Hydrant Visibility Inspection by Fire</u> – When the SFPS Department is notified (via public, civic employee or Public Works) that a hydrant is obstructed (i.e. shrubbery, fence, snow), a fire inspector will perform an inspection of the hydrant on the property and, if required, request that the property owner remove the obstruction so that a cleared area in a radius of at least 3 feet surrounds the hydrant. The fire inspector will perform a follow-up inspection to ensure compliance.</p> <p><u>This will ensure the following standards are met:</u></p> <ul style="list-style-type: none"> ● <u>AWWA Standards - Visibility</u> – The AWWA 	<p>Per the Water & Sewer Section Superintendent, the "Notify Fire Dept" check box on the IPAQ (PDA) was installed as part of the initial programming to generate an automatic email notice to SFPS Department of the hydrant obstruction, immediately upon downloading the data. Although the capability to generate automatic e-mail notification of obstructions is a feature of the system, it is not being used.</p> <p>The Water & Sewer Section Manager indicates that the current system works sufficiently and in time, given the cost benefit of the implementation, they will move towards programming the Spatial Data Engine (SDE) system to perform this automatic notification.</p> <p>We were unable to analyze whether SFPS Department is being notified of hydrant obstructions, or if notified in a timely manner, due to the fact that the Water & Sewer Section Superintendent and the Spatial Data Engine (SDE) Systems Administrator have concerns over the integrity of the inspection data captured in the system.</p> <p>Per the Water & Sewer Section Manager, there were incomplete datasets in relation to the detailed hydrant inspection information that was being recorded on the IPAQ (PDAs). In speaking with the Spatial Data Engine (SDE) Systems Administrator, it is likely the source of the problem was due to an inconsistent pattern of downloads from the field. In the past, power losses to the IPAQ (PDAs) would result in the loss of any data being stored in RAM. However, the new IPAQ (PDAs) being introduced allow for the storage of data onto a flash card, which is not affected by power losses. Also, the recent software upgrade allows for automatic downloads of data each time the IPAQ (PDAs) is docked for recharging. It is felt that these two changes will better secure the data being collected in the field.</p>

Ref	Current Systems, Practices & Controls	Commentary
	<p>Manual M17-Inspection, Installation, Testing, and Placing the Hydrant in Service, section 4.2 (22) indicates that hydrants must be highly visible and unobstructed at all times.</p> <ul style="list-style-type: none"> • <u>AWWA Standards - Obstructions</u> – The AWWA Manual M17-Inspection, Installation, Testing, and Placing the Hydrant in Service, section 4.2 (6) indicates there should be no obstructions that prevent or retard hydrant operation or hinder removal of outlet nozzle caps. • <u>Fire Underwriters Survey - Obstructions</u> – The “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1999” requires that there should be no obstruction that could interfere with their operation. • <u>NFPA Standards</u> – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. <ul style="list-style-type: none"> ○ Section 18-4 Hydrant Service states: <ul style="list-style-type: none"> ▪ 18-4.2 Fire hydrant locations shall be clearly marked and maintained so that each hydrant location is visible and accessible at all times. 	<p>Per the Water & Sewer Section Manager, this is a relatively new system and is in the process of revisions and updates which will assist in fixing the “bugs”.</p>
D4	<p><u>Hydrant Inspection by Public Works – Visibility</u> – When performing a hydrant inspection the inspector will record whether hydrant visibility is poor and repainting is required. This will be recorded on the Water Service Disruption Report and the work assigned to an individual as part of the summer program.</p> <p><u>This will ensure the following standards are met:</u></p> <ul style="list-style-type: none"> • <u>AWWA Standards - Visibility</u> – The AWWA Manual “M17-Inspection, Installation, Testing, and Placing the Hydrant in Service” section 4.2 (22) indicates that hydrants must be highly visible and unobstructed at all times. Hydrants should be painted with colors that are easily visible both day and night. • <u>Fire Underwriters Survey - Visibility</u> – The “Water Supply for Public Fire Protection, A Guide to Recommended Practice, 1999” requires that hydrants should be painted in highly visible colors so that they are conspicuous. • <u>NFPA Standards</u> – NFPA 1201 <i>Standard for Developing Fire Protection Services for the Public (2000 Edition)</i>. 	

Ref	Current Systems, Practices & Controls	Commentary
	<ul style="list-style-type: none"> ○ Section 18-4 Hydrant Service states: <ul style="list-style-type: none"> ▪ 18-4.2 Fire hydrant locations shall be clearly marked and maintained so that each hydrant location is visible and accessible at all times. 	
D5	<p><u>Hydrant Inspection of the Steam Port Height</u> – When performing a hydrant inspection the inspector will record the height of the steam port.</p> <p><i><u>This will ensure the following standards are met;</u></i></p> <ul style="list-style-type: none"> • <u>AWWA Standards – Clearance Height</u> – The AWWA Manual “M17-Inspection, Installation, Testing, and Placing the Hydrant in Service” section 4.2 (6) indicates to make sure nozzles are high enough [at least 12 inches] above the ground line to allow for attachment of hoses and operation of the hydrant wrench. • <u>NFPA Standards</u> – NFPA 14 <i>Standard for the Installation of Standpipe, Private Hydrant, and Hose Systems (2000 Edition)</i> section 4-5.3 states: <ul style="list-style-type: none"> ○ The center of a hose outlet shall be not less than 18 in. (475 mm) above final grade, or when located in a hose house, 12 in (305) above the floor. 	
D6	<p><u>Steam Port Direction and Apparatus Connection</u> – All the City engine pumper units have a connection port mid-ship on either side of the engine pumper. In addition they utilize a 20-foot – 6” hose to connect to the steamer port. This combination will allow the engine company to approach the hydrant from various directions.</p>	
D7	<p><u>Bylaw Preventing Parking in Front of a Hydrant, Penalty & Enforcement</u> – The Traffic Bylaw 7200, has a provision under section Part IV – Stopping and Parking, subsection 15 – Use of Space in Front of Fire Hydrant, stating the driver of a vehicle shall not park within one meter of the fire hydrant curb access point. Section Part XI – Enforcement, subsection 59 Penalty (1) states a person who contravenes any provision of this Bylaw is guilty of an offence. (2) states the penalty for breach of any provision of this Bylaw shall be those set out in Schedule No. 10 of this Bylaw, which for parking in front of a hydrant is \$50 with no discounted penalty. (4) states the Court may, in default of payment of a fine imposed under this Bylaw, order imprisonment of an individual</p>	

Ref	Current Systems, Practices & Controls	Commentary
	for a term not exceeding one year.	

Recommendation:

That the information be received.

Chapter 6 - Private Hydrants Malfunction and Inadequate Pressure/Volume

We examined whether adequate systems, practices and controls are in place to minimize the risk of private hydrant malfunction and inadequate pressure/volume. Private hydrant failure or inadequate pressure/volume could result in a firefighters injury/death, civilian injury/death or property damage.

We conclude that, for the most part, adequate systems, practices and controls are in place.

The following matrix outlines the current controls in place, our findings and opportunities for improvement.

Ref	Current Systems, Practices & Controls	Commentary
E1	<p><u>Private Hydrant Approval by the Authority Having Jurisdiction</u> – The City Construction Services Section reviews the plans and drawings for all commercial and multi-family construction projects in the City, which include the location and minimum hydrant flow requirements of private hydrants. These plans are reviewed against the same criteria (COS Design Standards) that have been established for public hydrants.</p> <p><u>This will ensure the following standard and the National Building Code is met:</u></p> <ul style="list-style-type: none"> • <u>NFPA Standards</u> – NFPA 24 <i>Standard for the Installation of Private Fire Service Mains and Their Appurtenances (1995 Edition)</i>. <ul style="list-style-type: none"> ○ Section 1-4.1 states: <ul style="list-style-type: none"> ▪ A layout plan shall be approved by the authority having jurisdiction in every case where a new private fire service main is contemplated. ○ Section 1-4.2 states The plan shall be drawn to scale and shall include all essential details such as: <ul style="list-style-type: none"> ▪ (a) Size and location of all water supplies. ▪ (b) Size and location of all piping, indicating, where possible, the class and type and depth of existing pipe, the class and type of new pipe to be installed, and the depth to which it is to be buried. ▪ (c) Size, type, and location of valves. Indicate if located in pit or if operation is by 	<p>The Building Standards Branch is responsible for ensuring compliance with the National Building Code. As such, based on the type of permit taken out, the SFPS department may not be aware of a newly installed private hydrant. Therefore, there could be private hydrants installed in the City and SFPS would not be aware of these resulting in failure to ensure inspections are carried out appropriately.</p> <p>Per the Water and Sewer Section Manager, anytime there is a single purpose connection from a main to a hydrant it is documented in the connection database. However, there are exceptions to the single purpose connection including Gated Communities, the U of S, Innovation Place and some large commercial properties that have extensive internal distributions systems. It is these exceptions that provide the biggest challenge in terms of capturing as-built information as they do not necessarily get reviewed and or inspected by the City.</p> <p>Per the Water and Sewer Section Manager, the Water Utility requires proper records of all connections including hydrants that can form the basis of the private hydrant inventory. Due to different development and inspection processes for some types of developments this information has not been properly made available to the Water Utility. Upon reviewing the private hydrant inventory, it was confirmed that not all the private hydrants are in the City’s inventory. This information needs to be gathered, however there will be a cost associated with this. These hydrants could then</p>

Private Hydrants Malfunction and Inadequate Pressure/Volume, cont'd

Ref	Current Systems, Practices & Controls	Commentary
	<p>post indicator or key wrench through a curb box. Indicate the size, type, and location of meters, regulators, and check valves.</p> <ul style="list-style-type: none"> ▪ (d) Size and location of hydrants, showing size and number of outlets and if outlets are to be equipped with independent gate valves. Indicate if hose houses and equipment are to be provided and by whom. • National Building Code (NBC) - Subsection 3.2.5 (2b) of the National Building Code (NBC) requires access routes to be provided to a building so that, for a building not provided with a fire department connection, fire department pumper vehicles can be located so that the length of the access route from a hydrant to the vehicle plus the unobstructed path of travel for the fire fighter from the vehicle to the building is not more than 90 meters. 	<p>be accurately represented in Public Works spatial database (SDE system). This information could be gathered by using a well designed field verification process and in some cases survey, as was used when Public Works conducted the quality assurance on the Right of Way (ROW) hydrants.</p> <p>Besides ensuring that private hydrants are functional for fire suppression they are also an access point to the water system for accidental or intentional contamination. Private hydrants are also a source of “lost” water, which must also be monitored. The inspection and flushing of private hydrants will have an impact on the performance of the system (pressure drops, etc.) and should require the notification to the water utility when the work is being performed. All components of the Water System must be properly documented and as-built by the water utility and this information made available to the SFPS.</p> <p>See Recommendation(s) Below: #10</p>
E2	<p>City Inspection – Throughout the course of construction and upon completion a City Inspector will inspect the project to ensure that the work is performed according to design plans, which were approved, as well as to the City Construction Specifications.</p>	
E3	<p>City Provides Developer with Water Characteristics – The City provides the developer with the water flow characteristics for the area being developed. This is based on a computerized water distribution model. The developer will then develop the plans to produce the required fire flows.</p>	
E4	<p>SFPS Department Conducts Flow Tests – Upon completion of the construction the SFPS Department will conduct a flow test on the hydrants to ensure the fire flow is adequate.</p>	
E5	<p>Backup Hydrants – The fire department has apparatus that can be used to pump water from one apparatus to the next in the event that the private hydrant fails. This allows them to utilize an alternate hydrant from a distance.</p>	
A9	<p>Alternative Water Supply – See Chapter 2, Control A9.</p>	
C8	<p>Firefighters Monitor Inlet Gauges – See Chapter 4, Control C8.</p>	

Ref	Current Systems, Practices & Controls	Commentary
E6	<p><u>Private Fire Hydrant Inspection by an Independent 3rd Party</u> – The SFPS Department requires private hydrants to be inspected & tested to meet the National Fire Code section 6.6.4.</p> <ul style="list-style-type: none"> • <u>National Fire Code</u> –The National Fire Code section 6.6.4 addresses hydrants in terms of maintenance, inspection frequency, records, inspections and repairs and annual flushing. <ul style="list-style-type: none"> ○ Section 6.6.4.2(1) states, hydrants shall be inspected at intervals not greater than 6 months and after each use in conformance with article 6.6.4.4. ○ Section 6.6.4.5(1) states, hydrants shall be flushed at intervals not greater than 12 months with the main valve and any outlet valves fully opened until the water runs clear. <p>There are various types of work performed including: inspection, operational test and pressure readings taken along with the hydrant being flushed. Some of the testing procedures within inspection include: hydrant accessibility, properly painted, undamaged, clear of obstructions, free from ice or water.</p> <p><u>This will ensure the following standard is met:</u></p> <ul style="list-style-type: none"> • <u>NFPA Standards</u> – NFPA 25 <i>Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems (2002 Edition) (Chapter 7 Private Fire Service Mains) (Chapter 7 Private Fire Service Mains)</i>: <ul style="list-style-type: none"> ○ Section 7-2.2.4 states Dry barrel and wall hydrants shall be inspected annually and after each operation. Hydrants shall be inspected, and the necessary corrective action shall be taken as shown in Table 7-2.2.4 ○ Section 7-3.2.1 Each hydrant shall be opened fully and water flowed until all foreign material has cleared. ○ Section 7-3.2.2 Flow shall be maintained for not less than one minute. ○ Section 7-3.2.3 After operation, dry barrel and wall hydrants shall be observed for proper drainage from the barrel. ○ Section 7-3.2.4 Full drainage shall take no longer 	

Private Hydrants Malfunction and Inadequate Pressure/Volume, cont'd

Ref	Current Systems, Practices & Controls	Commentary
	<p>than 60 minutes.</p> <ul style="list-style-type: none"> ○ Section 7-3.2.5 Where soil conditions or other factors are such that the hydrant barrel does not drain within 60 minutes, or where the groundwater level is above that of the hydrant drain, the hydrant drain shall be plugged and the water in the barrel shall be pumped out. ○ Section 7-3.2.6 Dry barrel hydrants that are located in areas subject to freezing weather and that have plugged drains shall be identified clearly as needing pumping after operation. ○ Section 7-4.3.1 Hydrants shall be lubricated annually to ensure that all stems, caps, plugs, and threads are in proper operating condition. ○ Section 7-4.3.2 Hydrants shall be kept free of snow, ice, or other materials and protected against mechanical damage so that free access is ensured. 	
E7	<p>SFPS Inspection – The SFPS Department will ensure that private hydrant testing has been performed when the building is due for an inspection. The inspection is based on the National Fire Code section 6.6.4</p> <ul style="list-style-type: none"> • National Fire Code – The National Fire Code section 6.6.4 addresses hydrants in terms of maintenance, inspection frequency, records, inspections and repairs and annual flushing. <ul style="list-style-type: none"> ○ Section 6.6.4.2(1) states, hydrants shall be inspected at intervals not greater than 6 months and after each use in conformance with article 6.6.4.4. ○ Section 6.6.4.5(1) states, hydrants shall be flushed at intervals not greater than 12 months with the main valve and any outlet valves fully opened until the water runs clear. <p>The SFPS fire inspector will perform a follow-up hydrant inspection where deficiencies were noted on the original inspection to ensure they are corrected.</p> <p><i>This will ensure the following standards are met:</i></p> <ul style="list-style-type: none"> • NFPA Standards – NFPA 24 <i>Standard for the Installation of Private Fire Service Mains and Their Appurtenances (1995 Edition)</i> section 4-3.6 states: <ul style="list-style-type: none"> ○ To ensure proper functioning, wet barrel hydrants shall be tested at least annually, and dry barrel 	<p>We note that according to the SFPS Department building inspection frequency standards, not every building is inspected at least annually. Therefore, there is a risk that the National Fire Code standards are not met.</p> <p>The Fire Marshall believes that there are private hydrants installed in the City that the SFPS Department is not aware of and therefore may not have been inspected. Although they have tried to gather such information from Infrastructure Services, they have been unsuccessful and have to rely on past inspection reports to see if a hydrant was located on the property and if so review the test/inspection reports issued by a qualified service providers to ensure the system is maintained and operable. Per the Water & Sewer Section Manager, all connection and hydrant hardware must ultimately be documented with Infrastructure Services, Public Works, Water and Sewer Section.</p> <p>In Chapter 6, Control E1, we recommended, “That controls be put in place to ensure that the City has at all times a current record of all private hydrants in the City.”</p> <p>See Recommendation(s) Below: #11</p>

Private Hydrants Malfunction and Inadequate Pressure/Volume, cont'd

Ref	Current Systems, Practices & Controls	Commentary
	<p>hydrants tested semiannually in the early spring and fall, in accordance with the requirements of the authority having jurisdiction.</p> <ul style="list-style-type: none"> • NFPA Standards – NFPA 25 <i>Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems (2002 Edition) (Chapter 7 Private Fire Service Mains) (Chapter 7 Private Fire Service Mains)</i>: <ul style="list-style-type: none"> ○ Section 7-5 Records shall be maintained in accordance with Section 4-3. ○ Section 4-3 states <ul style="list-style-type: none"> ▪ 4-3.1 Records of inspections, tests, and maintenance of the system and its components shall be made available to the authority having jurisdiction upon request. ▪ 4-3.2 Records shall indicate the procedure performed (e.g., inspection, test, or maintenance), the organization that performed the work, the results, and the date. ▪ 4-3.3 Records shall be maintained by the owner. ▪ 4-3.4 Original records shall be retained for the life of the system. ▪ 4-3.5 Subsequent records shall be retained for a period of one year after the next inspection, test, or maintenance required by the standard. 	

Recommendations:

- 10. That controls be put in place to ensure that the City has at all times a current record of all private hydrants in the City.
- 11. That the private hydrants inspection & flushing results by independent 3rd parties be examined at the hydrant inspection frequency standard set out in the National Fire Code, or that City Council approve a policy adopting an alternative service level frequency.

Management Response:

- 10. SFPS - Agree I/S - Agree
- 11. SFPS - Agree I/S - Agree

Chapter 7 - Implementation Plan

RECOMMENDATION	MANAGEMENT RESPONSE	IMPLEMENTATION DATE
1. That the City of Saskatoon Design Standards (2006) be revised to reflect the latest edition of the "Water Supply for Public Fire Protection, A Guide to Recommended Practice".	Agree	I/S - January, 2007
2. That SFPS Department Dispatch assume responsibility for notifying Public Works (via email) of hydrants used for fire suppression, including an assessment of the hydrant's condition after its use.	SFPS - Agree	SFPS - July, 2006
3. That the inspection service level standards be updated to include performing a formal inspection after hydrant repair or replacement.	Agree	I/S - December, 2006
4. That the City follow the inspection and testing frequencies set out in the National Fire Code, or alternatively, that City Council approve a policy adopting the current service level frequencies.	Agree	I/S - January, 2007
5. That controls be strengthened to ensure repair requirements noted in Water Service Disruption Reports are not overlooked.	Agree	I/S - February, 2007
6. That once priorities and standard timelines have been established for hydrant repair activities, management implement controls to monitor and report on compliance.	Agree	I/S - February, 2007
7. That controls be put in place to facilitate timely identification of recurring repairs/problems associated with particular hydrants and/or make/model of hydrants.	Agree	I/S - February, 2007
8. That all hydrants used by groups other than the SFPS be inspected after temporary usage.	Agree	I/S - December, 2006
9. That all hydrants that have a meter box removed be required to have a formal inspection at the time of the removal.	Agree	I/S - December, 2006

RECOMMENDATION	MANAGEMENT RESPONSE	IMPLEMENTATION DATE
<p>10. That controls be put in place to ensure that the City has at all times a current record of all private hydrants in the City.</p>	<p>SFPS – Agree IS – Agree</p>	<p>SFPS – in conjunction with Infrastructure Services I/S - December, 2007</p>
<p>11. That the private hydrants inspection & flushing results by independent 3rd parties be examined at the inspection frequency standard set out in the National Fire Code, or that City Council approve a policy adopting an alternative service level frequency.</p>	<p>SFPS – Agree IS – Agree</p>	<p>SFPS - June, 2007 I/S – June, 2007</p>