STAFF'S STATUS REPORT

Case No. GS-2004-0257

City Utilities of Springfield

March 2007

Exhibit A

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of an Investigation into City Utilities of Springfield Plastic Pipe Failures and the Adequacy of its Leak Survey Procedures, Installation Procedures and Replacement Criteria.	))))	Case No. GS-2004-0257

VERIFICATION

STATE OF MISSOURI)
)
COUNTY OF COLE)

I, Richard A. Fennel, Utility Technical Specialist II in the Commission's Energy – Safety/Engineering Department, of lawful age, on oath state: that I participated in the preparation of the Status Report that is being filed in the above case on March 30, 2007, consisting of eighteen (18) pages to be presented in this case; that information in the Status Report was given by City Utilities of Springfield; that I have true knowledge of the matters set forth in such Status Report; and that such matters are true to the best of my knowledge and belief.

Richard A. Fennel

Subscribed and sworn to before me this 30th day of March, 2007.

NOTARY PUBLIC NOTARY SEAL STATE OF MISSOURI

SUSAN L. SUNDERMEYER
My Commission Expires
September 21, 2010
Callaway County
Commission #06942086

NOTARY PUBLIC

EXHIBIT A

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STAFF'S STATUS REPORT
CASE NO. GS-2004-0257

This is Staff's fourth regularly scheduled status report concerning the ongoing nature of the monitoring, evaluation, and replacement of the plastic pipe in City Utilities' system.

BACKGROUND:

On June 18, 2003, a natural gas incident occurred in Springfield, Missouri at the Ozark Empire Fairgrounds on June 18, 2003, in which natural gas leaking from a damaged plastic pipe resulted in an explosion at the Frisco Building. An employee of the Ozark Empire Fair was fatally injured. The leak in the plastic pipe was the result of a rock impingement that damaged the pipe causing it to release gas which resulted in natural gas escaping into the lower level of the Frisco Building. The Commission's Energy Department–Gas Safety/Engineering Staff (Staff) conducted a formal investigation of the incident and filed its Gas Incident Report (Case No. GS-2004-0040) on December 16, 2003.

During the incident investigation, records provided to the Staff by City Utilities indicated other instances of rock impingement causing stress-induced cracks on plastic pipe. Based upon that information, Staff recommended that the Commission establish a separate case (Case No. GS-2004-0257) for the purpose of examining and evaluating City Utilities' plastic pipe failures, leak survey techniques, installation and backfill procedures, replacement criteria, and adequacy of its program activities.

The Commission opened this case on December 30, 2003, as an investigatory case to receive information and conduct an investigation into the failure mechanisms of both plastic mains and service lines used by City Utilities of Springfield. On June 16, 2004, Staff filed its report in Case No. GS-2004-0257, which summarized Staff's investigation into City Utilities' plastic mains and service lines. The Report contained eight (8) recommendations for City Utilities to undertake in development of a comprehensive plastic pipe replacement program and requested that the Commission issue an order directing City Utilities to file a response regarding the recommendations within 60 days of the filing of Staff's report. On August 16, 2004, City Utilities filed its response to Staff's recommendations. On September 10, 2004, the Commission issued an order for Staff to file a Status Report, no later than October 12, 2004, on the ongoing nature of the monitoring, evaluation, and replacement of the plastic pipe in City Utilities' system.

On October 12, 2004, Staff filed its Status Report, which contained an analysis of City Utilities' August 16, 2004 response to the eight (8) recommendations contained in Staff's report filed June 16, 2004. This filing also included a proposal for Staff to file another status report on June 16, 2005. In its June 16, 2004 Status Report, Staff stated that City Utilities satisfactorily complied with all seven (7) of Staff's recommendations as outlined in the **APPENDIX** to this report.

Subsequent to the filing of STAFF'S STATUS REPORT on October 12, 2004, the Commission issued an ORDER DIRECTING FILING in which the Commission agreed with Staff's proposal to file another status report on June 16, 2005 and directed the Staff to do so.

On June 16, 2005, Staff filed a status report indicating that City Utilities continued to comply with the Staff's June 2004 recommendations. Staff recommended that the Commission order City Utilities to comply with the recommendations in Staff's June 16, 2004 report. Staff also requested that the Commission leave the case open to receive additional information from City Utilities and additional reports from Staff. The Staff proposed to file an update with the Commission during the summer of 2006. This would allow Staff sufficient time to complete an analysis of the plastic pipe replacement program and leak survey data provided from City Utilities' semi-annual reporting for the last half of 2005 and first half of 2006, so Staff may provide the Commission with a comprehensive update report detailing the results of the plastic pipe replacement program and leak survey completed since the last reporting period.

Subsequent to the filing of STAFF'S STATUS REPORT on June 16, 2005, the Commission issued an ORDER ADOPTING STAFF'S RECOMMENDATIONS in which the Commission ordered City Utilities of Springfield to comply with the recommendations set out in the Staff's June 16, 2005 report. Furthermore, the Commission ordered Staff to file its next status report no later than June 30, 2006.

On June 27, 2006, Staff filed a status report indicating that City Utilities continued to comply with the Staff's June 2004 recommendations. Staff recommended that the Commission continue with the current recommendations as proposed in Staff's June 16, 2004 report, implemented by City Utilities, and as ordered by the Commission on February 2, 2006. Staff also requested that the Commission leave the case open to receive additional information from City Utilities and additional reports from Staff.

Staff also recommended that City Utilities conduct a leak survey during calendar year 2007 over all pre-1983 plastic piping operating at high pressure (60 psig) that is not currently annually leak surveyed. Staff proposed to review the results of this survey to determine if program requirements should be enhanced.

In addition, Staff proposed to file an update report during the first quarter of 2007, which would include plastic pipe replacement data and leak survey data from City Utilities' semi-annual reporting for the last half of 2006. The Staff proposed to then file the next update report during the first quarter of 2008, which would include a comprehensive status report detailing the results of the plastic pipe replacement program and leak surveys completed for calendar year 2007. This reporting change would allow the reporting of data for the entire calendar year verses the reporting of data from the second half of one calendar year combined with the data from the first half of the following year, as had been done in the past (up to and including Staff's June 27, 2006 report). Also, City Utilities' leak surveys are not completed until the end of each calendar year. Therefore, calendar year reporting would allow Staff to review and report the leak surveys completed for the entire year verses reporting only the leak surveys that have been completed prior to Staff's June update reports.

REPORT OVERVIEW:

Subsequent to the filing of STAFF'S STATUS REPORT on June 27, 2006, the Commission issued an ORDER ACCEPTING STAFF'S REPORT, DIRECTING COMPLIANCE, AND DIRECTING STAFF TO FILE STATUS REPORT in which the Commission ordered City Utilities of Springfield to continue to follow the recommendations of the Staff as previously directed and to conduct a leak survey during calendar year 2007 over all pre-1983 plastic piping operating at high pressure (60 psig) that is not currently annually leak surveyed. Furthermore, the Commission ordered Staff to file its next status report no later than March 30, 2007.

The following Status Report pertains to Staff's on-going investigation into plastic pipe leaks due to rock impingement and the plastic pipe replacement program. This Status Report summarizes data obtained from City Utilities' semi-annual report for the period of June 2006 through December 2006 and supplemental information dated March 21, 2007, during Staff's ongoing monitoring, evaluation, replacement of plastic pipe in City Utilities' system, and leak survey techniques and results. For purposes of this report, Staff will touch upon the major points of City Utilities' program.

The Staff proposal would no longer require a June 2007 update report (would have reported plastic pipe replacement data and leak survey data for the second half of 2006 and the first half of 2007). City Utilities will still be required to provide the Staff semi-annual reports as has been done since the beginning of the program and as outlined in the **APPENDIX** of this report.

STAFF STATUS REPORT

1. Plastic Main and Service Line Leaks and Replacements

Leaks

During the time period of June 1, 2006 through December 31, 2006, City Utilities has experienced 23 leaks due to rock impingement (two of these leaks were on service lines, and 21 of the leaks were on main segments that were not previously included on the "Plastic Pipe Failure Master List). The leaking service lines were replaced, main-to-meter, upon discovery. The mains where these leaks were found have been added to the "Plastic Pipe Failure Master List", and will be leak surveyed annually and included in the replacement program to be replaced within three (3) years of discovery. This compares to 18 and 22 rock impingement leaks found during the previous two reporting periods respectively (June 2005 through June 2, 2006 and June 2004 through May 2005). However, since implementation of the replacement program, there have been 24, 20 and 25 rock impingement leaks for the 2004, 2005 and 2006 calendar years respectively.

Records indicate 91% of rock impingement leaks have been on pre-1983 piping and 81% have been on piping operating at high pressure (60 psig). These percentages have essentially remained constant throughout the duration of the current program (June 2004 through December 2006).

Replacements

During this reporting period (June 2006 through December 2006), City Utilities replaced 2.53 miles of plastic main, 281 associated plastic service lines, and 3 additional service lines, all from the "Plastic Pipe Failure Master List". To date, 6.39 miles of main piping and the associated services lines have been replaced. Reflected in the extra replaced pipe, is piping replaced beyond the associated piping in the

same work order number because the piping was installed in the same time period and could have been installed using the same methods and in the same environmental conditions. This leaves 4.21 miles of piping to be replaced by August 16, 2007. In addition, approximately 1.3 miles of plastic piping, that was added to the list due to a rock impingement leak or where the exposed pipe report indicated rock-dirt mix as the bedding material has been replaced.

City Utilities has focused its replacement efforts on plastic pipe that has experienced or could have failures due to rock impingement. Currently, there are approximately 9.8 miles of piping on the "Plastic Pipe Failures Master List", with 4.21 miles to be replaced, by August 16, 2007. An additional approximately 5.6 miles of plastic main has been added to the "Plastic Pipe Failures Master List" due to rock impingement leaks and the "spot-checks". Approximately 7.9 miles of this piping is comprised of pre-1983 pipe operating at high pressure (60 psig). The rock impingements leaks are immediately repaired and the associated piping must be replaced within a minimum of 3 years from the date of discovery. 13 plastic service lines were added to the list, however, all of these service lines were immediately replaced, main-to-meter.

In addition, at the beginning of the program, approximately 12.9 miles of the piping on the "Plastic Pipe Failures Master List" was comprised of pre-1983 pipe operating at high pressure. This represented 17.9% of the total mileage of pre-1983 high pressure pipe in the system (72 miles). Since the beginning of the program, with more than five (5) miles of this piping has been replaced, leaving approximately 67 miles of pre-1983 high pressure pipe left in the system, which represents 11.9% of the total mileage of pre-1983 high pressure pipe in the system.

2. Main-to-Meter Replacements of Partially Replaced Plastic Service Lines

At the beginning of the replacement program there were 181 locations where only the portion of the plastic service line where the leak occurred was replaced. Staff believed the leaks at these locations may have been caused by rock impingement. City Utilities, however, had reason to believe that a portion of these leaks were not caused by rock impingement. After reviewing leak records, Staff agreed that 77 leaks were due to causes other than rock impingement. As a result, the list was reduced to 104 plastic service lines that needed to be replaced main-to-meter. City Utilities replaced these 104 plastic services between during January 2005 and July 22, 2005.

City Utilities continues to do main-to-meter replacements of any newly discovered leaking service lines, which have been damaged by rock impingement. Immediate replacement of plastic service lines, main-to-meter, when new leaks are discovered continues to be successful and, therefore, recommends that this replacement rate should be maintained at this time.

3. Leak Report Forms and Related Training

Effective January 1, 2005, City Utilities modified its "Plastic Pipe Failure Report" form, "Gas Leak" form and "Gas Leak Repair" form to include a specific category for "Rock Impingement". Its computer "Integrated Gas" database was also modified to track the new rock impingement category from the leak forms beginning with the 2005 leak data.

City Utilities' employees involved in these efforts received adequate training on the proper identification of leaks due to rock impingement and how to report the leaks. 2004.

Importantly, these modifications have greatly enhanced City Utilities' ability to identify leaks due to rock impingement and allow for more consistency in reporting these types of leaks. These modifications have also enhanced City Utilities' ability to track rock impingement leaks for replacement prioritization.

4. Exposed Plastic Piping Inspections

June 2006 through December 2006, City Utilities conducted 600 plastic pipe inspections. Of these locations, 14% were found to have a rock-dirt mix backfill around the pipe, which could lead to pipeline damage. This compares to 13% having a rock-dirt mix backfill around the pipe found during the previous reporting period. Since implementing the "Exposed Plastic Gas Piping" inspection form on September 14, 2004, City Utilities has recorded approximately 4,177 plastic piping inspections through December 2006. Of these 4,177 locations approximately 87.5% had acceptable backfill around the pipe. Approximately 11.3% were identified as having rock-dirt mix backfill around the plastic pipe, but no leak was present. Since implementing the inspections of exposed plastic pipe, there has been a slight increase in the percentage (approximately 1.3%) of exposed plastic pipe that has exhibited a rock-dirt mix backfill around the pipe.

Furthermore, City Utilities reports that since implementing exposed plastic pipe inspections (September 2004), approximately 11.6% of the pre-1983 pipe operating at high pressure was found to have a rock-dirt mix backfill around the pipe

City Utilities has found it impractical to fully excavate each location where rock-dirt mix bedding is found, as was recommended by Staff. As a result, all main segments where rock-dirt mix or other suspect bedding conditions are found are placed into an annual leak survey list (See the **Leak Surveys and Repairs** section of this report for the leak survey results). If a leak due to rock impingement is found on this piping, the piping will be immediately repaired and then added to the "Plastic Pipe Failures Master List" to be replaced within three years of discovery of the leak.

The results of the exposed pipe inspections are used to prioritize replacement of pipe and to schedule pipe replacement in other areas in a consistent manner. It is critical that any upward trends of bad backfill in new locations where rock-dirt backfill exists be identified promptly so efforts to prioritize these areas for replacement can be evaluated in a timely manner to prevent possible rock impingement leaks.

The Staff believes this on-going field monitoring program, designed to identify other possible areas that may be susceptible to rock impingement, is an integral part of the replacement program and has yielded valuable information for actions to be taken to prevent possible future rock impingement leaks.

5. New Plastic Main and Service Line Installations

Plastic service line piping that is being plowed-in is installed in a casing pipe. The casing pipe is in contact with the earth and is used as a protective sleeve for the service line piping. In addition, following Staff's recommendation in its June 16, 2004 Report, City Utilities revised their Gas Construction Standards to specifically require a minimum of four to six inches of bedding material around all newly installed plastic piping (both mains and services) in an open trench. This bedding is typically limestone sand and is used regardless of the trench conditions. Protective bedding material has been used on all newly installed plastic piping, regardless of the trench conditions, during the previous five (5), 6-month reporting periods (June 2004 through December 2006).

City Utilities no longer uses the type of plastic pipe involved in the program. Generally, the thermoplastic pipe that is currently is use is very ductile and can undergo considerable deformation without damage. However, proper installation techniques are required to ensure that the pipe is evenly supported and physically shielded from potential damage. Backfilling plastic pipe in accordance with sound bedding procedures, such as those now being practiced by City Utilities, should help ensure that rocks and other objects do not come in contact with the pipe, greatly reducing the possibility that the pipe may be damaged.

Leak Surveys and Repairs

Quarterly leak surveys of the downtown business district (the entire district is considered as a vent-restrictive location) were conducted during July and October 2006. During these surveys one (1) Class I (required to be immediately repaired) belowground leak was found. This leak was repaired immediately and was not attributed to rock impingement. It should be noted that City Utilities treats all leaks on plastic piping as either a Class I or Class II leak, assigning them a higher leak repair priority than may otherwise be required.

The annual leak survey of the remaining segments of piping listed on the "Plastic Pipe Failure Master List" was conducted during May 6 through November 10, 2006. During this survey three (3) Class I belowground leaks were found. Two leaks were under driveways and were repaired by replacing the entire segment of piping under the driveway, and consequently, the cause of the leaks was not determined so City Utilities does not know if they were due to rock impingement. One leak was on a tap connection and was not due to rock impingement. Any service lines that were only partially replaced have all been replaced main-to-meter (completed July 2005) and are not required to be annually surveyed now. The next leak survey over the same category of piping will be conducted throughout 2007 and the results will be reported in Staff's next annual report for calendar year 2007.

Annual surveys are done at locations where exposure of the plastic piping indicated rock-dirt mix backfill around the pipe. No leaks were detected during these surveys. Leak surveys of the pipe where the exposed pipe reports indicated rock-dirt mix as the bedding material for 2004, 2005 and 2006 are being conducted now and will be reported on the next annual report to Staff. The results of the annual leak surveys are

used to evaluate the remaining locations to determine the appropriate remedial action and replacement prioritization.

Beginning with the 2005 routine leak surveys, City Utilities began tracking service lines located under vent restrictive surfaces. When this type of condition is found, City Utilities is drilling two 2-inch diameter bar holes at the riser location and sampling the subsurface atmosphere in these bar holes with a combustible gas indicator (CGI). To date, 632 vent restrictive locations have been leak surveyed using this method. No leaks were detected during these surveys. From June 2006 through December 2006, Fifty (50) additional locations were added to the Vent Restrictive Surface Master List to be drilled and bar-hole surveyed.

While the increased frequency of leak surveys demands more personnel time and effort, it is Staff's opinion that the extra leak surveys help in achieving the program's goals of early detection before a possible rock impingement leak becomes hazardous and assists in prioritizing replacements. These leak survey frequencies exceeds MoPSC minimum pipeline safety regulations that require 1-year and 3-year leak surveys on business districts and on most residential areas, respectively.

In addition, during January through May 2004, City Utilities voluntarily conducted a leak survey over all plastic piping that was installed prior to 1983. These leaks were repaired upon discovery and none of the leaks were due to rock impingement. The Staff believes that the timely repairs of observed leaks prior to the subsequent leak survey provides better information to detect any upward trends in leakage rate totals. City Utilities treats and repairs all leaks, including Class III leaks, on plastic piping as a Class I leak, or Class II leak. This exceeds the MoPSC minimum pipeline safety regulations that require any Class III leak to be monitored every 6 months until repaired (within five (5) years of discovery).

For these reasons, the Staff recommends that City Utilities continue to conduct leak surveys at the current increased frequency and over the current category's of plastic piping. The Staff also recommends that City Utilities continue treating and repairing all leaks on plastic piping as a Class I leak, or a Class II leak.

Staff continues to recommend that City Utilities conduct a leak survey over all of the pre-1983 piping operating at high pressure (60 psig) during calendar year 2007 that is not included in the current annual leak surveys. This leak survey is currently being conducted and will be reported in Staff's report for calendar year 2007.

6. Spot-Checks of Plastic Mains

City Utilities has reviewed the individual leak reports for prior main-leak locations (1983-2004), as recommended by Staff, to spot-check and determine the pipe bedding condition near the pipe wall.

With the 118 locations that were already removed from the list, City Utilities agreed to spot-check the remaining locations (approximately 33) during 2005. City Utilities completed these spot-checks during July and August 2005. During these spot-checks 23 locations were found to exhibit a rock-dirt mix around the plastic pipe. However, five (5) of these locations were already on the "Plastic Pipe Failure Master List" leaving the main segments associated with 18 spot-check locations, where a rock-dirt mix was found, being added to the master failure list to be replaced by the end of August 2008. Twelve (12) of these spot-check locations were on main segments involving pre-1983 piping operating at high pressure.

FINAL SUMMARY

The recommendations contained in Staff's June 16, 2004 report and implemented into City Utilities' gas safety program are the foundation of City Utilities' continuing plastic pipe replacement program. All of these recommendations must be considered together in order to achieve the purpose of the replacement program, which is protection of the public's safety, and each, therefore, complement the other.

At this time, Staff believes that the results discussed in the preceding report point to a need to adjust requirements to meet the program's goals and objectives. The Staff believes this should include accelerating the replacement program for pre-1983 pipe operating at high pressure in a rock-dirt mix environment.

As previously mentioned in this report, there were 23 rock impingement leaks on pre-1983 pipe operating at high pressure during the last half of 2006 (June 2006 through December 2006). This compares to 18 rock impingement leaks during a **full year** between June of

2005 and June of 2006, and 22 rock impingement leaks during a **full year** between June of 2004 and May of 2005. Since the beginning of the program, approximately 90% of rock impingement leaks have been on pre-1983 piping and approximately 80% have been on piping operating at high pressure.

The number of rock impingement leaks on pre-1983, high pressure piping has not decreased since the inception of the replacement program indicating that the current program is not adequately addressing the problem. As previously mentioned in this report, City Utilities has been focusing its replacement efforts on replacing plastic pipe that has experienced or could have failures due to rock impingement and has been concentrating efforts on renewing piping from the "Plastic Pipe Failures Master List" as the other replacements are completed. The Staff believes this concept is valid. However, the level of replacements of pipe to date has not lowered the rock impingement leak rate on pre-1983 pipe operating at high pressure that is in a rock-dirt mix backfill.

Based upon these observations, the Staff believes several enhancements should be made to the current program for plastic piping. The Staff notes that the main focus of the program is to replace pre-1983 pipe operating at high pressure, in a rock-dirt mix backfill.

1. By March 31, 2009, replace the categories and amount of piping as listed below:
   (a) 7.9 miles of pre-1983 piping operating at high pressure that is currently on the "Plastic Pipe Failures Master List".
   (b) 1.5 miles of pre-1983 piping operating at high pressure that was found to have a rock-dirt mix backfill around the pipe (1) during the "spot checks" and (2) during the exposed pipe inspections.

   Note:
   The Staff expects City Utilities to continue their practice of replacing nearby or adjacent pipe segments that are beyond the specific piping in the same work order number because the piping was installed in the same time period and could likely have been installed using the same methods and in the same environment (See the **Replacements** section of this report for more details of this practice). Since the beginning of the program, this practice has resulted in replacing approximately 50% more piping than was specifically listed in the program. Continuation of this practice at the same rate would result in the replacement of approximately 14 miles (9.4 miles + 50%) of pre-1983 pipe operating at high pressure by March 31, 2009.

2. During 2007, all main segments where rock impingement leaks are found and where exposed pipe reports indicate the pipe is in a rock-dirt mix backfill shall be added to the "Plastic Pipe Failures Master List", and replaced by December 31, 2009

3. By May 1, 2007, provide the Staff with additional information concerning the backfill conditions on pre-1983 piping operating at high pressure that has been requested and any other information City Utilities believes would be helpful in the replacement prioritization of pre-1983 piping operating at high pressure.

In addition, as discussed in the **"Leak Surveys and Repairs"** section of this report, City Utilities is currently conducting a leak survey over all pre-1983 piping operating at high pressure that is not included in the current annual leak surveys. Staff will review the results of this survey, as well as the requested information noted above to determine if further enhancements need to be made to the program.

Additional Reporting

Based upon Staff's findings from the leak survey and requested information from City Utilities noted above, the Staff may file an update report within 60 days of the date of this report to inform the Commission if additional enhancements should be made to the program. The Staff then proposes to file the next update report during the first quarter of 2008. The 2008 report would include a comprehensive status report detailing the results of the plastic pipe replacement program, pipe inspection reports, rock impingement leaks found, and results from leak surveys completed in calendar year 2007.

Staff has been and will continue to monitor the effectiveness of City Utilities' plastic main and service line replacement program and leak surveys. If at any time, Staff determines that the program requirements should be enhanced, it will immediately bring its concerns and recommendations to the Commission.

APPENDIX

Staff's Recommendations in June 16, 2004 Report

1. City Utilities began tracking leaks due to rock impingement in 1998, and has added some additional leak locations dating back to 1991, based upon information found during the investigation. These prior leak locations were compiled into a "Plastic Pipe Failure Master List." Since that time, this list has been the primary source for performing Gas Main Renewals in the City Utilities Gas System.

   The Plastic Pipe Failure Master List contained 97 locations where a leak occurred due to rock impingement, and was subsequently repaired. In 37 of the 97 locations, City Utilities replaced the piping that was installed under the same work order number for the main segment in question. At each prior leak location, City Utilities reviewed its record to determine the length of pipe that was installed under the work order number for the main segment number in question. This method was chosen because it was felt that the length of pipe installed under the same work order number on a main segment would most likely have been installed using the same methods and in the same environmental conditions.

   These sections of plastic pipe are included in a replacement program. The remaining sections of pipe on the Plastic Pipe Failure Master List totaled 7.1 miles of piping yet to be replaced. City Utilities began replacing these sections over a three (3) year period, on August 16, 2004. City Utilities indicated that 861 associated service lines will also be replaced concurrently with these main replacements.

   Any new segment of plastic pipe (as described above) where a failure due to rock impingement is discovered will be repaired immediately, leak surveyed annually and replaced (as described below) within a minimum of three (3) years from the date of its discovery. City Utilities will review records to determine the length of pipe that was installed under the same work order number for the main segment number in question and replace all of the associated plastic piping installed under that work order. Factors, such as, the number of leaks, operating pressure and environmental conditions shall be considered when prioritizing the replacement of the pipe.

City Utilities' current policy is to replace the gas service line from the main to meter if a leak due to rock impingement is found and verified. There are 181 past locations on the referenced list where only a portion of the service line, where the leak occurred, was replaced. City Utilities agreed to replace all of these plastic services in their entirety from the main to the meter by December 31, 2005.

City Utilities has also agreed to replace the associated plastic service line concurrently with any mains that have to be relocated due to other construction projects. In addition, City Utilities is replacing all plastic service lines that were installed prior to June 16, 2004, when performing plastic main renewals. Also, all plastic service lines installed prior to 1983 are being replaced when renewing a steel main or performing a relocation of a main.

2. City Utilities has modified its Plastic Pipe Failure Report form to include a specific category for "Rock Impingement" and a place for comments. City Utilities has also developed written instructions to guide field employees in completing this form. City Utilities' field employees are currently using the new form.

3. City Utilities conducted training regarding the proper way to complete this form for all affected employees on September 14, 2004. Staff attended this training session.

4. City Utilities has developed a Plastic Pipe Exposed Pipeline Condition Report form to document the backfill conditions surrounding the plastic piping. City Utilities has also developed instructions to guide field employees in completing this form each time a plastic pipe (main or service) is exposed. City Utilities conducted training on the proper way to complete this form for all affected employees on September 14, 2004 (attended by Staff). City Utilities field employees are currently using this new form.

   If it is discovered that the backfill conditions surrounding the plastic piping contains rocks or other debris that could be detrimental to the piping, City Utilities will extend the excavation in both directions until suitable conditions are found. If extending the excavation in both directions is impractical, an engineering evaluation will be performed to determine the appropriate remedial action.

5. City Utilities modified its Gas Construction Standards on June 16, 2004, to require a minimum of four to six inches of bedding material around all newly installed plastic gas service lines that involve open trenches. This bedding material will typically be limestone sand. City Utilities has proposed that other suitable materials or alternate protection methods, such as, rock shield sleeves may be evaluated and used in the future.

   Staff's review of City Utilities' Construction Standards indicated that since 1977, its standards have contained specifications to use select dirt or AG limestone backfill in rocky areas during installation when directed by the Engineering Department. The revised standard specifically requires the use of four to six inches of limestone bedding material around plastic pipe when being installed.

6. City Utilities will continue its current practice of performing quarterly leak surveys of the downtown business areas.

   City Utilities will perform an annual leak survey on the following items: the remaining non-replaced segments of pipe contained within the "Plastic Pipe Failure Master List," the plastic services that were only partially replaced (until such time as they are renewed), and the plastic segments where gas main leaks were repaired, but were not verified to be due to rock impingement.

   City Utilities, during routine FI leak surveys as required by the Missouri Pipeline Safety Regulations, will perform a bar-hole reading using a Combustible Gas Indicator (CGI) near the service riser where no opening exists around the riser for plastic services located under vent-restrictive surfaces. City Utilities has developed and implemented written procedures for this bar-hole survey over vent restrictive surfaces.

   City Utilities has also conducted an instrument leak survey of <u>all</u> pre-1983 plastic gas piping during the first half of 2004. During this survey, City Utilities treated all underground leaks on plastic piping as either a Class 1, or a Class 2 leak, giving them a higher priority than they may have otherwise had. City Utilities will continue to classify all underground leaks on all plastic piping (mains and services) as either Class 1, or Class 2. City Utilities' Operations and Maintenance Manual has been changed to reflect these procedures.

7. (This item refers to a list of plastic pipe leak repairs on mains from 1983-2004 in which the primary leak cause description was vague, or unclear, as to whether rock impingement was involved, or not. Staff proposed that these locations be spot-checked for backfill conditions and if rocks and other debris were found against the pipe wall, these mains would be systematically replaced). City Utilities reports that of the 255 prior leak locations included on Staff's list, 56 locations were duplicated on the Plastic Pipe Failure Master List and either have been, or will be replaced. City Utilities will perform the recommended spot checks on the remaining 199 locations and will document the results. City Utilities proposed that 33% (or 66 locations) be checked each year until all locations are checked. Any locations that are found to have rocks or other debris against the pipe wall will be added to the list of plastic piping to be replaced as discussed under Item 1.

In addition, City Utilities agreed to provide the Staff semi-annual reports as outlined below:

- Results of the quarterly business district leak surveys.
- Results of leak surveys of plastic piping beneath vent restrictive surfaces.
- Results of annual leak surveys.
- The status of plastic service line and main replacements made to date.
- Schedules and records of training for personnel who are involved in documenting leak repairs of plastic pipe due to rock impingement, determining backfill conditions and whom is responsible for determining the extent of plastic piping that is in an environment conducive to rock impingement.